NOTICE OF PUBLIC MEETING
CITY OF ALBANY
CITY COUNCIL
Council Chambers
333 Broadalbin Street SW
Monday, December 8, 2008
7:15 p.m.

OUR MISSION IS

"Providing quality public services for a better Albany community."

OUR VISION IS

"A vital and diversified community that promotes a high quality of life, great neighborhoods, balanced economic growth, and quality public services."

AGENDA

Rules of Conduct for Public Hearing

1. No person shall be disorderly, abusive, or disruptive of the orderly conduct of the hearing.
2. Persons shall not testify without first receiving recognition from the presiding officer and stating their full name and residence address.
3. No person shall present irrelevant, immaterial, or repetitious testimony or evidence.
4. There shall be no audience demonstrations such as applause, cheering, display of signs, or other conduct disruptive of the hearing.

1. CALL TO ORDER

2. PLEDGE OF ALLEGIANCE TO THE FLAG

3. ROLL CALL

4. SCHEDULED BUSINESS

   a. Communications
      1) Considering an emergency grant request from Love INC. [Pages 1-8]
      Action:__________
      2) Considering the protest of special procurement for Library furnishings. [Pages 8a-14a]
      Action:__________

   b. Continued Quasi-Judicial Public Hearing
      1) SD-07-07, Fabian Estates, LUBA remand of City approval of a Subdivision Tentative Plat that would divide a 4.52-acre parcel of land into 11 residential single-family lots. [Pages 9-472]
      Action:__________

   c. Public Hearing
      1) Amending the fee schedule for certain building division fees. [Pages 473-482]
      Action:__________ RES. NO.______

   d. Business from the Public

   e. Adoption of Consent Calendar
      1) Approval of Minutes
         a) November 10, 2008, City Council Work Session [Pages 483-487]
      2) Accepting an easement from Bob G. Mitchell. [Pages 488-493] RES. NO.______
      3) Approving a liquor license for Cinema Treasures, Inc., D/B/A Pix Theatre, 321 Second Avenue SW. [Page 494]
      Action:__________

   f. Report
      1) Overview of Albany's pretreatment program plan to meet EPA pretreatment streamlining regulations. [Pages 495-528]
      Action:__________

5. BUSINESS FROM THE COUNCIL

6. RECESS TO EXECUTIVE SESSION TO DISCUSS REAL PROPERTY TRANSACTIONS IN ACCORDANCE WITH ORS 192.660 (2)(e)

7. RECONVENE

8. NEXT MEETING DATE: Work Session December 15, 2008;
   Regular Session December 17, 2008

9. ADJOURNMENT

Love INC
Love In the Name of Christ

Love INC of Linn County
PO Box 429
Albany, OR 97321

Tel 541-924-LOVE
Fax 541-928-5683
Website: www.loveinclinncounty.org

November 20, 2008
City of Albany

Greetings,

Please give consideration to the following emergency request for a grant to Love INC of Linn County. This organization developed out of and in response to an identified need as follow-up to the Summit on Homelessness of November 2006 and subsequent summits and discussions. An agency to provide overall coordination of churches, agencies and individuals to bring together poverty and homelessness need issues and persons with potential meeting of those needs seemed lacking.

In the months following, a group of persons representing a broad identity in the faith-based community met to discern how they might continue their concerns with the issue of homelessness and play a part in implementing the needs identified at the Summit. By God's grace, the Love INC model, already in place in neighboring Benton County was brought to our attention. It seemed to us that the Clearing House model of Love INC was exactly the instrument to bring our common interest to fruition, not only to address homelessness but other poverty issues common in the Albany area.

Love INC has completed all the requirements to become operational by January 1, 2009, such as a broad based board of directors, an executive director, and satisfactory office space in Two Rivers Market. Additionally six board members and the executive director underwent extensive training at Love INC training center in Hudsonville, Michigan. So we are ready to implement the need mentioned in paragraph 1 above with one exception. That is for adequate funds to ensure that the personnel, space, and equipment will be available to ensure viable continuity. With that in mind, we are submitting the attached application for an emergency start up grant from the City of Albany.

We realize that we are late for regular application and will be sure that future grant requests will be submitted as part of the regular cycle of application. Unfortunately, the progress of our organizational structure did not allow that for the 2009 year.

The accompanying application including adopted budget for 2009 more completely explains the nature and details of our request.

Respectfully submitted,

Lawrence S Eby
Chair, Board of Directors

Love INC
Love In the Name of Christ

Love INC of Linn County
PO Box 429
Albany, OR 97321

Tel 541-924-LOVE
Fax 541-928-5683
Website: www.loveinclinncounty.org

December 3, 2008

Albany City Council

RE: Love INC of Linn County Emergency Grant Request

I am writing, to personally support this grant request and, also, support it as a H.E.A.R.T. Board member. During the first six months following the Homeless Summit of November, 2006, the H.E.A.R.T. Board began to take form and identified two important "community needs" to help the City of Albany address its homeless issues and population. These were eloquently summarized by Captain Ben Atchley of the Albany Police Department as:

A. A one-stop clearing-house to more effectively and efficiently verify needs, refer to the appropriate service agency or organization, do follow-up to offer additional support services and to confirm that the need was met.

B. To mobilize the faith-based community to help provide personal services for and personal relationship with those in need. Captain Atchley referred to this as adopting or mentoring those who were homeless or at risk of becoming homeless (to come alongside of them).

The advantages of finding an affordable and broad-based way to meet these two community needs was obvious to all of us on the H.E.A.R.T. Board. It was generally accepted that the City of Albany most likely would have to be asked to help "kick start" (short-term financial and/or resource support) a process or identity that could satisfy these needs. I and most all community participants on the H.E.A.R.T. Board and the committee to develop a 10-year plan regarding homelessness in Linn County believe that Love INC. of Linn County is that identity.

Originally, Love INC of Linn County was asking the H.E.A.R.T. Board to support a request to the City of Albany for $40,000.00 for the 2009 calendar year (approximately ½ of LOVE INC'S first year budget). The H.E.A.R.T. Board thought this was too ambitious a request. Hence, Love INC. has restructured its fundraising plans so that it is only asking the City of Albany for $10,000.00 to "kick start" the first one-half of the 2009 calendar year.

I believe this request is reasonable, appropriate for our community needs, and a very cost effective way to develop a community resource without long-term or permanent financial obligations. I, respectively, hope all of you do also.

In service,

Randall L Glaser

RANDALL L. GLASER, Board Member
H.E.A.R.T.
Love INC of Linn County
Albany Helping Hands

APPLICATION FOR NONGOVERNMENTAL ORGANIZATION GRANT
For Fiscal Year 2008-2009 (begins July 1, 2008)

Amount Organization is requesting: $20,000.00________

Organization Name
Love INC of Linn County

Contact person(s) and title(s)
Debra Powell, Executive Director

Telephone 541-924-5683 Fax 541-928-5683 E-mail

Federal Tax Identification Number
33-1185030

1. Description and purpose of organization. Please attach a current list of your organization's board members and officers.

   Love Inc of Linn County is a not for profit organization consisting of member churches and individuals in Linn County addressing the alleviation of poverty issues for the general population of Linn County. The majority of member churches are in Albany and nearby communities. The Linn County affiliate is a member of a national organization. Board of Directors are Lawrence Eby, MD, Chair, Rev. Dick Sargent, Vice Chair, Joe McClarnan, Treasurer, Mike Brink, Secretary, Randy Glaser, Dave Hagfeldt, Don Kropf, Rev. George Matland, Curtis Miller, Eileen Rhodes, Rev. Peter Santucci, Skip Williams

2. Describe the program(s) or work proposed for funding. Be specific.

   The local Love INC chapter will be a clearing house for poverty/homeless needs in general. Calls will come in from member churches, service and health care agencies, law enforcement and other groups and individuals that are aware of unmet needs related to poverty. This clearing house through cooperation with these various agencies will have a resource listing of churches and other organizations that may be able to meet the needs. The clearing house office will be the vehicle for bringing together needs and potential resources to meet those needs. By doing this, although we may not be able to always put together solutions to problems, we feel we can do a great deal to relieve the hurts and needs of people in poverty in our community.

3. Who and how many persons will benefit from the City's funding of this proposal?

   There is the potential for all the poverty needs of Albany to be addressed by this clearing house. Since we are not yet operational, we have no numbers of the people that will be impacted. We will have a well-tested data system to record all calls received and the outcome of the call. In this way we will have a very reliable resource for determining the success of our program objectives of addressing and alleviating poverty needs in the county. Love INC of Linn County's mission is to mobilize volunteers and help "connect" donations and services directly to the poor and homeless needs of our community.

4. What is the applicant's prior experience and expertise in performing the proposed program or work? Highlight any previous work for the City of Albany.

   Love INC of Linn County itself has no record for the performance of this program. But we are an affiliate of Love INC national, a group of over 135 affiliates in 30 states helping more than 1 million people in need each year through nearly 9,000 churches, 6,000 community agencies, and more than 300,000 volunteers. There are 5 affiliates in Oregon, the nearest in Corvallis. Chosen members of the Board of Directors as well as the Executive Director will be trained in an active setting where there is an already well established functioning affiliate. This will assure that we will be rapidly operating by highly proven standards without a long and steep learning curve. Many of our Board of Directors attended the Albany City Homeless Summit in November 2006, the follow-ups to that Summit and are involved on the HEART board. In these meetings and connected conversations, Love INC is being counted on to play a crucial role in the City and community plans to profoundly impact and reduce homelessness in the greater Albany area.

5. What do you believe makes you the most or uniquely qualified to receive City funding for this purpose?

   We do not believe there is any other agency currently offering this comprehensive Clearinghouse model in The City of Albany or Linn County. The objectives of the project will therefore be unique and valuable.

6. How does this proposal address the Albany City Council's established goals and service priorities?

   We believe that the Albany City Council seeks to address the needs of all its citizens. This proposal would enhance the city's ability to address the needs of those least able to help themselves by mobilizing the resources and churches and coordinating them with resources offered by other community agencies in order to improve the access of persons in need to those resources. We believe in doing this we would be supporting the City of Albany in their efforts.

7. Please attach a budget that shows how the City's money will be spent. The budget should include such information as the cost of materials, labor, overhead, administration, transportation, and contract services, plus any additional expenses that are relevant. Be specific

Annual budget: January 1, 2009 to December 31, 2009

EXPENSES		INCOME	
Organizational		Churches	
INC Dues	$ 250.00	20 X $100 mo average	$24,000.00
Insurance	$1,000.00		**$24,000.00**
Training	$1,000.00		
	$ 2,250.00	Individual s and Directors	$ 10,000.00
Salary and Staff			
Director	$ 36,000.00	Businesses and Grants	$ 50,000.00
Clearinghouse Coordinator	$ 18,000.00		**$ 60,000.00**
Social security, Futa, Saif	$ 4,000.00		
	$ 58,000.00		
Administration			
Office Supplies	$ 1,500.00		
Postage	$ 1,000.00		
Bank Fees	$ 100.00		
	$ 2,600.00		
Promotions/Advertising			
Brochures, Newsletters Business Cards	$ 3,000.00		
	$ 3,000.00		
Equipment			
Computer, Telephone	$ 500.00		
	$ 500.00		
Facilities			
Rent	$ 12,000.00		
Utilities (Tel, Elec, Heat)	$ 600.00		
	$ 12,600.00		
Contingency Fund	**$ 5,050.00**		
Total Projected Expenses	**$84,000.00**	**Total Projected Income**	**$84,000.00**

8. How does your proposal leverage the requested City funds with other resources? Identify the source(s) and amount(s) of other funding to be used in conjunction with City funds.

This is shown in the Income part of the annual budget above. The $10,000.00 will be used to allow the organization to become operational at the beginning of 2009. That will demonstrate to the member churches and other potential donors that the organization is viable and valuable for the stated goal of addressing poverty issues in the community. This grant from the City of Albany will make people realize that Love INC of Linn County is part of the community with support from one of the community's most prominent and important bodies.

9. Explain how your proposal is a cost-effective way to achieve the City's objectives. Provide cost/benefit ratios, cost per unit of service, or other measures to illustrate how your program would be an effective use of City funds.

Based on our "sister" organization, Love INC of Benton County, we expect to provide cost/benefit rations, for every $10,000 received, of:

a) Service and Satisfy 140 plus calls for help
b) Mobilize approximately 270 volunteers
c) Provide a total value to our community of $33,707
d) Serve 272 adults and 214 children

10. Are there other facts or considerations that the City should use to evaluate your proposal?

Since much of the services that will be mobilized through Love INC will be done through non-paid volunteers, the money spent for the Executive Director and Clearinghouse Coordinator salaries and benefits and the general expenses of operating a small office will yield immeasurable benefits. So any agency or individual that contributes to the support of Love INC can be assured that their contribution is a good investment in the welfare of the citizens of Albany. Benefits will be direct in helping people in need but also on the general goodwill of the Greater Albany community.

11. Please attach your most current financial statement and provide any explanation that you feel is necessary.

3:04 PM
12/03/08
Accrual Basis

Love INC of Linn County
Statement of Financial Position
As of December 3, 2008

	Dec 3, 08	Dec 3, 07	$ Change	% Change
ASSETS				
Current Assets				
Checking/Savings				
Washington Mutual	5,764.03	500.00	5,264.03	1,052.8%
Total Checking/Savings	5,764.03	500.00	5,264.03	1,052.8%
Total Current Assets	5,764.03	500.00	5,264.03	1,052.8%
TOTAL ASSETS	**5,764.03**	**500.00**	**5,264.03**	**1,052.8%**
LIABILITIES & EQUITY				
Equity				
32000 · Unrestricted Net Assets	1,025.13	0.00	1,025.13	100.0%
Net Income	4,738.90	500.00	4,238.90	847.8%
Total Equity	5,764.03	500.00	5,264.03	1,052.8%
TOTAL LIABILITIES & EQUITY	**5,764.03**	**500.00**	**5,264.03**	**1,052.8%**

Audit Authorization

The organization applying for this grant hereby agrees to provide the City of Albany, its agents, officers, employees, and auditors, access to all organization documents and records for five (5) years following the grant of any City funds to organization. The organization further agrees that if funds are granted, City of Albany, its agents, officers, and employees, will, upon 24 hours' notice, be entitled to have access to and inspect any organization offices, locations, or facilities.

Should suitor action be instituted to enforce any term of this agreement, the prevailing party shall be entitled to an award of its reasonable attorney fees, including those incurred upon appeal.

Debra Powell
Name

Executive Director
Title

12/03/08
Date

TO: Albany City Council

VIA: Wes Hare, City Manager

FROM: Stewart Taylor, Finance Director

DATE: December 5, 2008, for the December 8, City Council Meeting

SUBJECT: Protest of Special Procurement for Library Furnishings

RELATES TO STRATEGIC PLAN THEME: • Effective Government

RELATES TO: • Effective Service Delivery

Action Requested:

By resolution, deny the protest of the special procurement contract for Library furnishings.

Discussion:

On November 24, the City Council, acting as the Local Contract Review Board, authorized the use of the Special Procurement method to procure shelving, paneling, and furniture for the Library Project. It also directed the City Manager to negotiate and award specified contracts after the City gave notice for seven days as required by Oregon Administrative Rules 137-047-0285.

Notice was given and a timely protest was received from Spacesaver Specialists, Inc. Oregon Revised Statutes Section 137-047-0700(3) states that a written protest must include:

(a) A detailed statement of the legal and factual grounds for the protest;
(b) A description of the resulting harm to the Affected Person; and
(c) The relief requested.

The notice from Spacesaver Specialists, Inc does not state legal grounds for the protest but rather provides information regarding the company and benefits it suggests would be realized by awarding the contract to a company located in Oregon. The actual letter of protest is attached to this memo.

Also attached is an email from Hennebery Eddy Architects, Inc. describing several considerations and specific reasons the architects did not choose to recommend the Spacesaver Specialists, Inc. product for the Library Project. The reasons have to do with quality of product and suitability for meeting seismic and functionality objectives of the project.

Budget Impact:

There is no budget impact in considering the merits of the protest.

ST

Attachments: Protest from Spacesaver Specialists, Inc.
Email from Hennebery Eddy Architects, Inc.

c: Ed Gallagher, Library Director
Jim Delapoer, City Attorney
Diane Wood, Purchasing Coordinator

8A

Spacesaver Specialists, Inc.
Your Storage Planning & Equipment Source

DEC 04 2008
1:24pm.

December 3, 2008

City of Albany
Attn: Diane Wood – Finance Department
333 Broadalbin Street SW
Albany, OR 97321

RE: Protest the proposed award for Tennsco-Estey shelving through a CMAS contract with Ross McDonald Company, Inc.

Statement of the legal and factual grounds for our protest:
Spacesaver Specialists, Inc., an Oregon based company with a thirty year history of serving libraries in Oregon, first received information and proposed floor plans for this project in 2007.

1. On July 18, 2008 project architect David Webb told our staff that the architect had not specified or planned storage equipment and recommended that we contact the Library Director.
2. In our phone conversation with Ed Gallagher we were told the current plan was to reuse existing shelving but to follow up.
3. In our sequent contact we were told nothing would happen before year end and we should follow up then.
4. The November 28th edition of the DJC carried your Notice to sole source the shelving.
5. Our KI/Spacesaver US Communities Contract (RQ08-953426-20A) provides exactly the same expedited ordering/shipping/installation benefit as called for in your Notice of Special Procurement. Please reference attached US Communities information. Many Oregon cities have taken advantage of our US Communities contract.
6. We can deliver and install the shelving during January, 2009.

Description of the resulting harm to the affected person:
Harm to Spacesaver Specialists, Inc.

1. Loss of potential business for a well established Oregon company.
2. Loss of tax revenue for the State of Oregon.

More importantly: harm to the taxpayers of Albany, Oregon:

1. By contracting with California and Washington companies, local control is limited.
2. Spacesaver Specialists, Inc. is headquartered in Tualatin, Oregon with installation and follow up service provided by our own employees, based just one hour North of Albany.
3. Spacesaver Specialists, Inc. expects to provide a justifiable cost benefit for this project.
4. Published timelines can be met.
5. All money stays in Oregon.

Relief Requested:

1. Provide an Oregon based company, with a proven reputation within the library community, the opportunity to compete for this business using our US Communities Contract.
2. We will have our proposal back to the appropriate party within 48 business hours after receiving specifications and drawings (which can be transferred electronically).
3. This will provide all information you will need to make a quick and well informed decision.
4. Should we be selected we will deliver and install the shelving to meet your published timeline.

Respectfully submitted,

James A. McCord

James A. McCord
President

9730 S.W. Herman Road • Tualatin, Oregon 97062 • Tel 503.924.4100 • Toll free 800.456.2066 • Fax 503.924.4114
General Contractor, OR: 88704 • WA SPACESI110J0
www.storageplanning.com

Celebrating 25 YEARS 1978-2003

Oregon and SW Washington Library Installations By Spacesaver Specialists, Inc.
(Partial List)

COUNTY
Clark County, Law
Corvallis-Benton County Library
  Corvallis
  Alsea
Crook County Library
Jackson County Libraries
  Applegate
  Central Point
  Eagle Point
  Gold Hill
  Jacksonville
  Medford
  Prospect
  Rogue River
  Ruch
  Sutherlin Public Library
Lane County Library
Marion County Library
Multnomah County Libraries
  Albina
  Belmont
  Capital Hill
  Central
  Fairview
  Gregory Heights
  Hillsdale
  Hollywood
  Northwest Branch
  North Portland
  St. Johns
  Sellwood
  Woodstock
Wasco County Library
Washington County Law Library

MUNICIPAL
Baker City Library
Beaverton Public Library
Bend Public Library
Cedar Mill Library
Forest Grove Public Library
Fort Vancouver Regional Library
  Vancouver
  LaCenter
  White Salmon
Hillsboro Public Library
Hood River Public Library
Independence Public Library
Lake Oswego City Library
La Grande Public Library
Monmouth Public Library
Newberg Public Library
Redmond Public Library
Reedsport Public Library
Salem Public Library
Sherwood Public Library
Tualatin Public Library
West Linn Public Library
Wilsonville Public Library
Wolf Creek Library

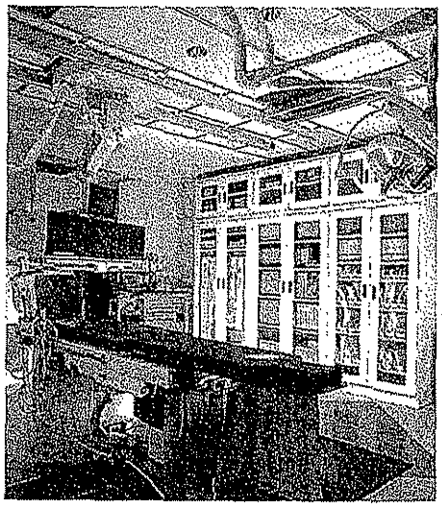
HIGHER EDUCATION
Eastern Oregon University
Linfield College
National College of Naturopathic Medicine, Portland
Northwest Christian College
Oregon Coast Community College
Oregon Institute of Marine Biology
Oregon State University
  Valley Library
  College of Veterinary Medicine
Pacific Northwest College of Art
Portland Community College, Rock Creek Campus
Portland State University
Reed College
Southern Oregon University
University of Oregon
  Knight Library
  Joseph Knight Law Library
Western Oregon University
Whitman College, Walla Walla,
Willamette University

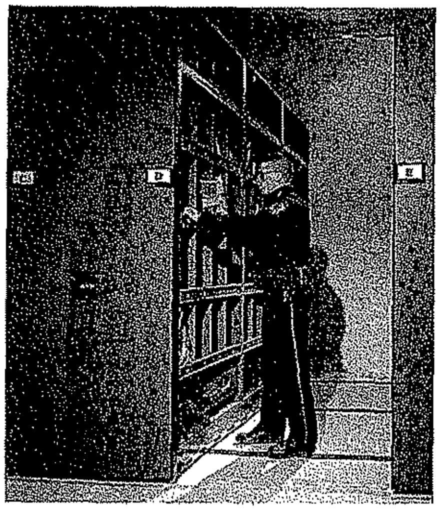
KI/Spacesaver
U.S. Communities Government
Purchasing Alliance

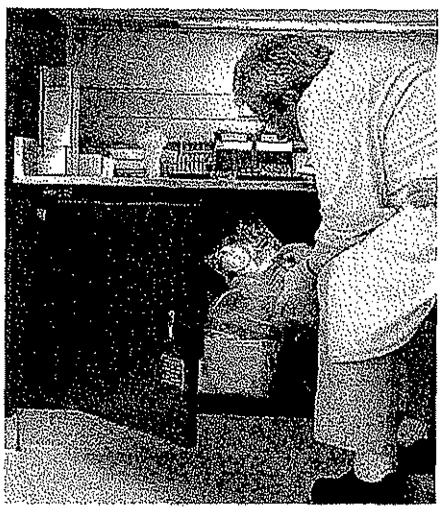
Spacesaver Storage Systems

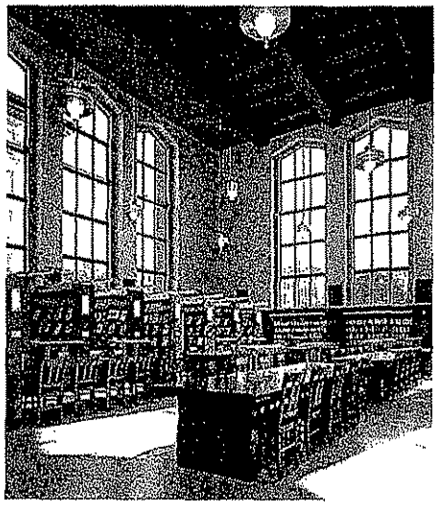
CONTRACT #:

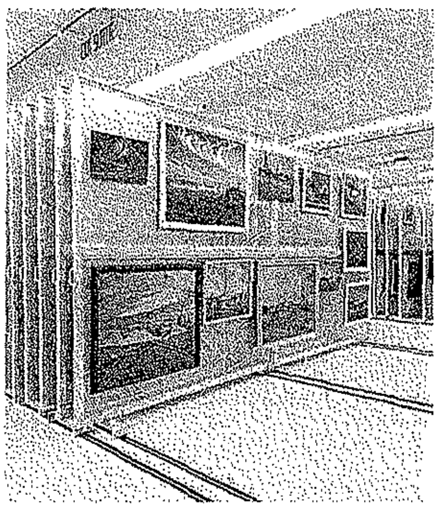
RQ08 – 953426 – 20A











Buying Spacesaver products just got easier!

You can now purchase KI/Spacesaver products using U.S. Communities.

Purchasing professionals from local and state government agencies, school districts (K-12), higher education and nonprofits nationwide can now obtain Spacesaver storage solutions at the most favorable public agency pricing.

It's simple to begin saving with U.S. Communities:

1. There is no cost to participate.
2. To register as a U.S. Communities Participating Agency, go to: www.uscommunities.org and click on "Register to Participate".
3. After registering, contact your local KI/Spacesaver Area Contractor and we will work with you from conception through final transaction details.

GOVERNMENT PURCHASING ALLIANCE
U.S. COMMUNITIES

Date of Award: February 22, 2007
Effective Dates of Contract: May 1, 2007

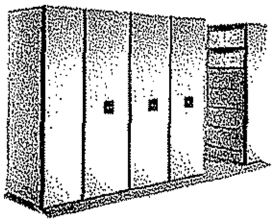
U.S. Communities is a nationwide strategic procurement source designed by public purchasing professionals for local and state government agencies, school districts (K-12), higher education, and nonprofits. U.S. Communities contracts provide quality products and services at great pricing, so agencies can save both time and resources.

Spacesaver®
Storage Solved®

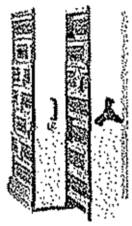
11A

U.S. COMMUNITIES

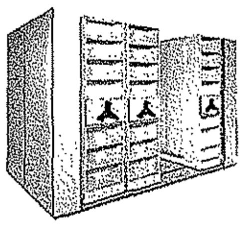
Spacesaver Storage Systems



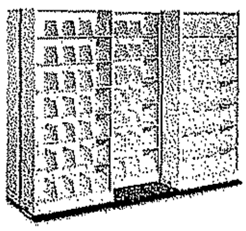
Eclipse Powered Systems™



PullOut (QuickSpace®) Systems

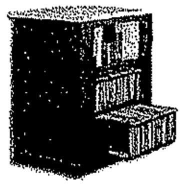


Mechanical Assist & Manual Systems
Mechanical Assist pictured.

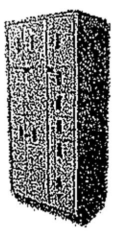


Lateral (Bi-File®) Systems

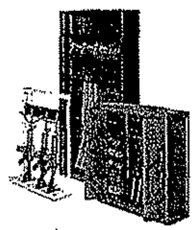
DSM™ Personal Duty Lockers



Rotary Storage System



DSM™ Evidence Lockers



Weapons Racks

We offer a complete line of storage products to satisfy virtually any requirement. From stationary shelving to rotary storage systems, high-density mobile storage systems, evidence to weapons storage. Spacesaver is the industry leader in storage solutions, with more installations than all of our competitors combined.

Through our extensive network of local Area Contractors, The Spacesaver Group provides a level of experience and competency that others simply do not.

All backed by the kind of reliable service you're looking for. Single-source turn-key project management. Certified system installation. Ongoing maintenance and support. Spacesaver sets a standard of professionalism, performance and responsiveness.

You can rely on The Spacesaver Group!

Spacesaver®

Spacesaver Corporation
1450 Janesville Avenue
Fort Atkinson, WI 53538-2798
1-800-492-3434
www.spacesaver.com

Spacesaver Specialists, Inc.
Your Storage Planning & Equipment Source
9730 SW Herman Road, Tualatin, OR 97062
Email: info@storageplanning.com
www.storageplanning.com
800.456.2066

KI
1330 Bellevue Street
P.O. Box 8100
Green Bay, WI 54302-8100
1-800-424-2432
www.ki.com

From: Amie Anderson [mailto:aanderson@henneberyeddy.com]
Sent: Thursday, December 04, 2008 3:45 PM
To: Wood, Diane
Cc: Grosso, Kathy; Gallagher, Ed; David Wark
Subject: reasons for choosing Estey - Albany library

There are several reasons why we chose Estey shelving rather than the SpaceSaver shelving. Ultimately we determined that Estey is the best quality product for the price, and therefore the best and most cost effective product for this project.

Here are our reasons for choosing Estey shelving.

1. Estey shelving is made of 2.5" rolled metal frames whereas SpaceSaver is made of 2" rolled metal frames. Therefore, Estey is a higher quality, sturdier product.

2. Estey shelving has 16 bends whereas SpaceSaver shelving has 8 bends. The number of bends is the most important aspect of the shelving related to strength. Therefore, Estey is a higher quality and more stable product.

3. The Worden panel style that we have chosen includes a floating top panel. Estey has a standard canopy bracket at the top of the shelving that supports the floating panel. SpaceSaver **does not** supply a standard bracket to support the floating Worden top panel. Therefore, SpaceSaver does not have a standard product to work with the Worden top panel. A custom SpaceSaver product could be made, but then the SpaceSaver cost would go up. To make Worden work on the SpaceSaver it would cost more because we have to do more attachments and the shelving doesn't accommodate the free floating tops. Standard Estey products readily work with the Worden Panels and are the best product for this project.

4. Estey has a 39" high concealed seismic gusset. They can accomplish this because the shelving is sturdier at 2.5" with 16 bends. Because the SpaceSaver shelving is less sturdy, it requires an approximately 80" high seismic gusset that is triangular in shape and visible. This distracts from the aesthetic goals and style of the library.

5. Estey has a base assembly and SpaceSaver doesn't, so Estey holds together better and is more seismically stable. SpaceSaver can be modified to be as stable as Estey but it would cost more and require more work. It takes SpaceSaver more to accomplish the performance of standard Estey shelving; therefore, Estey is more efficient and stable.

6. SpaceSaver is very limited in their end panels and it is more work to attach other manufacturer end panels to SpaceSaver products. Estey shelving products readily work well with the Worden panels. The Estey product is the best fit for the Worden panels and this project.

7. Estey automatically comes with 6 levelers, whereas SpaceSaver standard products do not automatically include them.

8. SpaceSaver is comparable in price to Estey, but it is of lesser quality and stability.

9. SpaceSaver specializes in compact shelving, whereas Estey specializes in library shelving.

Ultimately, Estey is the best product regarding quality and efficiency in working with the Worden panels. It is the best, most efficient product at the best price for this project.

Amie Anderson
Hennebery Eddy Architects, Inc.
921 SW WASHINGTON STREET SUITE 250
PORTLAND OREGON 97205
503 227 4860 TEL
503 227 4920 FAX
www.henneberyeddy.com

RESOLUTION NO. ________

A RESOLUTION DENYING THE PROTEST RECEIVED REGARDING THE PROCUREMENT METHOD FOR SHELVING, PANELING, AND FURNITURE FOR THE LIBRARY PROJECT.

WHEREAS, on November 24, 2008, the City Council, acting as the Local Contract Review Board, authorized the use of the Special Procurement method to procure shelving, paneling, and furniture for the Library Project; and

WHEREAS, The Council also directed the City Manager to negotiate and award specified contracts after the City gave notice for seven days as required by Oregon Administrative Rules 137-047-0285; and

WHEREAS, notice was given and a timely protest was received from Spacesaver Specialists, Inc.; and

WHEREAS, the notice from Spacesaver Specialists, Inc does not state legal grounds for the protest but rather provides information regarding the company and benefits it suggests would be realized by awarding the contract to a company located in Oregon; and

WHEREAS, the Library Project architect, Hennebery Eddy Architects, Inc., provided an email describing several considerations and specific reasons the architects did not choose to recommend the Spacesaver Specialists, Inc. product for the Library Project; and

WHEREAS, the City Council wishes to reaffirm the findings and decision to use the special procurement contract for the Library furnishings.

NOW, THEREFORE, IN CONSIDERATION OF THE LEGAL AND FACTUAL GROUNDS OF THE PROTEST, the City Council hereby:

1. Denies the protest of Spacesaver Specialists, Inc.

2. Reaffirms the action on November 24, 2008, to authorize and direct the use of the special procurement method to procure Library furnishings for the categories of shelving, paneling, and furniture for the Library Project.

3. Reaffirms the action to direct the City Manager to negotiate and award the specified contracts for the Library Project.

DATED AND EFFECTIVE this 8th day of December, 2008.

____
Mayor

ATTEST:

____
City Clerk

TO: Albany City Council

VIA: Wes Hare, City Manager
Greg Byrne, Community Development Manager

FROM: Don Donovan, Planning Manager

DATE: December 3, 2008, for the December 8, 2008, City Council Meeting

SUBJECT: File SD-07-07, Fabian Estates Subdivision
Land Use Board of Appeals (LUBA) Remand
Continued Public Hearing

Action Requested:

Review the attached information, hear any additional verbal testimony, and make a tentative decision on the Fabian Estates Subdivision LUBA remand.

Discussion:

Information Attached to This Memo

On November 12, 2008, the City Council held a public hearing on the Fabian Estates subdivision LUBA remand. The applicants, opponents, and City Council agreed to continue the hearing to the December 8, 2008, City Council meeting. The applicant and the opponents agreed that opponents would have until November 15, 2008, to submit additional written information and that the applicant would have until November 20, 2008, to submit additional written information. The opponents and the applicant subsequently agreed that opponents would have until November 17, 2008 to submit additional written information.

Please bring the staff report that you received for the November 12, 2008, hearing to the December 8, 2008, meeting for reference.

We have attached to this memo the written information received by the City Council at the November 12, 2008, hearing just to make sure you have it. That information includes:

1. Proposed Revised Conclusion 4.2, Revised Condition 4.2, and Revised Condition 4.7 Presented by Applicant's Attorney, Andy Bean (Attachment A).

2. Letter from Opponent's Attorney, Norman Hill, to City Council, dated November 12, 2008 (Attachment B).

3. Letter from Andrew R. Blaustein to Whom It May Concern, dated 11 November 2008 (presented by Hill) (Attachment C).

4. Letter from Dr. Mary Santelman to Albany City Council, dated November 8, 2008 (presented by Hill) (Attachment D).

5. Letter from Susan Beilke to Whom It May Concern, dated November 11, 2008 (presented by Hill) (Attachment E).

6. Gary G. Bliss *Employment Overview* and *Tentative Plat Drainage Material Review* (presented by Hill) (Attachment F).

7. City of Albany Application – East Thornton Lake Natural Area, addressed to Review Committee and Members of the Oregon Watershed Board (presented by Hill) (Attachment G).

We have also attached written information received after the November 12 hearing and through November 20, 2008. That information includes:

8. Letter from Jeff and Lynn Hinrichs to Don Donovan, dated November 14, 2008 (Attachment H).

9. Email from Craig & Amanda Bradley to Don Donovan, dated November 15, 2008 (Attachment I).

10. Letter from Norman Hill to Albany City Council, dated November 17, 2008, With Attachment from Gary Bliss (Attachment J).

11. Letter from Andy Bean to Albany City Council, dated November 20, 2008 (Attachment K).

12. Letter from K&D Engineering, Inc. (Dan Watson) to Don Donovan, dated November 20, 2008, with Attachments: Letter from Foundation Engineering to Dan Watson, dated November 20, 2008; *Storm Drainage and Detention Study*; and *Water Quality Report* (Attachment L).

Planning Staff Comments

It is important to keep in mind that the purpose of the City Council review now is to address the three issues that LUBA identified in the remand. The three issues are listed on page 5 of the staff report that went to the City Council for the November 12, 2008, hearing. The issues are also listed on the first page of the staff memo that went to the Council with the staff report for the November 12, 2008, hearing, followed by short staff comments.

None of the additional written information that was submitted at the hearing or after the hearing has caused staff to change the positions presented in the staff report and summarized in the cover memo on the three remand issues. Some of the details will change in findings that will support the City Council's decision on the issues because new and revised information has been submitted on some topics. The applicant's engineer has corrected errors in storm drainage calculations identified at the public hearing. Staff has the following additional brief comments on planning issues.

1. Easement. As described in the staff report, the easement originally proposed by the Fabian Estates applicant is not adequate. A public street right-of-way must be dedicated. The applicant has agreed to dedicate the right-of-way. The opponent's attorney agrees that the public street right-of-way should be dedicated and that the street does not have to be built now.

   In his November 12, 2008, letter, the opponent's attorney suggests that the City Council require the Fabian Estates subdivision applicant to provide a bond now to assure the cost of building a street in the right-of-way in the future will be paid by the developer (apparently the entire cost). Or alternatively, the attorney suggests that the City Council require the developer to record a covenant with each of the Fabian Estates subdivision lots that gives notice to future owners of the lots that they will be required to "contribute to the costs of the road when it is extended." (Attachment B, page 2).

ADC 12.060 does require that "Streets (including alleys) within and adjacent to a development shall be improved in accordance with the standards in this Article. But also says "Where the City Engineer determines that a required street improvement would not be timely, the City Engineer may accept a Petition for Improvement/Waiver of Remonstrance for a future assessment district."

The opponent's attorney does not provide an analysis of what properties will benefit from construction of the street. This type of analysis is sometimes necessary to assign the cost of street construction. It appears that the parcel to the east would be the primary beneficiary since that parcel would need the street for access if and when the property is divided to create one or more additional lots. None of the lots in the Fabian Estates subdivision needs the street for access. The attorney for the opponents suggests that it would be "unfair" to require the owners of the parcels to the east to pay to construct the street. He doesn't explain why he believes it would be unfair.

Without an analysis of which properties would benefit, it is not possible to conclude what would be a fair assignment of cost. Since the opponents agree that it is not timely to construct the street now, it appears the appropriate condition of approval would be to require a Petition for Improvement/Waiver of Remonstrance.

In some cases, courts have required an individualized determination of benefit to make sure that an exaction, such as street construction, is roughly proportional to the impact of a development. In this situation, it appears it would be appropriate to make this determination if and when someone proposes to build the street. If the developer provides the Petition/Waiver specified in ADC 12.060, this obligates the property to be part of a local improvement district if one is formed to improve the street. A public hearing will be held if a local improvement district is formed and property owners can participate in the discussion about how costs will be allocated to the properties that benefit from the street improvement.

The attorneys may have more to say about this question at the continued hearing.

2. Comprehensive Plan Goal 7, Implementation Method 10. The opponent's attorney suggests that "...the City and the Applicant claim that this explicit portion of the comprehensive plan can be ignored." The attorney also claims "the staff report urges you to ignore the comprehensive plan." This is an inaccurate summation of what the staff report says.

Nowhere in the staff report, nor anywhere in staff comments, does staff suggest that the City Council ignore the Comprehensive Plan. On the contrary, the staff report explicitly discusses what the Comprehensive Plan requires. The relevant language cited in the staff report in part is as follows:
"...the listing of any particular implementation method in this Plan does not, by virtue of the listing alone, obligate the City to undertake any particular implementation method."

"Standards will be incorporated into City regulations and policies by separate action, given the constraints of staff time and City priorities, and will not be put into effect by virtue of this Plan alone."

"It may not be necessary for the City to incorporate a specific implementation method where it can be demonstrated that an alternative action or no action at all will better or equally accomplish the intent of the related goals or policies."

This language makes it clear that the Plan intends that implementing development standards will be included in City regulations, such as the Albany Development Code. It is not intended that Implementation Methods be applied directly to land use applications.

The staff report goes on to explain that Implementation Method 10 was incorporated in the ADC and that an alternative was later adopted as is specifically recognized may be done in the Comprehensive Plan language cited above.

The staff report also notes that the City's Development Code includes mandatory development standards that apply to developments with steep slopes. These mandatory standards implement the Comprehensive Plan just as contemplated by the Plan. It is these standards, not Comprehensive Plan Implementation Methods, that apply to proposed developments.

The Fabian Estates staff report includes findings that establish the proposed subdivision application meets the standards. The opponents did not challenge those findings in the LUBA appeal. The opponent's attorney suggests that the City Council apply Implementation Method 10 directly to the Fabian Estates subdivision application. This would clearly be contrary to the explicit explanations in the Plan about what Implementation Methods are and how they are to be implemented. The language in the Comprehensive Plan stands on its own without the need for complicated interpretations such as those suggested by the opponent's attorney.

The opponent's attorney suggests that the City Council apply Implementation Method 10 because we should be concerned about "safety and stability of the lots." The ADC requires that safety and stability of lots be considered and assured by requiring that a geotechnical report be submitted with a development application. The applicant provided the required report with the Fabian Estates subdivision application. The report includes 39 requirements for construction on the Fabian Estates property. The requirements were adopted as conditions of approval of the subdivision.

<u>Engineering Staff Comments</u>

3. <u>Storm Drainage</u>. The opponents identified several concerns with the applicant's plans for addressing storm drainage. The opponents concerns were raised at the public hearing held on November 12, 2008 and in a letter dated November 17, 2008. The applicant's responded to those concerns with letters/memos dated November 20, 2008. The November 20, 2008, submittals also provided an updated *Water Quality Report* and an updated *Storm Drainage and Detention Study*. The documents cited are attached to this memo.

The City retained WRG Design, Inc. to conduct an independent review of the storm drainage information submitted by the applicant and the opponents. In a memo dated

December 1, 2008, WRG Design finds that the applicant's responses have adequately addressed the concerns raised by the opponents and that design modifications are not required to meet Albany's engineering requirements. However, in their review, WRG suggests verifying the assumption used for determining the existing condition runoff calculation to ensure that adequate detention volumes are provided. It is important to recognize that WRG is not identifying an error in the proposal, but merely suggesting that staff review this item further with the final design review. Detention through the 100-year event has already been required as a proposed condition of approval. The exact volume of detention will be determined during final design review.

The design reviews done by the City's engineering staff, the opponent's engineer, and WRG demonstrate that there are many variables, assumptions, and calculation methods that go into designing storm drainage facilities. These variables can lead to slightly different numerical answers. Although there are some variables in storm drainage calculations, there are basic underlying understandings and methodologies that apply to storm drainage design. WRG Design has reviewed the material submitted by both parties and finds that the proposed design meets the basic principles for storm drainage design and should be accepted for land use approval. As always, City staff will conduct a detailed design review and make any required modifications prior to issuing a Site Improvement (SI) construction permit.

The memo from WRG Design to Jeff Blaine that includes the review is attached to this memo as Attachment M.

At the November 12, 2008, public hearing, staff expected that the applicant would show a drawing of the proposed storm drainage system to the City Council and others at the meeting and describe the proposal, but the applicant didn't do this. Detailed drawings that show the storm drainage system were included in the information that was provided by staff to the City Council for the hearing. Staff believes that it is important for the Council to have a verbal and visual presentation that explains the proposed storm drainage system, so staff will provide it at the December 8, 2008, continued hearing. Staff will also expand on the applicant's responses to Council questions at the last public hearing to ensure that Council receives staff's understanding of the proposed improvements. Specifically, staff will discuss their understanding of potential impacts to trees from the proposed storm drain alignment, staff's understanding regarding easements south of West Thornton Lake Drive, and the potential "alternate" storm drain configuration that has been discussed conceptually with staff.

If Council decides to approve the subdivision application, the staff report will need to be updated in regard to items such as submittal date references and the correction to storm drainage condition 4.10 to identifying a maximum slope of 12 percent identified at the November 12 hearing.

If the Council decides to deny the subdivision application, findings for denial will be written to support that decision. In any case, revisions will be made and the final documents that will be adopted in support of the City Council's decision will be brought to the next Council meeting.

Budget Impact:

None.

U:\Community Development\Planning\Current\2007\07sd07\lubaremand\07sd07ccm3.dd.docx

Submitted by applicants at 11/12/08 city council meeting

ATTACHMENT A

Revised Conclusion 4.2

The City requires that a Permit for Private Construction of Public Improvements must be obtained from the City's Engineering Division to build required public improvements. Final design details (such as manhole locations, lateral locations, pipe size, and grade, etc.) for required public improvements and any changes, alterations, or exceptions to the proposed plan must be reviewed and approved by the City's Engineering Division.

Revised Condition 4.2

The property owner/developer must obtain a Permit for Private Construction of Public Improvements must be obtained from the City's Engineering Division to build required public improvements. Final design details (such as manhole locations, lateral locations, pipe size, and grade, etc.) for required public improvements and any changes, alterations, or exceptions to the proposed plan must be reviewed and approved by the City's Engineering Division.

Revised Condition 4.7

As shown on the plans that were submitted with the subdivision application, stormwater leaving the proposed development must be piped for its entirety through West Thornton Lake Drive. Stormwater between West Thornton Lake Drive and its point of discharge, located just to the west of the West Thornton Lake outlet culverts, shall be either piped or discharged to an open drainage system as directed and approved by the City Engineer. Exceptions may be provided for water quality facilities to be located between the proposed development and the point of discharge, located just to the west of the West Thornton Lake outlet culverts. Any exceptions must be approved by the City Engineer in the exercise of his or her reasonable and professional discretion. Exceptions to the approved plan that involve the exercise of discretion by the City shall be subject to a Type II notice and process so that surrounding property owners and interested parties can comment on the proposal and request a public hearing. If it is determined that improvements South of West Thornton Lake Drive are not required, historic drainage patterns between West Thornton Lake Drive and the existing outfall to West Thornton Lake will be utilized.

MARTINIS & HILL
ATTORNEYS AT LAW

Michael J. Martinis
Norman R. Hill

Wesley A. Hill

Legal Assistants:
Nicola L. Hedberg
Robin J. Paulissen

Mailing Address:
110 Madrona Avenue SE
Salem, Oregon 97302

Phone: 503.566.5800
Fax: 503.566.6775

Email for Michael J. Martinis:
martinis@opusnet.com

Email for Norman R. Hill:
nrh@opusnet.com

Email for Wesley A. Hill:
whill@opusnet.com

November 12, 2008

HAND DELIVERED

Albany City Council
333 Broadalbin Street SW
Albany OR 97321

Re: Files SD-07-07 and SP-19-07
Fabian Estates Subdivision Tentative Plat and Tree Felling

Dear Ladies and Gentlemen:

This office represents Mark Azevedo and Kathy Cook ("Azevedo"). This letter is offered as the Azevedos formal submission in opposition to the Applicant's proposal in this case.

<u>Introduction</u>

This matter is before the Council on remand from the Land Use Board of Appeals. LUBA remanded this matter for the City to consider the following three issues:

1. Has the Developer complied with the requirements of the Albany Development Code concerning storm water runoff?
2. Is an easement a proper means of providing access to future developments?
3. What is the impact of the comprehensive plan on lot sizes in this development?

The Azevedos only recently received notice of this hearing. The evidence the Applicant relies upon was not made available until a few days ago. Nevertheless, the Azevedos will do their best to respond to the material. However, the Azevedos object to the notice and the procedure of this hearing. They further contend that their procedural rights have been substantially prejudiced in their ability to respond to the Developer's arguments, including their ability to have an engineer present at this hearing. Accordingly, they object to the hearing.[1]

[1] Azevedos further object to the portion of the Albany Development Code which states that by appearing at this matter, the Azevedos waive any objections to notice of the hearing. Azevedos contend that such a provision deprives them of important substantive and constitutional rights, including their due process rights as applied in this case.

Street versus an Easement

The staff report properly lays out the controversy regarding the easement. Initially, the Developer proposed providing access to developable properties west of the subject via a 40 foot easement. However, the use of an easement in this fashion is clearly prohibited by the code. *See* ADC 12.150, 12.090, 22.400. The staff recognizes this fact. It also recognizes the fact that building a street now would not make much sense. Staff proposes deferring construction of the street until such time as the other parcel develops. That approach is a reasonable and unobjectionable. However, the Developer should do more than merely dedicate the right of way. Merely dedicating the right of way now and deferring construction until later will force the neighboring property owners to bear the cost of building this portion of the road. That is unfair. It is also a violation of the development code. *See* ADC 12.590. Instead, the Developer should either bond this condition or impose a covenant on the lots requiring the owners to contribute to the costs of the road if it is extended.

Public Improvements

Article 12 of the Albany Development Code governs public improvements for subdivisions. It clearly requires the Developer to provide plans for water, sewer and storm systems at the tentative plan stage. *See* AZC 12.530, 12.444 and 12.500. These cannot be deferred until later in the process. In the original version of this subdivision, the Developer tried to defer providing details of the storm drain system until after the public hearing was concluded so that the matter could be evaluated by staff alone without input from the public. The Developer argued that this was simply the way it was done. LUBA rejected that approach and remanded the matter to the City for a review of these systems as part of tentative plat approval as the code requires.

The storm drain system was finally submitted to the City on October 31, 2008, only eight business days before this hearing. However, a cursory review of the material shows that it does not meet the City standards and should not be approved. The system contains two parts. The storm drain system and a bioswale designed to satisfy the City's requirement that the storm water be adequately treated before being deposited into Thornton Lake, a sensitive natural habitat.

Unfortunately, the documents supporting the bioswale study are so contradictory that they cannot be believed. A detailed analysis of the study is provided by professional engineer Gary Bliss.[2] However, some of the problems are so glaring that they are obvious even to lay persons. Simply put, the conclusions in the text of the study are not supported by the calculations attached, because the assumptions in the data are different from the assumptions in the text and the plan.

The water quality study narrative states that it follows the City of Portland's model for bioswales. Those standards require the water to be contained in a channel for a minimum of nine minutes during the design storm. The swell itself must have a minimum bottom width of four feet and a maximum bottom width of eighth feet. The channel slope cannot exceed two percent (2%). The text claims that these standards are met with this design. The Developer asserts that during the water quality storm flows will not exceed .036 feet per second. It also claims velocities in the channel will not exceed .34 feet per second in the water quality storm. However, the calculations the Developer submitted to support these claims are not based on the design he proposes. For example, page 3 of the calculations contains the parameters used to measure the water quality storm event. That printout states that the engineer assumed the channel had a slope of 10%. It also assumed that the bottom of the channel was over 15 feet wide. Both these assumptions violate the standard of the City of Portland model and call into question the veracity of the engineer's calculations.

The design of the water quality system itself is also defective. A careful reading of the plan shows that the Developer plans on plugging up the existing drainage under Thornton Lake Drive and diverting the water through the water quality system. The problem with this system is that it allows high flows from relatively small storms to wash through the bioswale. This completely negates any benefit of the bioswale. With the Developer's design, storms as small as a five-year event will deposit pollutants into the lake without sufficient resident time in the swale.

The Azevedos' concerns about water quality and storm drain systems are not merely academic. The Azevedos have already spent hours of their own time and the City's resources preparing a grant application to preserve part of Thornton Lake. The grant application is included in the record in this case. It was done with the City's approval and participation. It simply makes no sense to spend City and State resources protecting the lake, while simultaneously allowing a developer to introduce additional pollutants into the lake without proper study or review. The Developer's study also fails to take into account the impact increasing volumes of run off water will have on the lake. The testimony Professor Blaustein provided at the prior hearing and in this hearing shows that increasing the volume of water in the lake would impact the wildlife in the lake.

[2] Mr. Bliss has extensive experience as a professional engineer specializing in hydrology, hydraulics and storm water systems.

Profession Blaustein's conclusions are shared by Susan Beilke of the Turtle Conservancy. The Developer has never refuted that fact. Instead, the Developer's attorney claims that its plan does not increase the volume of water because it has a detention system, which detains the off site flows to predevelopment levels. Unfortunately, that fact, even if true, does not mean that the volume of surface water run off decreases. The Developer's argues confuses the rate of run off with the volume of run off. When an area is developed it naturally increases the area of impervious surfaces on the site. This causes the water which falls on the site to run off more quickly. It also prevents water from soaking into the ground, causing an increase in the volume of water running off the site. The detention system merely collects the water which can no longer soak into the ground and attenuates the rate at which it leaves the site. The increasing volume caused by the increased impervious surface is not decreased by a detention system.

The Developer in this case should be required to submit proper calculations supporting his conclusions. Neither staff nor the Council nor the public should be in a position of simply trusting the Developer and the Azevedos should not be required to pay for the Developer's drainage study to make sure it is done correctly. The application should be denied at this stage.

Comprehensive Plan Policies

LUBA also remanded this matter to the City to address Azevedos' argument that the comprehensive plan policies and implementation provisions should be part of this process. In particular, Azevedo argued that under Comprehensive Plan Goal 7 the City must consider whether it is appropriate to increase lot sizes. Implementation Policy 10 of Goal 7 states that the projects identified as containing steep slopes should increase lot sizes, in some cases doubling the minimum lot sizes. The policy provides the following table to guide the City's analysis:

> Increase minimum lot sizes (or minimum lot area per unit hillside areas) allowing higher densities for cluster developments approved through plan development as outlined in the following table:

Slope %	Standard Dev.	(RS 6.5 Lot)	PUD Devel.	(RS 6.5 Avg)
13 to 20	1.25	8125	1.00	6500
21 to 25	1.50	9750	1.15	7475
26 to 30	2.00	13000	1.40	9100
31 & above	3.00	29500	2.00	13000

The City's prior decision ignored this requirement. Now on remand, the City and the Applicant claim that this explicit portion of the comprehensive plan can be ignored. They claim that this is not a criteria and that it has been superseded in any event by the hill side development standards of Article 6 of the development code. Staff and the Applicant are mistaken.

The basic standards for approving subdivisions are vague. ADC 11.180(5) merely states that the City must consider, "any special features of the site (such as topography, flood plains, wetlands, vegetation, historic sites)." The Developer claims this language allows the City flexibility to approve virtually any development. It argues that this is a standard less criteria. In fact, the Developer goes so far as to argue that it may disregard the development standards in Article 12 of the development code, so long as the City rubber stamps the subdivision. This approach to the Code is unworkable and improper.

The City must apply the discretion provided by ADC 11.180 with reference to some standards. For example, Article 12 provides guidance on how the Developer should lay out the subdivision. Subdivisions which do not comply with Article 12 will not pass muster under the broad criteria of ADC 11.180. The comprehensive plan implementation policies fit within this same framework. The City may apply the comprehensive plan implementation policy 10 of Goal 7 to this subdivision by concluding that the special features of the site have not been adequately considered or utilized, unless the Developer complies with the implementation policy. This interpretation gives meaning to all elements of the City's regulatory plan, and does not simply ignore the comprehensive plan. It also allows the Developer to develop the site, but does so in a manner that maximizes the value of the trees and the environment on the site.

The staff report urges you to ignore the comprehensive plan. It claims that the implementation language in the comprehensive plan is superseded by the hill side development ordinance. However, those two standards are not mutually exclusive. The City can enforce both against the Developer as a means of regulating the subdivision.

Finally, staff argues that Article 1.050 applies to only comprehensive plan policies and implementation methods. That argument is wrong. The City can clearly interpret ADC 1.050 as applying to both policies and implementation methods. In any event, Goal 7, Policy 13, clearly gives the City the authority to reduce standard densities, if need be, to properly consider the topography of the area.

The City clearly has the ability to make this development better by reducing the density even further. This would still give the Developer a viable project. However, it would preserve more trees and habitat than the current plan.

Trees

The development, as currently proposed, also fails to address the additional trees that will be removed from the property. The pipeline the Developer proposes will go through the middle of the natural area proposed for the southwest portion of the site. The

Developer's prior testimony concerning wildlife habitat and tree removal did not consider the impact of removing trees in a 30 foot swath along the back end of this property and adjoining properties all the way to Thornton Lake Drive. This information must be reconsidered, given the new plan. Without reconsideration, the City cannot say that it has properly considered the special features of the site. ADC 11.180(5).

Geological Consideration

In addition, the new plan calling for pipe drainage was never addressed in the geotechnical report previously submitted. Therefore, the plan does not comply with the requirements of Albany Development Code Chapter 6.

Need for Storm Drain Easements

The Developer most recently challenged the City's requirement that he provide an easement for the storm drains across private property planned as part of this subdivision. He claims that this requirement is an unconstitutional exaction of his property. He asserts that there is no benefit to the City or anyone else because the Developer already has a right to convey water on downstream property owners. The Developer's arguments in this regard are without merit.

First, the Developer over simplifies the basic rule of drainage. While it is true that an upland owner has the right to discharge water onto a low land owner's property, the law very clearly provides that they may not do so in an unreasonable manner. No Oregon court has defined this reasonable requirement. As a result, it is common practice for governments and private land owners to obtain drainage easements when they make changes to the natural drainage, including digging of ditches and reconfiguration of his historic drainage patterns.

Second, the development code clearly requires the Developer to provide easements to all of the public improvements in this project. *See* ADC 12.360, 12.540. After the Developer has completed construction of the storm drain pipes and bioswale, those projects would be the responsibility of the City of Albany. Clearly, the City is within its rights to require the Developer to provide an easement so that it can access those facilities for maintenance and repair. The requirement of an easement is thus clearly reasonable and constitutional.

Conclusion

Finally, throughout this process the Developer has repeatedly attacked the motives of Mr. Azevedo, Ms. Cook and the other opponents of this subdivision. The Developer's approach has been unfortunate and inappropriate. The Azevedos care deeply about their community. They volunteer their time and resources to try and improve the community. It is undisputed that this site has unique natural features and resources that will be profoundly impacted by this development. The Azevedos have every right to insist that the City carefully consider the concerns of the Azevedos and the community as a whole, to ensure that this development is completed with the least amount of destruction to the natural environment as is necessary.

Very truly yours,

MARTINIS & HILL

Norman R. Hill

NRH/nlh
Enclosures
c: Clients

Oregon State
UNIVERSITY

Andrew R. Blaustein
Professor of Zoology & Director Environmental Sciences Graduate Program
Department of Zoology
Oregon State University, 3029 Cordley Hall, Corvallis, Oregon 97331-2914
Phone 541 737 5356
FAX 541 737 8550
e- mail blaustea@science.oregonstate.edu

11 November 2008

To Whom it May Concern:

I am writing this letter regarding the effects of storm water in West Thornton Lake. I am a biologist who studies the population and community dynamics of animals. Much of my research investigates the effects of habitat alteration on amphibians (frogs, toads and salamanders). I visited the site and the surrounding areas in 2007 and several months ago in 2008. This site is ideal for breeding populations of several native amphibian species including the red-legged frog (*Rana aurora*), the Pacific treefrog (*Pseudacris regilla*), the long toed salamander (*Ambystoma macrodactylum*), the Northwestern salamander *(Ambystoma gracile*) and the roughskin newt (*Taricha granulosa*). Storm water into West Thornton Lake would undoubtedly change the lake dynamics enough that it could potentially disrupt directly and indirectly, the breeding biology of all the amphibians mentioned. Storm water would certainly change the pH of the lake, the silt parameters and other dynamics of the lake. Since amphibians require specific pH for egg development, it is likely that development of amphibian eggs might be hampered. It could also affect aquatic vegetation and invertebrates, including those eaten by amphibians and fish (which are also present in the lake). In other words, storm water could drastically change the entire lake constituency. Amphibians worldwide are undergoing drastic population declines and extinctions at unprecedented rates. One species, found in the Willamette Valley, the red-legged frog, is endangered in California and is much rarer than it used to be in Oregon. This species is being watched closely in Oregon, especially in the Willamette Valley. Breeding populations of red-legged frogs would be in danger in lakes where the pH and other aspects of their habitat are altered. This includes West Thornton Lake.

In summary, storm water into West Thornton Lake in Albany would be detrimental to the entire lake community which includes amphibians, fish, numerous invertebrates and aquatic vegetation. Amphibians would be affected directly because of changes in the chemistry of the lake. They may be affected indirectly because of the potential loss of their food sources. Thornton Lake is a unique habitat and its flora and fauna will be drastically changed.

Sincerely,

Andrew R. Blaustein

Andrew R. Blaustein
Professor

November 8, 2008

To: The Albany City Council
From: Dr. Mary Santelmann

I am a scientist with a PhD in ecology. My research concerns effects of land use and management on water and watersheds. I am writing with respect to a proposed development on a steep hillslope north of Thornton Lake. The site is located on a steep hill, and unless care is taken to ensure that stormwater management is adequately planned, development of the site could lead to increased delivery of high-energy runoff with relatively high sediment and pollutant loads to Thornton Lake. If the proposed bioswale is insufficient in size or capacity to retain the water that flows down from this site, there is the potential for excess nutrients, sediments, and other pollutants to reach Thornton Lake, threatening a valuable water resource. Increased nutrient pollution in the lake could make current algal blooms worse, and impact the lake and property along the lake. The proposed installation of a pipe to divert runoff towards the lake along an existing drainageway could lead to erosion along the drainageway.

There are many ways that this developer could manage stormwater onsite:

- minimizing the amount of impervious surface in the development and disconnecting those that must be used from pipes and gutters;
- maintaining recharge areas, buffer zones, and protecting existing drainageways;
- using infiltration swales, grading strategies, and open drainage systems onsite;
- and conserving open space, and retention of trees and woody vegetation.

Such features would add value to the properties, and help prevent the rapid runoff of high-energy water that could carry sediment and pollutants into the lake. I encourage you to protect neighboring properties, wetlands around Thornton Lake, and Thornton Lake itself from undesirable changes in water quality and hydrology that accompany poorly designed development.

I encourage the city council to protect the property and rights of current Albany residents and require the owner to develop this site in accordance with environmentally-sound policies that protect the water resources of the city of Albany and the property of neighbors.

Sincerely,

Mary Santelmann

Mary Santelmann

ATTACHMENT E

November 11, 2008

To whom it may concern:

I am writing in regard to the West Thornton Lake and surrounding area and the potential effects of storm water on the lake system. I am a wildlife biologist who has worked for over 20 years in Oregon, including projects involving reptiles and amphibians for the U.S. Fish and Wildlife Service and The Nature Conservancy. My current project, The Turtle Conservancy, is an all-volunteer effort dedicated to the long-term protection and conservation of Oregon's native turtles, the Western Painted (*Chrysemys picta bellii*) and the Western Pond (*Actinemys marmorata*) turtles.

I visited the West Thornton Lake and surrounding area several times in 2008. The lake is part of an old oxbow of the Willamette River and offers important habitat for a host of wildlife species including reptiles, amphibians, many species of songbirds, shorebirds, waterfowl, owls, raptors, small and large mammals and fish. This area is crucial habitat for turtles, providing the primary feeding, breeding and over wintering habitat for turtles in this area. Negative impacts to water quality, including an increase in pH from the addition of storm water to the lake, would have deleterious effects on the aquatic invertebrates as well as the aquatic plant species that make up this lake system. This would, in turn, reduce the food availability for all life stages of turtles as well as many other wildlife species, such as amphibians and waterfowl that inhabit the lake year-round.

Amphibians that use the lake system, including the Northern red-legged frog, are considered to be an indicator of the health of a wetland system, and their absence indicates a system out of balance. Frogs are highly sensitive to changes in water quality, and an increase in pH could result in the loss of this and other species in the lake. A recent study conducted in the Portland metro region in a number of urban ponds found that all ponds with a pH higher than 7.0 were absent of all frogs. Frogs, in a healthy system should make up the highest biomass of animals, for they are a major food source for birds, reptiles and many other species. An increase in the pH level in the West Thornton Lake system could result in the loss of this important amphibian from this area.

Both species of native turtles as well as the red-legged frog are listed on Oregon's sensitive-critical list due to their declining numbers. It is becoming increasingly rare in the Willamette Valley to find areas such as the West Thornton Lake site and surrounding habitat that still has both native turtles and frogs. Overall, changes in the health of the lake system, including negative impacts to water quality, could have long term negative impacts to turtle, frogs, waterfowl and many other wildlife, fish and plant species that depend on the lake and the lake system for their survival.

Sincerely,

Susan Beilke

Susan Beilke
Director, The Turtle Conservancy
Tigard, Oregon; 503-639-3519

EMPLOYMENT OVERVIEW

Seven years experience with a public agency followed by approximately 34 years of progressive experience in all aspects of land development engineering with an Emphasis in project management and engineering personnel management. Since retirement, I have continued practice by consulting and expert witness services.

WORK EXPERIENCE

Alpha Community Development, Inc. August 1998-August 2002 (Retired)

Senior Engineer/Project Manager- Responsible for managing project accounts and coordinating assignments. Mentor to staff and director of Continuing Education.

- Manage project personnel.
- Prepare contracts including define work scopes, budgets and schedules.
- Prepare and supervise projects.
- Make public presentations representing clients.
- Direct and maintain continuing educational program for firm.
- Provide expert witness consultation to clients.

Experience includes work in the Portland Metropolitan area, Salem, Woodburn, and Clark County, WA. The following are representative projects during Alpha Community Development, Inc. employment.

Bauer Oaks Subdivision (3-phases), Washington County, OR- Supervised development of 300-lot, 3-phased development, including wetland mitigation; managed construction project for client.

Expert Witness Consultation and Trial Testimony – Multitech vs Lake Labish Drainage District, Salem, Oregon, Marion County Court; Prepared analysis of 1996 flooding of Keizer area and assisted attorney in preparation for trial, and provided expert witness testimony at trial.

Expert Witness Consultation and Trial Testimony –Ehlers vs Multitech and City Keizer, OR, **Salem, Oregon, Marion County Court;** Prepared analysis of 1996 flooding of Keizer area and assisted attorney in preparation for trial.

Sunset Center at Tanasbourne, Buildings 2 & 3, Hillsboro, OR, - Supervised planning and design of multi-phased office complex. Designed new type of water quality treatment facility as test for Unified Sewerage Agency.

Mitchell Nelson Group, Inc. **June 1997 – August 1998**
233 SW Naito Parkway, Portland, OR 97204
Director of Engineering – Manage engineering group with responsibility for interpreting, organizing and coordinating assignments.

- Manage Engineering Department.
- Prepare contracts including define work scopes, budgets and schedules.
- Prepare/supervise infrastructure master plans and phasing plans, capital improvement programs, and construction management projects.
- Make public presentations representing clients.

Experience includes work within the Portland Metropolitan area, Salem, Cottage Grove, and Clark County, WA. The following are representative projects during Mitchell Nelson Group, Inc. employment.

Cottage Grove Industrial Park, Cottage Grove, OR, - Supervised design of infrastructure and bidding of contract.

Sunset Center at Tanasbourne, Hillsboro, OR, - Supervised planning and design of multi-phased office complex. Development of new type of water quality treatment facility as test model for Unified Sewerage Agency.

Greenwood Inn Flood Plain Alteration, Beaverton, OR, - Gained approval for flood plain alteration to flood proof existing complex by constructing flood protection berm protecting site from flooding by Fanno Creek.

Waker Associates, Inc. August 1976-June 1998
11080 SW Allen Blvd., Suite 100 Beaverton. OR 97005
Engineering Director – Manage multiple private sector land development projects with focus on processing of applications and infrastructure analysis:

- Manage Engineering Department.
- Prepare contacts including define work scopes, budgets and schedules.
- Prepare/supervise infrastructure master plans and phasing plans, capital improvement programs, and construction management projects.
- Client and governmental agency communications, Co-consultant coordination.

Experience includes work in the Portland Metropolitan area, Salem, Woodburn, Clark County, WA, and Tacoma, WA. The following are representative projects during Waker Associates, Inc. employment:

Cornell Oaks Corporate Center, Wash. County, OR, - Supervised development of master plan for roads, grading and utility infrastructure; managed construction project.

Waterhouse PUD and Waterhouse South Developments, Beaverton, OR, - Supervised preparation of plans for infrastructure, planned and designed and supervised construction of Jennie Lake.

__Tanasbourne Development,__ Hillsboro, OR – Supervised preparation for development of roads, grading and all utilities for approximately 800 acre Planned Development.

__Nike World Headquarters,__ Beaverton, OR- Managed planning and design of 77 acre corporate campus; prepared and processed 404 permit and Division of State Lands permits; consulted with project manager during term of construction of project.

Riffe Peters and Jones, Inc. **April 1973-August1976**
Pleasant Hill, CA (Retired/No longer in business)
Project Engineer – Designed infrastructure for single family, multifamily, and commercial developments and process applications.

- Prepare construction drawings for projects with estimates and specifications.
- Make public presentations representing clients.
- Act as office manager when principals absent.

Contra Costa County Flood Control and Water Conservation District - Feb. 1966-April 1973
Associate Hydraulic Engineer – Performed duties in various departments including Planning, Design, Construction, and Plan Review.

- Prepare feasibility studies and master plan infrastructure for drainage districts.
- Design storm drain improvement projects.
- Perform duties of Resident Engineer on construction projects.
- Perform duties as Assistant Construction Department Head; manage construction projects, and supervise inspectors.
- Plan Review Division Supervisor.

PROFESSIONAL REGISTRATION
Registered Professional Engineer
Oregon (#6848), Washington (#20188), California (#19085)(retired 2004)
Registered Water Rights Examiner
Oregon (#148)

PROFESSIONAL SOCIETIES – Fellow, American Society of Civil Engineers (life member)

EDUCATION
Shasta Jr. College (1961 – 1963) AA Civil Engineering

San Jose State College (1963 – 1966) Bachelor of Science Civil Engineering

Continuing Education: Attend seminars and conferences regarding engineering issues to obtain a minimum of 15 Professional Hours (PDH's) per calendar year.

REFERENCES

W. Bud Roberts, P.E.,
934 W. Cheltenham St., Portland, OR 97201 (503-245-3929)

Jerry Palmer P.E., President Alpha Community Development, Inc. (503-452-8003)

Mike Gougler, President, MJG Development, Inc. (503-810-5576)

Roy Gibson, P.E., City Engineer, Hillsboro OR (503-681-6148)
123 N. Main St. Hillsboro, OR 97123

GARY G. BLISS P.E., F.ASCE
3866 OAK MEADOWS LOOP, NEWBERG, OR 97132
PHONE 503-554-9380 FAX 503-538-6296
Email: GGBlissPE@comcast.net

FABIAN ESTATES SUDIVISION

Albany, Oregon

Tentative Plat Drainage Material Review

By

Gary G. Bliss, P.E., W.R.E., F.ASCE

November, 11, 2008

REGISTERED PROFESSIONAL ENGINEER
6848
OREGON
JULY 17, 1970
GARY G. BLISS

Expires 12/31/09

The following is a summary of my comments regarding the review of materials provided to me for the proposed development entitled "Fabian Estates Subdivision" located in the City of Albany, and Benton County. My charge was to review the materials as to correctness and conformance with the City of Albany's *Storm Water Management Engineering Standards*, and the standard of care for general engineering design practices.

The materials included the following:

- Design Construction Drawings
- Information submitted by the applicants regarding the addressing of Criteria and Findings.
- Storm Drainage and Detention Study dated October 9, 2008, and a revised copy dated October 31, 2008.
- Water Quality Report dated June 18, 2008, and a revised copy dated October 31, 2008.
- Division E Stormwater Management Engineering Standards, Public Works Department, Albany, Oregon, dated March 2007. (Printed from City web page)

General Conclusions:

From my experience as a Professional Civil Engineer of 39-years, I found the design construction drawings to be satisfactory at this stage of the approval process. However, I found the Water Quality Report and the Storm Drainage and Detention Study to be hopelessly confusing and difficult to follow.

It is my opinion that the information contained in the two reports supplemented by the construction drawings, do not meet the stated criteria in the City's *"Stormwater Management Engineering Standards"*. I further believe that the two reports do not meet the "Standard of Care" required to allow for a clear understanding of the storm drainage system and to allow for the determination that the engineering standards of the City have been met.

Specific Comments Addressing Issues of Design Materials Submitted:

1. The pipe size conveying storm waters away from subdivision through ravine is shown as an 8-inch diameter pipe. The City's "Engineering Standards" require a minimum of a 10-inch diameter.
2. The total developed storm water runoff from the contributing watershed is directed through the water quality swale. This is generally not acceptable unless the water quality swale is sized to convey the ultimate flows without washing out pollutants collected in the swale from the "first flush" runoff. Typically systems

as proposed would require a parallel pipe or channel to convey the ultimate developed storm water flows from the contributing watershed.

3. Item 2 above is covered by Division E – Storm Water Management – (SWM) e 1.01 Purpose A., D. & H. The present design fails to meet the criteria.
4. Division e –SWM- E 1.06 G -Easement- This item does not seem to have been met.
5. Division E –SWM- E 3.01 G- "The system shall accommodate all run-off from upstream tributary …". "Proposed storm drain systems shall not discharge flows into inadequate downstream systems unless approved by the City Engineer".

   Runoff flows from the development plus the contributing watershed will "flush out" the water quality swale during the higher peak design storms, 25, 50, & 100-year. I conclude that the proposed system will not meet the afore stated requirement, based on the enclosed comments and conclusions.
6. Division E –SWM- E 4.02 Pipe size for storm systems shall be a minimum of 10-inch in diameter, unless approved by city Engineer.

Storm Drainage & Detention Study report, revised October 31, 2008

1. A comparison of the pre-developed storm water flows and post developed storm water flows found my concurrence with the pre-developed flows, while the post developed flows in the report are more than 33% less than flows I calculated, using the same computer program "HydroFlow 2002.
2. Page 1, bottom of page "Subbasin Summary" Basin numbers do not agree with drainage map numbers or area quantities. Eg: Sub-14 indicates 0.53 acres, whereas the actual area is 16.56 acres.
   The Element Count: Report indicates there are 5 sub basins when there are 7.
3. Page 16, - Downstream Systems – 100-year event-
   Bioswale lists the Maximum velocity to be 3.87 ft/sec whereas the design criteria for the swale, limits the velocity to 3.0 ft/sec.
   Link ID – Con 38 which is just upstream of the bioswale, lists a maximum velocity = 12.67 ft/sec, where again the design criteria limits the velocity to a maximum of 3.0 ft/sec. Scouring of natural channels occurs for velocities over 6 ft/sec.
   Ref: page 1 – "Down Stream Systems"- diagram for location of Con 38 & Jun. 35 (bioswale).

Water Quality Report Revised October 31, 2008

1. Page 1 of report, lists the areas of total area of contributing drainage basin. Report = 30.16 acres; my determination was approximately 30.36 acres. <u>OK</u>
2. Page 3 & 4- Soils are listed as being Hydrologic Group "C".
3. Page following page 3- (spread sheet) labeled "Minimum Grassy Swale Design", lists a varying cross section for swale. The top row itemizes conditions for low flow water quality conditions, and second row itemizes conditions for the top portion of the swale to convey greater flows.

```
--------\              /-------
    2/1 \            / 2/1
         \          /
      4/1 \-----/ 4/1
            |-4'-|
```

Page 3 – "Downstream System"
Bioswale is listed as having an invert slope equal to 10.4871% with a roughness of 0.032. This does not conform to design criteria.

4. Page 4 lists Hydrologic soils Group as Group B, rather than original report which listed soils as Group C.
5. Page 6 – Soil Groups are not identified.
6. Page 16 – Listing of Water Quality Event-
   Bioswale flow is listed as...... 0.36
   Con (conduit) 39 is listed as ...0.40—which is upstream of swale
   Con (Channel) 45 is listed as...0.63—which is downstream of swale

Con 45 value is 1.75 times greater than bioswale value. Sub basin 13 appears to be introduced into system at upstream end of swale. No additional contributing areas are below swale.

As stated before, it is the opinion of this reviewer that the submitted materials do not address the criteria established within the City of Albany's Engineering Standards, and the Standards of Care of the Engineering Design Community have not been met.

Sincerely yours,

Gary G. Bliss, P.E., W.R.E., F.ASCE
OR Registration # 6848

lydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	------	------	0.03	------	0.29	0.51	0.87	1.18	1.51	Fabian Acres Undeveloped
3	SCS Runoff	------	------	0.08	------	0.97	1.37	1.94	2.40	2.87	developed lots Sub Area 2
5	SCS Runoff	------	------	0.20	------	2.61	3.92	5.82	7.39	9.00	Sub basin 14
7	SCS Runoff	------	------	0.05	------	0.52	0.93	1.57	2.11	2.69	Sub Areas 4, 5, 6 & 1
9	SCS Runoff	------	------	0.02	------	0.17	0.31	0.52	0.70	0.90	Sub Area 13
11	Reach	1	------	0.03	------	0.21	0.41	0.78	1.10	1.43	Route Sub Area 2 Hydrograph
14	Combine	5, 7, 9, 11	------	0.29	------	3.27	5.20	8.18	10.70	13.32	Sub area 2 (predev.) + 14, 4, 5, 6, 1,

Proj. file: Fabian Acres.gpw | Run date: 11-10-2008

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	1.51	2	500	0.741	----	----	----	Fabian Acres Undeveloped
3	SCS Runoff	2.87	2	484	1.046	----	----	----	developed lots Sub Area 2
5	SCS Runoff	9.00	2	480	3.224	----	----	----	Sub basin 14
7	SCS Runoff	2.69	2	482	1.084	----	----	----	Sub Areas 4, 5, 6 & 1
9	SCS Runoff	0.90	2	482	0.361	----	----	----	Sub Area 13
11	Reach	1.43	2	508	0.741	1	----	----	Route Sub Area 2 Hydrograph
14	Combine	13.32	2	480	5.410	5, 7, 9, 11,	----	----	Sub area 2 (predev.) + 14, 4, 5, 6, 1,

Proj. file: Fabian Acres.gpw	Return Period: 100 yr	Run date: 11-10-2008

ydrograph Summary Report

yd.).	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	1.18	2	500	0.615	----	----	----	Fabian Acres Undeveloped
3	SCS Runoff	2.40	2	486	0.895	----	----	----	developed lots Sub Area 2
5	SCS Runoff	7.39	2	480	2.722	----	----	----	Sub basin 14
7	SCS Runoff	2.11	2	482	0.899	----	----	----	Sub Areas 4, 5, 6 & 1
9	SCS Runoff	0.70	2	482	0.300	----	----	----	Sub Area 13
11	Reach	1.10	2	512	0.614	1	----	----	Route Sub Area 2 Hydrograph
14	Combine	10.70	2	480	4.535	5, 7, 9, 11,	----	----	Sub area 2 (predev.) + 14, 4, 5, 6, 1,

Proj. file: Fabian Acres.gpw	Return Period: 50 yr	Run date: 11-10-2008

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	0.87	2	502	0.492	——	——	——	Fabian Acres Undeveloped
3	SCS Runoff	1.94	2	486	0.744	——	——	——	developed lots Sub Area 2
5	SCS Runoff	5.82	2	480	2.228	——	——	——	Sub basin 14
7	SCS Runoff	1.57	2	484	0.719	——	——	——	Sub Areas 4, 5, 6 & 1
9	SCS Runoff	0.52	2	484	0.240	——	——	——	Sub Area 13
11	Reach	0.78	2	516	0.492	1	——	——	Route Sub Area 2 Hydrograph
14	Combine	8.18	2	480	3.679	5, 7, 9, 11,	——	——	Sub area 2 (predev.) + 14, 4, 5, 6, 1,

Proj. file: Fabian Acres.gpw	Return Period: 25 yr	Run date: 11-10-2008

ydrograph Summary Report

lyd.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	0.51	2	504	0.345	—	——	——	Fabian Acres Undeveloped
3	SCS Runoff	1.37	2	486	0.557	—	——	——	developed lots Sub Area 2
5	SCS Runoff	3.92	2	480	1.623	—	——	——	Sub basin 14
7	SCS Runoff	0.93	2	484	0.504	—	——	——	Sub Areas 4, 5, 6 & 1
9	SCS Runoff	0.31	2	484	0.168	—	——	——	Sub Area 13
11	Reach	0.41	2	532	0.344	1	——	——	Route Sub Area 2 Hydrograph
14	Combine	5.20	2	480	2.639	5, 7, 9, 11,	——	——	Sub area 2 (predev.) + 14, 4, 5, 6, 1,

Iydrograph Summary Report

Hyd.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	0.29	2	510	0.245	----	----	----	Fabian Acres Undeveloped
3	SCS Runoff	0.97	2	486	0.424	----	----	----	developed lots Sub Area 2
5	SCS Runoff	2.61	2	480	1.201	----	----	----	Sub basin 14
7	SCS Runoff	0.52	2	486	0.358	----	----	----	Sub Areas 4, 5, 6 & 1
9	SCS Runoff	0.17	2	486	0.119	----	----	----	Sub Area 13
11	Reach	0.21	2	576	0.244	1	----	----	Route Sub Area 2 Hydrograph
14	Combine	3.27	2	482	1.922	5, 7, 9, 11,	----	----	Sub area 2 (predev.) + 14, 4, 5, 6, 1,

Proj. file: Fabian Acres.gpw	Return Period: 5 yr	Run date: 11-10-2008

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

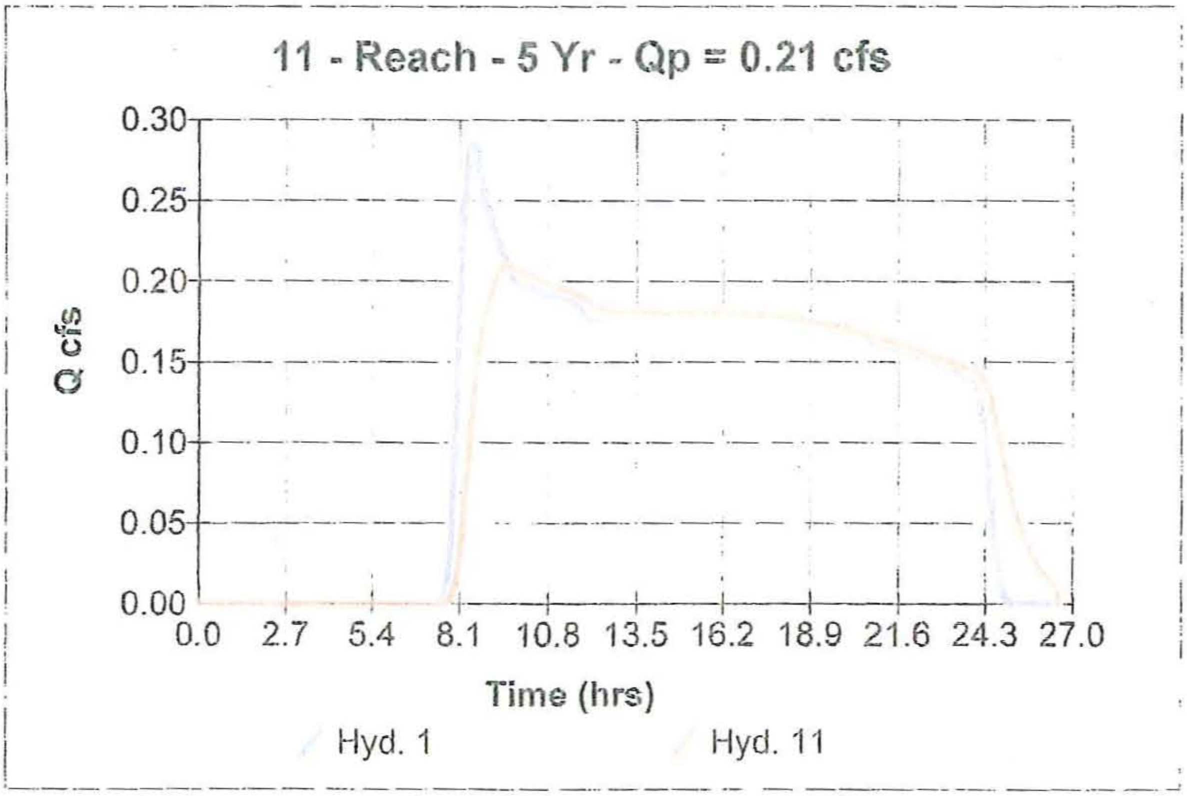
Hyd. No. 11

Route Sub Area 2 Hydrograph

Hydrograph type	= Reach	Peak discharge	= 0.21 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Inflow hyd. No.	= 1	Section type	= Circular
Reach length	= 1251.0 ft	Channel slope	= 13.1 %
Manning's n	= 0.010	Bottom width	= 1.0 ft
Side slope	= 0.0:1	Max. depth	= 0.0 ft
Rating curve x	= 29.100	Rating curve m	= 1.250
Ave. velocity	= 0.37 ft/s	Routing coeff.	= 0.0429

Modified Att-Kin routing method used.

Hydrograph Volume = 0.244 acft



Hydrograph Plot

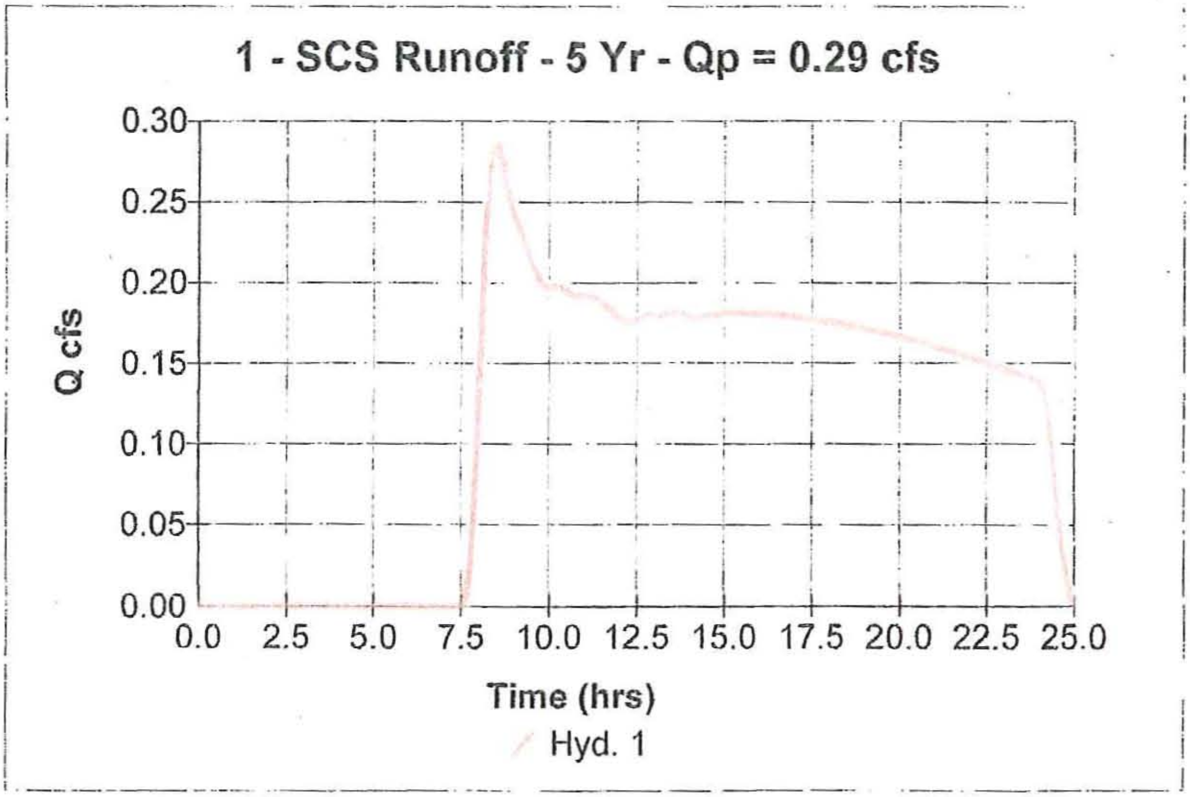
Hydraflow Hydrographs by Intelisolve

Hyd. No. 1

Fabian Acres Undeveloped

Hydrograph type	= SCS Runoff	Peak discharge	= 0.29 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 4.60 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 39.3 min
Total precip.	= 2.86 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.245 acft



Hydrograph Plot

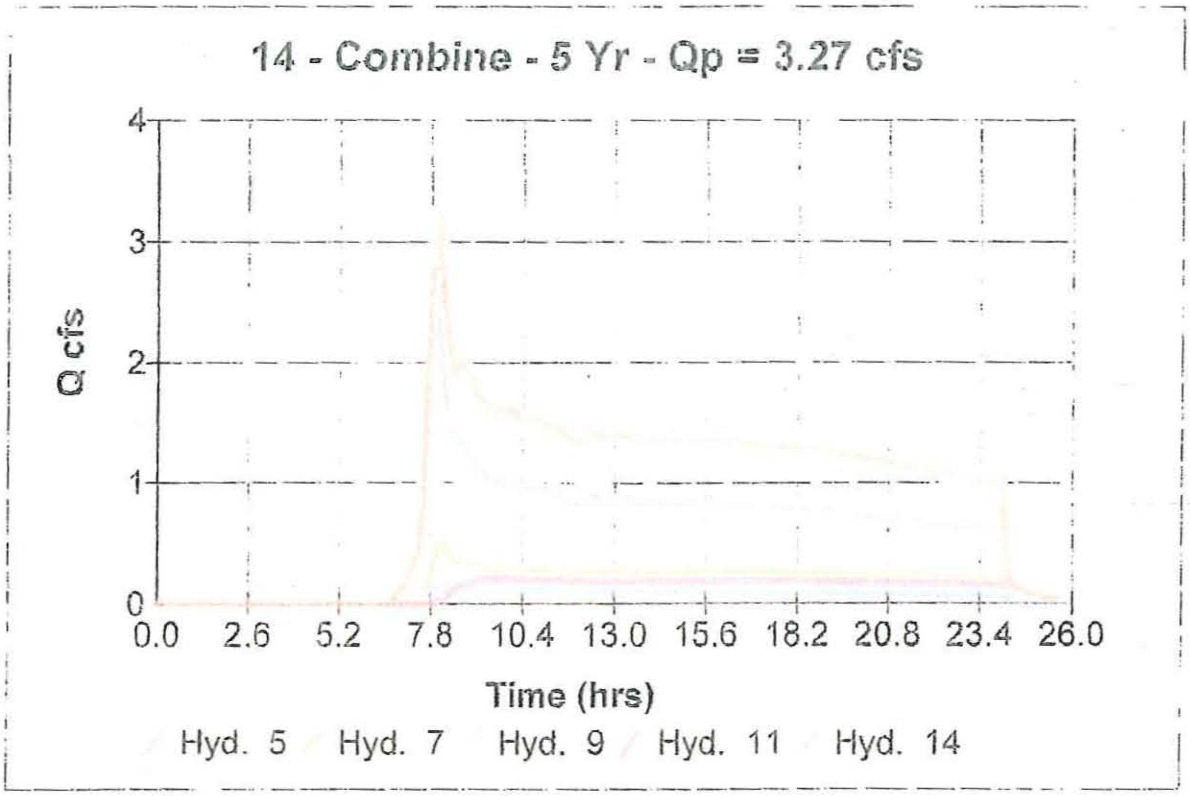
Hydraflow Hydrographs by Intelisolve

Hyd. No. 14

Sub area 2 (predev.) + 14, 4, 5, 6, 1, &13

Hydrograph type	= Combine	Peak discharge	= 3.27 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Inflow hyds.	= 5, 7, 9, 11		

Hydrograph Volume = 1.922 acft



Hydrograph Plot

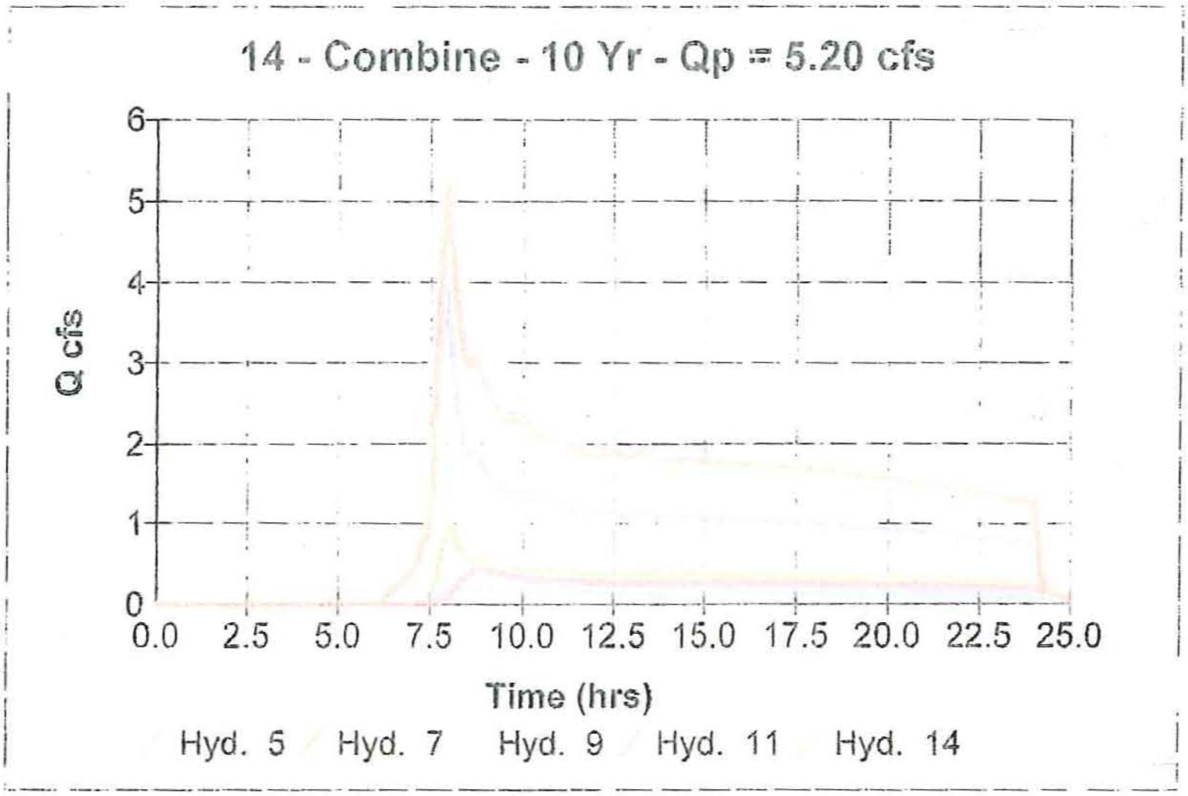
Hydraflow Hydrographs by Intelisolve

Hyd. No. 14

Sub area 2 (predev.) + 14, 4, 5, 6, 1, &13

Hydrograph type	= Combine	Peak discharge	= 5.20 cfs
Storm frequency	= 10 yrs	Time interval	= 2 min
Inflow hyds.	= 5, 7, 9, 11		

Hydrograph Volume = 2.639 acft



Hydrograph Plot

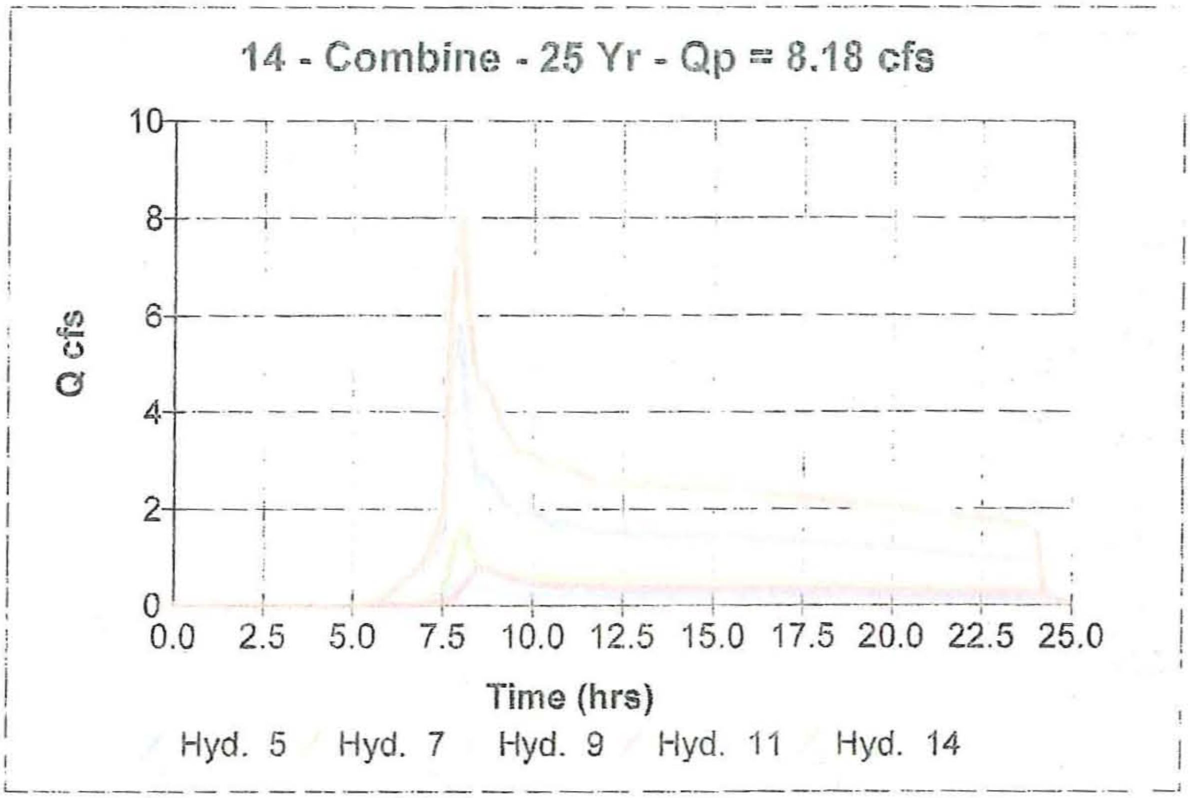
Hydraflow Hydrographs by Intelisolve

Hyd. No. 14

Sub area 2 (predev.) + 14, 4, 5, 6, 1, &13

Hydrograph type	= Combine	Peak discharge	= 8.18 cfs
Storm frequency	= 25 yrs	Time interval	= 2 min
Inflow hyds.	= 5, 7, 9, 11		

Hydrograph Volume = 3.679 acft



Hydrograph Plot

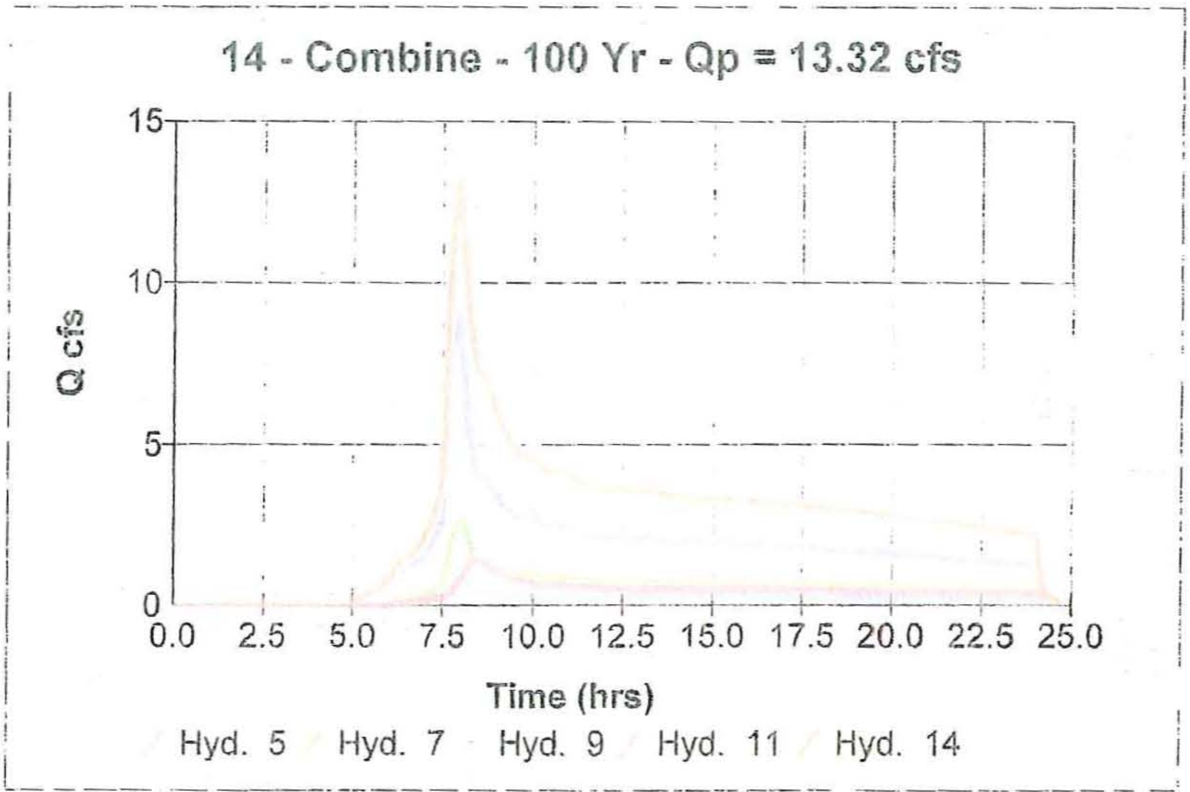
Hydraflow Hydrographs by Intelisolve

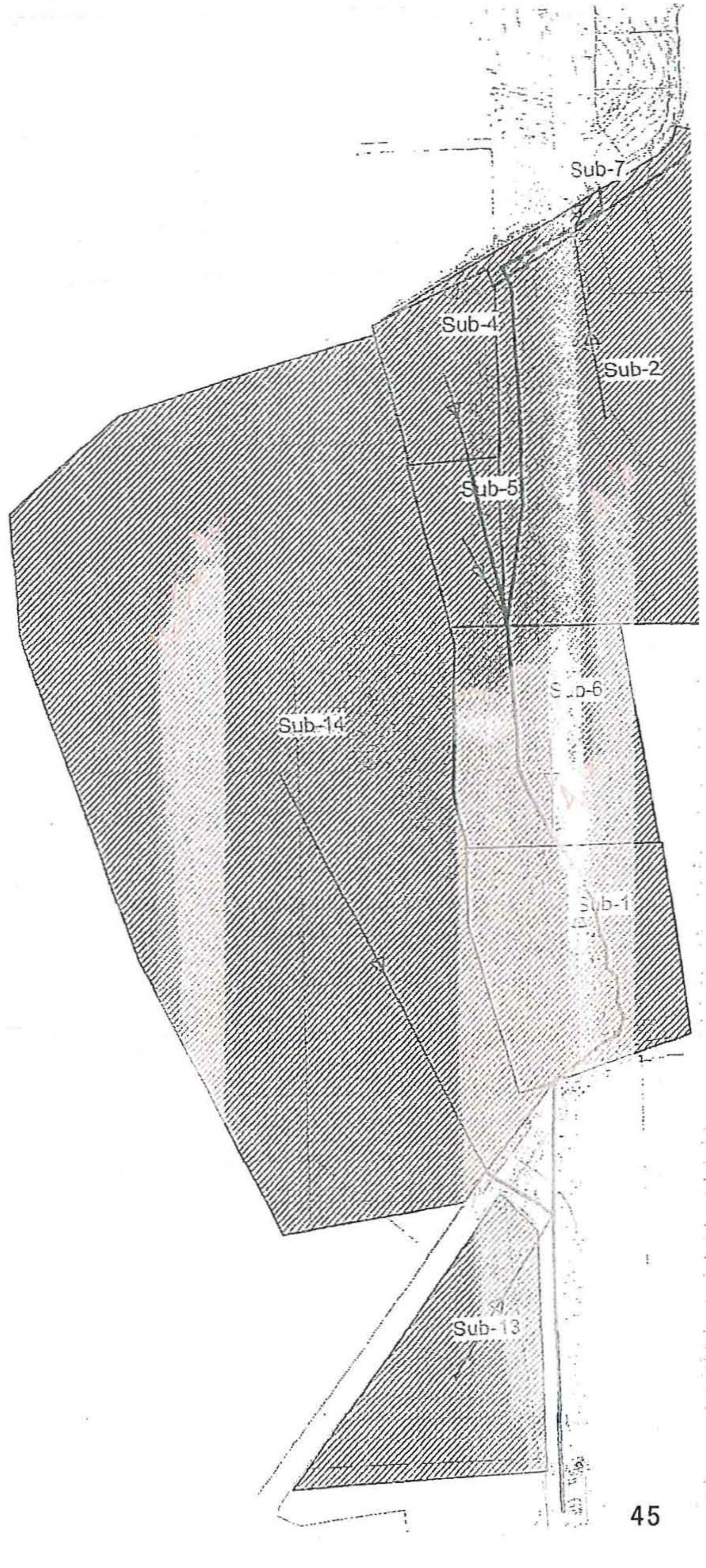
Hyd. No. 14

Sub area 2 (predev.) + 14, 4, 5, 6, 1, &13

Hydrograph type	= Combine	Peak discharge	= 13.32 cfs
Storm frequency	= 100 yrs	Time interval	= 2 min
Inflow hyds.	= 5, 7, 9, 11		

Hydrograph Volume = 5.410 acft




Sub-7
Sub-4
Sub-2
Sub-5
Sub-6
Sub-14
Sub-1
Sub-13

Hydrograph Plot

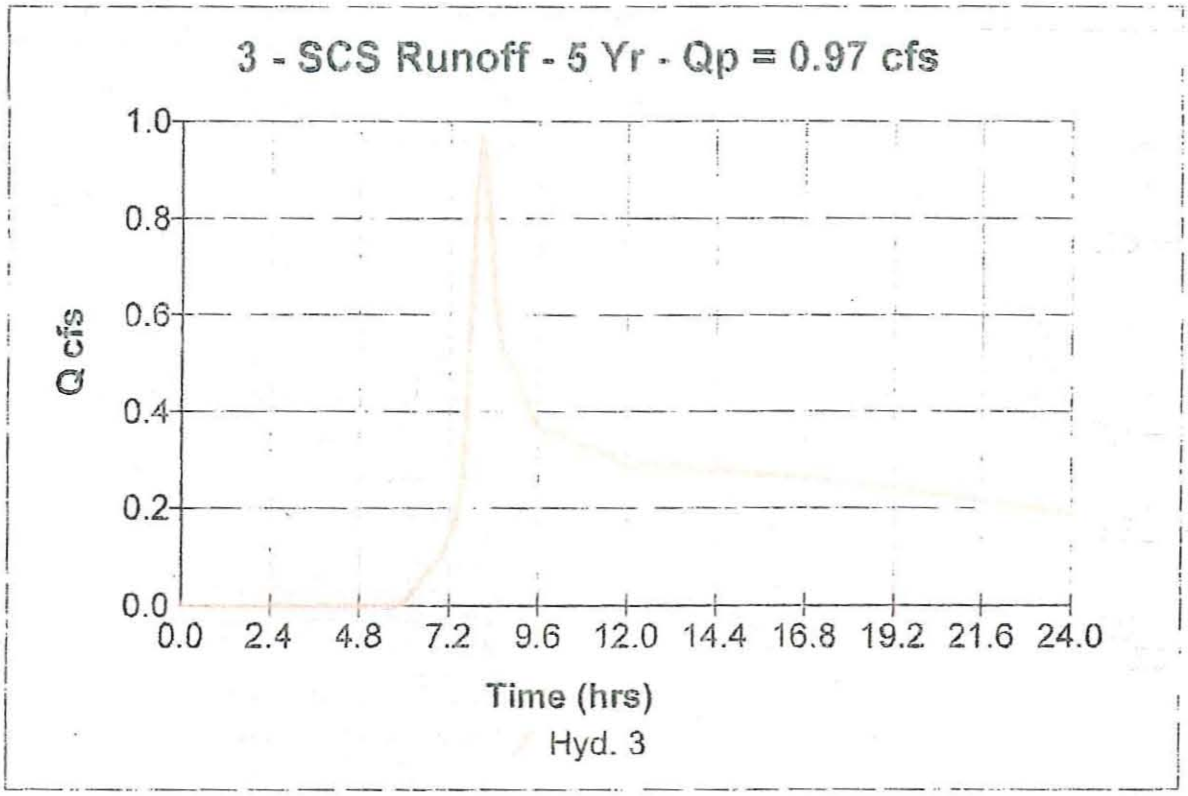
Hydraflow Hydrographs by Intelisolve

Hyd. No. 3

developed lots Sub Area 3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.97 cfs
Storm frequency	= 5 yrs	Time interval	= 2 min
Drainage area	= 4.60 ac	Curve number	= 79
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.3 min
Total precip.	= 2.86 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.424 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Hyd. No. 9

Sub Area 13

Hydrograph type	= SCS Runoff	Peak discharge	= 0.16 cfs
Storm frequency	= 5 yrs	Time interval	= 6 min
Drainage area	= 2.30 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.2 min
Total precip.	= 2.86 in	Distribution	= Type IA
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 0.115 acft

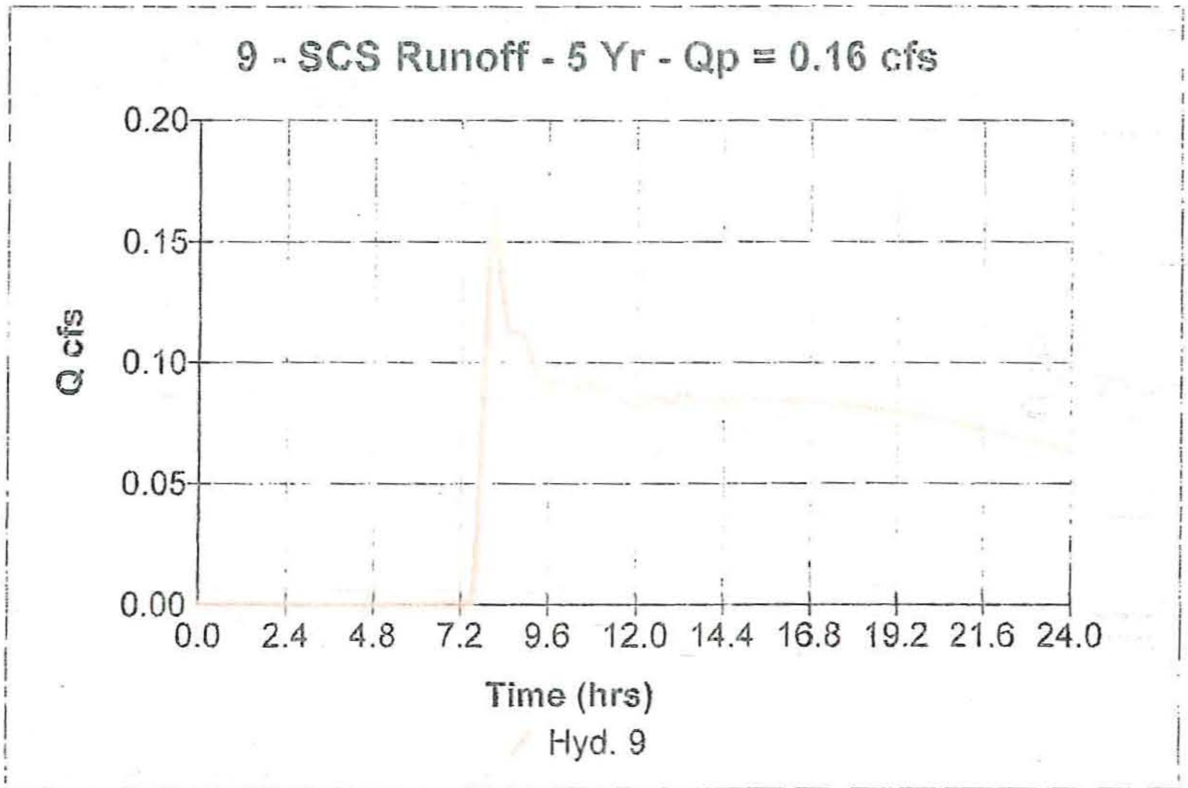


Table 1: Data Summary

	5 year	10 year	25 year	50 year	100 year
Pre-developed	0.35 0.29	0.60 0.51	0.89 0.87	1.27 1.18	1.59 1.5
Developed	0.65 .97	0.95/1.4	1.38/1.9	1.72 2.4	2.12 2.87
Detention outflow	0.35	0.53	0.87	1.16	1.59
Peak Height above outlet (Main detention)	1.27	1.64	2.13	2.51	3.54
Peak Height above outlet (Lot detention)	0.47	0.81	1.40	2.49	3.18

accepted

Red figures calculated by GGB

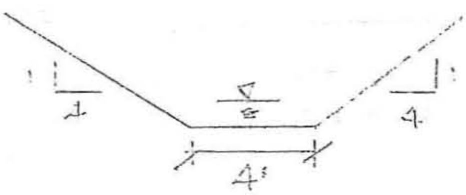
Water Quality Swale

Design Criteria — $b = 4.0'$ $SS = 4:1$, $S_o = 0.02$

minimum Residence = 9 min. $n = 0.25$ Max. Vel = 3'/sec.

→ Rev. page 5, W.Q Report by K & D Engr. dated Oct. 31, 1998

Length = 195 L.F. ; Q_{25} [illegible] 0.65'/sec.



Trial 1 $Q_2 = 0.29\,cfs$

$Q_{10} = 5.2$ cfs

$$K' = \frac{Qn}{b^{8/3} s^{1/2}} = \frac{5.2\,(0.25)}{40.3\,(0.1414)} = 0.228 \qquad \frac{D}{b} = 0.255$$

(.29) (.0127) (.055)

$D = 1.02'$ 0.22

$A = 8.08^{\square'}$ $V = 5.2/8.08 = 0.64'/sec$ (.29) (.27) $t = 195/.64\ ft/sec = 304.7\ sec$ (722)

$9 > 5.0$ min.

$9 < 12$ min

Trial 2

Q_{25} 8.18 $K' = \dfrac{8.18\,(0.25)}{40.3\,(0.1414)} = 0.3589$ $D/b = 0.315$

$D = 1.26'$

$A = 11.69^{\square}$ $V = \dfrac{8.18}{11.69} = 0.70'/sec$ $t = $ [illegible]

Trial 3

Q_{100} [illegible] $K' = 0.585$ $D/b = 0.395$ [illegible]

PROJECT: FABIAN ESTATES

CLIENT: JOB#: [illegible]

DESIGNER: [illegible] DATE: [illegible]-98 PAGE#: [illegible]

AEI ▲ Plaza West, Suite 230 ▲ 9600 SW Oak ▲ Portland, Oregon 97223 ▲ tel. 503.452.8003 ▲ fax. 503.452.8043

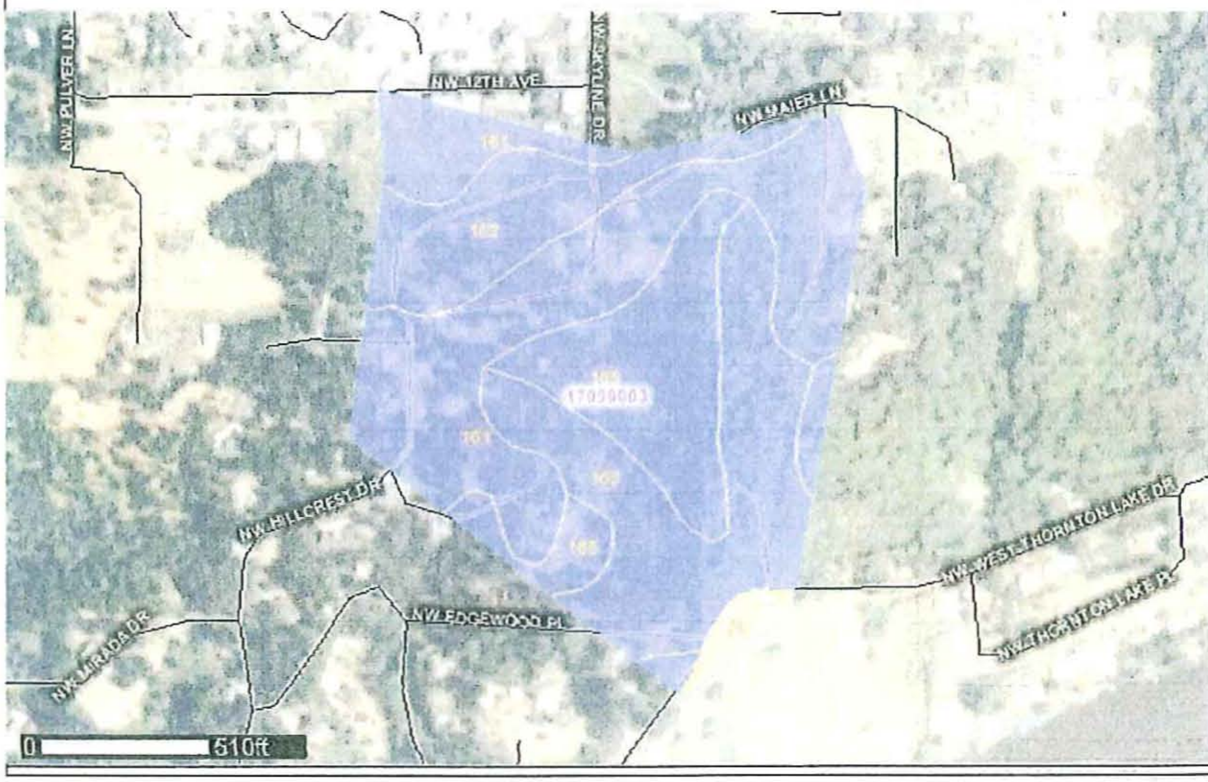
Area of Interest (AOI) | Soil Map | Shopping Cart

View Soil Information By Use: Urban Uses

Printable Version | Add to Shopping Cart

Intro to Urban Uses | Suitabilities and Limitations for Use | Soil Reports

Scale



Open All | Close All

Soil Chemical Properties

Soil Erosion Factors

Soil Physical Properties

- Available Water Capacity
- Available Water Supply, 0 to 100 cm
- Available Water Supply, 0 to 150 cm
- Available Water Supply, 0 to 25 cm
- Available Water Supply, 0 to 50 cm
- Bulk Density, 15 Bar
- Bulk Density, One-Tenth Bar
- Bulk Density, One-Third Bar
- Linear Extensibility
- Liquid Limit

Summary by Map Unit — Benton County, Oregon

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
61	Dupee silt loam, 3 to 12 percent slopes	C	0.9	2.1%
161	Wellsdale-Willakenzie-Dupee complex, 2 to 12 percent slopes	B	16.5	37.8%
162	Wellsdale-Willakenzie-Dupee complex, 12 to 20 percent north slopes	B	5.7	13.0%

- Organic Matter
- Percent Clay
- Percent Sand
- Percent Silt
- Plasticity Index
- Saturated Hydraulic Conductivity (Ksat)
- Saturated Hydraulic Conductivity (Ksat), Standard Classes
- Surface Texture
- Water Content, 15 Bar
- Water Content, One-Third Bar

Soil Qualities and Features

- AASHTO Group Classification (Surface)
- Depth to a Selected Soil Restrictive Layer
- Depth to Any Soil Restrictive Layer
- Drainage Class
- Frost Action
- Frost-Free Days
- Hydrologic Soil Group

View Description | **View Rating**

View Options

Map

Table

Description of Rating

Rating Options

Detailed Description

Advanced Options

Aggregation Method: Dominant Condition

Component Percent Cutoff

Tie-break Rule: Lower / Higher

View Description | **View Rating**

- Map Unit Name
- Parent Material Name
- Representative Slope
- Unified Soil Classification (Surface)

Water Features

165	Willakenzie loam, 20 to 30 percent slopes	B	8.5	19.5%
166	Willakenzie loam, 30 to 60 percent slopes	B	11.1	25.5%
167	Willakenzie-Wellsdale complex, 12 to 20 percent south slopes	B	0.9	2.0%
Totals for Area of Interest (AOI)			**43.6**	**100.0%**

Description — Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options — Hydrologic Soil Group

Aggregation Method: Dominant Condition

i. a water table at the surface (0.0 feet) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or

ii. a water table at a depth of 0.5 foot or less during the growing season if saturated hydraulic conductivity (Ksat) is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches, or

iii. a water table at a depth of 1.0 foot or less during the growing season if saturated hydraulic conductivity (Ksat) is less than 6.0 in/hr in any layer within a depth of 20 inches.

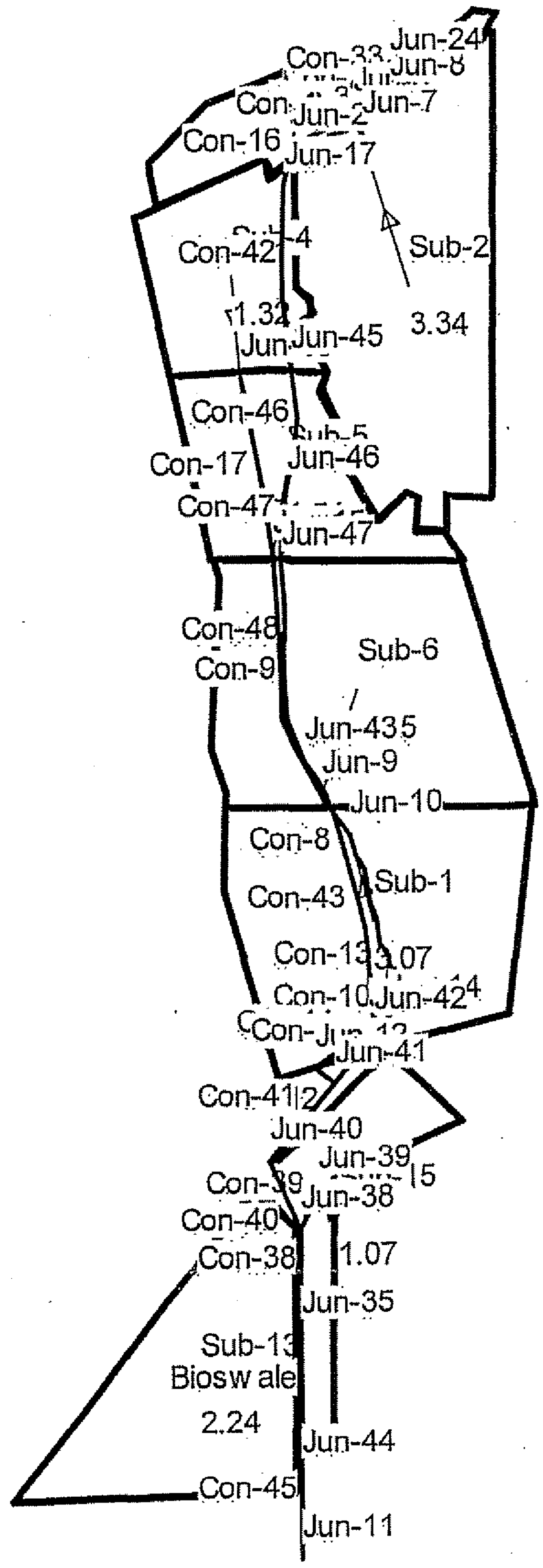
3. Soils that are frequently ponded for long or very long duration during the growing season.

4. Soils that are frequently flooded for long or very long duration during the growing season.

References:

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.
Federal Register. September 18, 2002. Hydric soils of the United States.
Federal Register. July 13, 1994. Changes in hydric soils of the United States.
Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.
National Research Council. 1995. Wetlands: Characteristics and boundaries.
Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.
Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.
Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.
Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.
United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

Downstream System



Element Labels

98

Fabian Estates
06-83 E
Sheet 13a MH #2 Hydraulic
Jump Calc

MH #2 w/ 18" out

Assume worst case scenerio where water is slowed to 0 ft/sec in manhole before discharging into 18" pipe

Normal Depth of 18" = 5.04" = 0.42'

$V_1 = 14.17$ ft/sec
$V_2 = 5.17$ ft/sec

Entrance Loss $= \frac{V^2}{2g} = \frac{(14.47 \frac{ft}{sec})^2}{2 \cdot 32.2 \frac{ft}{sec^2}} = 3.25'$

Exit loss $= 0.5 \frac{V^2}{2g} = 0.5 \cdot \frac{5.17^2}{2 \cdot 32.2} = 0.21$

Total loss = 3.46

Total Depth = 0.42' + 3.46 = 3.88'

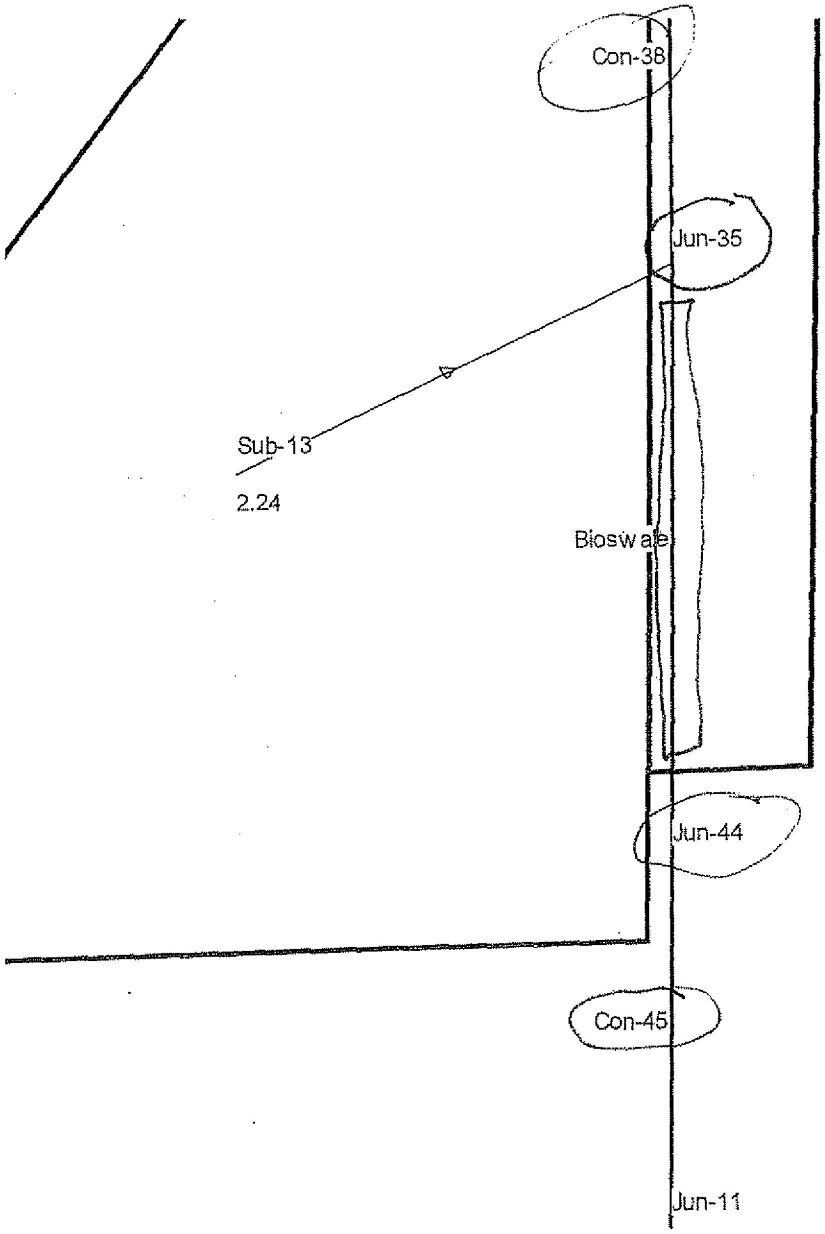
MH Depth = 4.18'
Water will not exceed the limits of the MH
But it is recommend that a bolt down lid be installed

$A = 18" = 1.767^{\square'}$

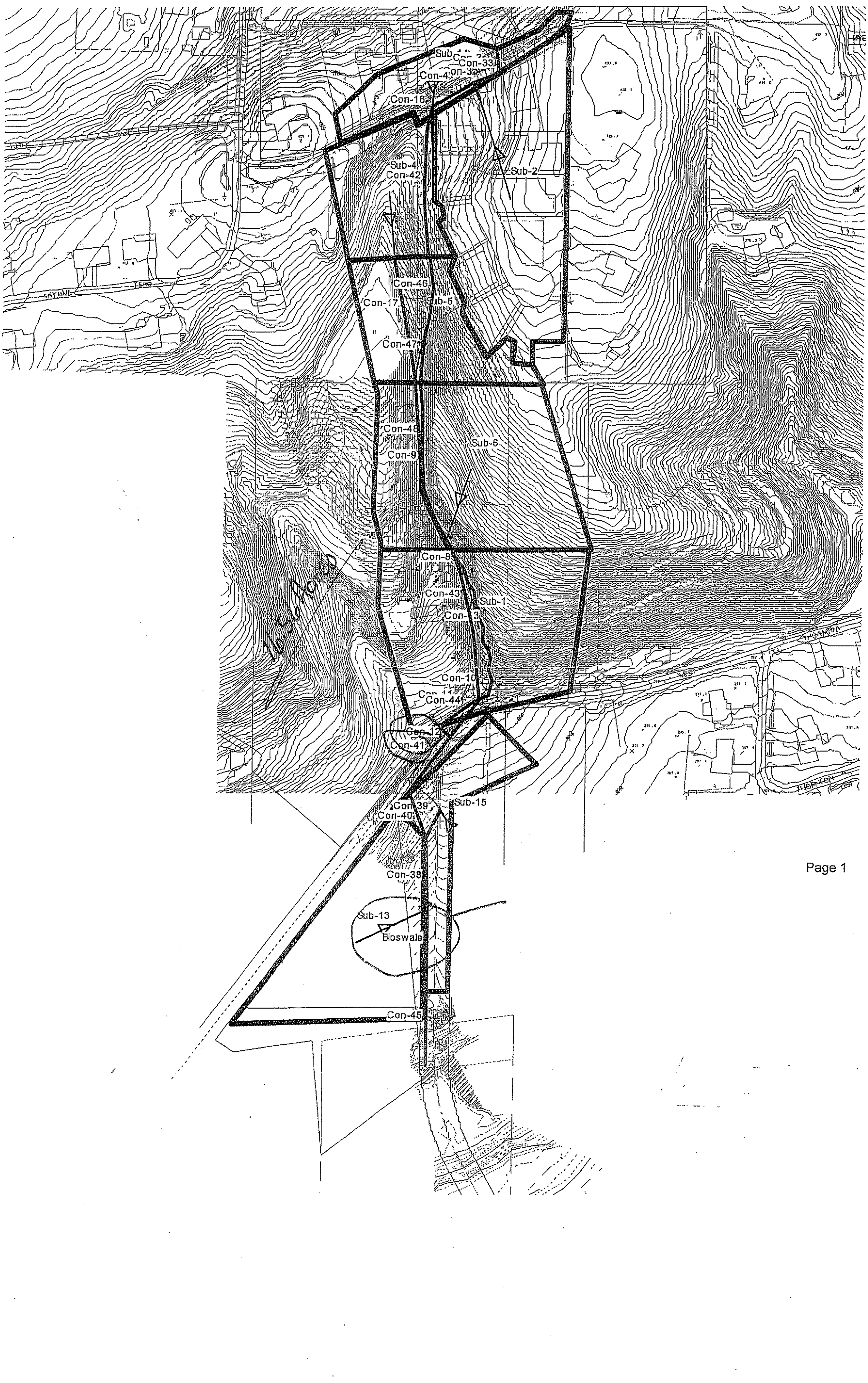
$Q = V \cdot A$
$5.17(1.767) = \underline{9.14 \text{ cfs}}$

Event interval?

Downstream System



Downstream System



Page 1

October 20, 2008

Review Committee and Members of the
Oregon Watershed Enhancement Board
775 Summer Street NE, Suite 360
Salem, Oregon 97301-1290

To All Concerned:

CITY OF ALBANY APPLICATION—EAST THORNTON LAKE NATURAL AREA

The City of Albany and the many partners of the East Thornton Lake Natural Area project are pleased to submit this request for $2,400,000 from the OWEB Acquisition Grant Program. This request is made to support the City's acquisition and restoration of approximately 24.2 acres on Thornton Lake, a historic oxbow lake of the Willamette River.

The subject property has already been approved for 78 home sites by the City, making this application timely and urgent. Of course, we have included in the application packet a letter of support from the current owner of the site.

I'm sure you'll agree that this project appears to have tremendous support from citizens, professionals, resource organizations, and the Albany City government. We are excited about the prospect of saving and restoring this extremely valuable natural resource for the environmental, cultural and educational benefit of future residents of Albany and Benton County.

We hope you will find this request worthy of your support and funding. Please do not hesitate to contact me with questions.

Sincerely,

Ed Hodney

Ed Hodney, Director of Parks and Recreation

OREGON WATERSHED ENHANCEMENT BOARD
775 Summer Street NE, Suite 360
Salem, OR 97301-1290
(503) 986-0178
Fax: (503) 986-0199

OWEB

LAND ACQUISITION GRANT APPLICATION

Revised
August 2008

DOWNLOAD COMPLETE INSTRUCTIONS SEPARATELY

GENERAL INSTRUCTIONS

Answer the questions in Sections I and II by typing in the information requested or by reproducing the pages on your computer. In Section III, provide answers to the questions in subsections A through F. ***Use 8½"x 11" single-sided, unstapled pages and the spacing and layout provided. Avoid color and detail that will not photocopy clearly.*** Complete and attach the required attachments, budget, land use, and legal requirements documentation.

A down-loadable electronic application form can be obtained by visiting the OWEB website at *www.oregon.gov/OWEB*

OWEB's "Land Acquisition Grant Application Guidance" explains OWEB's policies related to land acquisition grant applications and describes the evaluation criteria used to make funding decisions. It also provides examples of the information being requested. **Please read the Guidance documents before beginning your application.**

SUBMISSION OF GRANT APPLICATIONS

Grant applications may be submitted to OWEB at any time.
To learn of the next deadline and review schedule, please contact OWEB staff or visit www.oregon.gov/OWEB

Section I

APPLICANT INFORMATION

Please type in the information on pages 1 and 2 **(using the spacing and layout shown)**
NOT TO EXCEED 3 PAGES

Name of project: East Thornton Lake Natural Area

Project location:

	Thornton lake	Benton
Watershed	**Sub-Watershed/Stream Name(s)**	**County**
11S-4W-1AA, 11S-3W-6BB	Albany	
Township Range Section(s)	**City (if applicable)**	

OWEB dollars requested: $2,400,000.00 **Total cost of project:** $3,200,000.00

Applicant Name: City of Albany **Phone:** 541/917-7769 **Fax:** 541/917-7776

Applicant Contact: Ed Hodney **Email:** ed.hodney@cityofalbany.net

Applicant Address: 333 Broadalbin	Albany	97321
Street	**City**	**Zip**
Mailing Address (if different): P.O. Box 490	Albany	97321
Street	**City**	**Zip**

Applicant Website Address: www.cityofalbany.net

Applicant Organization Type: ☒ Local Government ☐ Non-Profit ☐ Tribe
☐ Watershed Council ☐ Soil and Water Conservation District ☐ Individual

Technical Contact (main contact – if different than applicant): Mark Azevedo

Email: azevedom@onid.orst.edu **Phone:** 541 990-4574 **Fax:** 541 738-4160

Proposed Holder of the Property Interest (if different than applicant/technical contact):

Email: **Phone:** **Fax:**

Address:
Street **City** **Zip**

Section II
PROJECT SUMMARY

Project Type – Check the primary type of activity proposed:

	Protection: Out of Production	**Restoration & Protection:** Out of Production	**Restoration & Protection:** Working Farm, Ranch or Forestland
Fee Simple Acquisition	☐	☒	☐
Conservation Easement	☐	☐	☐
Lease	☐	☐	☐

Short Description of Project

Describe the proposed acquisition(s) including project type, acreage, purchase price, amount requested from OWEB, the conservation need addressed by the project, and the conservation goals of the project. Please use 200 words or less.

The City of Albany seeks to secure a 24.2 acre transition area known as the East Thornton Lake Natural Area (ETLNA) from development into 78 residential home sites. The site is a remnant oxbow of the Willamette River within the City of Albany in Benton County and is on the urban fringe of North Albany. Acquisition and restoration will:

- Stabilize critical breeding habitat for Western Pond and Painted turtles.
- Prevent ecosystem degradation for Northern Red-Legged frog, Western Grey Squirrel, Short-eared Owl, Acorn Woodpecker, White-breasted Nuthatch, American Bittern, Dusky Canada Goose and Western Meadow Lark.
- Protect and restore recognized priority habitats such as Fresh-water Aquatic beds and emergent marshes, riparian forest and shrub lands and Western Oregon upland Prairie and oak savanna.
- Protect and enhance an area with exceptional biodiversity that contains rare or at-risk plant communities, threatened fresh-water mussels and juvenile salmonids feeding habitat.
- Establish a small (3-4 acre) park at the west edge of the site to provide public access for passive recreation and the interpretation of environmental, cultural, and historical values associated with the site.

Acquisition cost is $3,200,000, of which $2,400,000 is requested from OWEB. Partners and in-kind donations have been identified to assist in conservation and restoration efforts. This project complements and supports local and regional efforts in protection and restoration of priority habitats and fish and wildlife species. It provides open space protection and connectivity within the watershed.

Timeline

Describe the timelines for the project, including purchase. If there is an option to purchase or lease, when does it expire? If match is not yet secured, when are match funding decisions anticipated? If applicable, describe the timeline for development of a management plan, restoration activities, and a monitoring schedule.

The Trust for Public Land is entering into an option to purchase the project site on behalf of the City of Albany. The City's match has not yet been fully secured. The City intends to trade an undeveloped public property to the seller in exchange for a reduction in the sale price of the proposed East Thornton Lake Natural Area. The City-owned property is appraised conservatively at $500,000.

The City also plans to submit a funding request to the Oregon Parks and Recreation Department in April 2009 for a $300,000 Local Government Program (LGP) grant. This grant would be awarded in July 2009. The City will secure the required local match for the LGP grant with $250,000 from the Parks System Development Charges Fund and $50,000 in private cash donations. A commitment of a gift of $10,000 has been made by a local resident.

The Greenbelt Land Trust has agreed to work in an advisory capacity with the City and other stakeholders to assist in preparation of a site management and restoration plan. We expect that the work on the plan will commence with the purchase of the site. The plan will be implemented within one year of the acquisition of the site.

Section III

SPECIFIC PROJECT ACTIVITY

USE 8½" x 11" SINGLE-SIDED PAGES

LAND ACQUISITION PROJECT

Please answer the following questions. If there are multiple locations or properties, be specific for each site or property.

A. Ecological Benefits of the Project

The ecological value of a proposed land acquisition project will be evaluated, in part, by reference to the "OWEB Ecological Priorities for Land Acquisition by Basin" (Basin Ecological Priorities) adopted by OWEB on September 14, 2004. Copies of the Basin Ecological Priorities are available from OWEB's main office at 775 Summer Street NE, Suite 360 in Salem, Oregon, or on OWEB's website at www.oregon.gov/OWEB.

1. **List the priority habitat(s), plant communities, and species identified in the Basin Ecological Priorities the proposed project seeks to protect or restore.**

   Priority Habitats: Freshwater aquatic beds, Freshwater emergent marshes, Riparian forest and shrublands, Western Oregon upland prairie and oak savanna (currently fallow farm land which was described as scattered oak and yellow (Ponderosa) pine and red (Douglas) fir in the original 1850 Land Donation Claim Act survey (Attachment #1). All three of these habitat types (wetland, Bottomland hardwood forests and oak savanna) have been identified as broad-scale conservation priorities by the Oregon Biodiversity Project.

   Rare or at risk plant communities- White oak/poison oak/blue wildrye (to be restored), Oregon ash/Dewey sedge-stinging nettle, Black cottonwood - red alder / salmonberry, Pacific willow/stinging nettle, Water purslane/water pepper marsh, Dense sedge-tufted hairgrass, Tufted hairgrass-California oatgrass valley prairie (to be restored), and Lobb buttercup aquatic bed.

   Priority Species- Western Painted Turtle, Western Pond Turtle, Northern Red-legged Frog, Western Grey Squirrel. Acorn Woodpecker, Short-eared Owl roosting habitat, American Bittern, Chipping Sparrow, Hooded Merganser, White-breasted Nuthatch, American Kestrel, Dusky Canada Goose and Western Meadowlark (Attachments #2, #3). Fresh water mussels are being identified by Xerces Society staff to determine specie(s) present in the lake. Historically, juvenile salmonids existed in this Willamette river oxbow. Minor alterations to the Willamette river seasonal channel to the lake, combined with onsite restoration efforts, could increase water quality and provide habitat complexity for the reintroduction or enhancement of juvenile salmonid and other anadromous fish populations in Thornton Lake.

2. **Describe the approximate <u>number of acres and stream miles</u> protected on the property containing priority habitat(s), plant communities, and species identified in the Basin Ecological Priorities.** If the number of acres on the property containing priority habitat(s), plant communities, or species is less than 50 percent of the total property acreage, describe why the entire property interest is proposed for acquisition. For stream miles protected include the number of stream miles involved and identify whether both sides of the stream are within the boundary of the property to be acquired.

   The site consists of two tax lots (Benton County Tax Assessor's Map 11S-4W-1AA Tax Lot 2100 (21.10 acres) and Map 11S-3W-6BB Tax Lot 1400 (3.07 acres)) totaling 24.2 acres. Thornton Lake consists of two distinct but continuous sections. The west end of the lake extends from the historic channel from the Willamette River to the bridge on North Albany Road. The east end of the lake extends from the bridge to the east. Residents of the area refer to "West" and "East" Thornton Lakes as a way to describe the two sections. The property identified for acquisition is located south of East Thornton Lake. Tax lot 2100 extends from North Albany Road to the east approximately 1600 feet. This is 30% of the entire length of both "East and West" Thornton Lake and about 70% of the south shore of "East" Thornton Lake.

   The lake bottom consists of about 4.25 acres of the entire site, while the wooded riparian along the south bank represents an additional 3.7 acres. In total, approximately 8 of the 24.2 acres is directly associated with the lake and represents 33% of the entire site. The remainder of the site is fallow farmland which is relatively flat with some swales which contain perched water in the winter months. This area of the site was described as scattered oak and yellow (Ponderosa) pine and red (Douglas) fir in the original 1850 Land Donation Claim Act survey. Oregon white oak trees can be found on the outer edge of the wooded riparian and seedlings of white oak are beginning to establish in the adjacent fallow land. We intend to restore the fallow 16 acres of the land to an Oregon white oak savanna with under story plants that would have been managed, harvested and used by the Calapooia Indians who surely used the site pre-white settlement (see attached e-mail from Dr. Dennis Griffin S.H.P.O. (Attachment #4) and list of plants and animals used by the Calapooia peoples provided by Eric Thorsgard of the Confederated Tribes of Grand Ronde (Attachment #5).

3. **Describe the proposed project's consistency with one or more of the following Conservation Principles**, which are described in the Basin Ecological Priorities:

   A. Protect a large, intact area, or
   B. Stabilize an area "on the brink" of ecological collapse, or
   C. Secure a transition area, protecting it from development, or
   D. Require active restoration to achieve its conservation purpose that would not occur without a change in ownership, or
   E. Protect a site with exceptional biodiversity value, or
   F. Improve connectivity of habitat, or
   G. Complete or complement an existing network of sites in the basin or region.

   This proposed project is consistent with Conservation Principles B, C, D, E, F and G.

B. *Stabilize an area "on the brink" of ecological collapse* – The owner of the property is a real estate broker who purchased the property as an investment for development. The site was approved for subdivision into 78 residences by the Albany City Council in December of 2007. The approval was appealed to the State Land Use Board of Appeals and remanded back to the City in August, 2008 (see LUBA No. 2008-020). The owner of the property will develop the site if the City of Albany is not able to exercise its purchase option by the specified deadline. Development would negatively impact nesting habitat for priority species of turtles, birds, amphibians, and reptiles. Restoration of this site may be a catalyst for acquisition of nearby parcels for conservation and watershed enhancement. Development of the site would result in ecological collapse of those areas developed.

C. *Secure a transition area, protecting it from development* - The East Thornton Lake site is part of an old oxbow of the Willamette River and is connected to the river by a seasonal channel. This channel connects the Willamette into the extreme west end of the lake and acts as a wildlife corridor. Virtually all but the largest species of native, forest-dwelling wildlife inhabiting Benton County can move freely from the Willamette River Greenway (to the south and west of the proposed acquisition site) to Thornton Lake and the adjacent Gibson Hill area. The south slope of Gibson Hill is largely intact Oregon white oak/madrone/fir/maple woodland. The East Thornton Lake property provides sanctuary for wildlife from the surrounding developing urban landscape found to the south and east of the Lake system. Acquisition will lead to a long-term positive watershed and wildlife outcome by restoring watershed processes with seasonal flooding of slack water salmonids feeding habitats and protecting critical habitat.

D. *Require active restoration to achieve its conservation purpose that would not occur without a change in ownership*- The site consists of three distinct but contiguous habitat types: 1. Lacustrine (freshwater aquatic) - Active restoration of the lake will remove invasive non-native species, enhance water quality and protect the existing habitats for priority and at-risk species of fish, turtles, mussels and amphibians. 2. Palustrine consisting of adjacent bottomland hardwood/softwood riparian zone along the lake bank - Acquisition will lead to restoration of native plants and removal of invasive species such as blackberry. 3. Fallow farm land – Restoration of oak savanna can only be accomplished through acquisition. Oak seedlings are currently attempting to re-establish in the grass field. Restoration would assure the repopulation of these seedlings and other historically accurate plant species. This site could also be restored to include priority species such as the Willamette Valley Daisy, Kincaid's Lupine and Fender's Blue Butterfly.
Acquisition and restoration will conserve and restore a variety of habitat types and re-connect habitat fragments which would support the entire life-history needs of fish and wildlife; it will ensure long-term management of critical habitats and species.

E. *Protect a site with exceptional biodiversity value*- The site contains aquatic habitat which currently supports breeding populations of both the Western Pond and Painted Turtles, Oregon's only native turtle species. It is very rare to find sites in the Willamette Valley that support breeding populations of both native turtle species, which are now considered imperiled in much of their historic range. The aquatic habitat also provides habitat for numerous other wildlife including fresh water mussels, beaver, river otter, osprey, great horned owls, neo-tropical migratory songbirds, wading birds, migratory waterfowl, large and small mammals, reptiles and amphibians, including the Northern Red-legged Frog.

Preliminary plant surveys have documented extensive patches of native shrubs such as willow and dogwood along the lake margins, as well as a diverse array of emergent and floating aquatic plant species including wapato, simplestem burreed, floatingleaved pondweed, numerous sedges and rushes, water purslane, and two species of pond lilies. Wapato was historically a staple of the diet of some Native American tribes in the Willamette Valley, and traded extensively. Wapato is also an important food source for tundra swans and other wildlife. These native plants contribute to the biodiversity and are important components of the priority aquatic ecological systems found on site.

The adjacent riparian forest and shrub land zone over story is composed of ash, bigleaf maple, cottonwood, Douglas fir, red alder and Oregon white oak, which provides cover, nesting, roosting and feeding habitat for a host of species including woodpeckers, raptors, large and small mammals, great horned owls, osprey, amphibians and reptiles. This habitat also overhangs and shades the lake and provides habitat complexity and diversity. This in turn reduces predation, provides partially submerged snags used as basking sites by native turtles, increases feeding and resting opportunities for aquatic and terrestrial animals such as herons and river otters, and increases the scenic quality of the site. The fallow farm land will be restored to oak savanna with native trees, grasses, wildflowers and plants, many of which were traditionally used for food and basketry by the Calapooia Indians. The oak savanna will provide critically important habitat for priority wildlife species including turtles, Western Meadowlark and American Kestrel. This unique mixture of distinct but contiguous habitats all exists on a 24.2 acre site within the City of Albany and less than a mile from the Willamette River Greenway.

F. *Improve connectivity of habitat-* The East Thornton Lake site is part of an old oxbow of and is connected to the Willamette River Greenway by a seasonal channel which acts as both an aquatic and terrestrial wildlife corridor between the two bodies of water and the adjacent hillside. Acquisition of the property retains an important wildlife linkage between the east and west ends of the lake which would be lost with subdivision and development of the property. Acquisition will also improve connectivity of habitat by restoring the upland field adjacent to the riparian forest and aquatic systems to Oregon white oak prairie/savanna which will provide crucial habitat for a host of priority species including nesting turtles.

The Benton Soil and Water Conservation Fish Passage Program will be evaluating the historic channel between the Willamette River and the Thornton Lake system. Barriers to fish passage will be identified and the feasibility of increasing the quantity and quality of Willamette River water moving through the channel to the Lake will be determined. The City is evaluating the feasibility of creating a wetland mitigation bank site on the lower portion of land near where the historic channel leaves the river (Attachment #6). This potential offsite project will enhance complexity to the channel; improve both terrestrial and aquatic quality and quantity and provide multiple benefits for a variety of native fish species including ESA- listed spring chinook and winter steelhead, cutthroat trout, and Pacific lamprey.

G- *Complete or complement an existing network of sites in the basin or region*--East Thornton Lake Natural Area (ETLNA) would complement those nearby sites which provide oak savanna and upland prairie habitat for priority species such as the Owens Farm North of

Corvallis (contains oak savanna and is managed by the Greenbelt Land Trust) and lands in Benton County identified in the county's Multi-Species Habitat Conservation Plan (includes both public and private lands).Benton County supports an estimated 13% of the remaining prairie, savanna, and oak habitat in the Willamette Valley. These lands are home to a number of endemic Willamette Valley plants, invertebrates, and vertebrate species that are federally listed under the Endangered Species Act, considered candidate species, or species of concern. The ETLNA's oak savanna and upland prairie restoration would complement these other efforts and provide a convenient nearby restoration ecology educational opportunity for the community.

ETLNA would enhance those nearby sites which provide fish habitat restoration projects like the Calapooia Watershed Council's efforts to remove fish barriers and improve salmonid habitat in the nearby Calapooia watershed, the City of Albany's Simpsons Park wetland mitigation project and Cox Creek Restoration. Bowers Rock State Park is just upriver on the Linn County side of the Willamette River and is currently being evaluated by the Willamette Riverkeepers for improving slack-water habitat and connectivity to the Willamette River. Together, these projects strengthen and improve fish habitat in the Willamette basin adjacent to Albany. Several current or planned floodplain and river reconnection projects in the Willamette Valley complement and are consistent with this project. These include projects at the mouth of the McKenzie River, Bowers Rock, Luckiamute State Natural Area, and Mission Bottom.

The East Thornton Lake Natural Area would also supplement existing sanctuaries in the Mid-Willamette Valley for migratory waterfowl, shorebirds, birds of prey, songbirds and neotropical birds. These sites include the nearby City of Albany's Simpsons Park, the Jackson-Frazier Wetland outside Corvallis, the E. E. Wilson Wildlife Refuge which is 10 miles North of Corvallis and around 5 miles from Thornton Lake, Basket Slough and Finley Wildlife Refuges and the Willamette River Greenway which is less than 1 mile from the site and is contiguous with it. Attachment # 7 is a map which identifies the existing network of conservation sites in the region.

4. **Describe how the proposed project will benefit the priority habitat(s), plant communities, and species listed above.**

Through acquisition, the priority habitats, plant communities and priority species at ETLNA will be permanently protected. Following acquisition, restoration goals and objectives developed for the site will be implemented which will benefit the habitats and species in numerous ways. For example, one of the primary goals of the proposed project is to protect and restore the biological diversity that historically occurred on the site. Key elements of this goal will include: 1) re-establishing native plant communities including the oak savanna and prairie habitats; and 2) removal of invasive species such as yellow flag iris in the aquatic habitat that compete with native wetland plants found on the site including Wapato and Simple-stem bur-reed.

It is estimated that oak savannas originally covered over 1.5 million acres in the Willamette Valley, and historically supported a diverse array of unique plants and wildlife. Currently, it is estimated there is approximately 200,000 acres, but the remaining acreage has been highly degraded by invasive species. Restoration of the fallow field to oak savanna will benefit a host of plant and wildlife species including a number of priority plant communities and wildlife such as white oak/poison oak/blue wildrye, Western Meadowlark, Oregon Vesper Sparrow, American Kestrel, and Western Painted and Pond Turtles. Benefits will include development of high quality food, cover and nesting habitat to species in severe decline in parts of Oregon. Loss of nesting habitat for both the Western Painted and Pond Turtles has been identified as a key limiting factor for the conservation of these species in the Willamette Valley. Turtles have been documented nesting on private land adjacent to East Thornton Lake on what is considered marginal nesting habitat and these sites are not permanently protected. Through restoration of the oak savanna habitat, this project will permanently protect and restore high quality nesting habitat for both turtle species which will contribute to their long term conservation.

Removal of invasive species such as English ivy and planting of native plant species in the Riparian Forest adjacent to Thornton Lake will benefit priority species such as Acorn Woodpecker and White-breasted Nuthatch by greatly increasing the quality of essential food, cover and nesting habitat for these and other priority wildlife species. In addition, the Riparian Forest currently offers a number of dead, decaying trees which provide food for woodpeckers and nest cavities for Hooded Mergansers, also a priority species.

During the summer months, the lake attracts a wide array of flying insects which in turn support a sizable seasonal bat population. Acquisition would allow for baseline studies to determine species composition and best management practices for the bats.

Removal of invasive species in the aquatic habitats will increase both the quality and quantity of these habitats as well as increase plant species diversity. Competition from invasive plants will be reduced or eliminated and over time will allow for native plant communities, such as the Lobb buttercup aquatic bed, to become established and flourish. This project will allow for the permanent protection as well as an increase in these important habitat components which would not occur without acquisition and restoration. Overall, biological diversity at the ETLNA will greatly increase and will thus benefit the priority habitats, plant communities and fish and wildlife species listed previously under section A.

5. **Describe the relative importance of the proposed acquisition's habitat and species values at the subwatershed, watershed, basin, and ecoregion levels.** Why do you believe the habitat and species values of the proposed acquisition should be a high priority for OWEB?

   The East Thornton Lake Natural Area should be a high priority for OWEB because: At the sub-watershed level the site provides (or will provide in the case of Oak savanna) three contiguous but distinct habitat types which are in severe decline throughout the basin due to rapid urbanization. Of the estimated 1.5 million acres of oak savanna that occurred historically in the Willamette Valley, approximately 200,000 acres remain. The site also contains riparian forest and shrub habitat which supports a diverse assemblage of wildlife. Riparian habitat, which supports the greatest number of neotropical migratory land birds in Oregon, is considered by Oregon Department of Fish and Wildlife (ODFW) to be one of four priority habitats where statewide conservation and management efforts are needed, since it appears to have more species with declining than increasing population trends (Andelman and Stock, 1994). In the Willamette Valley riparian forests have been reduced to approximately 50% of their original acreage.

As stated earlier, it is very rare to find sites in the Willamette Valley that support breeding populations of both native species of turtles. The ETLNA is one of a handful of sites where both native turtle species occur and where nesting activity has been documented (on nearby private land). With restoration of the fallow farm field to oak savanna, nesting habitat for turtles would be restored on public land that would be permanently protected and that would have far less disturbance. This project offers the unique opportunity to protect and restore habitats for turtles that will meet all their life requirements.

Numerous efforts in the past 15 years at the basin or subbasin level have identified priority or focal habitats and species that should be protected and restored in order to increase the overall health and biodiversity of the Willamette River system. For example, the Willamette Subbasin Plan, prepared for The Northwest Power and Conservation Council in 2004, identified Focal habitats and species that include those found or for which restoration is proposed at East Thornton Lake Natural Area. These include Riparian Forest, Oak savanna, ponds and sloughs, Western Pond Turtle, Western Painted Turtle, Acorn Woodpecker, White-breasted Nuthatch, and Red-Legged Frog.

The Oregon Conservation Strategy (OCS), completed by ODFW in 2006, outlines a statewide strategy for protecting and restoring habitats and fish and wildlife species that include the Willamette Valley Ecoregion. The Strategy highlights specific actions that can conserve Oregon's fish and wildlife before they become sensitive or endangered. Habitats currently found at the ETLNA are identified as priority habitats under the OCS include Riparian forest and freshwater emergent marsh. In addition, oak savanna, which is proposed to be restored at ETLNA, is also a priority habitat under the OCS. Priority wildlife species that presently occur on site include Western Pond and Painted Turtles, Red-Legged Frog, Acorn Woodpecker, American Bittern, American Kestrel, Chipping Sparrow, Dusky Canada Goose, Hooded Merganser, Short-eared Owl, Western Meadowlark, and White-breasted Nuthatch. The proposed project contributes to and complements the OCS by proposing to conserve and restore a number of priority habitats and wildlife species that are declining throughout the ecoregion.

Attached is a table (Attachment #8) comparing OWEB priority species found at ETLNA to other regional conservation plans focal or strategy species.

6. **How does this proposed project relate to other restoration and protection efforts in the watershed?**

The East Thornton Lake Natural Area will complement conservation actions in the Willamette Valley Ecoregion by securing "conservation status through willing partnerships" for Oregon white oak savannas, wetlands and floodplain habitats as described by Pacific Coast Joint Venture Willamette Valley Implementation Plan and the Willamette Restoration Initiative.
(http://www.ohjv.org/pdfs/Willamette%20Valley%20draft%208-4-04.pdf).

The project will maintain riparian habitat and improve habitat complexity for birds of prey such as the Bald Eagle, Short-eared Owl and Osprey; waterfowl such as the Dusky Canada Goose and Hooded Merganser; shorebirds such as the American Bittern; Chipping

Sparrow and the Acorn Woodpecker as identified by the PIF Land bird Conservation Plan (http://www.pwrc.usgs.gov/pif/cont_plan/).

The East Thornton Lake Natural Area will restore floodplain interactions as recommended by the Willamette Restoration Initiative Willamette Subbasin Plan (2004). It will maintain or enhance off-channel habitat and pools as outlined in the Oregon Plan for Salmon and Watersheds.
(http://www.nwcouncil.org/fw/subbasinplanning/willamette/plan/Intro.pdf)

The Luckiamute Watershed Council is working with the OPRD and other partners to plan for channel reconnection and increase floodplain connectivity near the confluence of the Luckiamute and Santiam Rivers, a site just downstream from the ETLNA property. Both projects could increase winter rearing habitat for migratory winter steelhead and spring Chinook salmon.

The Calapooia Watershed Council has worked with their partners to remove barriers for anadromous fish on the Calapooia River. The ETNLA is within one-half mile of the Willamette River's confluence with the Calapooia River. This area has been highlighted in many Willamette Basin statewide recovery and prioritization plans.

The area is listed as Conservation Opportunity Area (WV-03, Willamette River Floodplain) by ODFW; "The section from the McKenzie River north to the Calapooia River has the greatest potential to return natural river function along the main-stem of the Willamette. This extensive reach supports the greatest aquatic biodiversity." This area has also been identified in other planning efforts by the Nature Conservancy Ecoregional Assessment and Willamette Basin Alternative Futures.
(http://www.esajournals.org/doi/pdf/10.1890/02-5011?cookieSet=1)

The City of Albany received an OWEB grant in 2003 for the fish ladder on Periwinkle Creek at Water Avenue. Large rocks were placed in Periwinkle Creek at Bowman Park to create a step-pool formation over an exposed sanitary main that was a fish passage obstruction. River cleanups, invasive plant removal, storm inlet marking, spill response, and other similar projects support water quality objectives. The City has provided $2,500 annually to each of the three watershed councils that we affect or are affected by (North Santiam, South Santiam, and Calapooia) in addition to staff time to attend monthly watershed council meetings and other events throughout the year.

In addition to the Thornton Lake project the City is engaged with and partnering with a local industry to create constructed wetlands adjacent to the oxbow area at the north end of Waverly Drive in Albany. In the primary stages of the total project, water discharged to the Willamette will be lower in temperature by 4 degrees Fahrenheit. In the final stages of that project, the water would not be discharged to the Willamette at all, but would be discharged to the Oxbow Lake system that is a backwater area of the Willamette River. The Oxbow area is currently in the early stages of eutrophication. The addition of cooler and cleaner water will have an inhibiting effect on this process and will enhance the diversity of the wildlife for both aquatic and terrestrial systems in and around the oxbow. An additional benefit to the Wetlands project is there would be a restoration of a cold water hyperaic zone on the north end of the project.

7. **If applicable, reference current conservation plans that identify the property, or the habitat, plant communities, and species on the property, as a protection or restoration priority**. Attach relevant pages (no more than 10 pages total) from these plans to the grant application.

Numerous efforts in the past 10 years at the basin or subbasin level have identified priority or focal habitats and species that should be protected and restored in order to increase the overall health and biodiversity of the Willamette River system. For example, the Willamette Subbasin Plan, prepared for The Northwest Power and Conservation Council in 2004, identified Focal habitats and species that include those found or for which restoration is proposed at ETLNA. These include riparian forest, oak savanna, ponds and sloughs, Western Pond Turtle, Acorn Woodpecker, White-breasted Nuthatch, and Red-Legged Frog. The plan can be found at: http://www.nwcouncil.org/fw/subbasinplanning/willamette/plan/

The Oregon Conservation Strategy (OCS), completed by ODFW in 2006, outlines a statewide strategy for protecting and restoring habitats and fish and wildlife species that include the Willamette Valley Ecoregion. Strategy Habitats identified for the Willamette Valley ecoregion include: oak woodlands, grasslands, wetlands, riparian, and aquatic habitats. The ETLNA site has all of these strategy habitats. Priority wildlife species that occur at the site include Western Pond and Painted Turtles, Red-Legged Frog, Western Bluebirds, White-breasted Nuthatches, Western Meadowlark and Acorn Woodpecker. With restoration efforts, many species listed by the OCS may be restored to the site. The OCS plan can be found at: http://www.dfw.state.or.us/conservationstrategy/document_pdf/b-eco_wv.pdf

The OCS Strategy highlights specific actions that can conserve Oregon's fish and wildlife before they become sensitive or endangered. Of particular interest in the Willamette Valley is maintaining and restoring fish and wildlife habitats in urban centers and conserving, restoring and reconnecting high value habitats. The proposed ETLNA project contributes to and complements the OCS by proposing to conserve and restore a number of priority habitats and wildlife species that are declining throughout the ecoregion.

The mission of the Oregon Plan for Salmon and Watersheds is to restore the watersheds of Oregon and to recover fish and wildlife populations of those watersheds to productive and sustainable levels. Goals include enhancement of habitat to support healthy populations of fish and wildlife throughout the state. Habitats identified in this plan include those found at the Thornton Lake site. In addition, fish and wildlife species identified in the Oregon Plan are also considered protection or restoration Priorities.
This plan can be found at: http://www.oregon-plan.org/

8. **If applicable, describe the watershed functions or water quality parameters the project proposes to directly affect, and the current condition and trend of watershed functions and water quality in the project area.**

The East Thornton Lake site is part of an old oxbow of the Willamette River. The lake is connected to the river by a seasonal channel which runs from the Willamette River through a wooded riparian, meanders through a grass field, crosses through a culvert under Highway 20 and connects into the extreme west end of the lake. During heavy winter and spring runoff, water moves from the river through a channel to the east end of the lake before it re-enters the Willamette River north of Albany.

Channelization of the Willamette River and destruction of its associated marshes and wetlands due to agricultural practices and urban development has led to a significant decrease in biological diversity and species composition throughout the watershed. Juvenile salmonids have been decimated by this loss of slack water feeding habitat.

Acquisition of the East Thornton Lake Natural Area site would lead to baseline studies and management plans to increase water flow during the late winter and early spring months from the Willamette River into Thornton Lake. ODFW have stated that this improvement of water flow and connectivity between the lake and river would provide critical slack water feeding habitat for juvenile salmonids (Attachment #9).

In Fall 2008, the Benton County Soil and Water Conservation District Fish Passage Program will assess connectivity between Thornton Lake and the Willamette River and determine steps necessary to improve fish passage. The City of Albany is determining if modifications can be made to the North Albany Road bridge, to improve water movement under the bridge. This improvement could provide cooler water to the partially isolated East end of the lake and decrease turbidity, thereby improving water quality to the proposed site during the spring and hot dry months of summer. In addition, the City is investigating the feasibility of acquiring privately owned lands adjacent to the historic channel to the river for wetland mitigation. Purchase of these lands would provide improved habitat connectivity between Thornton Lake and the Willamette River.

The Friends of East Thornton Lake have identified water quality sampling sites throughout the lake and channel system which will be used for baseline determination of water quality using procedures outlined in the "Oregon Plan for Salmon and Watersheds Water Quality Monitoring Guidebook". Neighbors in the area have been provided informational pamphlets from the City's Water Resource Specialist. These educational materials discuss lake water quality issues and instructions on how adjacent landowners can participate in improving water quality.

The Turtle Conservancy, Oregon Fish and Wildlife and Oregon Wildlife Institute in conjunction with the Greenbelt Land Trust will develop strategies and water restoration goals specific to the breeding populations of Western Pond and Western Painted turtles found on site. This will include increasing both the available number of basking sites and aquatic over-wintering habitat for turtles. Reducing water temperatures during critical development periods will result in an improved habitat for the turtles as well as improving habitat for feeding of juvenile salmonids. Acquisition of this site will partially restore watershed connectivity, improve wildlife habitat connectivity, protect and enhance the habitat of juvenile salmonids and eliminate system disturbances caused by subdivision development.

9. **Describe whether any water rights are associated with the property and whether they will be transferred to a protected instream water right as part of the project.** If the water right or portions thereof will be transferred instream, describe the watershed benefits associated with the transfer.

Oregon Department of Water Resources records do not show any water rights associated with the property.

10. **Describe how the acquisition furthers the goals of the Oregon Plan for Salmon and Watersheds as described in ORS 541.405 and available at www.oregon.gov/OWEB.**

This acquisition addresses Oregon Plan goals by 1) creating an opportunity for a range of natural resource uses that are consistent with watershed restoration and species recovery, 2) enhancing habitat available to support healthy populations of fish and wildlife, 3) aiding populations of T&E species to achieve levels of natural production consistent with overall restoration goals, and 4) coordinating activities and programs among federal, state and local governments.

11. **Describe why you believe acquisition of a property interest is the best method to accomplish the proposed protection or restoration of the property. Why will a change in ownership result in a change in management beneficial to priority habitat, species, or water quality?**

The current property owner purchased the land as an investment for subdivision and development of the property. The proposed acquisition would enhance and restore three distinct but contiguous habitat types, aquatic, riparian and upland oak savanna. This would protect or restore many at-risk species and their habitats and accomplish conservation directives as outlined by OWEB, the Oregon Conservation Strategy and the Willamette Sub-basin Plans. It would also provide improved water quality and habitat to the surrounding lake and historic channel areas. Development of the property would result in: potential loss of critical turtle breeding habitat from human disturbances and drainage of storm water into the lake, a decrease in water quality from storm water and disruption of natural groundwater hydrology from impervious surfaces required by development into 78 homesites.

B. Sustaining the Ecological Benefits of the Project

1. **Identify and describe who will hold title to the land interest and who will be responsible for managing the land interest.** If the proposed title holder is a different entity than the proposed manager of the interest, describe the relationship between the interest holder and the management entity.

   The City of Albany will hold title to the property and be responsible for future land management decisions. The City's Parks and Recreation Department in consultation with the Greenbelt Land Trust will develop conservation, restoration and management plans for the East Thornton Lake Natural Area. The Greenbelt and other stakeholders will assist in identifying grants and other funding opportunities for these conservation and restoration efforts.

2. **Describe whether the ecological benefits will be protected by lease or easement provisions limiting future land uses, or will depend on affirmative future activities of the landowner not funded by this grant.** If the latter, describe how the applicant proposes to ensure that the ecological benefits are realized. List specific easement or

lease provisions that will legally protect the conservation values of the property. Include other attachments to illustrate contractual limitations, if applicable.

The City of Albany will hold title to the property and OWEB will hold a conservation easement for all of the property except for a 3 to 5 acre portion on the southwest corner of the site which will be used by the City to create a small park. The City will develop a conservation and restoration plan that meets OWEB's goals and criteria with assistance from the Greenbelt Land Trust.

3. **Describe the proposed management goals and objectives for the land interest.** If a management plan exists, attach a copy to the application. If there is not yet a management plan for the interest, describe the process and timeframe for developing a long-term management plan for the land interest. (See Required Attachments.)

The City of Albany with assistance from the Greenbelt Land Trust will begin to develop a management plan for the property after acquisition. Emphasis will be placed upon protection and restoration of the three distinct but contiguous habitats on site: 1) Aquatic 2) Wooded Riparian 3) Upland Oak Savanna. Key management strategies will be developed for each of these habitat types. These plans will include baseline inventories of native and invasive species, water quality physical parameters, and restoration strategies. Attached are examples of Greenbelt Land Trust (Attachment #10) and Institute of Applied Ecology (Attachment #11) management plans for pertinent projects.

4. **Describe the organizational ability of the management entity to implement the management plan or management goals and objectives described above for the land interest in terms of staff, volunteer, partner, and consultant qualifications and experience.**

The City of Albany Parks and Recreation Department will be responsible for the management of the East Thornton Lake Natural Area. Currently, the Parks and Recreation Department is responsible for managing, operating and maintaining more than 700 acres of parks and open space within the City. These properties include three parks that operate under conservation easements.

The department performs its responsibilities with limited staffing. However, the City anticipates considerable volunteer support toward the restoration and management of the site, as indicated by letters of support and partnerships with many agencies and individuals (made part of this application).

The Greenbelt Land Trust will assist the City of Albany in developing the management plan and goals for restoration. The mission of the Greenbelt Land Trust is to conserve and protect in perpetuity native habitats, working lands and lands of natural beauty, which provide a connection to the natural world for the residents of the Mid-Willamette Valley. During its 18 years, Greenbelt Land Trust has made a substantial difference in protecting land, creating trails and recreational opportunities, partnering with governments and other agencies, and building organizational effectiveness (Attachment #12).

5. **Describe how the management entity will finance ongoing management costs to protect the interest to be acquired, whether stewardship funding has been raised for the project, and any future plans to raise stewardship funding.**

   Multiple funding strategies will be used to finance ongoing management costs. Initial grant funding from multiple sources will be sought by the City of Albany and the Greenbelt Land Trust to fund studies which establish baseline data for each of the habitat types identified in the management plan and for initial habitat restoration efforts. Subsequent ongoing operational costs to maintain the site will be met by the City of Albany in partnerships with The Greenbelt Land Trust, the Calapooia and Lukiamute watershed councils, Benton County Soil and Water Conservation District Fish Passage Program, the Confederated Tribes of Grand Ronde and other public and private entities. It should be noted that if the property is developed for subdivision as is proposed, the changes in the sites hydrologic and environmental characteristics would significantly increase the costs to maintain the existing riparian and aquatic habitats and would severely limit restoration efforts.

6. **If restoration of habitats, species, or watershed function is proposed as part of the applicant's management goals and objectives for the project, describe the applicant or management entity's capacity to accomplish the restoration goals.** Address how funding for restoration will be raised.

   Habitat, species and watershed quality restoration goals will be developed by the City of Albany in consultation with other stakeholders. The City of Albany will be responsible for the oversight and implementation of these goals with crucial guidance and assistance provided by their natural resource partners.

   As stated above, funding from multiple sources will be sought by the City of Albany to fund studies which establish baseline data for each of the habitat types identified in the management plan and for initial habitat restoration efforts. Restoration of aquatic, riparian and oak savanna, habitats, species and function is viewed as a long term program which requires inputs and partnerships from key natural resource agencies and Tribal Councils.

   Once the subject property has been acquired by the City of Albany, it will be protected from imminent habitat degradation due to housing development. Input from our various natural resource partners will determine the specific funding options that will be pursued for restoration of the site.

C. Measurable Ecological Outcomes

1. **Describe how the applicant, titleholder, or management entity will measure both short-and long-term success in meeting the management goals described above.** Include estimates of habitat area affected, species benefited, and water quality effects.

   Management plans will be developed for each habitat type by the City of Albany in consultation with the Confederated Tribes of the Grand Ronde, the Greenbelt Land Trust, and other partners within natural resource specialties. The City of Albany will rely on the expertise of the Greenbelt Land Trust and these other partners to develop a management plan which defines specific measurements of short-and long-term successes for restoration goals. Management goals may include the following:

Goal: *Reduce human impacts and inputs into the lake and watershed which will occur if proposed development occurs.*

Short-term Success: Acquisition will prevent the immediate development of approximately 16 acres into 78 home sites.

Goal: *Protect /Restore the sites habitat for sensitive species including native Western Pond and Painted Turtles, Red-legged Frog, Western Grey Squirrel, freshwater mussels, and Acorn Woodpecker.*

Short-term Success: Baseline surveys will be completed in 1-5 years for:

-aquatic/riparian plants
-fish and mussels (Luckiamute Watershed Council/Xerces Society)
-amphibians and reptiles (OSU Scientists/Turtle Conservancy
-upland prairie and savanna plants (Institute for Applied Ecology/Benton County Conservation Plan/Confederated Tribes of Grand Ronde.

Short-term/Long-term Success: Removal of invasive plant species by thinning or other methods.

Long-term Success: Successful establishment of priority species and habitats with continued monitoring for invasive non-native plant and animal species.

Goal: *Protect /Restore land as historical riparian and upland prairie/oak savanna.*

Short-term/Long-term Success: Establishment of historically accurate native plants and removal of nuisance species in cooperation with partners.

Long-term Success: Availability of high quality habitats for numerous imperiled species including priority species such as Western Meadowlark, American Kestrel, Western Grey Squirrel, Acorn Woodpecker, and Western Pond and Painted Turtles.

Goal: *Restore/Enhance water quality, connectivity of lake to improve aquatic habitat and increase native turtle, fish and amphibian populations.*

Short-term Success: Evaluation of physical barriers to fish passage from the Willamette River channel to Thornton Lake (will be completed by Benton County Soil and Water Conservation District Fish Passage Program Fall 2008).

Short-term/Long-term Success: Modification of existing culvert for fish passage and/or removal of barriers.

Short-term Success: Determination by City of Albany Public Works of water flow between the west and east ends of Thornton Lake for increased water quality.

Short-term/Long-term Success: Removal of barriers under North Albany Rd. bridge for increased water movement, decreased silting and infilling.

Short-term Success: Evaluation of the potential for purchasing property between the Willamette River and Thornton Lake for wetland mitigation and watershed enhancement by the City of Albany Public Works.

Short-term/Long-term Success: Database of water quality measurements and continued monitoring using methods prescribed by the Water Quality Monitoring Technical Guide Book.

Long-term Success: Protection of genetic diversity in turtle populations and other species including salmonids by improvement of habitat connectivity and dispersal corridors.

Goal: *Provide educational benefits to regional schools and communities.*

Short-term/Long-term Success: Development of a soft trail for observational viewing away from critical habitat.

Long-term Success: Creation of a city park with informational kiosks on cultural, historical and ecological significance: development of informational pamphlet for distribution in park.

Short-term/Long-term Success: Participation by surrounding lake-side homeowners and citizenry in restoration activities and informational seminars on watershed/habitat health.

D. <u>Educational Benefits</u>

Describe the educational benefits of the proposed acquisition, if applicable, including:

a. A description of any plans for education and outreach about the project.
b. A description of how the proposed acquisition will enhance local, regional, and statewide citizen understanding about watershed health.
c. A description of whether the public will be provided access to the property, and if so, under what conditions.

a. *A description of any plans for education and outreach about the project.*

A small public access area will be located on the west edge of the property. This area will contain informational kiosks and signage which will describe the rich cultural and environmental history of site. A narrative of the restoration process and watershed enhancement management goals will be presented. Signage will also provide a history and description of the properties usage by the Calapooia Indians as well as a description of the importance of J.Q. Thornton in early Albany and Oregon pioneer history. Guided trips could be provided for schoolchildren and adults by local educators including the Greater Albany Public Schools (GAPS), O.S.U., F.O.M.A.T. and the Institute for Applied Ecology. A soft trail adjacent to the oak savanna will provide an opportunity for observation of the native plants and wildlife as well as first hand observation of the restoration process.

Because of the site's rare occurrence of both Western Pond and Painted Turtles and rich biological diversity, the ETLNA provides a unique opportunity for research by University Scientists. Graduate and undergraduate student research in Botany, Zoology, Ecology, and Fisheries & Wildlife could be facilitated by the site's easy commuting distance to Oregon State University. The university has excellent outreach programs for education with the local high school and grade school children. As an extension of this outreach, local schools could apply for grants such as the Five Star Restoration Program administered through the Environmental Protection Agency. This program provides grant and technical support to community-based restoration projects that involve youth for restoration of wetlands.

The Confederated Tribes of the Grande Ronde can provide demonstrations on Native American use of native plants for basketry and food sources in addition to descriptions of their cultural history for the general public.

b. *A description of how the proposed acquisition will enhance local, regional, and statewide citizen understanding about watershed health.*

Many opportunities exist for public education of watershed health. The informational kiosks and trail will provide explanations and documentation of the changes occurring in the Thornton Lake Natural Area. The surrounding lakeside homeowners will be made aware of the management plans for the lake and opportunities for their involvement through active restoration participation and via information on how to manage their own properties for watershed health. Research performed by OSU and others will be available throughout the region, state, nation, and international communities. Outreach programs such as Adventures In Learning, Expeditions, and Saturday Academy could promote an understanding of watershed dynamics to schoolchildren grades 3-12. These programs draw hundreds of participants from across the state.

c. *A description of whether the public will be provided access to the property, and if so, under what conditions.*

After determination of the appropriate site by resource specialists, a soft trail will provide access to the non-sensitive areas of the property. The City Park and informational kiosks will be located in the S.W. corner of the site, away from the critical turtle nesting habitat. Access will be limited during critical nesting or other sensitive periods as determined by natural resource specialists.

E. Partners, Support for the Project, and the Effect of the Proposed Acquisition Project on the Local and Regional Community

1. **Describe the partners in the proposed acquisition, and what they will contribute.**

The City of Albany will own and manage the property. The City is providing cash and land for the local match to the OWEB grant and the proposed ORPD grant request.

The Trust for Public Lands is negotiating financial arrangements and terms with the property owner for the acquisition of the East Thornton Lake Natural Area property.

City of Albany will develop a conservation and restoration plan for the site in partnership with the Greenbelt Land Conservation Trust. This plan will follow OWEB's stated mission; "To help create and maintain healthy watersheds and natural habitats that support thriving communities and strong economies". All plans will be developed using OWEB principles and guidelines.

The Confederated Tribes of Grand Ronde will provide assistance to the project in several ways. The Cultural Heritage Department will work in partnership with the City, Greater Albany Public Schools and other potential partners such as Linn-Benton Community College to develop educational programs about the Calapooia tribe's historic and the Confederated Tribes of Grand Ronde's current use of native plants and animals for food and basketry. The Natural Resources Department will work in partnership with the City and the Greenbelt Land Trust to select, manage and oversee culturally important plant species in the site's restoration effort.

Research Scientists from Oregon State University will participate in research and baseline data collection from the site and report their findings in oral presentations, written reports and peer-review publications. Educators will also use the site as a teaching tool for upper division undergraduates and graduate coursework in Ecology, Botany, Zoology, Fisheries and Wildlife and Environmental Sciences.

The Turtle Conservancy and the Oregon Wildlife Institute will assist with development and implementation of turtle management plans for the site and coordinate survey and research projects associated with the Western Pond and Painted turtles and their habitats.

The Greater Albany Schools will develop educational projects aimed at teaching the importance and the basic principles of restoration ecology. These programs will be developed with input and participation from Natural Resource experts in the Community as well as from nearby Oregon State University. Another component of the project is to educate the general public about the cultural and historical significance of the site and surrounding landscape. This important component will be developed with the assistance of Cultural Resource Specialists from the Confederated Tribes of the Grand Ronde and the Oregon Historical Society.

The Oregon Historical Society currently possesses the J. Q. Thornton personal collection as well as extensive Calapooia Indian history and information. Documents and photographs from these collections in addition to the Oregon Historical Society's expertise will be utilized in developing onsite kiosks and informational pamphlets.

The Calapooia Watershed Council will provide staff technical assistance to review site specifics and restoration plans, conduct site visits, data research, and regular communications with stakeholders.

Benton County Soil and Water Conservation's Fish Passage Program will evaluate the feasibility of improving water quality and fish passage in the historic channel from the Willamette River to Thornton Lake.

The Institute of Applied Ecology will conduct a plant survey on the site this spring (2009) as part of the Benton County Prairie Habitat Conservation Plan.

The Friends of East Thornton Lake in partnership with the City and Oregon Department of Environmental Quality will set up and maintain water quality monitoring sites throughout the drainage. Data from these sites will be used to determine changes in water quality associated with altered management practices which are intended to improve aquatic habitat for native turtles and juvenile salmonids.

The Friends of Mature Albany Trees (FOMAT) will assist with outdoor environmental education and provide volunteers to assist with the reestablishment and management of the Oak savanna.

The Xerces Society of Portland will provide expertise in fresh water mussel taxonomy and ecology and will include the site in their OWEB funded aquatic survey of fresh water mussels.

The Luckiamute Watershed Council will provide technical and organizational expertise in the aquatic habitat evaluation and restoration plan with an emphasis on anadromous fishes.

2. **Describe the entities that support the proposed acquisition, and attach documentation of their support** (letters of support for the project are attached).

The Trust for Public Lands www.tpl.org/oregon/ - The Trust for Public Land (TPL) is a national, nonprofit, land conservation organization that conserves land for people to enjoy as parks, community gardens, historic sites, rural lands, and other natural places, ensuring livable communities for generations to come.

The Greenbelt Land Conservation Trust http://www.greenbeltlandtrust.org/ - "The Greenbelt Land Trust (GLT) benefits the people of Oregon's beautiful Mid-Willamette Valley by protecting open space in their communities."

The Confederated Tribes of Grand Ronde http://www.grandronde.org/ - "Ancestors of the Confederated Tribes of Grand Ronde have occupied Western Oregon since time immemorial. Our peoples have developed distinct lifeways through generations of interaction with this bountiful and diverse landscape."

Greater Albany Public Schools http://www.albany.k12.or.us/ - Founded in 1979, the Greater Albany Public School District proudly educates the children of Albany and surrounding areas of Linn and Benton counties in the heart of the Willamette Valley.

Department Chairs of:
Oregon State University, Botany and Plant Pathology
http://www.science.oregonstate.edu/bpp/ - "The Department of Botany and Plant Pathology offers programs leading to B.S., M.A., M.S., and Ph.D. degrees that prepare graduates for a variety of future employment opportunities. Department graduates are employed in both the public and private sector by local, state, national or international employers. Our faculty teach and advise students enrolled in the undergraduate Biology, Environmental Sciences, and Bioresource Research programs and in the graduate programs of Environmental Sciences, Molecular and Cellular Biology, and Genetics."

Oregon State University, Fisheries and Wildlife http://fw.oregonstate.edu/ - "The Department of Fisheries and Wildlife is a team of scientists, students and staff devoted to the study of conservation science and natural resource management. We educate our students to think critically and evaluate problems from a strong background in basic and applied science, fundamental ecological principles, and consideration of social influences on conservation. We strive to help our students succeed through a rich program of field and laboratory coursework and personal advising."

Oregon State University, Zoology http://zoology.science.oregonstate.edu/ - "The Department of Zoology promotes discovery and learning at all levels of biological organization (molecular, cellular, organismal, population, community, and ecosystem). Our integrative focus reflects the importance of strong disciplinary and interdisciplinary approaches in research and teaching. We strive for excellence and synergy in our coordinated programs of teaching, research, and service. Recognizing the essential roles of science and biology in the lives of citizens today and tomorrow, we emphasize biological literacy in our teaching and outreach programs."

Oregon State University, Biology Program Director http://biology.science.oregonstate.edu/ - "Issues and advances in areas such as biotechnology, environmental science, medicine and other fields continually emphasize the importance of biology and biologists in the future of our country and the world. The Biology Program prepares students for diverse fields through broad, interdisciplinary training in the life sciences. Faculty teaching, research and mentoring expertise are drawn from the OSU Departments of Biochemistry and Biophysics, Botany and Plant Pathology, Microbiology, and Zoology."

Dr. Pat Muir, Oregon State University, Elizabeth P. Ritchie Distinguished Professor in Environmental Sciences http://envsci.science.oregonstate.edu/

The Oregon Historical Society http://www.ohs.org/ - "The Oregon Historical Society's mission is preserving and interpreting Oregon's past in thoughtful, illuminating, and provocative ways."

Benton County Soil and Water Conservation's Fish Passage Program http://www.bentonswcd.org/fishpassage/ - "In 2001, Benton SWCD received funding from an Oregon Watershed Enhancement Board grant to implement the Benton Fish Passage Improvement Program (BFPIP). The program demonstrates a successful cooperative effort between Benton SWCD, Benton County Public Works and GIS Departments, and the local watershed councils (Marys, Alsea, and Luckiamute). Currently, the program involves compiling all available fish passage barrier and fish habitat inventory data in Benton County into one GIS database with the goal of identifying, prioritizing and planning fish passage and stream restoration projects throughout Benton County."

The Institute of Applied Ecology http://www.appliedeco.org/- "The mission of the Institute for Applied Ecology is to conserve native ecosystems through restoration, research and education."

The Friends of Mature Albany Trees (FOMAT) - "Dedicated to protecting Albany's tree canopy."

The Xerces Society http://www.xerces.org/ - "An international nonprofit organization dedicvated to protecting biological diversity through invertebrate conservation."

The Luckiamute Watershed Council http://luckiamute.watershedcouncils.net/ - "The Luckiamute Watershed Council is a volunteer group of neighbors from diverse perspectives working together to learn about the watershed and doing what they can to improve local water quality and habitat conditions. Our mission is to foster good stewardship of natural resources and develop an improved understanding of the area's biological diversity."

The Friends of East Thornton Lake- "Citizens of Albany dedicated to the conservation, restoration, education and research of Thornton Lake and the surrounding landscape."

3. **Describe the property's current land uses and zoning, and describe the land uses and zoning on adjacent properties.**

This property has three different zoning designations: Open Space, RS-10 (Residential Single Family, minimum 10,000 square foot lot size), and RS-6.5 (Residential Single Family, minimum 6,500 square foot lot size). The land has been periodically farmed for many years. An old barn is the only existing structure on the property. The surrounding zoning is all residential single-family zoning. The adjacent neighborhood exists as semi-rural, large-lot, single family homes. Railroad tracks define the southern boundary of the property.

4. **Describe the proposed acquisition's effect on the local property tax base, including the amount of property taxes paid in the prior year and whether the property will remain on the tax rolls or whether in-lieu-of payments will be made.**

Acquisition of the property would remove the property from the local tax base. The property is made up of two tax lots. One of the tax lots was assessed about $2,600 for property taxes in 2007. The other parcel was assessed about $850 for property taxes in 2007. The total in taxes paid for this property in 2007 was $3,450.

If the property is acquired and owned by the City of Albany and protected by a conservation easement, the property would be exempt from property taxes. Benton County would no longer collect taxes on the property and local jurisdictions would no longer receive this income. Acquisition of the property would reduce Benton County's approximately $90 million in tax revenues (2007) by $3450.

5. **Describe the economic and social effects the proposed acquisition may have on the local and regional economy, community, and agriculture/forestry infrastructure.**

The property is about 24 acres. An approved subdivision application shows that 78 residential single-family lots could be developed on the property. Acquiring the property for protection and restoration would result in a decrease in the amount of land available for residential single-family development in the Albany city limits. The City's Housing Needs Analysis (2006/2007) shows that the city has a surplus of residential single-family land through the planning period that was analyzed (2025). The surplus of residential single family land is about 920 acres. Removal of the 24 acres from the supply of residential land would decrease the surplus by about 3 percent.

The value of the crops previously raised on this property is not known. The property owner did not farm the land. It was leased to a farmer for crop production. Local residents observe that the farm use on the property was of relatively low intensity. It is unlikely that the economic value of the crops was significant.

The city has more than enough land available for housing and the economic loss of the land for agriculture would be minimal. The value of the land would increase in terms of natural resource and educational values. Protection and restoration activities would provide opportunities for research and education.

The site is about 10 miles from Oregon State University. This proximity will make it easy and convenient for University scientists and students to participate in research and baseline data collection from the site and report their findings in oral presentations, written reports and peer-review publications.

A 3 to 4 acre area at west edge of the property will be used for a small city park which will include informational kiosks. The Greater Albany Schools will develop educational projects aimed at teaching the importance and the basic principles of restoration ecology. Information and education will also be made available to the general public through cooperation with cultural resource specialists. A soft trail adjacent to the oak savanna will provide an opportunity for observation of the native plants and wildlife as well as first hand observation of the restoration process.

Research and educational activities will bring people to Albany who otherwise might not visit. A grocery store, restaurants and other retail services reside nearby. Albany's historic downtown business district and adjacent residential historic districts is about one mile east of the site. Visitors to the ETLNA may patronize nearby businesses, thereby contributing to the local economy.

6. **List the name(s) of the watershed council in the area (if any); soil and water conservation district in the area; local municipalities in which the project is located; and irrigation or drainage district in which the property is located (if any). Have these entities been informed about the proposed project? If not, why?**

The proposed site does not fall within any watershed council's area, however we have met and discussed the project with members of the Luckiamute (Benton and Polk Counties) and Calapooia (Linn County) Watershed councils. The Benton Soil and Water Conservation District and Fish Passage programs are active participants in evaluating the historic channel from Thornton Lake to the Willamette River to determine fish passage and water quality issues (see attached letters of partnership).

The City of Albany is submitting this application which has been approved by a vote of the Albany City Council. The project does not fall within any irrigation or drainage district.

7. **Name of tribe(s) whose tribal lands, including reservation lands, trust lands, or "usual and accustomed" sites, are affected by the proposed acquisition. Has the applicant contacted these tribe(s) to notify them about the proposed project and offer to consult with the tribe(s) about the project? If not, why?**

The site does not include any reservation or trust lands, but is part of Willamette Valley lands traditionally used by the Calapooia Indians prior to Pioneer settlement. The Confederated Tribes of Grand Ronde have been contacted about the project, and Mr. Eirik Thorsgard, the Tribal Cultural Heritage Specialist, visited the site and discussed ways that the tribes could participate in the restoration and educational aspects of the project Michael Karnosh, the Ceded Lands Specialist, has been involved in discussions regarding developing partnerships with the Grand Ronde Tribes to develop and implement restoration and education plans for the site.

F. Legal and Financial Terms

1. **If proposing a fee simple acquisition, describe in detail the proposed conservation values to be legally protected by OWEB's required easement, covenant or deed restriction described in OAR 695-045-0140(7). If proposing a conservation easement acquisition or lease, attach the proposed easement or lease to be acquired. (See required attachments.)**

   Priority Habitats: Freshwater aquatic beds, Freshwater emergent marshes, Riparian forest and shrublands, Western Oregon upland prairie and oak savanna.

   Rare or at risk plant communities- White oak/poison oak/blue wildrye, Oregon ash/Dewey sedge-stinging nettle, Black cottonwood - red alder / salmonberry, Pacific willow/stinging nettle, water purslane/water pepper marsh, Dense sedge-tufted hairgrass prairie,Tufted hairgrass-California oatgrass valley prairie, and Lobb buttercup aquatic bed.

   Priority Species- Western Painted Turtle, Western Pond Turtle, Northern Red-Legged Frog, Western Grey Squirrel and Acorn Woodpecker. Short-eared Owl roosting habitat, American Bittern, Chipping Sparrow, Hooded Merganser, White-breasted Nuthatch, American Kestrel, Dusky Canada Goose and Western Meadowlark. Fresh water mussels are being identified by Xerces Society staff to determine specie(s) present in the lake. Historically, juvenile salmonids existed in this Willamette river oxbow. Minor alterations to the Willamette river seasonal channel to the lake, combined with onsite restoration efforts, could increase water quality and provide habitat complexity for the reintroduction or enhancement of juvenile salmonid and other andromonous fish populations in Thornton Lake.

2. **Provide the names and addresses for the current owner(s) of the property interest to be acquired and significant partners involved in the proposed project.**

   Owner: Thornton Lake, LLC
   Attn: Byron Hendricks
   1220 20th Street SE
   Salem, OR 97302
   Tel: 503-371-3013
   Fax: 503-364-1453

   Option Holder: Trust for Public Land
   806 SW Broadway
   Suite 300
   Portland, OR 97205
   Tel: 503-228-6620
   Fax: 971-244-0518

3. **Generally describe the physical state of the property, including any current roads, structures, and legal encumbrances and their approximate location.** Discuss any proposed roads, structures, and legal encumbrances and their approximate planned location and timeline for implementation. Indicate whether the planned physical improvements (e.g., roads, structures) or legal encumbrances could potentially impact the habitats or species proposed for protection or restoration on the property.

   There is a natural lake on the property (East Thornton Lake). There are wetlands along the lake and a riparian area. Part of the property is in a floodplain. Dense mature trees occur along the lake, on part of the upland adjacent to the lake, and along the southern boundary of the property. These trees are primarily Douglas fir, maple, and Oregon White Oak.

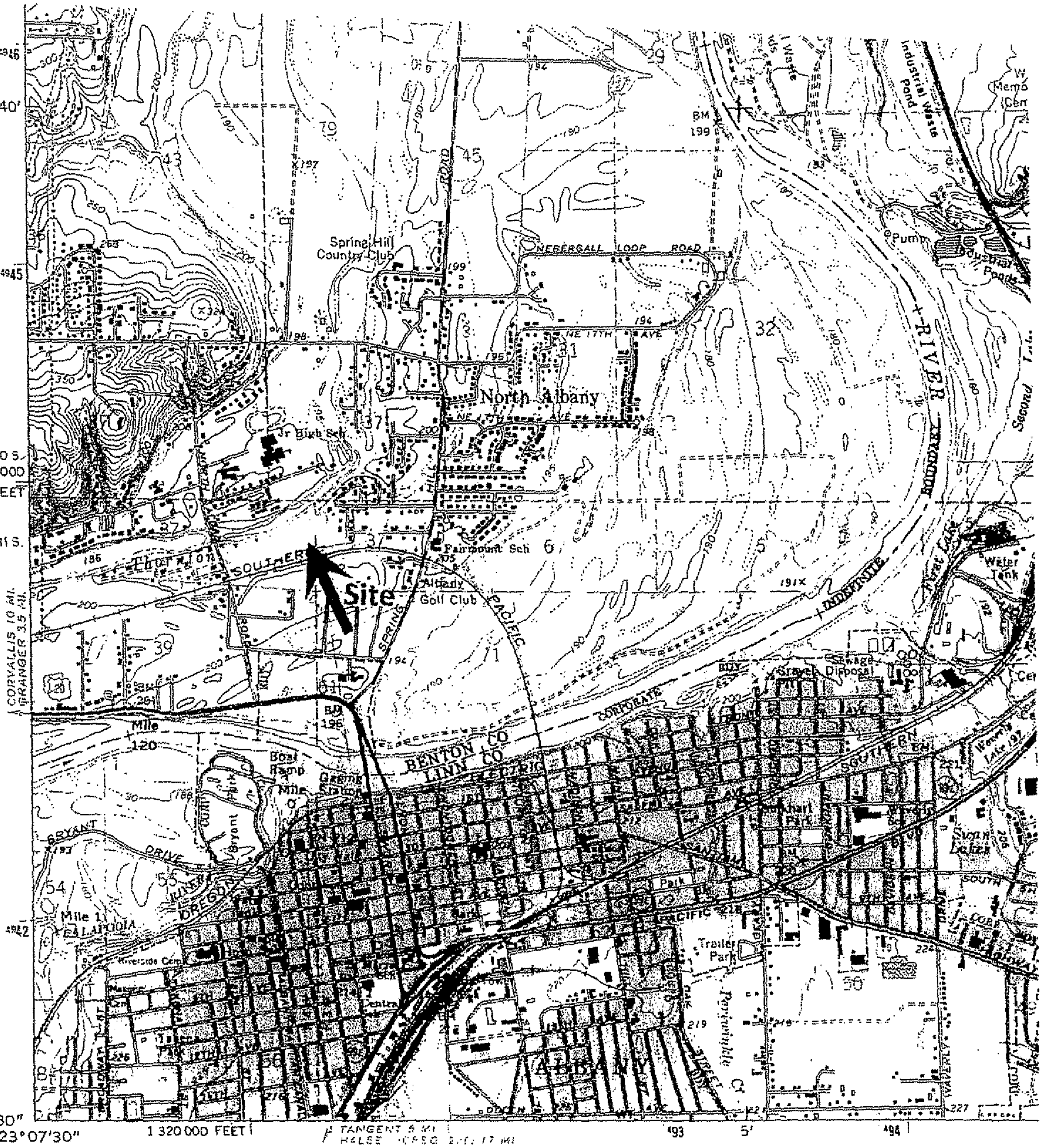
   There are no roads on the property. A dilapidated barn is the only structure on the property. There are no known easements or other legal encumbrances on the property.

   In January 2008, the City approved a 78-lot subdivision on the property. The City's approval was appealed to the state Land Use Board of Appeals. The City's decision to approve the subdivision was remanded based on a procedural issue that requires that participants in the public hearing be allowed to comment on a memorandum that was submitted by City staff after the hearing record was closed. The City has re-opened the record and expects to make a new decision on the subdivision by the end of the year (2008). The subdivision would avoid the lake, wetlands, riparian corridor, and trees along the lake and along the south boundary of the property. Approximately 21 mature trees within the open area of the property away from the lake and away from the southern boundary of the property would be removed. The subdivision would completely change the characteristics of the open area of the property. Streets, houses, and fences would be constructed.

4. **Provide the contractually agreed-upon purchase or lease price for the land interest, or if one does not exist, the anticipated price for the land interest and the basis for that anticipated price.**

   Purchase price will be Fair Market Value as established by an appraisal, subject to a minimum floor price, and not to exceed $3.2 million. Appraisal is expected to be completed by December 15, 2008.

Required Maps



Mapped, edited, and published by the Geological Survey

Control by USGS, USC&GS, and State of Oregon

Topography by photogrammetric methods from aerial photographs taken 1967. Field checked 1970

Polyconic projection. 1927 North American datum
10,000-foot grid based on Oregon coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 10, shown in blue

Red tint indicates areas in which only landmark buildings are shown

Fine red dashed lines indicate selected fence lines

Revisions shown in purple compiled from aerial photographs taken 1975. This information not field checked

Purple tint indicates extension of urban areas

ROAD CLASSIFICATION

Primary highway, hard surface

Light-duty road, hard or improved surface

Secondary highway, hard surface

Unimproved road

Interstate Route   U. S. Route   State Route

ALBANY, OREG.
NE/4 ALBANY 15' QUADRANGLE
N4437.5—W12300/7.5

1970
PHOTOREVISED 1975
AMS 1373 II NE—SERIES V892

Property Boundary

Public Access/Park

City Park to provide public access for passive recreation and the interpretation of environmental, cultural and historical values associated with the site.

Priority Habitat 1- Freshwater aquatic beds/ Freshwater emergent marshes

Rare or at risk plant communities- Lobb buttercup aquatic bed, Water purslane- waterpepper marsh.
Priority Species- Western Painted turtle, Western Pond turtle, Northern Red-legged frog, Dusky Canada Goose, juvenile salmonids, Fresh water mussels, American bittern, Hooded Merganser

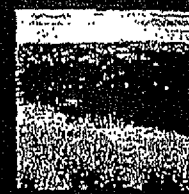
Priority Habitat 2- Riparian forest and shrublands

Rare or at risk plant communities- Black cottonwoods- red alder/ salmonberry, Pacific willow/stinging nettle
Priority Species- Short-eared owl roosting habitat, Chipping sparrow, American Kestrel, White breasted Nuthatch

Priority Habitat 3- Western Oregon upland prairie and oak savanna (to be restored)

Rare or at risk plant communities- White oak/poison/ blue wildrye, Dense sedge-tufted hairgrass valley prairie, Tufted hairgrass-California oatgrass valley prairie.
Priority Species- Western Meadowlark, Western grey squirrel, Acorn Woodpecker and American Kestrel

Conservation Plans

HABITAT:

CONSERVATION SUMMARIES FOR STRATEGY HABITATS

Photo © (left) Edward J. O'Neill; (right) Martin Nugent

Strategy Habitats were determined in a two-step process. First, maps of current vegetation were compared to those of the year 1850 to determine vegetation types that had high degrees of loss since European settlement. Vegetation types with a high degree of historic loss were evaluated for historic importance at the ecoregional scale, ecological similarity, amount of remaining habitat managed for conservation values, known limiting factors, ecological similarity and importance to Strategy Species. For more information on the methods used to develop the vegetation maps and determine Strategy Habitats, see Appendix IV.

Using 1850 provides a reference point to determine changes in vegetation since European settlement. It is a single point in time, so it does not

Key to ecoregion abbreviations:

BM = Blue Mountains
CP = Columbia Plateau
CR = Coast Range
EC = East Cascades
KM = Klamath Mountains
NBR = Northern Basin and Range
WC = West Cascades
WV = Willamette Valley

	BM	CP	CR	EC	KM	NBR	WC	WV	
Aspen Woodlands	X					X			
Coastal Dunes			X						
Estuaries			X						
Freshwater Aquatic Habitats	X	X	X	X	X	X	X	X	
Grasslands *(includes grass-dominated habitats such as upland prairie, Coastal bluffs, and montane grasslands)*		X	X		X		X	X	
Late Successional Mixed Conifer Forests			X		X		X		WC specifies Late Successional Douglas-fir Forests
Oak Woodlands			X	X	C[1]		X	X	Pine, Pine-Oak and Oak Woodlands are combined in KM
Ponderosa Pine Woodlands	X			X	C[1]				Pine, Pine-Oak and Oak Woodlands are combined in KM
Riparian Habitats	X	C[1]	X	X	X	X	X	X	Riparian and Wetlands are combined in CP
Sagebrush Habitats *(includes steppe and/or shrublands)*	X	X				X			
Wetlands *(includes all freshwater wetland types: ponds, marshes, wet prairies, vernal pools, bogs, lakes, swamps, etc.)*	X	C[1]	X	X	X	X	X	X	Riparian and Wetlands are combined in CP

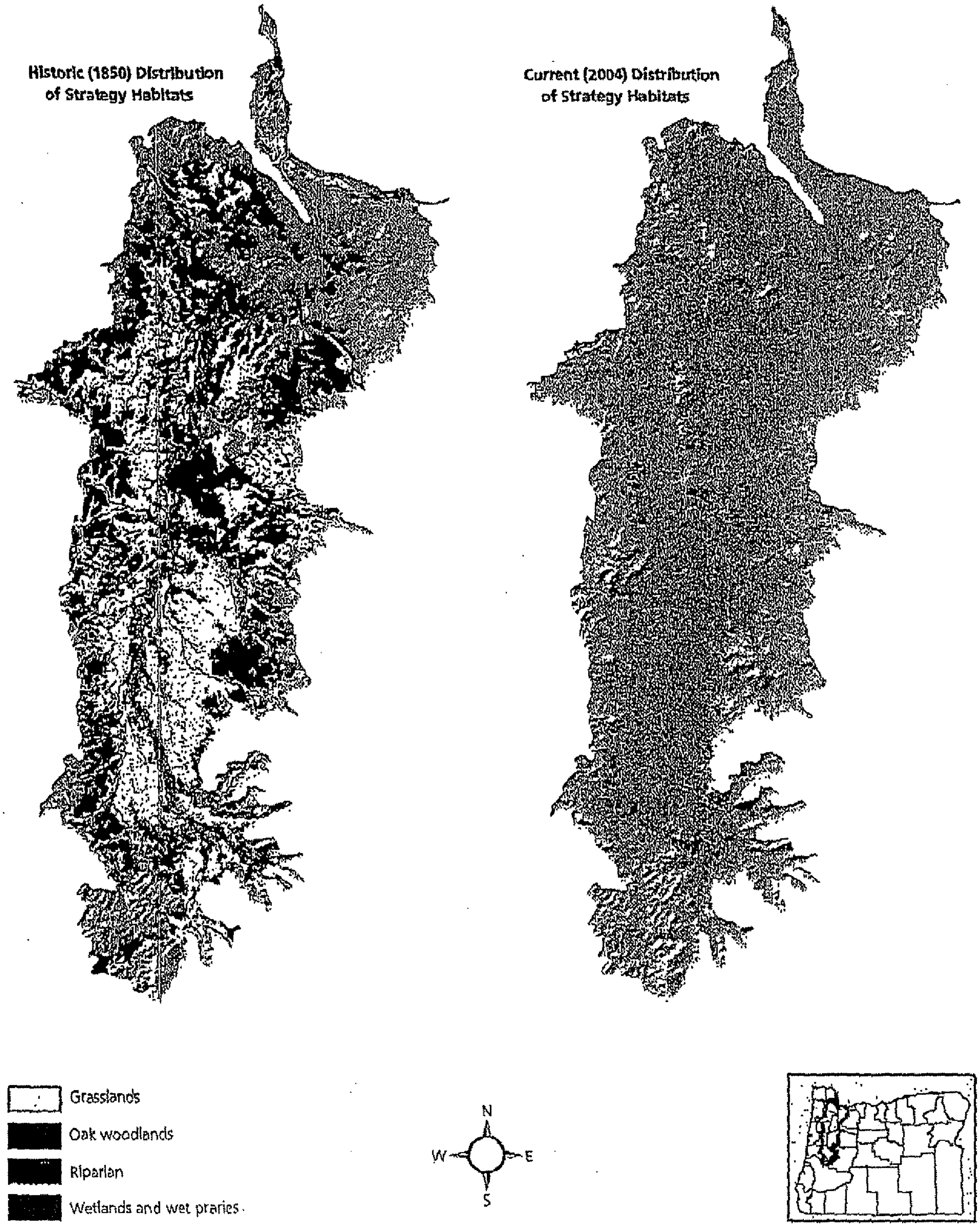
C[1] = Combined

Received Time Oct. 17. 2008 4:16PM No. 3382

Summary List of Strategy Habitats

Strategy Habitats in the Willamette Valley ecoregion include: oak woodlands, grasslands (including oak savanna), wetlands (including wet prairies), riparian, and aquatic habitats.

Change in Willamette Valley Strategy Habitats



Data Source: Oregon Natural Heritage Information Center, 2004.

Received Time Oct. 17. 2008 4:16PM No. 3382

Conservation Issues and Actions

Overview

The Willamette Valley ecoregion is both the fastest growing ecoregion in Oregon and the most densely populated, containing the states' three largest urban centers (Portland, Salem, Eugene). The population projected for 2050 is approximately four million, nearly double today's population. The ecoregion also provides about half of the state's agricultural sales and includes six of the top 10 agricultural-producing counties. Also, 16 of top 17 private sector employers (manufacturing, high technology, forest products, agriculture, and services) are located in this ecoregion.

Historical accounts indicate that prior to European settlement, much of the Willamette Valley was covered by native grasses and forbs. The Calapooia people regularly set fires to improve hunting and travel. The fires helped maintain the valley's mosaic of grasslands, oak savannas, wet prairies and other open habitats.

Since the 1850's, much of the Willamette Valley ecoregion has been altered by development (agricultural or urban), particularly affecting oak woodlands, oak savanna, grassland, riverine, and wetland habitats. The Willamette River has been disconnected from its floodplain, and much of the historic habitats have been fragmented. About 96 percent of the Willamette Valley ecoregion is privately owned, presenting challenges to conservation management. "Fine-filter" conservation strategies that focus on needs of individual at-risk species and key sites are particularly critical in this ecoregion.

Ecoregion-level limiting factors and recommended approaches

All six of the key conservation issue apply statewide, as do the approaches outlined in the Statewide Perspectives and Approaches chapter. However, land use changes, altered disturbance regimes (both fire and floodplain function) and invasive species are described further in this section, considering the Willamette Valley's ecoregional characteristics. In addition to the statewide factors, habitat fragmentation is of concern.

Summary List of Strategy Species

Mammals
- California myotis (bat)
- Townsend's big-eared bat
- Western gray squirrel

Plants
- Bradshaw's desert parsley
- Golden paintbrush
- Howellia
- Kincald's lupine
- Nelson's checker-mallow
- Peacock larkspur
- Wayside aster
- White rock larkspur
- White-topped aster
- Willamette daisy

Amphibians & Reptiles
- Northern red-legged frog
- Foothill yellow-legged frog
- Northwestern pond turtle
- Western painted turtle
- Western rattlesnake

Invertebrates
- American grass bug
- Fender's blue butterfly
- Taylor's checkerspot (butterfly)
- Willamette floater (freshwater mussel)

Fish
- Bull trout (Columbia Distinct Population Segment [DPS])
- Chinook salmon (Lower Columbia River ESU, spring run)
- Chinook salmon (Lower Columbia River ESU, fall run)
- Chinook salmon (Snake River ESU, spring/summer run)
- Chinook salmon (Snake River ESU, fall run)
- Chinook salmon (Upper Willamette River ESU, spring run)
- Coastal cutthroat trout (Oregon coast ESU)
- Coastal cutthroat trout (Southwestern Washington/Columbia River ESU)
- Coastal cutthroat trout (Upper Willamette River ESU)
- Coho salmon (Oregon Coast ESU)
- Coho salmon (Lower Columbia River/SW Washington Coast ESU)
- Oregon chub
- Pacific lamprey
- Steelhead (Lower Columbia River ESU, summer run)
- Steelhead (Lower Columbia River ESU, winter run)
- Steelhead (Middle Columbia River ESU, summer run)
- Steelhead (Middle Columbia River ESU, winter run)

Fish Cont.
- Steelhead (Oregon Coast ESU, summer run)
- Steelhead (Oregon Coast ESU winter run)
- Steelhead (Snake River Basin ESU)
- Steelhead (Southwest Washington ESU, winter run)
- Steelhead (Upper Willamette River ESU, winter run)
- Western brook lamprey

Birds
- Acorn woodpecker
- Chipping sparrow
- Common nighthawk
- Dusky Canada Goose
- Grasshopper sparrow
- Little willow flycatcher
- Oregon vesper sparrow
- Short-eared owl
- Slender-billed nuthatch
- Streaked horned lark
- Western bluebird
- Western meadowlark
- Western purple martin
- Yellow-breasted chat

Received Time Oct. 17. 2008 4:16PM No. 3382

Conservation actions in the Willamette Valley Ecoregion identified through other planning efforts

Landowners and land managers can benefit a variety of fish and wildlife species by managing and restoring Strategy Habitats. The following recommendations are relevant to Strategy Habitats. They were identified through a review of existing plans.

Actions	Strategy Habitat and General Location	Source Document
Maintain and restore oak habitat	Oak woodlands and savannas	OR-WA Partners in Flight Landbird Conservation Strategy (Altman 2000) (recommended target: maintain all large oak trees (more than 22in. dbh) and all oak woodland patches more than 100 ac (40 ha))
Initiate restoration private lands in partnership with willing landowners.	All Strategy Habitats throughout ecoregion	Oregon Biodiversity Project; NWPCC Subbasin Plans 2004
Secure conservation status through willing partnerships	Oak woodlands, grasslands and savannas; wetlands and wet prairies; floodplain habitats throughout ecoregion	Pacific Coast Joint Venture Willamette Valley Implementation Plan (Roth et al. 2002); Willamette Restoration Initiative
Maintain or restore riparian habitat in each major watershed. Ensure sufficient habitat complexity for wildlife (basking structures, nesting areas, snags near water, large expanses of wetlands and wet prairies, etc)	Riparian habitat throughout ecoregion	PIF Landbird Conservation Plan (Altman 2000)
Improve fish passage: Modify barriers or use spans where appropriate.	All locations (as appropriate)	Willamette Restoration Initiative; NWPCC Subbasin Plans 2004
Restore and enhance stream channel complexity in lowlands throughout the Willamette Basin	All locations (as appropriate)	Willamette Restoration Initiative; Willamette Subbasin Plan (2004)
Restore river and floodplain interactions	All locations (as appropriate)	Willamette Restoration Initiative; Willamette Subbasin Plan (2004)
Work with forestry, agricultural, and urban interests to provide large woody debris, reduce sedimentation and reduce point and nonpoint source pollution, improve water flows, and extend fish passage by removing barriers	All locations (as appropriate)	Willamette Restoration Initiative; Willamette Subbasin Plan (2004)
Establish integrated framework for wetland restoration assessment, priority setting, and actions at three scales: watersheds, ecoregions and project sites	Wetlands	Recommendations for a nonregulatory wetland restoration program for Oregon. J.W. Good and C.B. Sawyer. 1998. Prepared for Oregon Division of State Lands and U.S. EPA Region X.
Increase incentives for proactive, nonregulatory wetland restoration and enhancement on private land, focusing on a combination of financial assistance, tax benefits, technical assistance, and education.	Wetlands	Recommendations for a nonregulatory wetland restoration program for Oregon. J.W. Good and C.B. Sawyer. 1998. Prepared for Oregon Division of State Lands and U.S. EPA Region X.
Maintain or enhance in-channel watershed function, connection to riparian habitat, flow and hydrology: - Plant vegetation to stabilize banks; leaving stumps, fallen trees and boulders in waterways - Maintain or enhance off channel or side channel meanders, habitat and pools	Aquatic habitats (streams, pools)	Oregon Aquatic habitat restoration and enhancement guide. The Oregon Plan for Salmon and Watersheds May 1999. *See guide for specific technical recommendations, sources of information and assistance, and other guidelines.*
Maintain riparian and wetlands function: - Manage grazing, riparian vegetation planting and fencing, and livestock water facilities according to best practices, current techniques and with respect to natural hydrological conditions.	Riparian and wetlands habitats	Oregon Aquatic habitat restoration and enhancement guide. The Oregon Plan for Salmon and Watersheds May 1999. *See guide for specific technical recommendations*
Upslope erosion control: - Create water and sediment control basins to contain runoff, wastewater - Use windbreaks (tree and shrub rows—using native plants) to reduce erosion and deposition - Upland terracing	Aquatics, riparian and wetland habitats	Oregon Aquatic habitat restoration and enhancement guide. The Oregon Plan for Salmon and Watersheds May 1999. *See guide for specific technical recommendations*

Note: Conservation Strategy monitoring indicators, linked with OSOER Key Indicators, targets, and methods, will be identified in a statewide approach (See Monitoring chapter for more information).

Received Time Oct. 17. 2008 4:16PM No. 3382

DRAFT

September 2008

Northwest[1] Native Turtle Conservation Plan Outline

Conservation Goal

To maintain and protect healthy, sustainable, reproducing populations of the

- Western Painted Turtle (*Chrysemys picta bellii*) and
- Western Pond Turtle (*Emmys marmorata*[cap1] *marmorata*)

to ensure perpetuation of these two species in the Conservation Area[2].

Conservation Criteria

The native turtle populations will be deemed conserved when there are self-sustaining populations[3] as follows:

1 Western Painted Turtle (CHPI) populations throughout the Conservation Area meet the following criteria:

1.1 Populations[4] in public ownership have long-term protection[5]

1.2 Populations on private lands are protected by conservation easements, or have other long-term protection.

1.3 There is ongoing habitat management to ensure sufficient quality and quantity of all habitat types required to meet life history needs:

1.3.1 Basking

1.3.2 Feeding

---

[1] The geographic area addressed in this Conservation Plan includes portions of northwest Oregon and southwest Washington states. The Plan is part of the regional conservation plan(s) for these species, which covers the entire historic range of the species in Oregon, Washington and California.

[2] See Item 3 for full description of the Conservation Area.

[3] Self-sustaining means that species are naturally reproducing throughout the range with no dependency on artificial propagation or headstarting to sustain natural production over time (definition adapted from Oregon Administrative Rule, Division 100).

[4] Number or percentage of populations in 1.1 and 1.2 and in 2.1 and 2.2 to be determined.

[5] "Long-term protection" to be defined.

Received Time Oct. 17. 2008 4:16PM No. 3382

1.3.3 Overwintering
1.3.4 Nesting
1.3.5 Dispersal

1.4 There is ongoing monitoring of all populations and documentation of:
1.4.1. Stable or increasing population size
1.4.2 Healthy proportion of males/females with juvenile recruitment
1.4.3 Ensured opportunities for dispersal

2 Western Pond Turtle (EMMA) populations throughout the Conservation Area meet the following criteria:

2.1 Populations in public ownership have long-term protection

2.2 Populations on private lands are protected by conservation easements, or have other long-term protection.

2.3 There is ongoing habitat management to ensure sufficient quality and quantity of all habitat types required to meet life history needs:
2.3.1 Basking
2.3.2 Feeding
2.3.3 Overwintering
2.3.4 Nesting
2.3.5 Dispersal

2.4 There is ongoing monitoring of all populations and documentation of:
2.4.1 Stable or increasing population size
2.4.2 Healthy proportion of females/males with juvenile recruitment
2.3.3 Ensured opportunities for dispersal

Received Time Oct. 17. 2008 4:16PM No. 3382

Draft Willamette Subbasin Plan

Prepared for

The Northwest Power and Conservation Council

May 28, 2004

Prepared by

Willamette Restoration Initiative

David Primozich, Project Coordinator
Rick Bastasch, Executive Director

CH 0 FRONTMATTER.DOC
Received Time Oct. 17. 2008 4:16PM No. 3382

Table 3-25: Terrestrial Focal Species Selected for This Plan

Acorn Woodpecker	Red Tree Vole
American (Pine) Marten	Red-eyed Vireo
American Beaver	Red-legged Frog
American Dipper	River Otter
American Kestrel	Sharptail Snake
Bald Eagle	Sora
Black-tailed Jackrabbit	Southern Alligator Lizard
Bradshaw's Lomatium (*Lomatium bradshawii*)	Spotted Owl
Cascades Frog	Taylor's Checkerspot Butterfly
Chipping Sparrow	Townsend's (Pacific Western) Big-eared Bat
Coastal Tailed Frog	Vaux's Swift
Common Yellowthroat	Vesper Sparrow (*affinis* subspecies)
Dunlin	Water Howellia (*Howellia aquatilis*)
Fender's Blue Butterfly	Western Bluebird
Golden Paintbrush (*Castilleja levisecta*)	Western Gray Squirrel
Great Gray Owl	Western Meadowlark
Green Heron	Western Pond Turtle
Harlequin Duck	Western Rattlesnake
Horned Lark (*strigata* subspecies)	Western Wood-Pewee
Kincaid's Lupine (*Lupinus sulphureus* var. *kincaidii*	White Rock Larkspur (*Delphinium nuttallii* ssp. *ochroleucum*)
Marbled Murrelet	White-breasted Nuthatch
Nelson's Checkermallow (*Sidalcea nelsoniana*)	White-topped (Curtus's) Aster (*Aster curtus* = *Sericocarpus rigidus*)
Northern Harrier	Willamette Valley Daisy (*Erigeron decumbens* var. *decumbens*)
Olive-sided Flycatcher	Willow Flycatcher
Oregon Slender Salamander	Wood Duck
Peacock Larkspur (*Delphinium pavonaceum*)	Yellow Warbler
Pileated Woodpecker	
Purple Martin	

Received Time Oct. 17. 2008 4:16PM No. 3382

Table 3-26: Comparison of Focal Species with Species Identified as "Indicators" or "Focal Species" by Previous Wildlife Plans and Assessments in the Willamette Basin, Grouped by the Most Similar Focal Habitat Type

Sponsor:	WRI/ NPCC	OWEB—ONHP	PIF	ODFW	ODFW & USFWS
Source:	This plan	"Key species for land acquisition priorities" (Wiley, 2004)	*Strategy for Landbirds in Lowlands and Valleys of Western Oregon and Washington*	*Willamette River Basin Operational Plan* (draft chapter in the *Oregon Plan* and ODFW's Vision 2006 Strategic Plan)	Application of Habitat Evaluation Procedures (HEP) to Willamette Basin projects
Oak Woodlands	Acorn woodpecker Chipping sparrow W. Wood-pewee White-breasted nuthatch Southern alligator lizard Sharptail snake W. gray squirrel	Acorn woodpecker Chipping sparrow W. Wood-pewee White-breasted nuthatch Sharptail snake W. gray squirrel Bullock's oriole	Acorn woodpecker Bewick's wren Bushtit Chipping sparrow W. Wood-pewee White-breasted nuthatch	Acorn woodpecker Band-tailed pigeon White-breasted nuthatch	Elk Black-tailed deer Black bear Cougar Ruffed grouse Yellow warbler Pileated woodpecker Red fox Western gray squirrel Ring-necked pheasant California quail Wood duck
Upland Prairie-Savanna and Rock Outcrops	American kestrel Horned lark Vesper sparrow Western meadowlark Western rattlesnake Black-tailed jackrabbit Taylor's checkerspot Fender's blue butterfly Kincaid's lupine Golden paintbrush White rock larkspur White-topped aster	American kestrel Bullock's oriole Grasshopper sparrow Horned lark Northern harrier Vesper sparrow Western meadowlark Taylor's checkerspot Fender's blue butterfly	American kestrel Grasshopper sparrow Horned lark Northern harrier Vesper sparrow Western meadowlark	Horned lark Vesper sparrow Western bluebird Western meadowlark Western rattlesnake	Elk Black-tailed deer Red fox Western gray squirrel Ring-necked pheasant California quail Wood duck

Received Time Oct. 17. 2008 4:16PM No. 3382

Table 3-26: Comparison of Focal Species with Species Identified as "Indicators" or "Focal Species" by Previous Wildlife Plans and Assessments in the Willamette Basin, Grouped by the Most Similar Focal Habitat Type

Sponsor:	WRI/ NPCC	OWEB—ONHP	PIF	ODFW	ODFW & USFWS
Wetland Prairie and Seasonal Marsh	Dunlin Common yellowthroat Northern harrier Sora Red-legged frog Water howellia Bradshaw's lomatium Nelson's checkermallow Willamette Valley daisy Peacock larkspur	Dunlin Short-eared owl	N/A	Dunlin Painted turtle Pond turtle Red-legged frog Wood duck	Roosevelt elk Black-tailed deer Black bear Cougar Ruffed grouse Red fox Ring-necked pheasant California quail Common merganser
Perennial Ponds, Sloughs, and Their Riparian Areas	Western pond turtle Oregon spotted frog Cascades frog Purple martin Green heron Wood duck Yellow warbler	Western pond turtle Painted turtle Red-legged frog Purple martin American bittern Hooded merganser Wood duck	Purple martin Yellow warbler	Western pond turtle Painted turtle Red-legged frog Yellow warbler	River otter American beaver Common merganser Mink Wood duck
Stream Riparian	American dipper Bald eagle Harlequin duck Red-eyed vireo Willow flycatcher Coastal tailed frog American beaver River otter	Foothill yellow-legged frog Yellow warbler	Downy woodpecker Red-eyed vireo Swainson's thrush Willow flycatcher	Bald eagle Great blue heron American beaver	American Beaver American Dipper Black Bear Black-tailed Deer California Quail Common Merganser Cougar Elk Harlequin Duck Mink Pileated Woodpecker Red Fox Ring-necked Pheasant River Otter Ruffed Grouse Western Gray Squirrel Wood Duck Yellow Warbler

Letters

Unaffiliated Natural Resource Specialists

Oregon Wildlife Institute
PO Box 1061
Corvallis, OR 97339
(541) 745-5025

Oregon Watershed Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

October 8, 2008

Dear Mr. Bierly,

I'm writing to express my support for the East Thornton Lake Natural Area acquisition by the City of Albany. I believe its one of the best opportunities remaining in North Albany to reserve wildlife habitat and open space for human residents in the face of a fast developing urban landscape.

I lived near the north shore of East Thornton Lake for seven years during the 1990's and became very familiar with the variety of wildlife around both East and West Thornton Lakes. I recall observing ospreys, kingfishers, and more than a dozen species of waterfowl using the area in the winter. Willows and other shrubs along these lakes provide important stopover habitat for neotropical birds migrating along the Willamette River. East and West Thornton Lakes also may be a very significant area for native turtles. These lakes are occupied by both the western painted turtle and the western pond turtle. Co-occurrence of both these species in the same waterbody is uncommon. To my knowledge, the population western painted turtles inhabiting Thornton Lakes represent the southernmost extent of the species' range in the Willamette River basin.

The size and landscape position of the property being considered for acquisition presents an opportunity for maintaining an important wildlife area within the Albany city limits. With proper habitat management, the property could maintain wildlife diversity in North Albany and provide a "stepping-stone" habitat for animals moving between the Willamette River and the wooded hillsides to the north. If grassland habitat can be maintained on the property, there is a strong possibility that native turtles may use the site for nesting. At the landscape scale, the property could contribute to the network of riverine habitats along the Willamette such as Bowers Rock State Park, Luckiamute Landing State Natural Area, and the smaller green spaces that have been conserved along the river.

The City of Albany and other project partners involved in this proposed acquisition are to be commended for recognizing the ecological and cultural significance of the East Thornton Lake property. I hope that OWEB will help the partnership ensure that this unique site be reserved for wildlife and Albany residents.

Sincerely,

Dave Vesely

David G. Vesely
Executive Director
Oregon Wildlife Institute
(541) 745-5025
dave@oregonwildlife.org

Oregon Trout

65 SW Yamhill Street
Suite 300
Portland, OR 97204

503.222.9091
503.222.9187 fax
www.oregontrout.org

October 16, 2008

Ed Hodney, Director
Albany Parks and Recreation Department
P.O. Box 490
Albany Oregon, 97321-0144

RE: Support for Willamette River conservation and East Thornton Lake Natural Area property acquisition

Dear Ed:

This letter is being written to express Oregon Trout's strong support for the City of Albany's project to restore and preserve key Willamette River habitat.

Specifically, I would like to voice my strong support for full funding for the acquisition of the 24.2-acre East Thornton Lake Natural Area. The Willamette River provides important habitat for winter steelhead and spring Chinook – the potential restoration opportunity that this project presents is not one to be missed. As part of the proposed restoration of the site project partners seek to restore salmon and steelhead access to historically available habitat. The proposed acquisition and restoration of fish passage would advance priority aquatic restoration strategies designed to recover Upper Willamette Salmon and Steelhead (see e.g. Table 5-3 Willamette Basin Subbasin Plan. 2004; p. 6-20 Draft Upper Willamette Domain Recover Plan. 2007). The natural riparian areas, wetlands and freshwater aquatic beds contained on this property are an important piece to conserve in our efforts to restore salmon and steelhead runs in the Willamette.

Acquisition and conservation stewardship of the East Thornton Lake Natural Area property will protect the existing priority habitats. Preventing home site development and the loss of these high-quality habitats will benefit Willamette River fish and wildlife.

Oregon Trout appreciates the City of Albany's efforts in the Willamette River Basin.

Sincerely,

Mark McCollister
Fish Refuge Program Director

Ed Hodney
Director, Albany Department of Parks and Recreation
Albany, OR

Dear Mr. Hodney,

I am writing to express support for the OWEB grant application for the acquisition of East Thornton Lake. Acquisition of this property will provide significant benefits for wildlife within the Albany urban growth boundary. This property contains habitats (aquatic, riparian, oak woodland, and upland prairie) identified in the Oregon Conservation Strategy (Strategy) as priority habitats for protection in the Willamette Ecoregion. The Oregon Conservation Strategy is a comprehensive, statewide blueprint for conservation with the overarching goal of maintaining and enhancing fish and wildlife populations in Oregon. Also the Strategy describes several actions that may benefit wildlife in the Willamette Ecoregion and they include restoring fish and wildlife habitats in urban centers and reconnecting habitats of high value. Acquisition of this property may also provide benefits for a number of listed and state sensitive species including western pond turtle, spring Chinook, and winter steelhead. Please contact me if you have further questions.

Sincerely,

Michael D. Pope

Michael Pope
Conservation Strategy Coordinator
Oregon Department of Fish and Wildlife
3406 Cherry Ave, NE
Salem, OR 97303
503-947-6321

Letters

Current Owner

Ken Bierly
Miriam Hulst
Oregon Watershed Enhancement Board
775 Summer Street NE, Suite 360
Salem, OR 97301-1290

Owner letter

October 16, 2008

Re: Letter of Support for East Thornton Lake OWEB Grant Application

Dear Ken and Miriam:

As the owner of the property at East Thornton Lake in North Albany, which is the subject of the City of Albany's application for acquisition funding to the Oregon Watershed Enhancement Board, I write to express my knowledge of and support for this proposal.

Sincerely,

Byron Hendricks
Thornton Lake LLC

Letters

Other Supporters

Project Partner Agencies

& Organizations

greenbelt land trust

101 SW Western Suite #111 •Correspondence to PO Box 1721• Corvallis, OR 97339

Phone:(541) 752-9609
info@greenbeltlandtrust.org
www.greenbeltlandtrust.org

October 20, 2008

Oregon Watershed Enhancement Program
775 Summer St. NE, Suite 360
Salem, OR 97301-1290

Dear OWEB Board,

We are writing in support of the grant for acquisition of the Thornton Lake property in Albany. We have worked with the City of Albany and interested community members to review the project and determine the role of the Greenbelt Land Trust.

The property location along the Willamette River in ~~Linn~~ Benton County is within the service area of the Greenbelt and complements two conservation easement acquisition projects we are working on, one near Bowers Rock State Park and the other near the confluence of the Santiam and Luckiamute Rivers. Both of these properties contain similar species and floodplain habitat as delineated in the Thornton Lake application.

The design of the Thornton Lake property acquisition is similar to the Owens Farm property in North Corvallis that was purchased by the Greenbelt Land Trust and City of Corvallis in 2002. In that acquisition we worked with the City of Corvallis and interested community members to secure protection for the farm through a mix of public and private funds. The Trust for Public Lands worked with the GLT and the City to raise funds through a community wide bond measure. Bond funds and a mixture of private donations and federal and state grants secured by the GLT were used to protect over 230 acres of lands of community significance and an array of wetlands, upland prairie and oak woodlands. The Greenbelt worked with a technical advisory group to prepare a management/restoration plan for the 95 acres we own. We also served as a stakeholder in development of a management plan for the 133 acres owned by the City of Corvallis.

Following completion of the acquisition the GLT will work with the City of Albany and interested citizens on preparation of a management plan for the site. We believe our recently adopted Owens Farm Management Plan could serve as a good example for management planning at the Thornton Lake property.

Sincerely,

Karlene McCabe

Remember the Greenbelt Land Trust in your will.

October 13, 2008

Oregon Watershed Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building
775 Summer St. NE, Ste. 360
Salem, OR 97301-1290

To Members of the Oregon Watershed Enhancement Board:

It is with great pleasure that I write this letter to express my support for the East Thornton Lake Natural Area project. I am director of The Turtle Conservancy, a research and education organization made up of volunteers dedicated to the long- term protection and conservation of Oregon's native turtles, the Western pond and Western painted turtles. Since our formation in 1998 we have been expanding and reaching out to people and groups across the state who seek our help and expertise in various turtle issues including conservation and habitat protection and restoration. Through our educational efforts, we help both children and adults be aware of and understand the basic biology of turtles, the threats they face in our modern world, and how each and every one of us can help make sure turtles survive and flourish into the future.

Turtles are listed by the State of Oregon as Sensitive-critical because they are declining throughout much of their range. They are also priority species in a number of plans including the Oregon Conservation Strategy and the Willamette Subbasin Plan (prepared for the Northwest Power and Conservation Council). Habitat loss, introduced invasive predators, and a host of other factors has led to the decline of turtle populations in Oregon.

The East Thornton Lake area currently has populations of both the Western pond and Western painted turtles, and it is extremely rare to find both species on a site in Oregon. Thornton Lake, the adjacent marsh and riparian forest offer high quality basking, feeding and overwintering habitat for turtles. A critical habitat component, namely high quality nesting habitat for turtles, is missing and turtles are currently nesting on nearby private land on lawn edges, gardens, etc., and nests are frequently disturbed and destroyed. Through acquisition, protection and restoration, the East Thornton Lake Natural Area project will provide high quality nesting habitat for turtles on the restored oak savanna, which will be permanently protected. Overall, this project offers a unique opportunity to permanently protect and restore habitats for both native species of turtles that will meet all of their life requirements.

In addition to the many benefits to turtles the East Thornton Lake Natural Area will provide, this project will also protect important habitats for a host of wildlife species including neotropical migratory landbirds, owls, hawks, waterfowl, mammals, and amphibians and reptiles. Protection and restoration of the area will also provide for the potential to restore habitat for juvenile salmonids due to the seasonal connection to the main Willamette River.

The East Thornton Lake Natural Area project also provides numerous environmental education benefits, as it can serve as a living laboratory for students and adults to help with restoration, learn about the wildlife that live on the site, and help monitor changes to the site over time. The protection of this wonderful area in North Albany will benefit generations to come and will greatly enhance the quality of life for citizens of all ages.

The Turtle Conservancy looks forward to working with the many partners of the East Thornton Lake Natural Area and assisting with restoration efforts for turtles and other wildlife. We can assist with restoration efforts including the design and construction of turtle nesting habitat and other aspects of the project.

We urge the Oregon Watershed Enhancement Board to fund this very important project.

Sincerely,

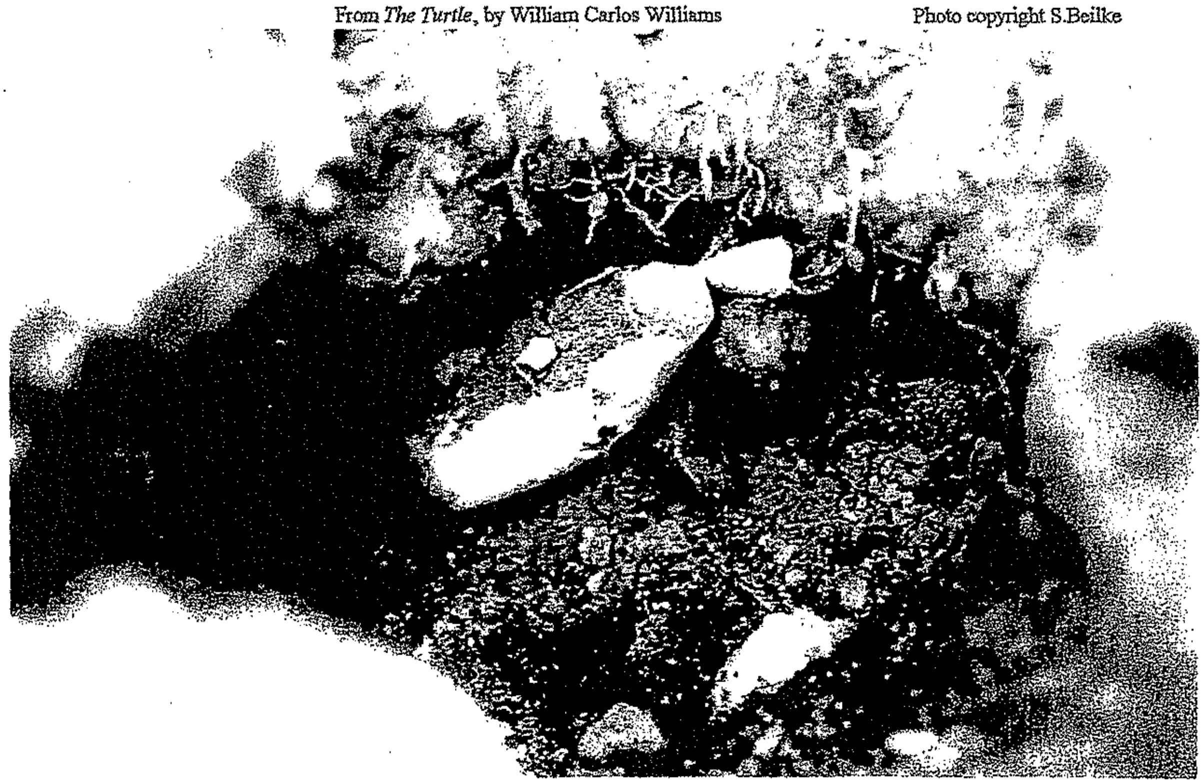
Susan Beilke

Susan Beilke, Director
The Turtle Conservancy

In the beginning was a great turtle who supported the world.
Upon her all ultimately rests.

From *The Turtle*, by William Carlos Williams

Photo copyright S.Beilke



THE XERCES SOCIETY
FOR INVERTEBRATE CONSERVATION
4828 Southeast Hawthorne Boulevard Portland, Oregon 97215, USA
Telephone 503-232-6639 Fax 503-233-6794 www.xerces.org

October 17, 2008

Dear Mr. Azevedo:

I am writing to express our support for the OWEB grant project proposal for the acquisition of the Thornton Lake Natural Area. Your work to protect and restore this area will help create and maintain habitat critically needed by native and endangered aquatic plants and animals.

This project is of particular interest to Xerces because of the implications for improving wetland habitat for invertebrate species. Oregon has lost over one-third of the wetlands that existed in the state prior to European settlement, and many of the wetlands that remain have been altered or severely compromised. Wetlands are important components of watersheds, and provide valuable ecological services such as flood control, water filtration, and erosion control. The Xerces Society is engaged in an on-going project to develop an invertebrate-based tool that can be used to conduct biological assessment of Pacific Northwest wetlands, and the Thornton Lake project area may be a potential monitoring site as our project continues.

Quality wetland habitat is also critical to native and endangered plant and animal species. The Thornton Lake Natural Area provides habitat for at least one species of native freshwater mussel, although little is known about species identity, status, or abundance. Freshwater mussels are one of the most at-risk groups of all plants and animals in North America. There is a paucity of information on the biology and status of Pacific Northwest freshwater mussels, which must be addressed in order to formulate effective conservation plans. Xerces staff is currently engaged in a status review project for the six species of freshwater mussels native to the Pacific Northwest. As a part of this project, we will help identify mussel species found in the Thornton Lake Natural Area and include this site information in our status review data.

You have our strong support and best wishes for success on the grant application.

Sincerely,

Celeste A. Mazzacano

Celeste A. Mazzacano, Ph. D.
Aquatic Conservation Coordinator

BENTON COUNTY

Natural Areas and Parks Department
360 SW Avery Avenue
Corvallis, OR 97333-1192
(541) 766-6871
Fax: (541) 766-6891

October 10, 2008

Oregon Watershed Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Stree NE, Ste 360
Salem, OR 97301-1290

Re: Support for East Thornton Lake Natural Area

Dear Mr. Bierly

We are pleased to support efforts now underway to acquire and preserve East Thornton Lake and surrounding sensitive habitats. The expressed goals for acquiring East Thornton Lake and transforming it into a public *Natural Area*, are complimentary to the Goals and Objectives of the Benton County Natural Areas and Parks Department.

We understand that oak savanna habitat would be encompassed within the designated Natural Area. One of the primary goals on lands owned and managed by Benton County, has been Oak habitat management and restoration. Additionally, the County is nearing completion of a Habitat Conservation Plan aimed toward preservation of sensitive species within prairie habitats. Public Acquisition of East Thornton Lake would facilitate the completion of on-site sensitive species surveys in order to determine appropriate habitat management techniques and species protection.

Benton County's Natural Areas host a great number of practical environmental education programs and benefit from group restoration activities. Local school districts and the OSU community are active in these efforts and support the establishment of Natural Areas which support educational opportunities. We are confident that East Thornton Lake would be well used and supported in this context.

Please contact me if you have questions or would like additional information in support of the City of Albany's application.

Sincerely, Jeffy L Powers

Jeff Powers
Benton County Natural Areas and Parks Director

Cc: Benton County Board of Commissioners

OSU
Oregon State
UNIVERSITY

Department of Fisheries and Wildlife
Oregon State University, 104 Nash Hall, Corvallis, Oregon 97331-3803
Phone 541-737-4531 | **Fax** 541-737-3590 | fw.oregonstate.edu

14 October 2008

Oregon Water Enhancement Board
Attention: Key Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 summer Street NE, Suite 360
Salem, OR 97301-1290

Dear Ken and Board:

I support and endorse the East Thornton Lake Natural Area and Park proposal that OWEB will be considering. The proposed land for acquisition offers several key habitats and at risk plant communities in close proximity to a mid-valley urban area. Thus, the area could be both an important conservation area as well as provide an excellent site for education outreach and research activities. Several faculty members in the Department of Fisheries and Wildlife at Oregon State would be interested in the site for both research and educational opportunities. Its close proximity would increase the likelihood that the site would be used frequently for education and research.

In closing I urge you to consider funding the East Thornton Lake Natural Area and Park project. I am certain that our citizens will receive both substantial conservation and educational benefits from the project.

Regards,

W. Daniel Edge
Department Head

OSU
Oregon State
UNIVERSITY

Andrew R. Blaustein
Professor of Zoology & Director Environmental Sciences Graduate Program
Department of Zoology
Oregon State University, 3029 Cordley Hall, Corvallis, Oregon 97331-2914
Phone 541 737 5356
FAX 541 737 8550
e- mail blaustea@science.oregonstate.edu

16 October 2008

To Whom It May Concern:

I am writing to express my support for the acquisition and restoration of the East Thornton Lake Natural Area. This is an important piece of property that is rich in biological diversity and represents an important component of Willamette Valley ecosystems. East Thornton Lake Natural Area has an abundance of animal and plant life that is representative of the mid-Willamette Valley. For example, the vertebrate fauna includes dozens of bird species, amphibians (salamanders and frogs), reptiles (snakes and lizards) as well as a host of mammals from raccoons to opossums to many rodent species. With increased urbanization and habitat alteration, these animals will continue to use this region as an oasis and natural ecosystem processes will continue.

I am a biologist who studies the population and community dynamics of animals. Much of my research investigates the effects of habitat alteration on amphibians . This site is ideal for breeding populations of several native amphibian species including the red-legged frog (*Rana aurora*), the Pacific treefrog (*Pseudacris regilla*), the long toed salamander (*Ambystoma macrodactylum*), the Northwestern salamander (*Ambystoma gracile*) and the roughskin newt (*Taricha granulosa*).

Amphibians worldwide are undergoing drastic population declines and extinctions at unprecedented rates. One species, found in the Willamette Valley, the red-legged frog, is endangered in California and is much rarer than it used to be in Oregon. This species is being watched closely in Oregon, especially in the Willamette Valley. Breeding populations of red-legged frogs and other amphibian species would be in danger in lakes where the pH and other aspects of their habitat are altered. This includes the Thornton Lake Natural Area.

The East Thornton Lake Natural Area is an ideal site to enhance and maintain biodiversity, public awareness and appreciation for wildlife reserves, research and education opportunities at all levels including primary and secondary schools as well as university level education. It is one of the unique sites in the Willamette Valley and should be maintained as a natural site.

Sincerely,

Andrew R. Blaustein

Andrew R. Blaustein
Professor

OSU
Oregon State
UNIVERSITY

Department of Zoology
Oregon State University, 3029 Cordley Hall, Corvallis, Oregon 97331-2914
Phone 541-737-3705 | **Fax** 541-737-0501 | http://zoology.science.oregonstate.edu/

Oregon Watershed Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building
775 Summer St. NE, Ste. 360
Salem, OR 97301-1290

October 14, 2008

Dear Members of the Oregon Watershed Enhancement Board,

I am writing to enthusiastically endorse the plan to acquire the property that would form the proposed East Thornton Lake Natural Area and Park in North Albany, Benton County, Oregon. Once acquired, this proposed natural area and park would undergo extensive restoration, enhancement, and most importantly in my view, protection of the plants and wildlife that live their currently, and could be attracted to resume residence in the future. As a resident of Oregon for the past 18 years, I have seen the accelerating pace of development and the concomitant loss of natural habitat, especially in the mid-Willamette Valley. Something that has struck me in my years here is how little standing water there is in Western Oregon. By that, I mean small ponds and lakes, but especially lakes like East Thornton Lake that are seasonally connected to larger bodies of water, in this case, the Willamette river. The importance of this underappreciated geophysical feature is that it provides avenues of migration, or corridors for wildlife. It is important to protect ponds and lakes for sure. However, it is critically important to preserve those ponds and lakes that can also serve as reservoirs for plant and animal diversity, as well as a refuge for wildlife that undergo natural migrations.

As a professor in the Department of Zoology, my own research area deals with the ecology of reptiles. In the initial surveys that have already been conducted, several salient species have already been identified. Of particular importance are the two species of native turtles, the western pond turtle and the western painted turtle, that are currently living and breeding in the East Thornton Lake area. These two species of turtles are the only native freshwater turtles in the Northwest, not just Oregon. They have suffered devastating losses, mostly due to habitat loss, but also predation by introduced species like bullfrogs. What may not be apparent to the public is the need for land around a body of water in order to insure a healthy population of reptiles and amphibians. It is easy to think that if we protect the water, the turtles and frogs will be fine because they live in the water. This is only partially true. Turtles for instance must leave the water to lay their eggs in the dry soil. The females migrate from the ponds often for several hundred meters to find suitable nesting sites. Thus, it is critical to set aside areas of land large enough to encompass the entire life-history of sensitive species like these turtles.

One group of animals that is not mentioned at all in the informational packet is snakes. Although some people have aversions to snakes, they are a vital and critical component of a healthy ecosystem. I have not surveyed this area intensively, but my students and I have been conducting surveys of snake and lizard populations in the mid-Willamette valley for almost two decades now. I would expect to find 7 species of snakes and potentially 3 species of lizard in the proposed natural area including, red-spotted, Northwestern and wandering garter snakes, gopher snakes, yellow-bellied racers, ring-necked snakes, and sharp-tailed snakes. In addition, southern and northern alligator lizards and western fence lizards would be expected. Western skinks would also be a possibility.

These species have not been well studied in Western Oregon as a community. This proposed natural area would be an outstanding research resource for our students here at Oregon State University. As Chair of the Biology Program here at OSU, we have students that are interested in conducting wildlife surveys, participating in conservation efforts and generally working to improve habitat for native plants and animals. The physical proximity of this proposed site to the OSU campus would make it a particularly feasible site for our students to work at. I can envision long-term ecological projects being conducted at the site that students could participate in year after year. In addition, we have several Biology courses that have field components and the unique features of this proposed site would make it very desirable to take students on field trips. I can only imagine that the high schools in the region would find these same attributes attractive to their educational goals.

In summary, the proposed East Thornton Lake Natural Area and Park would be a fantastic addition to Oregon's protected habitat areas. Protecting such habitats in the rapidly expanding mid-Willamette region should be a priority now while there is still time and land available to acquire. I enthusiastically support this effort and sincerely hope that this proposal can be supported and come to fruition.

Please contact me if I can be of any further assistance in this regard.

Sincerely,

Robert T. Mason

Robert T. Mason
Professor of Zoology,
J.C. Braly Curator of Vertebrates and
Chair, Biology Program

OSU
Oregon State
UNIVERSITY

College of Science, Department of Zoology
Oregon State University, 3029 Cordley Hall, Corvallis, Oregon 97331-2914
T 541-737-5360 | F 541-737-0501 | www.zoology.science.oregonstate.edu | beattyj@science.oregonstate.edu

October 16, 2008

Oregon Water Enhancement Board
ATTN: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Oregon Water Enhancement Board Members:

I am writing to you in support of the proposal to create the East Thornton Lake Natural Area. I came to Corvallis in 1973 and entered graduate school in the Department of Zoology at Oregon State University. I defended my thesis in December, 1978, and was hired the following September to coordinate introductory biology labs for life science majors. My PhD training was in herpetology (amphibians and reptiles) and I've taught that course as well as vertebrate biology since I became a faculty member in 1979. Currently, I am a senior administrator in the Department of Zoology and I continue to teach herpetology.

The creation of the East Thornton Lake Natural Area provides a unique opportunity to preserve a good-sized, productive piece of wetlands in the Willamette Valley. I am especially excited that the area proposed for protection has breeding populations of Northern Red-legged Frogs (*Rana aurora*) and Western Pond Turtles (*Actinemys marmorata*). Over parts of their historical range, both species have had problems maintaining viable populations. Any existing breeding populations of these species should be carefully maintained and monitored. The monitoring can range from simple types of monitoring to advanced projects utilizing state of the art GIS techniques. This area could be an invaluable teaching tool for college and university students as well as younger students from about the age of middle school through high school aged students. Both species are ones that can be live-caught, marked, released, and recaptured. Those kinds of data can be used to estimate population sizes and whether or not the populations are relatively stable through time. And, both species have very different life history strategies that would make for a nice contrast to illustrate how different demographic characteristics of a population could affect management strategies for each.

In closing, I hope you will consider the proposal to protect this unique natural area. It has my strongest support for that consideration. Please don't hesitate to contact me if you have questions or require more information as I would be happy to provide you with technical references regarding each of these species as well as other species that occur in the area.

Respectfully,

Joseph J. Beatty

Joseph J. Beatty
Executive Associate Chair

Western Oregon University • 345 N. Monmouth Ave • Monmouth, OR 97361 • (503) 838-8804 • lwc@wou.edu

Oregon Watershed Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grants Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

October 14, 2008

Dear Mr. Bierly:

The Luckiamute Watershed Council is lending its support to the East Thornton Lake Natural Area land acquisition proposal. Our coordinator, Nicole Duplaix, and our Project Manager, Michael Cairns, have reviewed the proposal and attended several meetings in Albany to discuss its components.

The Albany Parks and Recreation Department and many local groups and organizations cooperated to devise a plan for the acquisition of this property that will provide regional school and communities environmental education opportunities. It will also preserve a unique wetland habitat that has resident sensitive and threatened species.

Thank you for your consideration of this proposal.

Sincerely,

Kenn Carter

Kenn Carter, P.E.
Chair, Luckiamute Watershed Council

THE
TRUST
for
PUBLIC
LAND

Oregon Field Office
806 SW Broadway
Suite 300
Portland, OR
97205
T. 503-228-6620
F. 971-244-0518
www.tpl.org

Ken Bierly
Miriam Hulst
Oregon Watershed Enhancement Board
775 Summer Street NE, Suite 360
Salem, OR 97301-1290

October 15, 2008

Re: Letter of Support for East Thornton Lake OWEB Grant Application

Dear Ken and Miriam:

I write to express The Trust for Public Land's (TPL) support of the City of Albany's application for grant funding to assist in public acquisition of approximately 24 acres of significant natural area on East Thornton Lake. The Trust for Public Land is a partner to the City in this project. We are entering into an option to purchase the property and intend to purchase and convey the property to the City of Albany for use as a natural area and park as described in the grant application.

The Trust for Public Land is a national nonprofit organization that conserves land for people to enjoy as parks, community gardens, historic sites, rural lands, and other natural places. Since 1972, TPL has worked with willing landowners, community groups, and national, state, and local agencies to conserve over 2.4 million acres or land valued at over $5 billion dollars. In Oregon and the Columbia River Gorge, TPL has helped conserve over 80,000 acres approaching a market value of $100 million.

The East Thornton Lake property holds great potential to advance OWEB's commitment to restoring the main stem of the Willamette River. Additionally, it will serve as a community resource, a site for research and education, and a commemoration of both Native American and European cultural heritage in the Willamette Valley. For all of these reasons, The Trust for Public Land is excited to partner with the City of Albany and many other organizations in the effort to see this land conserved and restored.

Sincerely,

Owen Wozniak

10-3-08

Pacific Northwest Natives

"Enhancing Biodiversity One Population at a Time"

Oregon Water Enhancement Board
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290
Attn: Ken Bierly, Deputy Director/Manager

RE: East Thornton Lake Natural Area

Dear Ken,

I would like to support acquisition, establishment and enhancement of the East Thornton Lake Natural Area for the community of North Albany and citizen of Benton and Linn County.

A well organized effort will reduce the impact of human activity on this valuable watershed within the city limits of Albany. In addition, it will provide habitat for waterfowl, sensitive species indigenous to wetland, riparian and savannah habitat of western Oregon.

Considerable resources are available to enhance this natural area in the short and long run. Pacific NW Natives would be willing to contribute limited staff and resources to facilitate this enhancement process.

Best regards,

C W Edminsr

Craig W. Edminster
Pacific NW Natives

Cc: Ed Hodney, Director – Albany Parks and Recreation Department

1525 Laurel Hts. Drive NW ◆ Albany, OR 97321
NW
Phone: 541-928-8239 ◆ Fax: 541-924-8855 ◆ E-mail: cwe@proaxis.com ◆ www.pacific[redacted]natives.com

The Confederated Tribes of the Grand Ronde Community of Oregon

Natural Resources Department
Phone (503) 879-2424 or (800) 422-0232
Fax (503) 879-5622

47010 SW Hebo RD
Grand Ronde, OR 97347

October 1, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

RE: East Thornton Lake Natural Area Proposal

Dear Mr. Bierly:

As resource professionals of the Confederated Tribes of the Grand Ronde Community of Oregon (Tribe), we are aware of the efforts of the City of Albany, Trust for Public Lands, Greenbelt Land Trust and others in protecting and restoring the East Thornton Lake Natural Area. The Kalapuya, an antecedent tribe of the Tribe, lived and gathered materials in the East Thornton Lake area from time immemorial. Therefore, the area has great cultural significance to the Tribe.

In 1855, the Kalapuya and other tribes of the Willamette Valley ceded their lands including East Thornton Lake to the United States by treaty, but retained certain rights to cultural resources. The archaeological resources, water, fish, wildlife and plant species of the area are all enormously important cultural resources to the Tribe. While our positions do not authorize us to declare Tribal policy, as Tribal staff members we look forward to involvement with the preservation, restoration and enhancement of these resources as well as community involvement and education regarding the cultural history of the Tribe in the area.

In particular we look forward to working in partnership with the City of Albany, Greater Albany Public Schools and Linn-Benton Community College to develop educational programs about the Kalapuya's historic use and the Tribe's current use of native plants and wildlife for food, weaving and other traditional uses. We also look forward to partnerships with the City and the Greenbelt Land Trust for the restoration and management of the Natural Area, particularly to select, manage, and oversee culturally important plant species. If you have any questions, please feel free to contact us at the numbers below.

Sincerely,

Michael Karnosh
Ceded Lands Coordinator
503-879-2383

Eirik Thorsgard
Cultural Protection Coordinator
503-879-1630

Umpqua Molalla Rogue River Kalapuya Chasta

OSU
Oregon State
UNIVERSITY

Saturday Academy
College of Engineering, 247 Batcheller Hall, Corvallis, Oregon 97331-2404
T 541-737-1822 | F 541-737-1805 | cori.hall@oregonstate.edu

October 9, 2008

Ken Bierly, Deputy Director/Manager
Oregon Water Enhancement Board
Land Acquisition Grant Program
State Lands Building, 3rd Floor
775 Summer Street NE Ste 360
Salem, OR 97301

Dear Mr. Bierly,

On behalf of Saturday Academy at Oregon State University, I encourage you to consider and support the East Thornton Lake Natural Area's proposal to the Land Acquisition Grant. We are excited about the potential opportunity to involve youth in environmental education, community service, and to encourage them to be stewards of their local land.

Since 1984 Saturday Academy has provided over 12,000 Oregon students a chance to study topics in more depth than traditional schools allow, and to explore career-related opportunities. Saturday Academy at Oregon State University is a non-profit, cooperative effort among the business, professional, and educational communities to provide intensive extracurricular academic opportunities in science, math and technology for fifth through twelfth grade students. Saturday Academy serves Corvallis and its outlying small rural communities, which don't have access to learning about cutting edge science and technology research. During the 2007 - 2008 school year Saturday Academy at OSU served 303 students from 30 different communities in Oregon.

Through Saturday Academy's classes and workshops program, students attend classes, workshops, and camps at the OSU campus, state agencies, and businesses, all taught by professionals in the field. The informal educational setting of Saturday Academy classes lends itself well to engaging students in experiential and environmental projects. The class sizes are small, with 15 – 20 students who self-select the topics of interest. Many of the classes are project-driven. They are all hands-on and have a real world context where students can make personal connections between the content of the classes and their lives. This setting is a natural fit for watershed education, both in the classroom, and on location at East Thornton Lake.

Saturday Academy's involvement in The East Thornton Lake project would enhance the goals of this project by bringing educational opportunities to youth audiences. Classes could be offered at the site, where students could gain an understanding of the watershed dynamics in the area, the cultural history, and be involved in the preservation of the site. We are interested in expanding the diversity and variety of topics within our progarms, and engaging students in quality educational experiences where they're encouraged to contribute to the future of our world and a healthy planet around them. This collaboration would further the goals of both organizations.

Please contact our offices if you have any further questions. We look forward to the exciting possibilities through this project and strongly encourage you to consider this proposal.

Sincerely,

Anna Corinne Hall

A. Cori Hall
Director
Saturday Academy at Oregon State University

FOMAT
(Friends of Mature Albany Trees)
c/o Bodie Dickerson
526 11th Avenue S.W.
Albany OR 97321
541-926-2533
bodie@proaxis.com

September 25th, 2008

To: Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

From: Friends of Mature Albany Trees (FOMAT)
Chair: Bodie Dickerson
526 11th Ave. SW
Albany, OR 97321-2504

This is a letter of support for the proposed East Thornton Lake Natural Area in North Albany. It is rare to come across a property that so perfectly exemplifies both a wonderful piece of Oregon history and at the same time a unique wildlife habitat with several threatened species. It's even more remarkable that these 20-some acres have been right in the middle of Albany all along, and we are only now discovering their true value, thanks to a determined group of North Albany citizens. The research that has been done by these citizens is tremendous. When the group made its presentation to the Albany City Council on September 7, it was clear that the Council did not know of the historical significance of the Jesse Quinn Thornton Land Claim of 1850 nor of the diverse "natural history" of the site even today, surrounded as it is by modern-day traffic and subdivisions. After a brief discussion all members of the City Council expressed their support.

Let me introduce our group. Friends of Mature Albany Trees (FOMAT) is a grass roots organization dating back to 1998. As the wave of growth and development grew in the early part of this decade, new subdivisions mushroomed on all sides, and the City's tree canopy cover diminished rapidly. Mature trees were especially at risk and none more so than the Oregon white oaks. Albany's urban forest - and its accompanying wildlife - dwindled at an alarming rate, as developers found it more convenient to clear-cut than work around existing trees. FOMAT's overriding goal is to save as many of the healthy, old trees of Albany as possible, and our members have been actively involved in finding creative compromise solutions with developers. Sometimes we have succeeded, at other times not.

We first came to know the East Thornton Lake property when a group of us walked there in the spring of 2006 and observed both deer, red-tailed hawk and smaller birds *too numerous to mention. Since the strip along the lake itself was already largely off-limits to development, we chose to focus on the green southern boundary along the railroad track. One FOMAT member described this natural green buffer as "a wonderful tangle" providing a rich habitat for all kinds of wildlife. The mature trees include a number of Oregon white oaks of various sizes, a 32-inch diameter maple, at least two Douglas firs in the 20-22 inch range, a 35-inch grand fir, cottonwoods, and wild cherry trees. Add to this an under-story of filbert, hawthorn, and elderberry - with occasional apple and pear trees - and you have an invaluable wildlife "pantry".*

Yet, intent as we were on preserving individual trees we still did not really see the "forest". We did not dream that it might be possible to save the entire 24.2-acre site and to restore it to what it once was. We applaud The Friends of East Thornton Lake for their vision and hard work and give the group our complete support. We plan to contribute to the Friends of East Thornton Lakes' efforts and will strive - through our membership - to assist in providing outdoor environmental education, as well as join work parties to replant Oregon white oak to restore the property.

Respectfully,

Bodie Dickerson

Bodie Dickerson
526 11th Avenue S.W.
Albany OR 97321

Steve Cramer

Steve Cramer
630 Fifth Avenue S.W.
Albany OR 97321

James J. Hogan

Leslie and Jim Hogan
931 Washington Street S.W.
Albany OR 97321

Leslie L. Hogan

Oregon State UNIVERSITY

Department of Fisheries and Wildlife
Oregon State University, 104 Nash Hall, Corvallis, Oregon 97331-3803
T 541.737.2164 | F 541.737.3590 | E tiffany.garcia@oregonstate.edu/

Oregon Water Enhancement Board, Land Acquisition Grant Program
To: Ken Bierly, Deputy Director
Re: Letter of Support for East Thornton Lake Natural Area Restoration Project

I am writing to express my support for the acquisition and restoration of the East Thornton Lake Natural Area (ETLNA). This appealing piece of property is rich in biological benefits and should be preserved as a remnant habitat vital to the hydrological function of the Willamette Valley. As an aquatic ecologist, I prize sites such as this; sites with diverse habitat types and a history of connection with the Willamette River system. East Thornton Lake Natural Area contains an oxbow lake that experiences seasonal hydrological changes once prevalent in this area. Because of urbanization and agricultural development, many of these seasonally flooded habitats have been drained and filled. Much of our environmental heritage has been lost because of this ecological misstep, and remnant sites such as the ETLNA need to be recognized as necessary components to our natural environment.

The biodiversity crisis which is occurring in Willamette River is primarily due to historic changes in water flow. Wetlands and other periodically flooded habitats are only now being recognized as essential buffers that benefit both aquatic and terrestrial processes. East Thornton Lake Natural Area is a prime example of how oxbows, wetlands and rivers are dynamic elements of our environment that change over time. This project aims at restoring the seasonal flooding into the lake and returning this area to its historic hydrological state. The plan is to increase the influx of winter waters to cool the temperature of this currently land-locked area, eventually making it more suitable for native Oregon species. Restoring the physical condition of this area is only the first step; invasive species must then be removed, further allowing for the re-colonization of natives.

Enhancing the environmental health of the region should be a priority for all local funding agencies. This not only increases the wild biodiversity inhabiting the area, but allows for public awareness and education. I pledge to expose my students at Oregon State University to this site and to chronicle the changes occurring in the ETLNA over time, as well as study its species, communities and physical attributes in an attempt to understand local ecology. I teach several courses that have field components and plan on utilizing the ETLNA as a study site for my class excursions. In addition, my research on amphibian communities and populations will benefit from the addition of this accessible and naturally relevant site. I have generally conducted my field research on state and national refuges; obtaining field sites with alternate land use histories will greatly enhance my exploration into local amphibian dynamics.

In short, the ETLNA is an optimal site to enhance wild biodiversity, public awareness, ecological research and university education opportunities. I look forward in becoming an active participant in this area's reclamation. Please contact me if I can provide any additional information on this issue.

Yours,

Tiffany Garcia

Tiffany Garcia
Assistant Professor

Benton Soil and Water Conservation District
BENTON SWCD SOIL AND WATER CONSERVATION DISTRICT
305 SW C Avenue, Suite 1
Corvallis, OR 97333
office@bentonswcd.org
Phone (541) 753-7208
Fax (541) 753-1871
www.bentonswcd.org

October 2, 2008

Oregon Watershed Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, Oregon 97301-1290

RE: East Thornton Lake Natural Area Acquisition Grant

Dear Mr. Bierly,

This letter is written to support the City of Albany's grant proposal for acquisition of the East Thornton Lake Natural Area. This site is located in an area in Benton County which is experiencing rapid urban development. Development on this parcel of land, in particular, threatens the unique wildlife diversity which exists on this site. It provides habitat for several sensitive species such as Western Pond and Painted Turtles, red-legged frogs, acorn woodpeckers and Western gray squirrels. By protecting and restoring this riparian and upland habitats within an urban setting, human activities which negatively impact water quality and watershed health, will be minimized. The East Thornton Lake Natural Area will provide educational and volunteer opportunities to local schools and citizens of Albany and Benton County to learn more about local natural resources and participate in restoration activities.

In addition to offering our support for the acquisition proposal, the Benton Fish Passage Improvement Program Coordinator is interested in assessing the connection between the Willamette River and Thornton Lake for fish passage. Since it is an old oxbow of the Willamette River, the channel and possibly Thornton Lake could provide refugia for salmonids during high winter flows. We also can assist the City of Albany to seek funding for fish passage barrier removal and restoration of the site.

Again, we offer our support for the proposal for acquisition.

Sincerely,

Donna Schmitz

Donna Schmitz
Resource Conservationist

Taber Burton
Benton Fish Passage Improvement Program Coordinator

The Benton SWCD mission is to provide leadership to Benton County residents through education and technical assistance for conservation and responsible use of soil, water and related resources through a balanced, cooperative program that protects, restores, and improves those resources.

Calapooia Watershed Council

P.O. Box 844 Brownsville OR 97327 Phone: (541) 812-7622
E-mail: calapooia@peak.org

October 9th, 2008

Oregon Watershed Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

RE: East Thornton Lake Natural Area, OWEB Acquisitions Application

Dear Ken,

On behalf of the Calapooia Watershed Council I am writing in support of the City of Albany's OWEB acquisition grant application to support the protection of East Thornton Lake, an ecologically sensitive and culturally valuable area in Mid-Willamette Valley.

North Albany is currently facing extreme development pressure, as are many of the small sized cities located in the Upper Willamette Basin. It has become evident to our Council in recent months that Albany would like to focus on open space protection even in light of the pressures to expand into wetland and open areas. We have been working with the City for over 7 years and on a number of occasions have performed walking tours of local wetland areas, open spaces and drainage ways, and have first hand knowledge of the serious planning obstacles they face and housing development pressures. The impacts on these water resources at Thornton Lake from the potential housing development that has been proposed would in probability include: severe soil compaction, bank erosion, severe water quality degradation, wildlife habitat destruction, native plant removal or destruction, significant out-crops of invasive plant species such as Himalayan black and weed canary grasses and wetland fill and destruction.

It is important to note that East Thornton Lake is located just across the Willamette River from the Calapooia River confluence, which is an area of that has been highlighted in almost every Willamette Basin and statewide recovery and prioritization plan because of the wildlife habitats and riparian corridors. Thus, for habitat connectivity and to preserve the ecological services this specific area of the Willamette Basin provides it is in the Council's interest to see this East Thornton Lake site guarded from future development. It is also important to the Calapooia Watershed

Council that the Albany Parks and Recreation Department and Planning Commission establish their floodplain development and open space protection policies in light of recent housing developments. The preservation of East Thornton Lake is a huge step in the right direction toward this end. If subdivisions continue to be constructed in filled wetland areas, the City will continue to encounter the associated controversies and disapproval from some residents.

During the first phase of this project the Calapooia Watershed Council is glad to donate 20 hours, or $600 of in-kind staff technical assistance in the following forms: review of site specifics and restoration plans, site visits, data research and mining, and regular communications with the stakeholders.

As always Ken, if you have any questions, please call the number above and I would happy to talk with you!

Sincerely,

Tara Putney

Tara Putney
Council Coordinator
Calapooia Watershed Council

Institute for Applied Ecology

Mailing address:
PO Box 2855
Corvallis Oregon 97339-2855

Street address:
563 SW Jefferson Ave
Corvallis, Oregon 97333

Ph. 541-753-3099
Fax 541-753-3098

www.appliedeco.org

September 30, 2008

Oregon Watershed Enhancement Board
Land Acquisition Grant Program
775 Summer Street NE, Suite 360
Salem, OR 97301-1290
Attention: Ken Bierly

Dear OWEB,

I am writing in support of a request for funding by the City of Albany for a land acquisition grant. The Department of Parks and Recreation proposes to purchase private lands to establish the East Thornton Lake Natural Area.

I support this acquisition primarily because of the existing and potential natural features at the site. Specifically, Western Pond Turtles and Painted Turtles occupy the aquatic habitat at East Thornton Lake and these significant populations are vulnerable to impacts from urban development in the area, which will occur if the site is not protected.

In addition, the terrestrial habitats at the site include wetland and upland prairies which have not been surveyed for special status species. Habitats at the site could support federally and state listed species such as Fenders Blue Butterfly, Kincaid's lupine, Nelson's checkermallow, Bradshaw's desert parsley, Willamette daisy, and Peacock larkspur. The Institute for Applied Ecology can conduct the needed surveys at no cost as part of field surveys supporting development of a Habitat Conservation Plan for prairie species in Benton County. This field work could take place as soon as spring of 2009. Even if these special status species are currently absent from the site, the habitats present may be appropriate for restoration activities to support the species in the future, and could contribute to their recovery in the Willamette Valley.

In sum, I urge OWEB to consider this grant request and preserve the aquatic and terrestrial habitats at this site.

Sincerely,

Tom Kaye

Tom Kaye, PhD
Executive Director

Greater Albany
Public School District 8J

ALBANY
for our FUTURE

718 Seventh Avenue SW
Albany, Oregon 97321-2399
www.albany.k12.or.us

Phone (541) 967-4501
Business FAX (541) 967-4587
Instruction FAX (541) 967-4584

September 30, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Mr. Bierly:

This letter is in support of the East Thornton Lake Natural Area Project. The proposed project lies within the Greater Albany School District boundaries, a school district of more than 9,000 students. I became aware of this project several weeks ago and am quite excited about the educational possibilities for our school children. Our science teachers are always looking for ways to bring watershed curriculum to life and this proposed project more than fits the bill. There are three schools, including a middle school, that are within walking distance of this site, making the project well within reach. Schools requiring transportation for science-related field trips can often receive grant funding from environmental groups and I would anticipate that would be the case for the East Thornton Lake project as well.

Again, I wish to accept my full support and enthusiasm for the East Thornton Lake Natural Area Project.

Sincerely,

Maria Delapoer

Maria Delapoer
Superintendent of Schools

THE OREGON
HISTORICAL
SOCIETY
FOUNDED 1898

September 29, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Sirs:

The Oregon Historical Society fully supports the acquisition of the 24-acre site for the East Thornton Lake Natural Area to protect and enhance its many natural features. In addition, the site is also historically important as a resource of the Calapooia Indians. It is listed as a potential site of burials, villages and pre-historic camps.

Another historic note is that this site is part of Jesse Quinn Thornton's land claim donation. Thornton came to Oregon in 1846 and quickly became an active participant in the Territorial Government. He is an important figure in Oregon pioneer settlement history. The Oregon Historical Society is fortunate to possess the J. Q. Thornton Collection which includes his notes, legal papers, essays, and scrapbook.

This site has unique educational value for providing historical and cultural information. The Oregon Historical Society is willing to partner with the City of Albany in this venture. OHS can provide expertise in developing interpretive kiosks and copies of documents and photographs to be included in informational pamphlets.

Please consider very seriously protecting and restoring this unique site.

Sincerely,

George L. Vogt
Executive Director

GLV-08-109

1200 SW PARK AVENUE · PORTLAND, OREGON 97205 · 503.222.1741 · FAX 503.221.2035 · WWW.OHS.ORG

OSU
Oregon State
UNIVERSITY

Department of Botany and Plant Pathology
Oregon State University, 2082 Cordley Hall, Corvallis, OR 97331-2902
Phone 541-737-3451 | Fax 541-737-3573 | www.oregonstate.science.edu/bpp/

October 3, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Members of the Oregon Watershed Enhancement Board:

This letter is to express my support for the OWEB grant to acquire 24 acres for the East Thornton Lake Natural Area. The restored site will contain wetlands, riparian, upland prairie, and oak savanna habitat types which are identified by the Oregon Diversity Project and OWEB as conservation priority ecological systems. In addition, priority species such as the Western Painted turtle, Western Pond turtle, Red-legged frog, Western grey squirrel and Acorn woodpecker inhabit the site. This property represents a very rich and diverse community of plant and animal species.

As the Department Head for the Department of Botany and Plant Pathology at Oregon State University, I also work with a diverse community of research scientists and undergraduate and graduate students. Our programs include research and education in plant ecology, bryology, habitat restoration, oak-woodland plant communities, native plant establishment, riparian vegetation, plant systematics and more! Our faculty interacts and teaches students in other departments including Biology, Environmental Sciences, Forestry, Bioresearch Programs, Molecular and Cellular Biology and Genetics. Our researchers have brought in over 14 million dollars in grants and contracts over the last two years. OSU is ranked 1st in the country in Conservation Biology by the prestigious Journal of Conservation Biology.

The East Thornton Lake Natural Area is an asset for research and education at OSU and other institutions of learning. It is an ideal outdoor classroom and offers tremendous opportunities for research. I encourage the OWEB board to approve the acquisition grant to protect this unique environment and offer my support and partnership in education and research.

Sincerely,

Lynda M. Ciuffetti

Lynda M. Ciuffetti
Professor and Department Head

OSU
Oregon State
UNIVERSITY

Department of Botany and Plant Pathology
Oregon State University, 2082 Cordley Hall, Corvallis, OR 97331-2902
Phone 541-737-3451 | Fax 541-737-3573 | www.oregonstate.science.edu/bpp/

Oregon Watershed Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building
775 Summer St. NE, Ste 360
Salem, OR 97301-1290

September 24, 2008

To the Members of the Oregon Watershed Enhancement Board:

I am writing to express my enthusiastic support for the acquisition, protection, restoration, and enhancement of the proposed East Thornton Lake Natural Area and Park in North Albany, OR. As a professional plant ecologist who has lived and worked in the Willamette Valley for nearly 22 years, I value and understand the habitat and other ecosystem services provided by lands and waters such as are encompassed in the East Thornton Lake area. I also am all too aware of the rate at which we have lost – and are continuing to lose – natural areas in the Willamette Valley, including both upland and wet prairie areas, which are some of the most threatened ecosystems not only in Oregon, but in the U.S. as a whole. The property (and waters) in question are particularly valuable given the potential for restoration of upland prairie/oak savanna habitat and wet prairie habitat; their seasonal connection to the main Willamette River, which may allow some potential for the lake to provide habitat for spawning or juvenile salmonids; and their current provision of habitat for several state-listed sensitive animal species, including the western painted and the western pond turtle, which are both listed as "critical" on the state sensitive species list. We have a rare opportunity here to protect and enhance several valuable habitat types all in a relatively small land area!

In addition, the proximity of the site to Albany – and Corvallis – will make it useful as a "living classroom" for school children and university students. Students could be involved in initial mapping and inventory work, in helping to design restoration approaches – and in implementing them, and in monitoring their progress. In addition, student groups could propagate native plants for use in restoration efforts, in line with educational restoration outreach efforts being taken in Corvallis and Philomath by the Institute for Applied Ecology's RARE (Restoration and Reintroduction Education) program (http://www.appliedeco.org/ecological-education/programs). I am a member of the Board of Directors of this Institute, and will encourage staff to provide information and ideas for educational outreach efforts associated with East Thornton Lake.

I can serve as a partner for conservation efforts at the East Thornton Lake site in other ways as well.

- I teach BI 371, Ecological Methods, at Oregon State University each spring term. In this class, each student carries out an independent field-based research project, which spans the entire term. Initial evaluation and subsequent restoration efforts at this site will provide numerous opportunities for student projects, some of which could be designed as long-term monitoring studies, which would be followed by different students over time.

- I would also be happy to provide advice on and review of restoration plans, as they develop, and on their implementation and subsequent monitoring.

I hope that funds and necessary permissions will be made available for the purchase and subsequent restoration and protection of this valuable property. Generations into the future will thank you for the foresight!

Sincerely,

Patricia S. Muir

Patricia S. Muir
Elizabeth P. Ritchie Distinguished Professor

FRIENDS OF EAST THORNTON LAKE
c/o 1240 NW SHADY LANE
ALBANY, OREGON 97321

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director
Land Acquisition Grant Program
State Lands Building, Third floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

October 5, 2008

Dear Mr. Bierly and Board Members,

The Friends of East Thornton Lake are writing to express our strong support of the East Thornton Lake Natural Area. Many of us are nearby neighbors, long term residents of the area or lakeside land owners sharing a treasured history with Thornton Lakes. Three key reasons for the Oregon Water Enhancement Board to award this land acquisition grant are 1) preservation of rich biological diversity, 2) improved watershed function and connectivity and 3) tremendous educational value to the surrounding communities.

-Protect an amazing biodiversity in one area:
In our increasingly urbanized world, there are very few places where so many different bird and wildlife species, and their habitats, could be helped by preserving a single area. The East Thornton Lake site, from its sunny open land to its unique lakeside ecosystem is one of these special places. A rare combination of native turtles bask on partially submerged logs just down slope from the grassy upland. A corridor of old growth conifer-snowberry-trillium-fawn lily-forest gives way to oak, ash and maple. Wildlife snags on the riparian forest border of the open meadow are home to raptors (osprey, hawks, owls). It is visited by river otter, bald eagle and sandhill crane. It even has freshwater mussels, which can live to be 150 years old. Native aquatic plants include willows, Wapato and pond lily. Not many neighborhoods have Western Painted and Western Pond turtles nesting in their yards or traversing their lands. People are excited. Neighbors are learning and encouraging one another about the covering and protection of turtle nests, water quality and non-native plants. Friends of East Thornton Lake want to support this wholeheartedly into future generations to protect this unique biological diversity.

-East Thornton Lake is known for its species-rich birding and wildlife:
For years the Audubon Society and other wildlife organizations have utilized the site and this Thornton Lake area for compiling bird species and annual count lists. The wide array of bird life in this area, both the open land, oak and conifer forest fringe to the lake with its vast number of migratory waterfowl, has made it a known birding site.*(SEE ATTACHED BIRDS OF THORNTON LAKE AREA LIST and the most recent Audubon Christmas Bird Count list.)*

Birding the open fields and the forest, bottomland and aquatic area is always amazing. It is akin to driving to four different locations to visit multiple habitat types, except that no vehicle is necessary.

-The bigger watershed picture; it is all connected and there's not much left: As an old oxbow arm of the Willamette River, just a half a mile from the confluence with the Calapooia River, this piece of land and lakeside, are part of a greater network here in the Willamette Valley. From Ankeny Wildlife Refuge, Baskett Slough, Bower's Rock, Luckiamute Landing State Natural Area and Finley Wildlife Refuge to the nearby Horseshoe Lakes, it is part of an interconnected wildlife corridor, laced together by waterways. Migratory bird life and other aquatic species are dependent on these kinds of places. As rich as the whole Willamette River Basin used to be with prairies, wetlands, bottomlands, oxbows and sloughs, it is getting "poorer" by habitat loss all the time. East Thornton Lake Natural Area is a vital piece we don't want to lose.

If OWEB uses its funds to help keep critical habitat and waterways like this preserved into the future, it bolsters the chances of so many different kinds of birds, fish, amphibians, reptiles and mammals which are feeling the encroachment of development and urbanization.

-What could happen and why save it? If this land at East Thornton Lake is *not* preserved, *(and a high-density subdivision, with it's mountains of imported fill dirt required to build on the floodplain, and storm water runoff)* is the alternative, then resulting chances of survival are slim for the rare combination of native turtle species found here. Indeed, many other critical habitats and species that depend on this land would be completely displaced and greatly endangered. The water quality would undoubtedly suffer from urban runoff due to the lakeside development.

The OWEB grant would allow for watershed enhancement of the entire lake system and provide an opportunity for improved seasonal connectivity to the Willamette River, thus improving the overall water quality of the lake basin.

The upland area is currently re-growing the Oregon White Oak trees that the pioneer description of the land in the 1850's gave. We've heard what a diminishing 'commodity' these types of oak prairies are becoming in the Willamette Valley. Here is one well on its way;
let's not allow for its destruction.

Residents in the Thornton Lake area have considered for years how much more valuable and 'forward-thinking' an educational natural area would be than to lose this site to development.

-Educational jewel for the Mid Willamette Valley: If this land is purchased and preserved as a Natural Area via the OWEB land acquisition grant, it will secure a priceless opportunity for the surrounding communities, local schools and universities. There are many educators interested in this site; they see great potential for its use in science programs---from biological/life sciences, ecology, hydrology, study of habitats, wildlife, soils to research, historical (pioneer & native American), outdoor education, community and student volunteerism. The land acquisition will be a taking off point for many excellent educational and restoration projects to preserve these important habitats and species.

-Restoration hand in hand with Education:
The Friends of East Thornton Lake have long discussed the educational uses and how well these could be blended with some of the restoration and preservation activities on the site: from removal of invasive plants to tree planting, plant and animal monitoring, even water quality studies, *since the lake portion of the acreage would be included in the land purchase made possible by this OWEB grant.*

It is important to have full support of a project like this, not only to lift it off the ground, but to keep it going into the future. People are already excited about the many potential benefits and are thinking about education and restoration projects to keep this amazing area of land and lake healthy into future generations.

We urge OWEB to consider the value of awarding this grant, not only to the communities of people in Oregon, but all the aquatic and terrestrial communities as well. Thank you.

Sincerely,

FRIENDS OF EAST THORNTON LAKE
Chair, Annette Higinbotham et al.

Birds of the Thornton Lake Area

- **Waterfowl:**
  - Canada Goose
  - Snow Goose
  - Cackling Goose
  - Wood Duck
  - Northern Shoveler
  - Green-winged Teal
  - Hooded Merganser
  - Common Merganser
  - Cinnamon Teal
  - American Coot

- **Wading Birds:**
  - American Bittern
  - Great Blue Heron
  - Green Heron
  - Great Egret

- **Aquatic Birds:**
  - Belted Kingfisher
  - Double-crested Cormorant
  - Red-winged Blackbird

- **Birds of Prey:**
  - Osprey
  - Bald Eagle
  - Sharp-shinned Hawk
  - Cooper's Hawk
  - Red-tailed Hawk
  - American Kestrel

- **Owls:**
  - Great-horned Owl
  - Short-eared Owl

- **Woodpeckers:**
  - Acorn Woodpecker
  - Red-breasted Sapsucker
  - Downy Woodpecker
  - Northern Flicker

• **Songbirds/Forest/ Field/Open Area Birds:**

- Mourning Dove
- Tree Swallow
- Violet-green Swallow
- Barn Swallow
- Black-capped Chickadee
- Chestnut-backed Chickadee
- Bushtit
- Red-breasted Nuthatch
- Brown Creeper
- Bewick's Wren
- Golden-crowned Kinglet
- Ruby-crowned Kinglet
- Varied Thrush
- Cedar Waxwing
- Townsend Warbler
- Western Tanager
- Spotted Towhee
- Chipping Sparrow
- Fox Sparrow
- Black-headed Grosbeak
- Evening Grosbeak
- Pine Siskin
- Sandhill Cranes (seen only during their migration)
- Killdeer

From National Audubon Society's annual [illegible]
count this last year. The part of the count circle that includes Thornton Lake is highlighted in
yellow.

Seq. #	Countable	Species		Don Boucher, Lisa Millbank	Molly Monroe, Jarod Jebousek	Joel Geier, Wil Geier, Martha Geier	Total
		Observers					
				West Albany, south	Ankeny NWR	Owling	
		Foot HR		6.5	2		113.4
		Foot MI		7	1		129.25
		Car HR		0.75	5.5		106.75
		Car MI		5	8		882.5
		Bike HR		0	0		0
		Bike MI		0	0		0
		Boat HR		1	0		10
		Boat MI		0.25	0		12.5
		Nocturnal HR		0	0	0.25	0.5
		Nocturnal MI		0	0	5	10
			TOTAL				
1	1	Pied-billed Grebe	60	2	2		60
2	1	Horned Grebe	0				0
3	1	Eared Grebe	0				0
4	1	Western Grebe	0				0
5	1	Double-crested Cormorant	81	32	6		81
6	1	Great Blue Heron	60	1	8		60
7	1	Green Heron	1				1
8	1	Great Egret	52	2	25		52
9	1	Tundra Swan	185		66		185
9.2		Swan sp.	12		12		12
10	1	Trumpeter Swan	9				9
12	1	Canada Goose	835	267	398		835
13	1	Cackling Goose	20581	451	17430		20581
13.1		Canada/Cackling Goose	14123				14123
14	1	Snow Goose	0				0
15	1	Greater White-fronted Goose	1				1
16	1	Wood Duck	91	4			91
17	1	Green-winged Teal	6369		6290		6369
18	1	Cinnamon Teal	5		3		5
19	1	Mallard	1342	1	1157		1342
20	1	Northern Pintail	6354		4720		6354
21	1	Northern Shoveler	482		29		482
22	1	Gadwall	31		12		31
23	1	Eurasian Wigeon	2		2		2
24	1	American Wigeon	1693	6	1450		1693
25	1	Canvasback	18		18		18
26	1	Redhead	0				0
27	1	Ring-necked Duck	104		12		104
28	1	Tufted Duck	0				0
29	1	Lesser Scaup	35		12		35
30	1	Greater Scaup	8				8
31	1	Barrow's Goldeneye	0				0

32	1	Common Goldeneye	5				3
33	1	Bufflehead	220		35		220
34	1	Hooded Merganser	47	4	5		47
35	1	Common Merganser	22	4			22
36	1	Red-breasted Merganser	0				0
37	1	Ruddy Duck	168		164		168
38	1	Turkey Vulture	0				0
39	1	Bald Eagle (sum of unspecified)	10	0	7	0	10
39.1		Bald Eagle - ad	7	0	5	0	7
39.2		Bald Eagle - imm	3	0	2	0	3
41	1	Golden Eagle	1		1		1
42	1	White-tailed Kite	1				1
43	1	Northern Harrier	44		15		44
44	1	Sharp-shinned Hawk	11	2			11
45	1	Cooper's Hawk	7				7
46	1	Northern Goshawk	0				0
47	1	Red-shouldered Hawk	7		3		7
48	1	Red-tailed Hawk	144	6	19		144
49	1	Rough-legged Hawk	13				13
50	1	American Kestrel	98	2	9		98
51	1	Merlin	3		1		3
52	1	Prairie Falcon	0				0
53	1	Peregrine Falcon	4		3		4
54	1	Gyrfalcon	0				0
55	1	Ring-necked Pheasant	3		2		3
56	1	Blue Grouse	0				0
57	1	Ruffed Grouse	0				0
58	1	Wild Turkey	51				51
59	1	Mountain Quail	0				0
60	1	California Quail	65		1		65
61	1	American Coot	445	30	257		445
62	1	Virginia Rail	0				0
63	1	Black-bellied Plover	0				0
64	1	Killdeer	783	6	2		783
65	1	Lesser Yellowlegs	0				0
66	1	Greater Yellowlegs	0				0
67	1	Spotted Sandpiper	2				2
68	1	Least Sandpiper	0				0
69	1	Western Sandpiper	0				0
70	1	Dunlin	7814		7540		7814
71	1	Long-billed Dowitcher	671		671		671
72	1	Wilson's Snipe	85				85
73	1	Red Phalarope	0				0
74	1	Mew Gull	359				359
75	1	Ring-billed Gull	0				0
76	1	California Gull	1				1
77	1	Herring Gull	24		8		24
78	1	Glaucous-winged Gull	51				51
79	1	Band-tailed Pigeon	0				0
80	1	Rock Pigeon	70	3	12		70
81	1	Mourning Dove	557	11			557
82	1	Eurasian Collared-Dove	0				0
83	1	Burrowing Owl	0				0
84	1	Short-eared Owl	3		1		3

85	1	Long-eared Owl	0					0
86	1	Barn Owl	4			1		4
87	1	Western Screech-Owl	3				3	3
88	1	Great Horned Owl	12			1	3	12
89	1	Barred Owl	0					0
90	1	Spotted Owl	0					0
91	1	Northern Pygmy-Owl	0					0
92	1	Northern Saw-whet Owl	1				1	1
93	1	Anna's Hummingbird	1		1			1
94	1	Belted Kingfisher	18		3	2		18
95	1	Acorn Woodpecker	19		2	3		19
96	1	Lewis's Woodpecker	0					0
97	1	Red-breasted Sapsucker	12		1	2		12
98	1	Downy Woodpecker	51		3	3		51
99	1	Hairy Woodpecker	7					7
100	1	Northern Flicker	254		8	13		254
101	1	Pileated Woodpecker	2					2
102	1	Tree Swallow	0					0
103	1	Black Phoebe	0					0
104	1	Say's Phoebe	0					0
105	1	Horned Lark	80					80
106	1	Steller's Jay	79		8	1		79
107	1	W. Scrub Jay	417		47	20		417
108	1	Gray Jay	0					0
109	1	American Crow	889		25	6		889
110	1	Common Raven	11					11
111	1	Black-capped Chickadee	682		106	12		682
112	1	Chestnut-backed Chickadee	40		6			40
113	1	Mountain Chickadee	0					0
114	1	Bushtit	247		100			247
115	1	Red-breasted Nuthatch	44		2			44
116	1	White-breasted Nuthatch	15		1	1		15
117	1	Brown Creeper	60		1	1		60
118	1	Bewick's Wren	139		15	8		139
119	1	Winter Wren	46		2			46
120	1	Marsh Wren	9			1		9
121	1	Golden-crowned Kinglet	400		73	4		400
122	1	Ruby-crowned Kinglet	189		8	6		189
123	1	Western Bluebird	64		10			64
124	1	Townsend's Solitaire	0					0
125	1	Hermit Thrush	5					5
126	1	American Robin	1597		113	13		1597
127	1	Varied Thrush	36					36
128	1	Wrentit	8					8
129	1	American Pipit	136			16		136
130	1	Cedar Waxwing	19		17			19
131	1	Northern Shrike	1			1		1
132	1	Loggerhead Shrike	0					0
133	1	European Starling	5714		185	595		5714
134	1	Hutton's Vireo	3					3
135	1	Orange-crowned Warbler	1					1
136	1	Yellow-rumped Warbler (undiffe	94		18	14		94
136.1		*Yellow-rumped (Audubon's) Wa*	37					37
136.2		*Yellow-rumped (Myrtle) Warbler*	1					1

137	1	Townsend's Warbler	16	2			16
138	1	Common Yellowthroat	0				0
139	1	Spotted Towhee	425	17	31		425
140	1	Vesper Sparrow	0				0
141	1	Savannah Sparrow	36		23		36
142	1	**Chipping Sparrow**	14				14
143	1	Clay-colored Sparrow	0				0
144	1	Fox Sparrow (undifferentiated)	203	1	3		203
144.5		*Red Fox Sparrow*	0				0
144.7		*Sooty Fox Sparrow*	36				36
145	1	Song Sparrow	1286	25	40		1286
146	1	Lincoln's Sparrow	46		4		46
147	1	Swamp Sparrow	0				0
148	1	Golden-crowned Sparrow	944	30	48		944
149	1	White-crowned Sparrow	417		43		417
150	1	White-throated Sparrow	10				10
151	1	Harris's Sparrow	0				0
152	1	**American Tree Sparrow**	0				0
153	1	Lark Sparrow	0				0
154	1	Dark-eyed Junco	3730	181	130		3730
154.1		*Slate-colored Junco*	7				1
155	1	Red-winged Blackbird	886	41	122		866
156	1	Western Meadowlark	27	3	3		27
157	1	Brewer's Blackbird	1574		24		1574
158	1	Brown-headed Cowbird	0				0
159	1	Evening Grosbeak	0				0
160	1	Pine Grosbeak	0				0
161	1	Red Crossbill	0				0
162	1	Purple Finch	62				62
163	1	House Finch	343	93			343
164	1	Cassin's Finch	0				0
165	1	Common Redpoll	0				0
166	1	Pine Siskin	68	15	1		68
167	1	Lesser Goldfinch	45	7			45
168	1	American Goldfinch	138	30	5		138
169	1	House Sparrow	244	65			244
	1	**Palm Warbler**	1				1
	1	**Sandhill Crane**	2		2		2
		gull sp.	472				472
			0				0
		Species	118				86784
		Individuals	86784				
		# of participants	25				
		# of parties afield	16				
		# of party-hours					

Letters

Other Supporters

Professionals

Oregon

Theodore R. Kulongoski, Governor

Department of Fish and Wildlife
South Willamette Watershed District Office
7118 NE Vandenberg Ave.
Corvallis, OR 97330-9446
(541) 757-4186
FAX (541) 757-4252

October 17, 2008

Review Committee and Members of the Board
Oregon Watershed Enhancement Board
775 Summer St. NE., Suite 360
Salem, OR 97301

RE: Letter of Support for City of Albany's East Thornton Lake Natural Area Land Acquisition Grant Application

Dear Board and the OWEB Grants Review Team,

The mission of the Department of Fish and Wildlife (ODFW) is to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations. As such, ODFW is writing In support of the grant application referenced above.

ODFW recognizes the value of habitat restoration and conservation, especially in areas identified as having significant resource value. Based on available data as referenced within the grant application, it is anticipated that preservation and ultimately restoration, of the 24-acre site could provide substantial opportunity for a multitude of species and in particular, the expansion of breeding habitat for the Western pond (*Actinemys marmorata*) and painted (*Chrysemys picta*) turtles that reside in East Thornton Lake. Both species are recognized as "critical" sensitive species and are identified in the Oregon Conservation Strategy as Strategy species for conservation.

Turtle breeding has been documented on the north shore of West Thornton Lake (*pers. comm.*, Sue Bielke, ODFW), however, breeding is severely restricted due to current land uses in the area and lack of opportunity for expansion. Acquisition of the referenced area would provide a feasible opportunity to support the current breeding population as well as increase the likelihood of reproductive success if the upland area were to be eventually restored and managed as grassland habitat.

Thank for the opportunity to provide comment. Please do not hesitate to contact me with any additional questions or clarification you may have.

Ann Kreager

Habitat Conservation Biologist
Oregon Department of Fish and Wildlife
Southwest Willamette Watershed District
7118 NW Vandenberg Ave
Corvallis, OR 97330-9446
541.757.4186 x 246

cc: Susan Barnes, ODFW
Susan Bielke, ODFW
Steve Marx, ODFW
James Young, ODFW
Mark Azevedo

Willamette
RIVERKEEPER®

October 17, 2008

Oregon Watershed Enhancement Board
Attn: Ken Bierly, Deputy Director
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste. 360
Salem, OR 97301-1290

Re: Letter of Support and Partnership for East Thornton Lake Natural Area

Willamette Riverkeeper would like to pledge our support for and commitment to the City of Albany for their grant application to acquire land for the East Thornton Lake Natural Area.

Willamette Riverkeeper is a non-profit, 501(c)(3) organization established in 1996 and dedicated to protecting and restoring the Willamette River and in reconnecting people to the river.

As you know, we are looking very closely at Bowers Rock for a channel reconnection project, and the Greenbelt Land Trust is working with willing landowners just south of the park to further extend restoration efforts. We will likely work together on outreach and planning to coordinate and expand these efforts, and the proposal to acquire a natural area on East Thornton Lake that could be reconnected to the mainstem adds to the momentum building on this reach of the river.

The reach between Corvallis and Albany, already rich with meanders and public lands, is among the most scenic on the river and presents unparalleled opportunities to realize the reconnection and restoration goals put forward by the *Willamette River Basin Planning Atlas*, the Willamette Restoration Initiative, the Willamette Valley Livability Forum, and other major studies.

We urge you to give full consideration to this land acquisition grant, and to the work that the City of Albany, the Greenbelt Land Trust, Linn and Benton Counties, local watershed councils and SWCD's, and Willamette Riverkeeper are implementing to reconnect the river with its side channels and floodplains and restore natural function to this crucial reach.

As always, thank you for your support.

Sincerely,

Travis Williams

Travis Williams
Riverkeeper and Executive Director

1515 SE Water Ave #102, Portland, OR 97214 • 503-223-6418 • www.willamette-riverkeeper.org

Oregon Trout

65 SW Yamhill Street
Suite 300
Portland, OR 97204

503.222.9091
503.222.9187 fax
www.oregontrout.org

October 16, 2008

Ed Hodney, Director
Albany Parks and Recreation Department
P.O. Box 490
Albany Oregon, 97321-0144

RE: Support for Willamette River conservation and East Thornton Lake Natural Area property acquisition

Dear Ed:

This letter is being written to express Oregon Trout's strong support for the City of Albany's project to restore and preserve key Willamette River habitat.

Specifically, I would like to voice my strong support for full funding for the acquisition of the 24.2-acre East Thornton Lake Natural Area. The Willamette River provides important habitat for winter steelhead and spring Chinook – the potential restoration opportunity that this project presents is not one to be missed. As part of the proposed restoration of the site project partners seek to restore salmon and steelhead access to historically available habitat. The proposed acquisition and restoration of fish passage would advance priority aquatic restoration strategies designed to recover Upper Willamette Salmon and Steelhead (see e.g. Table 5-3 Willamette Basin Subbasin Plan. 2004; p. 6-20 Draft Upper Willamette Domain Recover Plan. 2007). The natural riparian areas, wetlands and freshwater aquatic beds contained on this property are an important piece to conserve in our efforts to restore salmon and steelhead runs in the Willamette.

Acquisition and conservation stewardship of the East Thornton Lake Natural Area property will protect the existing priority habitats. Preventing home site development and the loss of these high-quality habitats will benefit Willamette River fish and wildlife.

Oregon Trout appreciates the City of Albany's efforts in the Willamette River Basin.

Sincerely,

Mark McCollister
Fish Refuge Program Director

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

821 SE 14th Avenue
Portland, OR 97214-2537

fax 503 802-8199

nature.org/oregon

October 17, 2008

Oregon Watershed Enhancement Board
Grants Review Committee, Watershed Restoration Program
775 Summer Street NE, Ste. 360
Salem, OR 97301-1290

Re: East Thornton Lake Natural Area Acquisition Proposal

Dear members of the Review Committee and the Oregon Watershed Enhancement Board,

This letter is to indicate our support for The City of Albany's effort to acquire the 24.2 acre East Thornton Lake for a combined city park and natural area.

The site, part of an old oxbow of the Willamette River, has a remarkable combination of natural features that justify its consideration for acquisition. These features include Willamette River floodplain/riparian habitat, open water, potential prairie / oak savanna, western pond turtles, western gray squirrels, acorn woodpeckers and diverse amphibians, birds, and native vegetation.

I'm sure you are well aware of the extreme loss these habitats and species have experienced and the urgency with which we need to act to save them throughout the Valley.

The site is not without its issues however, it is both small and located within the urban growth boundary of Albany, and more or less surrounded by development; this adds up to a high per acre cost, and potential future management challenges. While these factors certainly do not exclude the site from contributing substantial ecological benefit to the Willamette Valley, it is the reason that the Conservancy has declined to take a leadership role in protecting and managing this site. What we said at the time and believe today however, is that the site is well suited for a strong locally based coalition committed to combining ecological restoration, public outreach and education in a way that would provide great community benefits and help address the long-term management issues.

The applicants appear to have worked hard to build that appropriate coalition of local and regional partners to turn the central challenge of the site into a potential opportunity. If strong local funding can also be brought to the table I think the project would merit investment of OWEB's resources.

Sincerely yours,

Jonathan Soll
Willamette Basin Conservation Director

Public School District 8J

ALBANY
for our FUTURE

718 Seventh Avenue SW
Albany, Oregon 97321-2399
www.albany.k12.or.us
Phone (541) 967-4501
Business FAX (541) 967-4587
Instruction FAX (541) 967-4584

October 7, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Suite 360
Salem, Oregon 97321-0144

Dear Mr. Bierly,
I am enthusiastically offering my support in favor of funding the "East Thornton Lake Natural Area" located in the North Albany neighborhood of the Albany community. I have worked in the Albany schools for the last 32 years as a teacher of Biological Sciences and as a school administrator. This concept and more importantly, this location are the perfect match for providing our children and our local citizens with the ideal backdrop for the direct observation and study of fundamental ecological principles.

The entire Thornton Lake ecosystem represents a textbook model for river/lake/marsh succession from a wetland to a Northwest prairie/oak savannah landscape. The lake ecosystem supports a wide variety of life forms native to the Willamette Valley. With diversity ranging from microscopic protozoans, plants and insect larvae, to small crustaceans, marsh plants, fishes and amphibians, to a nice population of reptiles, birds, mammals, native shrubs, grasses and trees. It is difficult to find biological sites within the boundaries of a city that hold such a cross-section of native wildlife, so available for observation and study by children and adults. The "East Thornton Lake Natural Area" is a gem, just waiting to be polished and put into use as a truly unique educational tool.

For students, the opportunity to undertake the hands-on study of a number of individual species and their relationships to each other is special. The variation within specific populations and the understanding of the impact of man's activities on these populations may have never been more important than it is today. The lessons learned here will surely apply to our global struggle as we self-examine man's impact on this planet from a broader perspective. Life lessons that can only benefit those who are lucky enough to participate in this experiential learning.

The Thornton Lake ecosystem even offers a historical look at the natural flow of the Willamette River prior to flood control and the impact of water storage dams built throughout the western valleys of Oregon. This was never more evident than during the floods of 1996, when the river temporarily reclaimed it's historical pathway, overflowing it's dredged banks and traveling across North Albany, through the Thornton Lake drainage before finally rejoining itself about 2 miles downstream. The opportunity to actually observe this action brought a better understanding to the entire community about the historic behavior of our Willamette River.

In closing, I need to state that I fully support this effort by a large contingent of persons and organizations, with a quite diverse background to create and protect this living laboratory. The "East Thornton Lake Natural Area" is truly a refuge for wildlife, a hands-on classroom for our children and a treasure for our community.

Sincerely,

Ric Blasquez

Ric Blasquez
Human Resources-Risk Management

14 October 2008

Oregon Water Enhancement Board
Attn.: Ken Bierly, Deputy Director/Manager
Land Acquisitions Grant Program
State Lands Bldg., Third Floor
775 Summer St., NE, Ste 360
Salem, OR 97301-1290

Dear Mr. Bierly,

I strongly support the acquisition of the East Thornton Lake Natural Area by the Oregon Water Enhancement Board. As you know, habitats like this are disappearing from Oregon's landscape at a rapid rate through urbanization and agriculture use. The value of these natural areas cannot be overestimated. They provide living space for many different species of native plants and animals. They also provide uses for the human community in the form of open space for recreational and educational purposes. These areas help clean water and aid in absorbing excess water in times of floods.

As an instructor in botany at Oregon State University I am particularly interested in the preservation of the site. Thornton Lake would be an ideal site for field trips for classes – it is near the university and would have the plant life I want my students to see. For example, this term I am teaching Aquatic Botany and Thornton Lake would be the perfect location to teach about this particular type of habitat – an oxbow lake – and the aquatic and wetland plants that grow in and around it. In the spring I teach a class in the Flora of the Pacific Northwest and again this would provide a great area to bring a class to identify the native flora. The proximity of the lake to Oregon State University and other elementary and high schools make it a perfect site for numerous educational activities.

The preservation and restoration of East Thornton Lake would provide the state of Oregon with a resource for future generations to enjoy and utilize. The most important reason to save the area is to preserve the native habitat and native species of plants and animals that live there. Without these Oregon loses its identity.

Sincerely,

Richard R. Halse

Richard R. Halse
272 S.E. Viewmont Ave.
Corvallis, OR 97333

NORTH ALBANY MIDDLE SCHOOL
1205 NORTH ALBANY RD NW · ALBANY, OR 97321
PH. (541) 967-4541· FAX (541) 924-3704

JANE EVANS
PRINCIPAL
TRACY DAY
ASSISTANT PRINCIPAL
TARA DIXON
OFFICE MANAGER
KAREN LEE
SECRETARY

Oregon Water Enhancement Board
Attn: Ken Bierly
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Oregon Water Enhancement Board,

Please accept this letter of support for the East Thornton Lake Natural Area. As a science educator at North Albany Middle School, I am in full support of a natural area that my students could access to provide hands-on learning in accordance with the Oregon State Standards.

Our sixth grade students study the water cycle and preservation of natural resources. Studying the health of a local watershed and the impacts the surrounding areas could have on it will reinforce their learning. Students learn so much better when they can see a connection to the real world. The proximity of the East Thornton Lake Natural Area provides a rare opportunity to take students outside to enhance what they learn inside my four walls. Students can practice real world science by taking water samples and observe plants and animals in their natural habitat.

The seventh graders study ecosystems, amphibians, and reptiles. The combination of Western pond and painted turtles allows students to make field observations of animals they can only see in pictures.

North Albany's newest science class is a hands-on science class. This class focuses on environmental science and is particularly interested in native plants. Students can study the effects of preserving land and document the change in the area as it becomes more low impact.

The science teachers of North Albany Middle School stand fully in support of this project.

Sincerely,

Katy Kelly

Katy Kelly
NAMS Science Teacher

Colleen Muller
825 7th Ave. SW
Albany, OR 97321
October 3, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, Oregon 97301-0144

Dear Mr. Bierly:

I am writing to ask you to support the East Thornton Lake Natural Area Project. As a science teacher in Albany, Oregon, I have had the incredible opportunity to visit East Thornton Lake with my students and to use it as a laboratory experiment site. My students and I, along with several other teachers, were able to test water quality, collect water samples, and to collect both aquatic and land invertebrates. My students were able to learn about the importance of watersheds by exploring this wonderful local example.

The purpose of this project is to protect and restore a natural habitat that is quickly disappearing. This watershed could very well be gone in our near future if something is not done to prevent the loss of this small, yet very important natural area. This project will prevent a proposed subdivision from being built that could potentially devastate the area. North Albany has already suffered from too much subdivision development and adverse environmental effects are being felt in many areas. Please don't allow this trend to continue, especially in such a vulnerable area.

I think that this is an extremely important project. It will benefit the community at large and provide a wonderful learning opportunity for the students and citizens of Albany, Corvallis, and the surrounding areas for years to come. The educational opportunities are endless, and the environmental impact of saving this valuable watershed is tremendous. I urge you to support the East Thornton Lake Natural Area Project. It will not only enhance the beauty of the North Albany area but will also save critical habitat for many sensitive species.

Thank you for your support.

Sincerely,

Colleen J Muller

Colleen Muller
Science Teacher, Albany Options School

Oregon Water Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste. 360
Salem, Oregon 97301-1290

October 7, 2008

To Whom It May Concern:

I would like to voice my support for the East Thornton Lake Natural Area. The proposed plan not only provides a natural area for several types of wildlife, it also offers a unique opportunity to have a substantial impact on educating our younger generations teaching them the value of caring for the world and environment around us. The East Thornton Lake area has much potential to allow the native plants and animals to survive in their natural habitat. If we destroy the environment these plants and animals are gone forever and we will have lost out on preserving one more natural resource for future generations.

As a public school educator for 32 years, having a unique area for study and exploration for our local schools and organizations would be a plus for our community. Think of the possibilities of having a live laboratory close at hand, where students would be able to study and research the plants and animals that depend on this area for healthy habitat. The North Albany area has been growing and the East Thornton Lake area gives us a beautiful setting that preserves natural resources and provides a place where students, community and researchers could study and relish in the unique opportunities that can only enhance our existence.

We don't need to add to the congestion of our area with a new housing development. We need to preserve natural areas that can be shared for generations of today and for our many tomorrows.

It appears there is considerable support from over 15 groups and organizations for the East Thorton Lake Natural Area and I would like to add my name to that list.

Sincerely,

Sharon Baum

Sharon Baum
2765 NW Valley View Dr.
Albany, Oregon 97321

Oregon Water Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste. 360
Salem, Oregon 97301-1290

October 7, 2008

To Whom It May Concern:

I would like to voice my support for the East Thornton Lake Natural Area. The proposed plan not only provides a natural area for several types of wildlife, it also offers a unique opportunity to have a substantial impact on educating our younger generations teaching them the value of caring for the world and environment around us. The East Thornton Lake area has much potential to allow the native plants and animals to survive in their natural habitat. If we destroy the environment these plants and animals are gone forever and we will have lost out on preserving one more natural resource for future generations.

As a science teacher for 26 years, having a unique area for study and exploration for our local schools and organizations would be a plus for our community. Think of the possibilities of having a live laboratory close at hand, where students would be able to study and research the plants and animals that depend on this area for healthy habitat. The North Albany area has been growing and the East Thornton Lake area gives us a beautiful setting that preserves natural resources and provides a place where students, community and researchers could study and relish in the unique opportunities that can only enhance our existence.

We don't need to add to the congestion of our area with a new housing development. We need to preserve natural areas that can be shared for generations of today and for our many tomorrows.

It appears there is considerable support from over 15 groups and organizations for the East Thorton Lake Natural Area and I would like to add my name to that list.

Sincerely,

Jmc Hinrichsen 10·07·08

Jolene Hinrichsen
2765 NW Valley View Dr.
Albany, Oregon 97321

Saturday Academy
College of Engineering, 247 Batcheller Hall, Corvallis, Oregon 97331-2404
T 541-737-1822 | F 541-737-1805 | cori.hall@oregonstate.edu

October 9, 2008

Ken Bierly, Deputy Director/Manager
Oregon Water Enhancement Board
Land Acquisition Grant Program
State Lands Building, 3rd Floor
775 Summer Street NE Ste 360
Salem, OR 97301

Dear Mr. Bierly,

On behalf of Saturday Academy at Oregon State University, I encourage you to consider and support the East Thornton Lake Natural Area's proposal to the Land Acquisition Grant. We are excited about the potential opportunity to involve youth in environmental education, community service, and to encourage them to be stewards of their local land.

Since 1984 Saturday Academy has provided over 12,000 Oregon students a chance to study topics in more depth than traditional schools allow, and to explore career-related opportunities. Saturday Academy at Oregon State University is a non-profit, cooperative effort among the business, professional, and educational communities to provide intensive extracurricular academic opportunities in science, math and technology for fifth through twelfth grade students. Saturday Academy serves Corvallis and its outlying small rural communities, which don't have access to learning about cutting edge science and technology research. During the 2007 - 2008 school year Saturday Academy at OSU served 303 students from 30 different communities in Oregon.

Through Saturday Academy's classes and workshops program, students attend classes, workshops, and camps at the OSU campus, state agencies, and businesses, all taught by professionals in the field. The informal educational setting of Saturday Academy classes lends itself well to engaging students in experiential and environmental projects. The class sizes are small, with 15 – 20 students who self-select the topics of interest. Many of the classes are project-driven. They are all hands-on and have a real world context where students can make personal connections between the content of the classes and their lives. This setting is a natural fit for watershed education, both in the classroom, and on location at East Thornton Lake.

Saturday Academy's involvement in The East Thornton Lake project would enhance the goals of this project by bringing educational opportunities to youth audiences. Classes could be offered at the site, where students could gain an understanding of the watershed dynamics in the area, the cultural history, and be involved in the preservation of the site. We are interested in expanding the diversity and variety of topics within our progarms, and engaging students in quality educational experiences where they're encouraged to contribute to the future of our world and a healthy planet around them. This collaboration would further the goals of both organizations.

Please contact our offices if you have any further questions. We look forward to the exciting possibilities through this project and strongly encourage you to consider this proposal.

Sincerely,

Anna Corinne Hall

A. Cori Hall
Director
Saturday Academy at Oregon State University

October 8, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste, 360
Salem, OR 97301-1290

To the Members of the Oregon Watershed Enhancement Board:

I am very pleased to write a letter of support for the acquisition, protection, and restoration of the proposed East Thornton Lake Natural Area and Park in North Albany, Oregon. I have worked as a professional plant ecologist at Oregon State University for many years, working closely with managers of natural habitats in the Willamette Valley and thus, understand the importance of conserving natural ecosystems.

I strongly support the long term preservation of this unique and diverse lakeside habitat through land acquisition and restoration. It is impressive that it so many rare and sensitive species are assembled in a single location. We have a rare opportunity to protect and enhance several valuable habitat types all in a relatively small land area. Moreover, there is wide-spread community support for this acquisition and restoration. In addition there is considerable input from a diversity of experts and consultants on the development of restoration strategies.

The proposal for East Thornton Lake Natural Area fulfills many of OWEB's conservation directives, specifically

- the site contains multiple priority species,
- the site contains priority habitats, and
- the site provides wildlife and watershed connectivity to the Willamette River system.

The potential educational benefits are significant:

- public education of the rich cultural and natural history of the area, in addition to promoting understanding of watershed health
- numerous unique research opportunities by scientists of nearby universities because of the special assemblage of wildlife and habitat at the site
- hands-on educational opportunities for public school children (K-12) through habitat restoration and management activities.

In summary, I encourage you to fund the proposed East Thornton Lake Natural Area and Park. I whole-heartedly agree with the statement that "this site is a preservation and educational jewel for the mid-Willamette Valley."

Sincerely,

Deborah Clark

Deborah Clark, Ph.D.

Oregon State University

Department of Biochemistry and Biophysics
Oregon State University, ALS 2011, Corvallis, Oregon 97331-7305
T 541-737-4491 | www.oregonstate.edu/dept/biochem/ | mcfaddep@oregonstate.edu

October 11, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Mr. Bierly:

This is just a quick note to show my support for the East Thornton Lake Natural Area Project that is currently making its way forward in the granting process. I'm very familiar with the proposed site and recommend it as a preserved wetland area with high marks in its potential as an educational resource. There are not too many wetlands inside of urban growth boundaries having such superb public access and such a broad complement of natural amenities. The folks involved in this endeavor are top-notch and come into this group endeavor from diverse backgrounds. I think the municipality would support the project wholeheartedly through contributions in-kind. Above all, I think the children of the community stand to benefit from the central location of an accessible wetland. I know the teacher-faculty contacts between the local school districts and our universities will light up brightly if this project moves forward.

I hope to be involved and look forward to the Board's kind review of the project.

Sincerely,

Phil McFadden
Associate Professor of Biochemistry and Biophysics

neighborhood naturalist

neighborhood naturalist
Don Boucher
5008 SW Technology Loop, #9
Corvallis, OR 97333
541-753-7689
bouchdon@peak.org

Ed Hodney, Director
Albany Parks and Recreation Department
P.O. Box 490
Albany, OR 97321-0144

10-9-08

I am very excited by the proposal for the ***East Thornton Lake Natural Area.*** Since 2003 the Neighborhood Naturalist program has served the Mid-Willamette Valley by promoting interest in the region's natural character. We educate people about our local flora and fauna by leading regular field trips, and producing publications and videos. Since 1999, I have also been an active member in the Audubon Society of Corvallis where I teach birding classes, lead field trips and help with publicity efforts.

I often have participated in the National Audubon Society's annual Christmas Bird Count which is essentially a winter bird census. For the last five years my Christmas Bird Count team has covered North Albany and Thornton Lake. The proposed East Thornton Lake Natural Area has always been good for birds and other wildlife. We've had many memorable experiences watching birds on the water, in the forest and out in the fields. Last year we had a chance to paddle a canoe and watched a family of otters play. I'm excited to hear that Western Painted Turtles live alongside Western Pond Turtles in Thornton Lake. The proposed natural area will help these and other species breed and thrive. People in North Albany and nearby are blessed to have a place like this.

I am happy to see that there is a plan to protect and manage the proposed East Thornton Lake Natural Area for its native plant and animal species. I would like to point out that this spot is surrounded by residential areas and that the neighbors will benefit greatly by it. People need a place nearby where nature is presented on its own terms. Children need an unstructured experience in nature, and East Thornton Lake Natural Area is ideal. There is a plan for a city park in a portion of East Thornton Lake Natural Area. I appreciated that the infrastructure in this plan is minimal. With less infrastructure, nature will remain the focus and the cost of maintaining this park will be low.

When natural areas are preserved within residential communities, people develop a sense of pride in the beauty and natural character of their neighborhoods. People are happier when they live amongst nature. This sense of value will keep people in the community and promote their involvement in future conservation efforts and other community improvements of all kinds.

Beyond the local community, places like this are of state-wide significance. Every spot where nature is preserved, the quality and vitality of life improves. The protection of natural land promotes Oregon pride, natural diversity is improved and the value of all of Oregon land is increased.

I am an enthusiastic supporter of the acquisition of this area and the development of the proposed East Thornton Lake Natural Area as an area where nature is preserved and restored.

Sincerely,

Don Boucher

Don Boucher

www.neighborhood-naturalist.com

October 4, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Oregon Watershed Enhancement Board,
As a member of the steering committee of the Oregon Oaks Working Group I would like to voice our support of the East Thornton Lake Natural Area acquisition proposed by the City of Albany. The Thornton Lake area has a unique combination of flora and fauna, including the potential for high quality oak savannah habitat, which make it a wonderful candidate for upland and wetland restoration. The Oregon Oaks Working Group is a self organized group of Oregonians who share an interest in the habitats and ecology of oak woodlands and savannah throughout the state and offer semi yearly sessions to share knowledge and experience in the preservation and management of these resources. We are concerned about the loss of our native oak woodlands and the fauna associated with these threatened landscapes. The Thornton Lake proposal has the involvement of a knowledgeable and dedicated group of citizens and the support of the city of Albany Parks Department, a pairing which can propel the project to success in acquisition and restoration of the property. Please support their grant request with the fund necessary to acquire this property.

Sincerely,
Patti Haggerty
Patti Haggerty
6963 NW Cabernet Place
Corvallis, Oregon 97330

Members of the steering committee include: Jane Kertis (USFS)
Adam Novick (private landowner, and recipient of Landowner awards for oak habitat restoration from the Oregon Wildlife Society)
Allan Branscomb (University of Oregon Institute for a Sustainable Environment)
Hugh Snook (BLM)
Deborah Clark (Oregon State University)
Nancy Sawtelle (BLM)

Oregon
Theodore R. Kulongoski, Governor

Department of Forestry
State Forester's Office
2600 State Street
Salem, OR 97310
(503) 945-7200
FAX (503) 945-7212
TTY (503) 945-7213/800-437-4490
http:/ /www.odf.state.or.us

"STEWARDSHIP IN FORESTRY"

October 9, 2008

Ken Bierly,
Oregon Water Enhancement Board
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Ken,

It is my pleasure to write a letter of support for the City of Albany's application for the East Thornton Lake Natural Area project. I manage the urban forestry program at the Department of Forestry, and my staff and I provide assistance to cities and non-profit organizations to help them manage their urban forests and urban natural resources in ways that maximize their environmental, economic, and social benefits. The East Thornton Lake Natural Area project is an excellent example of local collaboration with city government, citizen organizations, natural resource agencies, and concerned homeowners cooperating to further their quality of life while conserving our natural resources.

Given the multiple priority species and priority habitats that can benefit from providing wildlife corridors and watershed connectivity to the Willamette River system, the East Thornton Lake project appears to be an ideal habitat preservation project and environmental education treasure for the Mid-Willamette Valley.

Urban residents need places like the East Thornton Lake Natural Area to maintain a connection to the natural world that we depend on so greatly - yet so often take for granted. The educational component of this project can help youth understand how important our natural resources are to our quality of life in Oregon. I am always looking to support project that help Oregonians avoid the trap of thinking that urban and rural are two separate concepts rather than two parts of an interconnected concept. We need to help people understand that the rivers that get their start in our rural forests travel through our urban forests on their way to the Pacific - meaning we cannot have a healthy watershed unless we have a healthy urban component as well. East Thornton Lake represents an opportunity to help tell that story, to help emphasize the value of nature in cities, and to recognize the importance of proper urban natural resource management.

This project certainly seems worthy of OWEB assistance.

Sincerely,

Paul D. Ries

'aul D. Ries
Jrban & Community Forestry Program Manager

October 5, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Director Bierly,

I am writing to express my full support for funding of the Acquisition of East Thornton Lake Natural Area. I support this proposal not only because it will protect and restore a watershed threatened by human impact, but also because it will provide a unique public educational opportunity regarding environmental restoration.

The acquisition of Thornton Lake Natural Area strongly supports OWEB's goal to strengthen ecosystems that are critical to healthy watersheds and sustainable communities. The acquisition plan clearly accounts for restoring at-risk plant communities and priority species, including the reintroduction of juvenile salmonids into Thornton Lake. Moreover, protecting salmon habitat provides an economic boost in multiple ways: by providing clean drinking water, generating recreational and tourism dollars, and increasing property values.

Furthermore, this land is rich in cultural history. Prehistoric burials and village camps likely exist as an extension of nearby archaeological findings. By keeping this land out of the hands of developers, the land acquisition strengthens the capacity of local indigenous communities to protect and manage their cultural resources, as well as promotes their cultural values and sustainable traditional land use practices.

Acquisition of this land will create opportunities to learn about the importance of watersheds and encourage community stewardship. As a former middle school biology teacher and OSU Biology teaching assistant, local watersheds provided a unique forum for teaching environmental education outside the classroom that no textbook could replace. I have found that immersing students within a fragile ecosystem that is under restoration promotes environmental literacy and understanding. This type of setting provides students with a visceral connection to the downstream effects of unchecked urban growth. This site could not only be used for studies that monitor water quality, but also those that follow and promote riparian habitat restoration and native animal repopulation. The creation of East Thornton Lake Natural Area will further enhance such outreach opportunities between the OSU community and local students in surrounding rural schools.

In conclusion, the East Thornton Lake Natural Area Acquisition proposal will have an enormously positive benefit for local students, indigenous peoples, and the surrounding community. The project will prevent land degradation that threatens environmental services, livelihoods, and the cultural history of indigenous communities while conserving the region's high, but increasingly threatened, biodiversity resources.

Sincerely,

Anne Halgren

Anne Halgren, Ph.D.
Plant Pathologist, USDA-ARS
National Forage Seed Production Research Center

Oregon
Theodore R. Kulongoski, Governor

Department of Fish and Wildlife
South Willamette Watershed District Office
7118 NE Vanderberg Ave.
Corvallis, OR 97330-9446
(541) 757-4186
FAX (541) 757-4252

OREGON Fish & Wildlife

September 8, 2008

Oregon Watershed Enhancement Board
775 Summer Street NE
Salem, OR 97301

Dear Sirs,

The Oregon Fish and Wildlife Department (ODFW) fully supports the acquisition and restoration of the East Thornton Lake Natural Area in Benton County (T 11S, R 4W, Section 1AA, TL 2100 and T11S, R 3W, Section 6BB, TL 1400.) This 24.2 acre property consists of lake bottom, a willow/sedge/grass riparian zone and a fallow farm field dotted with mature oaks, maples, and snags. The site supports breeding western pond and painted turtles, red legged frogs, western gray squirrel, and acorn woodpeckers. The site is also used by migratory waterfowl, neotropical birds, green and great blue herons, and both beaver and river otters.

ODFW supports the a) goals for this project, b) collaborative efforts with multiple partners to protect and restore the site, and c) the educational opportunity for this Willamette Valley Natural Area to promote the Oregon Conservation Strategy habitats and species to the greater Albany/Corvallis populace.

Sincerely,

Nancy Taylor

Nancy Taylor
District Wildlife Biologist
South Willamette Watershed District
7118 NE Vandenberg Ave
Corvallis, OR 97330

Adamus Resource Assessment, Inc.
6028 NW Burgundy Drive, Corvallis, OR 97330 • (541) 745-7092 • adamus7@comcast.net
September 27, 2008

Oregon Watershed Enhancement Board
Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem OR 97301-1290

Dear Ken:

I am writing in support of the proposal by Albany residents to acquire funds to purchase an important habitat area along East Thornton Lake. I am knowledgeable of the habitat needs of priority species at both local and regional scales due partly to my roles in crafting wildlife components of the Willamette Alternative Futures Study and the Willamette Sub-basin Plan. Also, in 2003 I completed a regionwide survey of Western Pond Turtle sites and wrote the conservation report addressing this state-listed species.

I have visited the property proposed for purchase at East Thornton Lake on several occasions. I believe that with some restoration and enhancement, it offers good potential for providing critical nesting habitat for turtles that presently inhabit East Thornton Lake. The site is not unlike parts of Green Island that I studied that also support nesting pond turtles. The Albany site is increasingly being surrounded by development, so there may be some degree of urgency for its acquisition. This site will help meet the goals for protection of habitat of the Western Pond Turtle, a Strategy Species as defined in Oregon's Conservation Strategy and the Willamette Sub-basin Plan. In fact, this site is within an area mapped by the Strategy as a Conservation Opportunity Area. The same area is known to also support another Strategy Species -- the Western Painted Turtle.

In the greater Albany area, I know of few areas of comparable size that are richer in birds than Thornton Lake and the remaining natural lands that surround it. Protection and restoration of this area will benefit multiple species besides turtles, and will limit further degradation of water quality and aquatic life habitat in Thornton Lake. Protection and restoration will provide habitat to oak woodland Strategy Species such as Acorn Woodpecker and White-breasted (Slender-billed) Nuthatch will allow this area to continue to serve as a habitat corridor. Restoration of the riparian areas here could also provide habitat for Strategy Species including Northern Red-legged Frog, Bald Eagle, Willow Flycatcher, Band-tailed Pigeon, Yellow-breasted Chat. Protection will provide important open space for public enjoyment and education. The group that is proposing to purchase this with OWEB support appears to have a clear vision of how the land will be managed once it is acquired, and I believe they have the energy and commitment to accomplish that over the long term.

Sincerely,

Paul Adamus

Paul R. Adamus, Ph.D.

Oregon

Theodore R. Kulongoski, Governor

Department of Agriculture
635 Capitol Street NE
Salem, OR 97301-2532

October 7, 2008

OWEB (*Attn:* Ken Bierly)
Land Acquisition Grant Program, State Lands Building
775 Summer Street NE, Suite 350
Salem, OR 97301-1290

Subject: Proposal to Develop the East Thornton Lake Natural Area (ETLNA)

After reviewing an informational summery for the ETLNA I wanted to offer my support for the project. The summary is well-written and provides a useful overview of East Thornton Lake and the immediate area. The stated goals regarding the acquisition, restoration, and management of the site are clearly defined, appear reasonable, and if implemented should enhance the livability of the North Albany area.

Few native prairie, savannah, and adjoining riparian-wetland communities of the quality described in the proposal remain available for purchase in the valley, and the establishment of an administratively protected natural area at East Thornton Lake would have clear ecological and educational benefits. Many sensitive or priority animal species are recorded or suspected from the area, including the now seldom seen western pond turtle.

Although the summary I reviewed did not specify if the site harbors any federally- or state-listed threatened or endangered plant species, included in the 24 acres are habitat types (e.g., savannah-prairie interfaces and ash riparian) known to support populations of *Sidalcea nelsoniana*, *Erigeron decumbens*, *Delphinium pavonaceum*, and other protected taxa. And even if listed plants are not extant, prairie and wetland rehabilitation work could be undertaken here in conjunction with the artificial establishment of new populations of certain protected plant species (in cooperation with the Oregon Department of Agriculture and U.S. Fish and Wildlife Service). As such, the proposed ETLNA may be useful in species recovery efforts, not to mention its possible value as a study site for ecologists and botanists at nearby Oregon State University.

Finally, the planned inclusion of a modest city park on the property underscores the broad appeal the project is likely to have to local residents (as opposed to simply being an ecological reserve). The plan to incorporate a general educational component into the overall experience for site visitors is commendable, and should ensure regular usage by schools and families. Moreover, the proposal makes sense from a biological standpoint, and assuming it has the support of local land owners, agencies, and state officials, seems like a good idea.

Sincerely,

Robert J. Meinke
Program Lead
Native Plant Conservation
(541) 737-2317

Letters

Other Supporters

Citizens & Community

October 7, 2008

Christina Bevens
1019 16th Ave SW
Albany, OR 97321

Oregon Water Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

SUBJECT: East Thornton Lake Natural Area

I strongly support the effort to purchase land in North Albany to develop a City Natural Area and Park. It would be a shame not to preserve the strong cultural and natural value of the property. As a citizen of Albany, I also appreciate the wonderful educational and recreational opportunities that the site would afford.

Albany has many assets, such as its diverse historical buildings making up a number of historic districts. However, the community tends to lack natural areas within and near the City, especially compared with nearby Corvallis. The significance of the proposed project is only heightened by this lack of nearby natural space available to citizens of and visitors to Albany.

Thank you very much for considering my comments.

Sincerely,

Christina Bevens

Christina Bevens

Oregon Water Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer street NE Ste.360
Salem, Oregon 97301-1290

This letter is in regard to the property known as and was to be developed as Thornton Lake Estates.

We here in Oregon are blessed with some of the most fascinating and beautiful lands equal too and surpassing any other in our great land. This property is no exception. In mans rush for progress and to develop, far too many times is the rich beauty of the land forsaken in the name of progress.

Progress has it's place, but in a responsible manner. A manner in which scenic beauty, history and wild life is preserved not destroyed. What a treasure it would be to preserve this place in our community for it's wildlife, cultural and historic value as well as educational value.

Please chose to help preserve this treasure.

Thank you,
Mark and Julie Gasperino

Julie Gasperino

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer St. NE, Ste. 360
Salem, Oregon 97301-1290

Dear Board Members:

East Thornton Lake Natural Area is a natural resource jewel. As a longtime neighbor in close proximity to this site, parent with a student attending OSU and educator, I can easily see this area as a wonderful educational site for history, biology, ecology, hydrology, photography, etc.

Historically this area was important for tribes, especially the Calapooias. It is listed as a potential site of pre-historic camps, villages and burial grounds. This site is also part of the Jesse Quinn Thornton's Land Claim Donation . The Thorntons were important local pioneers. With the Oregon Historical Society possessing Jesse Quinn Thornton's personal collection as well as Calapooia Indian history and information, educating students and the general public on site is a possible dream come true. (Of course OHS expertise would be needed to help achieve this.)

Rich educational potential in the studies of hydrology, ecology, and biology are waiting to be uncovered. The Thornton Lakes & the Willamette River appear to be connected. The natural drainage system of the surrounding neighborhood, river and the Thornton Lakes has great educational potential in the field of hydrology. The intricate workings of plant life and animals are available for study. There are native Western Pond and Western Painted turtles and fresh water mussels living in this area. There are the wetlands, riparian areas and Oak savanna right there. There are other plants and animals with their habitat available for examination. What a treasure trove this whole area is.

I wholeheartedly support the acquisition of this area to establish East Thornton Lake Natural Area and Park. It has the potential to educate all of us in the fields of history and science and to help us become better stewards of our part of the world.

Thank-you.

Bonnie L. Rollema

Bonnie L. Rollema
220 Picardy Ln. N.W.
Albany, Oregon 97321

Andrew C. Yost, PhD
1436 NW Harder Lane
Albany OR 97321

October 9, 2008

Ken Bierly
Oregon Watershed Enhancement Board
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Ken,

This letter is to express my support for the City of Albany's application for the East Thornton Lake Natural Area project. This piece of lakeside area has great potential as another small piece in the ecosystem restoration puzzle that citizens and organizations of the Willamette Valley having been investing their time in putting back together. I have personally visited this piece of ground on regular walking trips from my home at the north end of the Lake and have observed the natural regeneration of oaks and other native species. It is a perfect opportunity for creating a first class urban natural area with first class educational and recreation opportunities for people.

I have developed a wildlife habitat plan for part of my property that becomes part of the Willamette River during flood-stage years. Neighbors with adjoining property have also invested time and resources in maintaining portions of their property in the natural biota. The acquisition of the E. Thornton Lake Parcel would add a significant piece of watershed connectivity in this part of an active oxbow of the Willamette R. watershed.

The site was pursued for high density residential infill which is essential for future development of cities in the Willamette Valley and Oregon given the urban growth boundary. City Council members and citizens of North Albany quickly saw the pileup of traffic and other problems the development would create. Given adjacency to the Lake and the increasing need for public recreation in natural environments it is easy to see why the site is perfect for restoration of its natural biotic potential.

This project should given OWEB assistance.

Sincerely,

Andrew Yost

OLSEN
HONEY FARMS

1037 North Albany Road
Albany, Oregon 97321

Dirk W. Olsen Phone: (541) 926-0443

September 25, 2008

To: Members of the Oregon Water Enhancement Board,

Subject: East Thornton Lake Natural Area

I am writing this letter in support of the effort to bring about the creation of the East Thornton Lake Natural Area. We live on the property on the north side of the lake. My grandfather settled on this property in 1920. Our house is near the lake and over the years we have had the opportunity to observe the many creatures that live on and use the lake and its surrounding environment. We have seen, on a regular basis, ospreys, river otters, western and painted pond turtles, bald eagles, and countless other creatures. Among the more unusual creatures we have seen are snowy owls. We have also caught trout and immature salmon in the lake on occasion.

As the years have gone by, family members of many generations have found Native American artifacts on our place in the course of gardening. In fact, when my Dad was a kid, he used to walk the proposed East Thornton Lake property and found many arrowheads, especially after the dirt had been worked up. Dad also told us about visiting the old William Peacock house where Mr. Peacock had lined up skulls (reportedly of Native Americans) that had been discovered in the course of his farming the land.

Needless to say, the preservation of the subject property is very important to me, my family, and many neighbors of North Albany. In fact, many Mid-Willamette Valley residents believe the preservation of the subject property is an important step forward in conserving precious resources and making room for wildlife in the ever-growing urban areas of the valley. At present, there are no such natural areas designated within or even near Albany. What a wonderful educational and culturally historical place this natural area will be.

Many of my friends and neighbors are as excited about this possibility of this natural area as am I. I would like to take this opportunity to pledge $10,000 toward the purchase of the subject property when the sale and purchase is finalized for the proposed natural area.

The Dirk Olsen Family would also like to take the opportunity to thank all those involved in this process. We commend their foresight in preserving the treasure the subject property truly is. This opportunity to preserve a small natural area in the midst of so much urban development must not be allowed to slip away.

Sincerely,

Dirk Olsen & Family

Dirk Olsen and Family

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer St. NE, Ste.360
Salem, Oregon 97301-1290

Dear Board Members,

We wholeheartedly support the acquisition of property for the establishment of East Thornton Lake Natural Area and Park. This area has both natural and historical significance. Thus, it could become a real asset in educating our children and the general public in history and many fields of science.

This site is part of the Jesse Quinn Thornton Land Claim Donation. The Thorntons were important pioneers. Native Americans tribes, especially the Calapooias, find this site historically important. The Oregon Historical Society has important information from both groups that could be used to in an educational setting.

This property can be used to teach about watershed health along with wetland and riparian ecology. On this site needing our protection are many critical and at risk species such as native turtles, Oregon white oaks, red legged frogs and fresh water mussels.

As development increases in Albany, the Willamette Valley and all of Oregon, it is important to safeguard and maintain our plant and wildlife habitats, Not only for our enjoyment but also for their continued existence.

Sincerely,

Melvin T. Rollema
Longtime neighbor, resident & parent of three (one presently at OSU)
220 Picardy Ln. NW
Albany, Oregon 97321

Ingrid Rollema
OSU student, longtime neighbor of site

N.A.N.A.

NORTH ALBANY NEIGHBORHOOD ASSOCIATION

Oregon Water Enhancement Board

Attention: Ken Bierly, Deputy Director/ Manager

Subject: East Thornton Lake Natural Area and Park

Dear Mr. Bierly:

We are so excited to be able to see this happening. We are in full support of the acquisition of property to create the East Thornton Lake Natural Area and Park. The North Albany Neighborhood Association was formed in 2007 to be a means to better communicate with the city of Albany and also to be a watchdog on the continued development of the North Albany area. We have been opposed to the development of this site for a number of reasons, not the least of which was the loss of important habitat for wildlife. Some of the wildlife found here at Thornton Lake is unique and endangered in other areas.

Albany is blessed with having a rich and diverse down town area that is absolutely filled with houses and buildings that date back to the time of the Oregon Trail. Here is an example of having the ability to demonstrate to the public just what the land looked like before the early settlers. What a great opportunity for this area to have something like this inside the city limits of Albany. What a great opportunity also for the children to be able to study first hand what they will be learning in school about the area. Not just the grade school or high school students but also students from the nearby Oregon State University, and from Linn Benton Community College.

We are fortunate to have the Greenbelt Land Trust from Corvallis as a partner in this project. Corvallis is very proactive in land conservation. The city has many green ways and open spaces which are supported mostly by taxpayers in the city. The green belt oversees most of these natural areas. This area will be such a great addition to the existing open spaces, as well as being unique. This area is such a biologically diverse site, with several distinct habitat types, from the lakeside ecosystem and wetland, to the sunny oak upland.

In addition we will be protecting the habitat of several at-risk species, including the very rare combination of the Western Painted and the Western Pond turtles. This will also be adding open space as well as being a great opportunity for the city of Albany to further its protection of natural resources. By preserving this area in a natural state it can be used for education, wildlife habitat, and wetlands preservation. One of the benefits of the preservation is the results will undoubtedly help keep and improve the quality of the water in Thornton lake.

This project will be protecting an area that has significant Native American and early pioneer history. The historical importance of this area is just now coming to the surface. As this area is studied and preserved it will no doubt become an even more important addition to the study of the early settlers and also in the continued research on the Native American culture.

The timing on this project is also somewhat special as this will be happening on or around the time of the 150th anniversary of the State of Oregon. This is a project that we can all be proud of. Not just the people that have worked so hard to put this together, but all of the residents in both Linn and Benton counties.

We salute you and your staff and all of the others working on this project. The North Albany Neighborhood Association is behind this project completely and we are so thrilled to be a part of such a historically significant event happening right here in Albany.

Sincerely,

William H. Root

William H. Root , chairman

North Albany Neighborhood Association

October 5, 2008

Ken Bierly, Deputy Director/Manager
Oregon Water Enhancement Board
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste. 360
Salem, OR 97301-1290

Ed Hodney, Director
Albany Parks & Rec
PO Box 490
Albany, OR 97321-0144

Re: East Thornton Lake Natural Area

Dear Messrs Bierly and Hodney:

Approving the acquisition of the 24 acres ("Byron Hendricks" property) between North Albany Road and Green Acres Lane is crucial to the future livability of North Albany residents. Its acquisition as a long term educational project or community green space/park is one of the most important issues for our community, our neighbors, and to my family.

During law school I earned a Certificate in Real Estate Development, and completed an independent research project focused on increasing the quality of living in communities through an integrated issues analysis. My research produced analyses of existing demographics, characteristics of pending developments and constraints to alternative types of development. The analysis also integrated fundamental aspects of community planning such as considerations of significant geographic locations, natural and man-made infrastructure, traffic volume dynamics, economic development, managing urban sprawl, and zoning issues.

This parcel's "best use" in my opinion would be to preserve its natural features, protect the existing watershed and tree corridor, secure and promote wildlife habitat, by the City of Albany acquiring it for educational use and or as a community green space or park. Acquisition of this parcel by the City and preserving it could support an urban forestry project supported by Oregon Department of Forestry. On a broader scale preserving the parcel could contribute to sequestration and storage of atmospheric carbon further advancing the goals of House Bill 3453.

Our home sits on a parcel of land near the acreage currently proposed as the East Thornton Lake Natural Area. We are maintaining a wildlife habitat plan created by my husband, Andrew Yost, scientist and forest ecologist with Oregon Department of Forestry. Wildlife habitat plans and watershed restoration projects are promoted and encouraged both by Oregon, and Benton County

2967 NW Valley View Dr.
Albany, Oregon 97321
September 19, 2008

Oregon Water Enhancement Board
attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, Oregon 97301-1290

Dear Sir:

The East Thornton Lake Natural Area will be a great asset for us all.

Since Albany has been a state leader in promoting Historic Houses it is appropriate to honor our pioneer and prehistoric past by also promoting our wildlife and habitat.

This is an important project because our wild lands are continually being diminished by unceasing development."

How refreshing to live in a state that believes as Thoreau, "In Wildness is the Preservation of the World."

Sincerely,

Mrs. S. G. Bechtold

Subj: **Thornton Lake Natural Area!!**
Date: 10/8/2008 6:47:07 P.M. Pacific Daylight Time
From: Johanna440
To: ed.hodney@cityofalbany.net
CC: ALANHIGSPOTTERY

Please copy to CWEB

October 8, 2008
To: Ed Hodney
Director
City Parks, Albany

Dear Mr. Hodney,
Forgive us for sending you this letter so late; we have been flying for 19 hours from Indonesia and just walked in the door but feel so strongly about voicing our support for the East Thornton Lake Natural Area that we opted for writing before napping.
We love the Lake. It wraps around our property on two sides so we are constantly aware of its truly remarkable and inspiring biological diversity. There are nesting herons here and wood ducks and osprey and countless migrating species, Western Pond and Western Painted turtles, a wide variety of fish, muskrats, beavers and others. It's an amazing Lake, full of life. It brings us joy in every season from the turtles laying their eggs all over our property in the summer to the pair of river otters which visit every winter. We try to be responsible custodians of all of this natural wonder. We've placed aerators in the Lake to improve the water quality and oxygenation, and encouraged the City to help educate property owners on run off, septic tanks and lake health. We contacted the biologist from the Oregon Department of Fish and Wildlife who established that the Lake is home to the two aforementioned native turtle species, a rare event. We try to make our environment as critter-friendly as possible and protect the various species in any way we can.
We are delighted that The City of Albany intends to bring the joys of East Thornton Lake to the public. Albany's citizens lives will be enhanced by the proposed ETL Natural Area; we know this because it has enhanced ours.
Thank you,
Johanna Omelia and Michael Waldock

---

to encourage and sustain our precious ecosystems. Our wildlife habitat plan was approved by Benton County, and we currently monitor and maintain the wildlife habitat area near the proposed East Thornton Lake Natural Area. As a result of our habitat plan which runs along the corridor of Thornton Lake, directly west of the Hendricks property, the land serves to protect red and gray foxes, coyotes, white tailed deer, heron, egrets, Canada geese, Northern Flickers, bats, and many other birds and wildlife who use the Hendricks and our property for coverage, water source, foraging, and as a basis for their continued existence.

We routinely walk with our children, a high schooler and preschooler to discover the diversity of native trees and shrubs, butterflies, dragonflies, beetles, praying mantis, woodpeckers and songbirds on our land, and the adjoining neighboring lands. We also continually plant native species to encourage sustainable habitat along our property and the Thornton Lake corridor.

Preserving this parcel from future development will provide safer passage of pedestrians and bicyclists who use either the North Albany Road corridor or Springhill Road to reach commercial areas located near Hickory Street. Development of the parcel would deteriorate or eliminate the surrounding ecosystems, and pose safety hazards to users of North Albany Road, especially the walkers and bicyclists, who are often unaccompanied children.

Please support acquisition of this parcel and preserve it for future generations to enjoy.

Respectfully,

Ann B. Yost, JD
1436 NW Harder Lane
Albany, OR 97321

October 4, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE Ste. 360
Salem, OR 97301-0144

Dear Mr. Bierly:

The Lebow Family strongly supports the proposed East Thornton Lake Natural Area. My husband's family moved to this property in 1961. He and I have lived here since 1982. East Thornton Lake covers a portion of our property and flows both on the east and west side.

The lake is very special to us. We raised our children here, and *many* hours were spent observing the wildlife. The "pond" as we referred to our end of the lake was a great place for science projects! We observed the turtles every summer, basking on logs. Herons have always nested here, except for the three years following the 1996 flood when the City of Albany used the east of end of Thornton Lake as a dumping spot for contaminated flood water. We were afraid they were never coming back.

This end of the lake provides shelter to a diverse group of songbirds. Both gray squirrels and the Douglas squirrels are active here. Last summer we had a den of red fox on the property. Damselflies and dragonflies are plentiful in the summer. It is also home to many frogs and newts. Two summers in a row we have observed a Merlin here and Cooper's hawk are also seen frequently.

Clayton and I both feel it is important to instill the wonders of the natural world in children. This area provides an opportunity to do that and to teach that pollution, not just in the air but in the water as well has serious consequences. We feel it would be beneficial to the area to have it managed by someone who understands the natural world.

Sincerely,

Clayton & Florence Lebow

Clayton & Florence Lebow
1340 NW Harder Lane
Albany OR 97321
541-967-7346

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE Ste. 360
Salem, OR 97301-1290

October 06, 2008

Mr. Bierly:

I am writing to voice my support for the East Thornton Lake Natural Area. The proposed plan provides a natural area for critical wildlife and offers a unique opportunity to make a substantial impact on educating so many - all ages and walks of life - on the value of nurturing and sustaining our natural resources. More and more, native plants and animals are being forced out of their natural habitat and into areas where they have little chance of survival. We see it in our North Albany neighborhoods as housing developments pave and build over areas that previously contained large groves of trees, grass seed fields and other havens for wildlife. The plants and animals are here because it the most natural environment for their existence. Once we destroy that environment these plants and animals are gone forever. What a tragedy that would be!

Also, very importantly, maintaining this natural area would prevent the congestion that the original proposed housing development would have created, should it be allowed. Traffic is already high on the roads in and around North Albany, increasing daily. There is potential to create an unlivable situation right here in our beautiful part of the city.

Areas of natural beauty such as the East Thornton Lake Natural Area are becoming fewer and fewer. And, yet, they are critical to this fast paced and stressful society in which we all reside. Your serious and thoughtful consideration of a grant to fund the East Thornton Lake Natural Area will be appreciated and valued. Thank You!

Respectfully,

Osalyn Houser

Osalyn Houser
2990 NW Sunny Lane
Albany, Oregon 97321

October 5, 2008

Don and Gloria Dziggel
330 NW Green Acres Lane
Albany OR 97321

Oregon Water Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisitions Grant Program
Sate Lands Building, Third Floor
775 Summer Street NE Ste 360
Salem, OR 97301-1290

Dear Sir:

We strongly support the proposed East Thornton Lake Natural Area to be located in the North Albany area of Albany, Oregon.

We urge approval of any grant for funding of this project.

Sincerely yours,

Don Dziggel

Gloria Dziggel

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE Ste. 360
Salem, OR 97301-1290

October 06, 2008

To Whom It May Concern:

I would like to voice my support for the East Thorton Lake Natural Area. The proposed plan not only provides a natural area for several types of wildlife it also offers a unique opportunity to have a substantial impact on educating our younger generations the value of caring for the world around us. We seem to be constantly pushing the native plants and animals out of their natural habitat and into areas where they will have a slim chance of surviving. These plants and animals are here because it the most natural environment for their existence. Once we destroy that environment these plants and animals are gone, forever. They cannot adapt as well as the human race.

The educational opportunities will benefit not only the City of Albany and its schools but will also be available for other local schools and organizations and provide a unique study area for our local secondary schools. Since this area would be so close to so many here in the mid valley it would mean less travel time, less fuel and less pollution. It would also provide for an inexpensive field trip for our school districts who are struggling to meet budgets.

Not only would this project provide the educational opportunities it would also ease the congestion that the original proposed housing development would have created should it be allowed.

The creating of this Natural Area would also provide an area of natural beauty we all could enjoy.

It appears that there is considerable support from over 15 groups and organizations for the East Thorton Lake Natural Area and I would like to add my name to that list.

Thank You,

Larry Falk
2990 NW Sunny Ln
Albany, Oregon 97321

October 03, 2008

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street, NE, Ste 360
Salem, OR 97301-1290

We're writing in support of the East Thornton Lake Natural Area and Park. We believe this will be the best use of this land. This proposed Natural Area will provide educational benefits which consist of rich cultural and environmental history.

It's important for our citizens to access information about the properties usage by the Calapooia Indians as well as the early Albany and Oregon pioneer, J.Q. Thornton. This land will also be able to provide an observation of the native plants and wildlife in the area. What a valuable resource for everyone. You can study history, botany, and zoology in books, but the best classroom for these studies is a natural area with hands on experience.

Yes, we believe this natural area will be the best use of this land. Let's help Albany choose wisely so that our citizens benefit most from our decisions.

Sincerly,

Nancy Lochner
Allen Lochner
Nancy Lochner and Allen Lochner

Mr. & Mrs. Matt Hellman
605 E Thorntn Lk
Albany, OR 97321

October 8th 2008

Greetings,

I am writing concerning the East Thornton Lake area. We are in support of keeping the area a natural preserve. Albany has no other area ~~with~~ so much potential as an educational and just plain enjoyable nature preserve. We just can't go around destroying everything in our path for the sake of developement.

We have lived near the lake over 40 years and have seen development all around. We are not against development, but we must use judgement wisely and preserve areas for future generations. This (Thornton lake) area ~~needs~~ our protection. It is the best and only use for this piece of land. As a developement the access onto North Albany Rd would be a "nightmare" of traffic so near the tracks (RR). We come onto North Albany RD from East Thornton Lake dr. and some times in the day, the traffic is so heavy, one feels you can't get onto NA Road without risking an accident. Or sit there 15 min, waiting for a ~~brake~~ in traffic. I can't imagine what would happen if a developement was put in this area.

We whole ~~heartedly~~ support keeping it a natural preserve.

Matt & Marjorie Hellman

to our community. Thank you for considering our views.

Sincerely,

Toby & Amber Meekins

Toby and Amber Meekins

831 NW Ridders Lane

Albany, OR 97321

October 3, 2008

Dear OWEB Members,

Me and my wife are writing this letter to express our support for the proposed creation of the East Thornton Lake Natural Area and Park. We have been life long residents of Albany and are very familar with the proposed site.

At times we have taken walks through the area where the natural area will be located. We have always enjoyed the quiet and tranquility that it contains- kind of an oasis in the busy world that surrounds it. In our walks we have often times seen a number of creatures- ospreys, various types of hawks, bald eagles at certain times, and one of our favorites, the snowy egrets that roost along the edge of the lake.

Three of four times a year I like to take my float tube down to the lake and do some catch and release fishing. East Thornton Lake is a treasure in it's own right. It contains a variety of ecological habitats- from relative deep water to shallow mud flats. These all contain a diversity of flora and fauna adapted to live in these different habitats.

And yes, contrary to what some may beleive, there is a viable population of western pond turtles living in the lake. Again the habitat for turtles is supreme- many sunken and exposed dead snags and an abundance of insect and aquatic life to feed on.

We will and do support the aquision of this property and the educational, historical, and natural resource it will bring

M. E. Anderson
914 NW North Albany Rd.
Albany, Oregon 97321-1324

October 3, 2008

Oregon Water Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisitions Grand Program
Sate Lands Building, Third Floor
775 Summer Street NE Ste. 360
Salem, OR 97301-1290

Subject: Thornton Lake Natural Area.

What a wonderful project this can be for the city of Albany. We have no wild area set aside for animal habitat like this would provide. I'm sure others have listed many of the animals situated around these Thornton Lakes. I've been thrilled by turtles come to my Marion berries to dig nests and lay eggs. That would be 500 to 600 feet south of the lake. Some of the neighbors complain about the deer, but the habitat they used to use is now houses, backyards, and streets. There is not much cover left for them. They deserve a little room and there are ways to control where they browse.

I understand the Albany City Council looks on this favorably; good for them. The proposed Thornton Lake Natural Area restored to a prairie savanna, as in the 1850's, could make a wonderful outdoor classroom. What a learning opportunity. I understand that the Museum of Natural History Toronto, Canada, has much information about the Native Americans of the era. That was headquarters for the Hudson Bay Company, and when trappers resigned they had to return to Canada to do so; much information went back with them. What a rich heritage this area has.

Then we have our own pioneers. How they used to farm, work, and became part of the Union. But all started with virgin land in a natural state. How in the world did Jesse Quinn Thornton fade into the distant past so completely? The only obvious reminder of his presence is that these lakes bear his name. His contribution to the State of Oregon was enormous. However, he is a relative unknown in Albany's current version of history. What a tragedy.

Land to put houses on does not have to intrude on ALL areas, especially sensitive areas of important habitat. These two lakes need to be protected as well as the adjacent undeveloped areas near them or we could loose this asset for all time.

Please help in preserving this small portion of the mid-Willamette Valley. West Salem has its Audubon Sanctuary. Corvallis has its Jackson-Fraser Wetland. Hopefully, Albany will have a restored wildlife sanctuary/savanna.

Sincerely,

M. E. Anderson

M. E. Anderson

October 4, 2008
1282 NW Gibson Hill Rd.
Albany, Oregon 97321

Oregon Water Enhancement Board
Attn: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE, Suite 360
Salem, Oregon 97301-1290

Board Members:

We are writing to strongly endorse the creation of an "East Thornton Lake Natural Area" here in North Albany, just a mile from our home. We have lived here for thirty years and are acutely aware of the negative environmental impact that has been allowed to occur with the spread of seemingly unchecked growth.

We are very excited to learn of the possibility of retaining what is essentially a wild habitat, with the accompanying restoration of the Thornton Lakes water quality! What a wonderful outdoor classroom for both North Albany Elementary and North Albany Middle schools to have within walking distance! To our knowledge, there is no park or natural area at all close for our students to investigate.

Frankly, we need such a calming buffer between the downtown City and this suburban area. We need the natural area for the preservation of all kinds of native wildlife, and the protection of air quality that only wild spaces can create.

So-called "development" of this sensitive area would negatively impact all North Albany citizens with obvious safety issues and the worst type of urbanization in turning a vibrant habitat into concrete and fertilized yards that would adversely even the Willamette River. The time for planning for the future is already running out. We must protect both human and wildlife now.

We urge you to approve this grant! Thank you!

T. Edward Leslie T Edward Leslie
Carol Leslie Carol Leslie
Lily J. Nulf Lily J. Nulf

Cc: Ed Hodney, Albany Parks
Cc: M. Azevedo

Oregon Water Enhancement Board
ATTN: Ken Bierly, Deputy Director
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer St NE, Site 360
Salem, OR 97301-1290

8.7.08

Dear Mr. Bierly,

The use of the East Thornton Lake area as a natural area is a wise and environmentally sound policy. The land, its floral and faunal inhabitants, and the cultural, geographic, riparian, and hydrological components, collectively provide a necessary and meaningful link to our natural world. It is the best possible use of this tract. At this particular time, such a choice may not seem warranted or necessary, however, in ten, fifty, or one hundred years , the wisdom of this decision will be seen to have added immeasurably to the educational opportunities and life experiences of the citizens of Albany, and preserved in perpetuity an integral part of our local environment.

Sincerest Regards,

Rick Atwell
2513 NW Woodcrest Ave
Albany, Oregon
97321

John Sterner
735 NW Thornton Lk Dr
Albany, Or 97321

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grand Program
State Lands Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

I am writing in support of the proposed East Thornton Lake Natural Area. I have lived on East Thornton Lk Drive since 1992, not on the lake, but very close to it. I have long been interested in the city's zoning plans, particularly the local impacts on traffic and livability in my neighborhood. I have attended numerous planning commission meetings and city council meeting when development in the area were topics, and was always amazed at the attitude of the city insisting on developing an areas that in my opinion was not suitable for the planned density. Development that would contribute a significant loss to the highly valued rural nature of my chosen home.

I frequently walk and bike the stretch of North Albany Road that crosses the lakes and am intimately familiar with the traffic issues. The Hickory development is an example of positive development. It used to be that a trip to the grocery store for me meant driving all the way to the center of Albany, now I frequently walk to the shopping center.

I have also taken a canoe out on East Thornton Lake, and it is pretty amazing how quickly the rush of North Albany road disappears. Yes, there is lots of room for improvement and restoration, and protection from adverse development affects are a first step. I have personally experienced the way the river flows through the lakes at times of high water.

The cultural history of the area also interests me. As the informational packet notes, not a lot is known of the pre-historical culture in the region, but the potential seems high. The packet also has interested me in the lake's namesake, Jesse Quinn Thornton, and his significant impact on early Oregon Culture.

I have been very impressed with the efforts of the proponents of the East Thornton Lake Natural Area. It very much improves my opinion that citizens can have a positive effect on local government. This proposal really is a win-win solution for all the parties involved.

Sincerely,

John Sterner

Kneque Chaffin
1030 NW Green Acres Lane
Albany, Oregon
97321

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE Ste.360
Salem, OR 97301-1290

Dear Board Members,

My name is Kneque Chaffin. I am writing to express my full support for the proposal to turn the area just south of East Thornton Lake into a protected natural area for educational purposes.

My home is just east of the area. Its beautiful views and tranquility were a strong selling point for my husband and I when we were considering buying the home. I have always loved wildlife and nature, and I cannot begin to express to you how much of an honor and a joy it is for me to share my life with the animals and the land.

We have a fox that we watch in the mornings, hunting for breakfast or just poking around. We watch the hawks, herons and other birds during summer. In winter, we have the joy of watching flocks of ducks and geese. Occasionally, we are even treated to seeing bald eagles flying and perching in the trees by the lake. Besides all these, we have turtles show up now and then. My husband and I have seen various native turtles travel down the dirt road coming from the lake to find nesting areas within neighbor's yards and flower beds.

Being half Native American, I am thrilled that the tribes could also be part of the educational and cultural aspect of this proposal.

Please help us preserve this unique property and all the wildlife that deserve to continue to live here. Thank you very much.

Sincerely,

Kneque Chaffin

Kneque Chaffin

Keith M. Chaffin
1030 NW Green Acres Lane
Albany, Oregon 97321

Oregon Water Enhancement Board
Attention: Ken Bierly, Deputy Director/Manager
Land Acquisition Grant Program
State Lands Building, Third Floor
775 Summer Street NE Ste.360
Salem, OR 97301-1290

Dear Board Members,

My name is Keith Chaffin, and I am writing to let you know of my heartfelt, enthusiastic support for the proposed East Thornton Lake nature preserve. I am thrilled and excited that the beautiful 24 acres of land just west of my home has the chance to become a community treasure for all to enjoy. It obviously has so much to offer.

Ever since my wife and I moved here five years ago, we have loved the gorgeous sunsets that are framed by the trees that surround the meadow. It's hard to describe, but when I look toward that whole area from our backyard, I always get a strong sensation of peace and comfort. Add to that the sight of the birds gliding overhead and the subtle noises of all the different wildlife, and it truly feels like the closest thing to heaven on earth.

My occupation is in training and development, so the idea that this special area could be used to educate people of all ages is extremely appealing to me. There is so much to learn about the abundant wildlife and diverse vegetation here. In addition, this setting will serve to teach about long ago days, from the time when only Native Americans lived here to when the settlers came to join them. This area is perfect to help educate our citizens about the rich history that surrounds them. Of course, the icing on the cake will be that this arrangement will ensure that all aspects of its natural habitat will be preserved and protected. In short, everyone and everything will win with this project, not only now, but also for generations to come.

This is a wonderful and unique opportunity for our community, both near and far. Please help us to make it a reality. Thank you.

Sincerely,

Keith M. Chaffin

Keith M. Chaffin

Oct. 5, 2008

To: Oregon Water Enhancement Board
ATTN: Ken Bierly, Deputy Director / Mngr.
Land Acquisitions Grand Program
State Lands Bldg., 3rd Floor
775 Summer St. N.E. Ste. 360
Salem, OR. 97301-1290

As lakeside property owners (2 acres) and long time family residents of this property, we would very much like to see this acquisition of the proposed East Thornton Lake Natural Area.

Our parents lived here from 1974 to 1991, we have lived here since 1991. a total of 34 years. In our time here we have watched North Albany grow by thousands. The traffic is so heavy at times, it takes 7 to 10 minutes to get out our driveway onto North Albany Rd. We do not need more subdivisions.

What we need is this wonderful Natural Area. It would be a terrific place for our children and grandchildren (who (attend N.A. school) to visit and learn Biology, History, Ecology, with abundant wildlife in this area.

I remember shortly after we moved here, my sons running into the house yelling, Mom, Dad theres a turtle in the backyard laying eggs! We went out to have a look. Sure enough there she was with 2 eggs, We carefully moved her and the eggs to a nest of cut grass and leaves closer to the lake and watched her until she dissapeared, I can only hope everything went as nature intended, and assured my boys that

October 2, 2008

Ed Hodney, Director
Albany Parks and Recreation Department
P.O. Box 490
Albany Oregon, 97321-0144

Dear Mr. Hodney,

As a resident of North Albany, **I <u>urge</u> you to approve the East Thornton Lake Natural Area Project.**

While I appreciate the desire of a developer to add more housing to North Albany for their own gain, and I appreciate that new housing might even increase the value of my own home, ultimately I strongly feel the plot of land facing East Thornton Lake should be reserved as a natural area. The City of Albany has very few natural areas. Most of our parks seem to be about playgrounds, sports fields and barbeques, rather than the essence of what a park <u>should</u> be –a place to reconnect with nature.

Furthermore, the East Thornton Lake Natural Area Project is a unique site for this purpose. Since it overlooks the lake, visitors will be encouraged to learn about how water, and water creatures, are an essential part of our land-locked life. There is plenty of land in North Albany on which to build more houses; can't we save just this one spot? It is ideal for the purpose and would require little "improvement."

If approved, I would like the East Thornton Lake Natural Area to:

- Have a <u>very small</u> parking lot –or no parking lot, since the large, unused Ray's parking lot is within walking distance.
- Allow public access for **<u>non-motorized</u>** water craft to the lake so that kayaks and canoes can explore the water-world up close; right now, only property owners boarding the lake are allowed lake access. We should all have the chance to explore its wonders, even if that chance requires a special permit or fee.
- Do **<u>not</u>** include any play structures. We have plenty of playgrounds in Albany. But if it must, keep it very small and away from the lake.

As a tax payer, property owner, and concerned citizen, I thank you for reading this letter and considering my opinions.

Sincerely,

Brie Caffey

Brie Caffey
720 E. Thornton Lake Dr. NW
Albany, OR 97321

OCTOBER 6, 2008

OREGON WATER ENHANCEMENT BOARD:

WE WHOLEHEARTEDLY SUPPORT THE CREATION OF THE EAST THORNTON LAKE NATURAL AREA. ALBANY PRESENTLY DOES NOT HAVE ANY SUCH THING. WHAT A MARVELOUS EDUCATIONAL TOOL FOR THE CHILDREN OF ALBANY TO HAVE. OUR SCHOOLS COULD BENEFIT SO GREATLY BY HAVING SUCH AN "ON SITE, OUTDOOR LAB FACILITY" AVAILABLE TO THEM.

NEEDLESS TO SAY, EVERYONE I TALK TO IS EXCITED ABOUT THE POSSIBILITY OF THIS HAPPENING. WE AS A COMMUNITY WILL GREATLY SUPPORT SUCH A VALUABLE ECOLOGICAL, CULTURAL, HISTORICAL ... THE LIST COULD GO ON FOREVER - SITE ADDED TO ALBANY'S LANDSCAPE. THANK-YOU

GH

THE GREG HANSEN FAMILY
1050 S.W. 13TH AVE.
ALBANY, OR 97321

Since that first time we have seen many more turtles. Just this last summer after mowing the back yard, I glanced up and saw what looked like a baby turtle, I thought "No", it can't be! I just mowed, it must be a leaf. I started to walk away ~ turned back and went over to take a look. I couldn't believe it ~ it was a baby turtle, about the size of a quarter. How did it live through the lawn mowing? It must have been deep down in the grass when the mower went over it. My husband picked it up and moved it closer to the lake.

We have also seen Hawks, Herons, Geese, Ducks, even a bald eagle a time or two! Deer, Rabbits, Skunks, fish, frogs, Snakes, Beaver, Nutria ~ "The Good, the Bad, and the Ugly"! But that's Nature.

Please, Please, for the generations to Come ~ turn this wonderful area into a Natural Habitat for WildLife!

Our Parents who are now both gone, would support this acquisition, as do we, our Sons and our Grandchildren.

Calvin and Estelle Tigner (Parents deceased) "Past Residents"
Donald and Sherry Tigner - "Current residents"
Zachary + Seth Tigner - "Our Sons"
Olivia, Noah, Grace and Wyatt Tigner - "Our Grandchildren"

Thank-You, Sherry

The water is completely safe for swimming. A large housing development upstream would create ~~great~~ pollution and cancel all our efforts

Please do consider a grant towards a natural area.
Thank you

Sincerely
Dorothy Henry.

Oregon Water Enhancement Board
Attn: Ken Bierly

Dear Mr. Bierly —

What an exciting alternative to the ~~East~~ Thornton Lake housing development — a nature park and historic information center, a great asset and near the city, so everyone can partake.

Those of us who own the property surrounding West Thornton Lake have, in the last ten years spent over $40,000 caring for the water quality, safely suppressing invasive species, and adding a bubble system to circulate oxygen to benefit fish, ducks and other wildlife.

November 14, 2008

RECEIVED
NOV 14 2008

Don Donovan
Planning Manager
City of Albany
333 SW Broadalbin Street
Albany, OR 97321

Dear Mr. Donovan:

RE: Fabian Estates

As a property owner next to the proposed Fabian Estates Development on Maier Lane we respectfully request the following:

1. During the public hearing on November 12, 2008, the Fabian Estates Engineer told the City Council that the developer was willing to install a fence between the development and the entire length of our property. We are very concerned about traffic, pedestrians, and pets entering our property from this new large development where a forest once stood. We request the developer install a solid non-see-through eight (8) foot tall fence between the development and our property. We understand an eight (8) foot tall fence would require special approval from the City. The City has already provided, and is currently being asked to provide additional flexibility, discretion, and exceptions to the Fabian Estates Developer, so in turn we request this fence height exception.

2. It is our understanding that the developer is required to provide access to our property for possible future development of our property. We request our driveway to be connected to the cul-de-sac with pavement that professionally transitions into our existing driveway. In addition, we would require a locking vehicle access gate, solid non-see-through eight (8) feet tall, to match the fence mentioned above. We would install a lock on this gate to ensure our existing privacy and safety and it would only be used when we see fit.

3. We request the City strongly scrutinize the water runoff issues from this property. Since the developer illegally clear cut half of the subject property almost two years ago, we have already noticed an increase in surface water running onto our property. Parts of the proposed development are higher in elevation than our property and we fear increased water runoff from the development and future yards will cause damage to our driveway, trees, and landscaping.

4. We request that none of our newly planted evergreen trees along the proposed development be damaged by the developers and/or their contractors. We planted these trees well inside our property as marked by K&D Engineering.

Thank you for your serious consideration of our requests. Please feel free to contact us if you have any questions.

Sincerely,

Lynn Hinrichs

Jeff and Lynn Hinrichs
2190 NW Maier Lane
Albany, OR 97321
(541)936-2537

Donovan, Don

From: Craig Bradley (personal email) [craigthekiwi@comcast.net]
Sent: Saturday, November 15, 2008 10:42 PM
To: Donovan, Don
Cc: nrh@opusnet.com
Subject: Re Fabian Estates - Maier Lane, North Albany

Craig & Amanda Bradley
1071 NW Skyline Drive (Tax lot 3303)
Albany, OR 97321

Re Fabian Estates Development - *Azevedo v. City of Albany LUBA No. 2007-262*

15 November 2008

Dear Sir/Madam

We write to record the history of this development concerning our property, our concerns and objections regarding the LUBA Remand public hearing on the land immediately adjacent to our property.

History:
In September 2006, we were approached by a realtor acting on behalf of Mr Fabian who offered us $350,000 (we paid $300,000 in July of 2005) for our property to be settled in 14 days. We declined this offer a few days later and subsequently the realtor offered $80,000 for a two acre parcel of our land that immediately adjoins the Mr Fabian's property - we declined that offer as well.

For all of 2007, we lived to New Zealand and rented our property. We were contacted by neighbours during the year and advised there were several objections being raised to the development. We were also advised that there was work being done by the developer to clear the site for construction.

I contacted Mr Don Donovan at the City of Albany and enquired about 'through and to' access to our property if the development went ahead and was assured we had no access or utility issues should we wish to develop the east side of our property in the future.

Sometime later in 2007, one of our neighbours asked me to contact Mr Donovan again regarding drainage from Mr Fabian's site. I contacted Mr Donovan and he advised that Mr Fabian had requested an easement to allow storm water from the development to run through the east side of our property (through the forested area). We did not give our approval due to concerns over possible pollutants, water flow increases, flooding/erosion etc but note that there was no further effort from Mr Fabian to secure such an easement or discuss this option in more detail to see if a solution was possible.

With regard to the LUBA remand issues, our major <u>concerns</u> are:

1. That *accurate* and *independent* engineering analysis regarding storm water drainage has not been carried out or presented adequately to affected property owners. We note that our property *will* be affected by storm water run-off not captured by the proposed drainage system down to Thornton Lake.
2. That adequate numbers and placement of trees will be enforced with property owners on the west side of the development adjacent to our property to ensure the bank does not suffer from erosion that will occur as a result of storm water run-off from Fabian Estates. Trees smaller than 8 inches in diameter are important for preventing landslides also and need to be retained right across the embankment in their current density.
3. We share all of the concerns raised thus far regarding Fabian Estates by Mr Azevedo and Ms Cook.

With regard to the LUBA remand issues, our major <u>objections</u> are:

1. The clearing of trees that has already taken place on the development property. This seems to have been done without final approval of the development and more importantly, without adequate plans in place for the change to water run-off that the tree removal has *already* caused.

2. The additional clearing of trees that will be required to run the proposed drainage system to handle the run-off from the new development through to Thornton Lake. Referring to point 2 of our 'concerns,' it seems that more trees will need to be removed along the embankment above our property, as well as on three other large properties, to accommodate digging machinery to lay the drainage system.
3. We share all of the objections raised thus far regarding Fabian Estates by Mr Azevedo and Ms Cook.

Please feel free to contact me if you have any queries regarding the above.

Craig & Amanda Bradley
Ph. 967 1035 / 974 7333

CC Norman Hill, Mark Azevedo, Kathy Cook.

ATTACHMENT J.

RECEIVED

NOV 20 2008

City of Albany
City Managers Office

MARTINIS & HILL

ATTORNEYS AT LAW

Michael J. Martinis
Norman R. Hill

Wesley A. Hill

Legal Assistants:
Nicola L. Hedberg
Robin J. Paulissen

Mailing Address:
110 Madrona Avenue SE
Salem, Oregon 97302

Phone: 503.566.5800
Fax: 503.566.6775

Email for Michael J. Martinis:
martinis@opusnet.com

Email for Norman R. Hill:
nrh@opusnet.com

Email for Wesley A. Hill:
whill@opusnet.com

November 17, 2008

Via Fax 541-917-7511 and
First Class Mail

Albany City Council
333 Broadalbin Street SW
Albany OR 97321

Re: Files SD-07-07 and SP-19-07
Fabian Estates Subdivision Tentative Plat and Tree Felling

Dear Ladies and Gentlemen:

As you know, this office represents Mark Azevedo and Kathy Cook. The purpose of this letter is to follow up with our written response to the application in this matter. The parties had agreed and the Council had ordered that this material be submitted by November 15, 2008. However, it appears that November 15, 2008 was a Saturday. I contacted Mr. Bean, the attorney for the Applicant, and we agreed that neither party would object if our clients filed their materials on November 17, 2008. If necessary, my clients extend the courtesy of allowing Mr. Bean's client an extension of a few days to respond to these additional issues, as well. We appreciate the Council's careful consideration of these matters.

The Applicant's Proposed Condition

The Applicant's proposed condition in this case is unacceptable. It violates Albany's Development Code and it violates well settled Oregon law. Most importantly, it is contrary to both the letter and the spirit of LUBA's previous decision in this case. In short, the Applicant requests that the City make a special procedure for them in this case. The Applicant wants a condition of approval that will allow them to modify the storm drain plan later, after the preliminary plan review is completed, without proceeding through the modification process. That is clearly impermissible.

First, the public improvement section of the code contains mandatory provisions for public improvements. ADC 12.440, ADC 12.500, ADC 12.530 all require water, sewer and storm drainage to be reviewed and approved as part of the tentative plat or site plan review process. The provisions governing storm drainage are particularly specific. ADC 12.530 states,

> "The review body will approve a development request only where adequate provisions for storm and flood water run off have been made as determined by the City Engineer...All proposed storm sewer plans and systems must be approved by the City Engineer as part of the tentative plat or site plan review process." (emphasis added)

LUBA confirmed that this provision is mandatory. The City cannot waive it by simply imposing a condition of approval.

The law also clearly prohibits the City from developing a special procedure to govern this Applicant's subdivision process. Oregon state law clearly requires applications to be judged and determined based on the policies and procedures available at the time the application is filed. The City cannot change the rules of the game in mid stream. ORS 227.178(3). However, that is precisely what the Applicant is proposing.

Second, it is clear that the Applicant is not entitled to approval, based on the existing plan. Staff's approval is based on a condition that the Applicant obtains easements for the drainage ways. This is required by the City's code. The engineering standards of the City of Albany are explicit. They require easements for all public storm drains. E 6.010(4); E 7.04(e). These engineering standards are consistent with the development code, ADC 12.540.

Third, it should now be very clear that the storm drain materials previously submitted by the Developer are in error. They should not be relied upon by the City in approving this application. See letter of Gary Bliss dated November 17, 2008 and supporting documentation attached as Exhibit "A."

The Need for Easements

Finally, the Applicant argues that he should be allowed to proceed withoutthe necessary easements. He contends that he has a right to discharge the water onto his neighbor's lowland property without that individual's consent or an easement. Unfortunately, the legal citations the Applicant present are incompletely described. The authorities they have provided stand for the proposition that an upland owner may discharge onto low land owners water in the direction that water historically flow. However, the upland owner must do so with due care and may not unreasonably increase the volume, velocity or rate at which run off occurs to the detriment of their neighbors.. Unfortunately, no Oregon case has addressed the question of when a water discharge unreasonably causes damages to neighboring downstream properties.

In this case, the City is being asked to take responsibility for this discharge of water. The system will be owned by the City. Accordingly, it is entirely reasonable and constitutional for the City to require the Developer to acquire an easement before allowing this development. Without an easement, the Developer is simply shifting the potential liability for an unreasonable discharge on the City. The citizens of Albany should not be forced to bear this additional liability. It is not constitutionally impermissible to require the Developer to mitigate the potential impact of their development by obtaining an easement. Indeed, the fact that the Applicant is unable to obtain such an easement suggests that the property owners downstream may have significant objections to altering the natural and normal flow of the water.

For the reasons set forth above, we request that you deny this application until the Developer has fully complied with the requirements for this subdivision listed in the City of Albany's development code and comprehensive plan.

Very truly yours,

MARTINIS & HILL

Norman R. Hill

NRH/nlh
Enclosure
c: Clients w/enc.
Andrew Bean w/enc. Via Fax 541-967-6579 and Mail

RECEIVED NOV 17 2008

GARY G. BLISS P.E., F.ASCE
3866 OAK MEADOWS LOOP, NEWBERG, OR 97132
PHONE 503-554-9380 *FAX 503-538-6296*
Email: GGBlissPE@comcast.net

November 17, 2008

Mr. Norm Hill
Martinis & Hill
110 Madrona Ave. S.E.
Salem, OR 97302

Re: Fabian Estates Storm Drainage and Water Quality Study

Dear Norm:

Following my submittal of my comments and conclusions, dated November 11, 2008, regarding the two reports submitted for the design of the storm drainage facilities for Fabian Estates, I noticed additional information in the reports that needed to be brought to your attention. There is a spread sheet in the Water Quality Report that shows two conditions of flow for the water quality swale. The top line shows the depth of flow to be 0.33 feet, a flow value of 0.603 cfs, with a velocity of 0.343 ft/sec, and the second line in the spread sheet shows a depth of 1.03 feet, a flow value of 4.23 cfs, and a velocity of 0.632 ft/sec. This would appear to be two separate flow regimes within two different shaped swales. Once I made a closer review of the listed information, I discovered what appears to be a tabulation of one flow regime for the proposed design water quality swale as listed in the Water Quality Report. (The first line of the tabulated data.) The second line on the spread sheet appears to be a separate flow regime for an entirely different shaped conveyance facility not conforming to the design criteria for the water quality swale. .

Given: First condition; The swale has a bottom width of 4.0 feet, with the side slopes of the channel at 4:1 ratio, with an invert slope of 2%. Analyzing this shape of channel with the described conditions, and a flow of 0.603 cfs, I determined all factors listed in the first line of the spread sheet were in agreement, and produced a roughness factor (n) of 0.25, as listed in the design criteria.

Given: Second condition: This appears to define a trapezoidal conveyance with a bottom width of 5.64 feet, side slopes of the channel at 2:1 ratio, and an invert slope of 2%. Analyzing this shaped channel with the described conditions, and a flow of 4.226 cfs, I determined that there was an error in the listed data. Either the depth is incorrect or the one of the other factors of this condition are not valid. The following explores my analysis:

Assume 1. Q = 4.226 cfs, D = 1.03 feet, b = 5.64 feet, side slopes are 2:1 ratio, and s =0.020.

Then TW = 9.76 feet; R = 0.652; $R^{2/3}$= 0.752; but the x-sectional area = 7.93 sf. Not 6.68 as listed, and the velocity would be v = 0.533 ft/sec not 0.632 as listed.

If the above listed data were evaluated for the roughness value (n) of the swale, the following would result:

$n = \dfrac{K'(b^{5/3})(s^{1/2})}{Q}$ $Q = 4.226$ cfs; $b = 5.64$ ft.; ss = 2:1; $s = 0.020$; $s^{1/2} = 0.1414$

Then: For $D = 1.03$ ft. $D/b = 0.1826$ and $K' = 0.0986$ $b^{5/3} = 101$

$n = \dfrac{0.0986\,(101)\,(0.1414)}{4.226}$ $n = 0.33$

Not 0.250 as listed in the Criteria for the Water Quality Swale.

This "n" value is greater than that for the lesser depth listed in line one of the spread sheet. This would not be the case as the deeper the flow in a channel, the lesser effect the vegetation would have on the flow as described in the materials following this letter. The information enclosed supporting this conclusion is from The *"Handbook of Hydraulics"* by Horace King, Professor of Hydraulics at the University of Michigan. This is a standard handbook used for teaching hydraulics in colleges and used throughout the engineering field. The second reference is from a text book *"Open Channel Flow"* by Ven Te Chow, Professor of Hydraulics at the University of Illinois.

To conclude, the above comments regarding the information listed in the spread sheet, included within the Water Quality Report, is additional support of my contention that the reports and information submitted in support of the design for the Fabian estates Subdivision do not meet the standards of care. Therefore the applicants have not provided valid engineering data to support their contention that the "Stormwater Management Standards" of the City of Albany have been met.

Sincerely,

Gary G. Bliss, P.E., WRE, F.ASCE

Enc.

REGISTERED PROFESSIONAL ENGINEER
6848
OREGON
JULY 17, 1970
GARY G. BLISS

Expires 12/31/09

Kings 'Handbook of Hydraulics'
5th Edition
McGraw-Hill Book Co., Inc.

SECTION 7

STEADY UNIFORM FLOW IN OPEN CHANNELS

Reference to Sec. 3 will show that the conditions specified in the title of this section require that the discharge in the channel be constant with respect to time and that the cross-sectional area remain the same from place to place in the channel. For subcritical flow (p. 8-38), this condition can exist throughout the full length of the channel only if the outlet end of the channel is controlled so that there will be no drawdown or backwater. For supercritical flow, uniform flow can occur throughout the channel only if the water enters the channel at the uniform-flow depth from a pressure chamber and if no obstruction exists at the outlet end of the channel. Strictly speaking, this type of flow can occur only in parallel-walled channels, thus precluding all natural streams. Practically speaking, however, there are often reaches of natural streams in which flow is nearly uniform, and in many cases flow can be considered as steady in rivers for short time intervals.

The principles governing the relationship between depth slope and discharge for uniform flow depend entirely on the rate of energy dissipation due to friction. Consequently, this section deals entirely with this aspect of flow in open channels. However, because the rate of energy dissipation for gradually varied flow (p. 8-36) depends on the same variables as in the case of uniform flow, the material presented here will also be used in Sec. 8. The problems involved in steady nonuniform flow are discussed in Secs. 8 and 9, and unsteady flow in open channels is treated in Secs. 10 and 11.

In other words "n" value, or roughness coeficient!

Elements of a Cross Section. The more important elements

EXHIBIT A
Page 3 of 10

where $K = f(z, x)$; or, replacing D in Eq. (7-38) with bx from Eq. (7-3),

$$Q = \frac{Kx^{8/3}b^{8/3}s^{1/2}}{n}$$

or

$$Q = \frac{K'b^{8/3}s^{1/2}}{n} \tag{7-39}$$

where $K' = Kx^{8/3} = f_1(z, x)$.

Tabulations of data relating K and K' to z and x are presented in Tables 7-10 and 7-11, respectively. They cover all symmetrical trapezoidal channels, including rectangular and triangular channels. They permit the direct solution for D or b if the other is known, thus eliminating a solution by trial.

The computation of gradually varied flow profiles requires the solution for s in the Manning equation [Eq. (7-49)]. This solution of the Manning equation involves the term $(1/K')^2$. Consequently, a table relating $(1/K')^2$ to x and z is presented, Table 7-12. The eight-thirds and three-eighths powers of numbers may be obtained from Tables 7-19 and 7-20, respectively.

For *circular channels* flowing part full (Fig. 7-2*d*), the discharge factor for use in formula (7-38) is

$$K = \frac{1.486\left(\frac{360 - \theta}{360}\frac{\pi}{4} + \frac{1}{8}\sin\theta\right)^{5/3}}{x^{8/3}\left(\frac{360 - \theta}{360}\pi\right)^{2/3}} \tag{7-40}$$

where $x = D/d$ = ratio of depth of water to diameter of channel and θ is the angle between the radii subtending the water surface. Since θ is a function of x, there is in reality only one variable in the right-hand member of this equation. Table 7-13 contains values of K for different values of D/d.

By replacing D with xd, the following equation is obtained for circular sections:

$$Q = \frac{K'd^{8/3}s^{1/2}}{n} \tag{7-41}$$

where $K' = f(x)$. Values of K' are given in Table 7-14.

Then the expression for mean depth becomes

$$D_m = \frac{a}{T} = \frac{1/x + z}{1/x + 2z} D = C_m D \qquad (7\text{-}9)$$

Values of C_m in terms of z and x are given in Table 7-2. The distance down from the water surface to the center of gravity is obtained by taking moments as follows:

$$a\bar{y} = bD\frac{D}{2} + eD\frac{D}{3}$$

Substituting for a, b, and e, using Eqs. (7-4), (7-3), and (7-2), respectively,

$$\bar{y} = \frac{1/2x + z/3}{z + 1/x} = C_{\bar{y}} D \qquad (7\text{-}10)$$

Values of $C_{\bar{y}}$ are given in Table 7-3.

If the slopes of the two sides of the channel are different, an average value of z used in Eqs. (7-4), (7-9), and (7-10) will give correct values of a, D_m, and $\bar{y}$, respectively, but Eq. (7-7), used with an average z, will not give exact values of r. For example, if $D = 5$, $b = 10$, and $z = 1$ and 2; from Table 7-1, using z (average) $= 1.5$, then $r = 3.12$, while the correct result is 3.10. For smaller differences in z, the error will be relatively less. The values corresponding to an average z obtained from Table 7-1 will usually therefore be within 1 per cent of the correct result.

The *rectangular section* and *triangular section* are special cases of the trapezoidal section. The former has $z = 0$, and the latter has $b = 0$. The rectangular section (Fig. 7-2*b*) is used for wooden flumes and for various types of lined conduits. Triangular cross sections (Fig. 7-2*c*) are seldom encountered, but channels of this form have interesting hydraulic properties.

For the rectangular section, $a = bd$, $r = bd/(b + 2d)$,

$$\bar{y} = \frac{D}{2}$$

and $D_m = D$. For the triangular section, $a = zD^2$,

$$r = \frac{zD}{2}\sqrt{1 + z^2}$$

$\bar{y} = D/3$, and $D_m = D/2$. In Table 7-1, the first column gives C_r [Eq. (7-7)] for rectangular sections, and the bottom row gives this factor for triangular sections.

OPEN-CHANNEL HYDRAULICS

VEN TE CHOW, Ph.D.

Professor of Hydraulic Engineering
University of Illinois

McGRAW-HILL BOOK COMPANY, INC.

New York Toronto London

1959

EXHIBIT A
Page 6 of 10

for n between 0.011 and 0.040. For practical purposes, the following approximate forms of Eq. (5-9) are generally suggested for use:

$$y = 1.5\sqrt{n} \qquad \text{for } R < 1.0 \text{ m} \tag{5-10}$$
$$y = 1.3\sqrt{n} \qquad \text{for } R > 1.0 \text{ m} \tag{5-11}$$

5-7. Determination of Manning's Roughness Coefficient. In applying the Manning formula or the G. K. formula, the greatest difficulty lies in the determination of the roughness coefficient n; for there is no exact method of selecting the n value. At the present stage of knowledge, to select a value of n actually means to estimate the resistance to flow in a given channel, which is really a matter of intangibles. To veteran engineers, this means the exercise of sound engineering judgment and experience; for beginners, it can be no more than a guess, and different individuals will obtain different results.

In order to give guidance in the proper determination of the roughness coefficient, four general approaches will be discussed; namely, (1) to understand the factors that affect the value of n and thus to acquire a basic knowledge of the problem and narrow the wide range of guesswork, (2) to consult a table of typical n values for channels of various types, (3) to examine and become acquainted with the appearance of some typical channels whose roughness coefficients are known, and (4) to determine the value of n by an analytical procedure based on the theoretical velocity distribution in the channel cross section and on the data of either velocity or roughness measurement. The first three approaches will be given in the next three articles, and the fourth approach will be taken up in Art. 8-7.

5-8. Factors Affecting Manning's Roughness Coefficient. It is not uncommon for engineers to think of a channel as having a single value of n for all occasions. In reality, the value of n is highly variable and depends on a number of factors. In selecting a proper value of n for various design conditions, a basic knowledge of these factors should be found very useful. The factors that exert the greatest influence upon the coefficient of roughness in both artificial and natural channels are therefore described below. It should be noted that these factors are to a certain extent interdependent; hence discussion about one factor may be repeated in connection with another.

A. Surface Roughness. The surface roughness is represented by the size and shape of the grains of the material forming the wetted perimeter and producing a retarding effect on the flow. This is often considered the only factor in selecting a roughness coefficient, but it is actually just one of several major factors. Generally speaking, fine grains result in a relatively low value of n and coarse grains, in a high value of n.

In alluvial streams where the material is fine in grain, such as sand,

EXHIBIT A
Page 7 of 10

clay, loam, or silt, the retarding effect is much less than where the material is coarse, such as gravels or boulders. When the material is fine, the value of n is low and relatively unaffected by change in flow stage. When the material consists of gravels and boulders, the value of n is generally high, particularly at low or high stage. Larger boulders usually collect at the bottom of the stream, making the channel bottom rougher than the banks and increasing the value of n at low stages. At high stages, a portion of the energy of flow is used in rolling the boulders downstream, thus increasing the value of n. A theoretical discussion of surface roughness will be given in Art. 8-2.

B. Vegetation. Vegetation may be regarded as a kind of surface roughness, but it also markedly reduces the capacity of the channel and retards the flow. This effect depends mainly on height, density, distribution, and type of vegetation, and it is very important in designing small drainage channels.

At the University of Illinois an investigation has been made to determine the effect of vegetation on the coefficient of roughness [22]. On one of the drainage ditches in central Illinois under investigation, an average n value of 0.033 was measured in March, 1925, when the channel was in good condition. In April, 1926, there were bushy willows and dry weeds on the side slopes, and n was found to be 0.055. This increase in n represents the result of one year's growth of vegetation. During the summers of 1925 and 1926 there was a thick growth of cattails on the bottom of the channel. The n value at medium summer stages was about 0.115, and at a nearly bankfull stage it was 0.099. The cattails in the channel were washed out by the high water in September, 1926; the average value of n found after this occurrence was 0.072. The conclusions drawn from this investigation were, in part, as follows:

1. The minimum value of n that should be used for designing drainage ditches in central Illinois is 0.040. This value is obtainable at high stages during the summer months in the most carefully maintained channels, where the bottom of the channel is clear of vegetation and the side slopes are covered with grass or low weeds, but no bushes. This low value of n should not be used unless the channel is to be cleared annually of all weeds and bushes.

2. A value of $n = 0.050$ should be used if the channel is to be cleared in alternate years only. Large weeds and bushy willows from 3 to 4 ft high on the side slopes will produce this value of n.

3. In channels that are not cleared for a number of years, the growth may become so abundant that values of $n > 0.100$ may be found.

4. Trees from 6 to 8 in. in diameter growing on the side slopes do not impede the flow so much as do small bushy growths, provided overhanging branches are cut off.

EXHIBIT A
Page 8 of 10

The U.S. Soil Conservation Service has made studies on flow of water in small shallow channels protected by vegetative linings (Chap. 7, Sec. C). It was found that n values for these channels varied with the shape and cross section of the channel, the slope of the channel bed, and the depth of flow. Comparing two channels, all other factors being equal, the lesser average depth gives the higher n value, owing to a larger proportion of affected vegetation. Thus, a triangular channel has a higher n value than a trapezoidal channel, and a wide channel has a lower n value than a narrow channel. A flow of sufficient depth tends to bend over and submerge the vegetation and to produce low n values. A steep slope causes greater velocity, greater flattening of the vegetation, and low n values.

The effect of vegetation on flood plains will be discussed later in item H.

C. Channel Irregularity. Channel irregularity comprises irregularities in wetted perimeter and variations in cross section, size, and shape along the channel length. In natural channels, such irregularities are usually introduced by the presence of sand bars, sand waves, ridges and depressions, and holes and humps on the channel bed. These irregularities definitely introduce roughness in addition to that caused by surface roughness and other factors. Generally speaking, a gradual and uniform change in cross section, size, and shape will not appreciably affect the value of n, but abrupt changes or alternation of small and large sections necessitates the use of a large value of n. In this case, the increase in n may be 0.005 or more. Changes that cause sinuous flow from side to side of the channel will produce the same effect.

D. Channel Alignment. Smooth curvature with large radius will give a relatively low value of n, whereas sharp curvature with severe meandering will increase n. On the basis of flume tests, Scobey [23] suggested that the value of n be increased 0.001 for each 20 degrees of curvature in 100 ft of channel. Although it is doubtful whether curvature ever increases n more than 0.002 or 0.003, its effect should not be ignored, for curvature may induce the accumulation of drift and thus indirectly increase the value of n. Generally speaking, the increase of roughness in unlined channels carrying water at low velocities is negligible. An increase of 0.002 in n value would constitute an adequate allowance for curve losses in most flumes containing pronounced curvatures, whether built of concrete or other materials. The meandering of natural streams, however, may increase the n value as high as 30%.

E. Silting and Scouring. Generally speaking, silting may change a very irregular channel into a comparatively uniform one and decrease n, whereas scouring may do the reverse and increase n. However, the dominant effect of silting will depend on the nature of the material deposited. Uneven deposits such as sand bars and sand waves are

EXHIBIT A
Page 9 of 10

channel irregularities and will increase the roughness. The amount and uniformity of scouring will depend on the material forming the wetted perimeter. Thus, a sandy or gravelly bed will be eroded more uniformly than a clay bed. The deposition of silt eroded from the uplands will tend to even out the irregularities in a channel dredged through clay. The energy used in eroding and carrying the material in suspension or rolling it along the bed will also increase the n value. The effect of scouring is not significant as long as the erosion on channel bed caused by high velocities is progressing evenly and uniformly.

F. Obstruction. The presence of log jams, bridge piers, and the like tends to increase n. The amount of increase depends on the nature of the obstructions, their size, shape, number, and distribution.

G. Size and Shape of Channel. There is no definite evidence about the size and shape of a channel as an important factor affecting the value of n. An increase in hydraulic radius may either increase or decrease n, depending on the condition of the channel (Fig. 5-4).

H. Stage and Discharge. The n value in most streams decreases with increase in stage and in discharge. When the water is shallow, the irregularities of the channel bottom are exposed and their effects become pronounced. However, the n value may be large at high stages if the banks are rough and grassy.

When the discharge is too high, the stream may overflow its banks and a portion of the flow will be along the flood plain. The n value of the flood plains is generally larger than that of the channel proper, and its magnitude depends on the surface condition or vegetation. If the bed and banks of a channel are equally smooth and regular and the bottom slope is uniform, the value of n may remain almost the same at all stages; so a constant n is usually assumed in the flow computation. This happens mostly in artificial channels. On flood plains the value of n usually varies with the stage of submergence of the vegetation at low stages. This can be seen, for example, from Table 5-4, which shows the n values for various flood stages according to the type of cover and depth

TABLE 5-4. VALUES OF n FOR VARIOUS STAGES IN THE NISHNABOTNA RIVER, IOWA, FOR THE AVERAGE GROWING SEASON

Depth of water, ft	Channel section	Flood-plain cover				
		Corn	Pasture	Meadow	Small grains	Brush and waste
Under 1	0.03	0.06	0.05	0.10	0.10	0.12
1 to 2	0.03	0.06	0.05	0.08	0.09	0.11
2 to 3	0.03	0.07	0.04	0.07	0.08	0.10
3 to 4	0.03	0.07	0.04	0.06	0.07	0.09
Over 4	0.03	0.06	0.04	0.05	0.06	0.08

EXHIBIT A
Page 10 of 10

WEATHERFORD THOMPSON
Est. 1875 ATTORNEYS AT LAW

130 WEST 1ST AVE
P.O. BOX 667
ALBANY, OR 97321

PHONE: (541) 926-2255
FAX: (541) 967-6579
EMAIL: abean@wtlegal.com

November 20, 2008

RECEIVED
NOV 20 2008

VIA E-MAIL ONLY
Albany City Council
c/o Don Donovan, Planning Manager
333 Broadalbin St. SW
Albany, OR 97321

Re: Fabian Estates Subdivision Remand
File Nos. SD-07-07 & SP-19-07

Dear Councilors:

This letter is in response to materials submitted by opponents at and subsequent to the November 12 hearing. This matter is a remand from LUBA of a prior approval by this Council of the proposed subdivision. LUBA remanded the matter for purposes of addressing three issues: 1) Does Albany Comprehensive Plan Goal 7, Implementation Measure 10, apply to this application; 2) Does the proposed subdivision provide for access to adjacent properties under ADC 11.180(2); and 3) Does Applicant show the proposed storm sewer plans and systems on the tentative subdivision plat and have those plans been approved by the City Engineer as required by ADC 12.530. Issues that were not appealed to LUBA or were appealed and rejected, cannot be raised now.

Technical and expert testimony is submitted separately and is referenced herein. Please consider that much of the "expert" testimony submitted in opposition to the proposed subdivision does not address actual development criteria in Albany's code or is not subject to this remand. Applicant will not respond in detail to, and by this letter objects to, testimony or evidence that does not address the criteria, such as arguments involving trees or fencing.

PROCEDURAL OBJECTIONS

Opponents objected to the notice for the November 12 hearing, stated concerns regarding information not being available until October 24, and raised issues involving defective copies being provided by the City. This was resolved by allowing additional days to submit information, a continuation of the public hearing, and agreement of the parties.

STREET IMPROVEMENTS

Opponents are requesting a bond or deed restrictions to ensure improvements to the street extension from the cul-de-sac. This would be inappropriate. Improvements to that public street would be for the benefit of adjacent properties and, thus, would be the corresponding burden of those property owners. The developer of the adjacent property can make improvements when needed. If the adjacent property is never developed, the street will not be improved. This ensures minimal impact to the surrounding area.

The Development Code does not have a requirement for Applicant to make the improvements requested by opponents. Applicant is already required to make offsite street improvements pursuant to the original approval of this application. Those required offsite improvements are necessary as a result of the impact of the proposed development. Should the adjacent property owners ever develop their property, it will be necessary for them to make the improvements to the street extension because they will be the only owners benefiting from, and will be the cause of the impacts that create the need for, the improvements. This is no different than requiring Applicant to make offsite improvements due to the impacts of the proposed development.

Opponents provide no information or authority to explain how placing the same burden on others that is placed on Applicant is "unfair," as claimed by opponents. If opponents are correct, then all property owners that have developed their property and will benefit from *Applicant's* offsite street improvements should be required to contribute to those offsite improvements. This argument simply indicates the lack of credibility in the opponents' arguments. It is an attempt to pile costs onto this application that have nothing to do with the criteria.

HINRICHS LETTER

Jeff and Lynn Hinrichs request an 8-foot fence along the entire length of their property adjacent to the proposed subdivision. This request arises as a result of an apparent misunderstanding of testimony at the November 12 hearing. Applicant indicated a willingness to construct a fence at the property boundary, separating the proposed street extension from the adjacent property to the east. This discussion did not address any other part of the property line. The Hinrichs' request cannot be granted because it contradicts the purpose of the conditions already placed on the development to avoid unnecessary structures that would interfere with animal migration. This illustrates the problem with placing conditions that do not specifically address criteria in the Development Code and are intended solely to placate opponents of development. This is also outside the scope of the remand.

The Hinrichs further request improvements to the street extension that will transition with an existing driveway. However, the intent of the extension is for improvement and use only when the adjacent property is developed. It serves no purpose to improve and connect with an existing driveway when the condition is for an extension for purposes of development. It is also unclear why they wish the improvements to occur now, after raising concerns about traffic, pedestrians, and pets earlier in their letter. These requests and concerns are contradictory and cannot be satisfied.

HILLSIDE DEVELOPMENT

It is unclear what opponents are arguing with regard to hillside development pursuant to 11.180(5). They do not explain why Goal 7, Implementation Policy 10 provides a standard within the framework of ADC 11.180(5). The provisions under the Hillside Development ordinances in Article 6 of the Development Code were intended to provide the standards and framework to follow. The staff report does not encourage you to ignore the Comprehensive Plan, as claimed by opponents, but simply points out that applicable standards have been adopted pursuant to the Comprehensive Plan in the Hillside Development ordinances. It serves no purpose to apply two separate and different standards to *any single* development.

Opponents argue that ADC 11.180(5) provides vague standards for considering special features of the site and further claim that *Applicant argues* that this is essentially a standardless criterion. While Applicant may *want* that to be the interpretation, the information in the record from the prior approval of this subdivision makes it clear that Applicant did *not* pursue such an interpretation. Substantial studies and evidence were submitted regarding this specific criterion. which is no longer at issue on this remand.

Opponents have found a simple way to oppose this application: simply ignore the criteria and evidence in the record. They ignore the geotech investigation already undertaken and the report submitted in the record. They ignore the zoning of the subject property and the lower density proposed and approved. They ignore that Applicant has already complied with the City's Hillside Development provisions and the standards that actually apply. Just as with the drainage issues addressed below, opponents argument essentially boils down to "Listen to us because we are right and Applicant and City staff are wrong. Ignore the actual criteria and evidence."

DENSITY

"The City clearly has the ability to make this development better by reducing the density even further." This sentence in Mr. Hill's November 12 letter clarifies all of opponents' arguments and reasoning throughout this process. It has absolutely no relevance to the decision criteria or the scope of this remand. In following this reasoning, the density could be reduced to one building site, or preferably no building sites, and the resulting project would be perfect in the eyes of those that do not want any development or, more appropriately, who do not want any development now that they already have theirs.

This raises the question of what is meant by a "better" development? If the applicant had proposed a development with density of 10,000 sq. ft. lots, as allowed by the zoning, would the opponents have simply insisted on a development with lot sizes averaging more than 15,000 sq. ft.? Since applicant has *already proposed* this much lower density in an effort to create a "better" development, does that simply encourage opponents to seek even further restrictions? There is no counter-argument to opponents on this issue. According to their reasoning, any development can be made "better" until there is no development allowed. That is a "perfect" development their eyes, but is not the result dictated by compliance with the Development Code.

STORM DRAINAGE

Criteria:

Opponents acknowledge that the Council has always put off approval of a drainage plan until the next phase of subdivision approval. The detailed planning occurring at this phase is simply due to LUBA's interpretation of the City's Development Code. The council is not normally involved with this level of detail, which has always been addressed by the experts at a later time. As a result, opponents are being given an opportunity to raise arguments over minutiae that the Council has seldom had to deal with. This allows them to put together a thick smoke screen to distract the Council from the actual mandate of LUBA on this remand. The issues are as follows: 1) is the drainage plan shown on the plat, and 2) has the plan been approved by the City Engineer as part of the tentative plat review process as required by ADC 12.530? The answer to both questions is YES. Therefore, it is unclear to what opponents are objecting.

Engineering:

Applicant's engineer, who has worked closely with the City engineer, addresses all engineering issues related to the approval criteria in a separate submittal. The proposed drainage plan works. Opponents' engineer spends substantial effort raising questions about the plan, but he cannot say the plan is inadequate.

An issue that Applicant will not address in detail is the claim by opponents' engineer that the City's and Applicant's engineers are all unqualified to determine adequacy of drainage for this 11 lot subdivision. Their attorney claims a cursory review of the proposed system shows that it does not meet City standards, but weeks of review by the City Engineer does not disclose anything? These technical arguments are addressed in a separate submittal and the Council can review the actual evidence submitted. That evidence, as well as the historical work of local and City engineers, can speak for itself. The sheer number of hours Applicant's engineers and city engineers have put into reviewing, researching, and discussing these issues over the past 2 years, in comparison to the cursory review by opponents' engineer also speaks for itself.

While opponents' engineer correctly pointed out several minor calculation errors in Applicant's proposed plan, he failed to note that even with those calculation errors, Applicant's plan meets the City's engineering standards. This is the result of the conservative nature of Applicant's plan and original calculations. While minor errors are to be expected when making significant and repeated revisions to meet staff and opponent concerns, the credibility of

Applicant's and the City's engineers is illustrated by the conservatism and redundancy of the calculations used in developing the proposed plan.

The Bradleys, opponents that expressly share all of the concerns and objections raised by Mr. Azevedo and Ms. Cook, are particularly concerned that there has been no *independent* engineering analysis of the water drainage plan. Beyond having Applicant's engineers undertake studies and submit required reports and documentation, and the City's engineers reviewing that information, it is not clear what this independent review would consist of. Apparently *any* engineer hired and paid for by Applicant or the City would automatically be disqualified from the definition of independent. As would any engineer hired by opponents. Therefore, this concern and objection is unrealistic and irrelevant in determining if the criteria have been met.

Opponents are concerned that this is the only chance to address the pipe that will run down the hill from the subdivision. They ignore that the Council added this condition to pipe water down the hill as a result of the councilors' expressed concerns about Applicant's proposal to use the natural drainageway. This condition was not challenged by the opponents or considered by LUBA.

Opponents argue that Applicant will be adding water from another drainage basin to the drainage from the development by plugging existing drainage at West Thornton Lake Drive. Applicant assumes this is a reference to the condition requiring Applicant to send water further west before discharging to easements south of the road, rather than using the natural drainageway as it exists now. This condition was the preference of opponents to avoid discharge into what they considered the actual body of West Thornton Lake and it is strange that it is now the subject of objections. This is a fictional problem created for the sake of argument. Mr. Hill's November 12 letter states that the plan "allows high flows from relatively small storms," but provides no evidence to support this claim.

Conditions:

If opponents now object to a condition they previously thought important, they will be reassured by the **revised condition 4.7**, which will allow alterations to the approved plan if the easements south of the road cannot be obtained. In that case, a likely alteration would be to use the existing drainage across the road, rather than "plugging up the existing drainage." Of course, such an alteration would be subject to approval by the City Engineer and notice to property owners in the area.

Opponents imply that Applicant, through the proposed revised conditions, is attempting to pawn off onto staff the responsibility for determining whether the development criteria have been met, rather than having the Council take responsibility. However, Applicant is simply working with the City's experts to ensure compliance with all criteria and, as LUBA requires, to obtain approval of the proposed drainage plan by the City Engineer. Staff must analyze the technical issues sufficiently for the Council to be able to rely on the resulting expert recommendations. Regardless, the **proposed condition 4.7** does not avoid notice and review by the Planning Commission or City Council if alterations are requested.

They further argue that Applicant tried to cut out public input on storm drainage. This is simply not true. Applicant previously tried to comply with the City's own past interpretations of the Development Code and there was substantial public input during that process. However, LUBA's interpretation of the criteria shows that it is not input of the public that determines the storm water drainage criteria. It requires the approval of the City Engineer. That is the specific directive in this remand. While public input is relevant, both now and if any alterations are later sought, it is the City Engineer's input that controls.

This is not a new and "special policy" designed for this application as claimed by opponents. A drainage plan has been submitted. The plan relies on obtaining easements from other property owners, including owners that are three properties away from the proposed development. If Applicant cannot obtain all of the necessary easements, there must be a process to propose alternatives from the preferred, and approved, plan. The proposed process allows for notice and a hearing if requested by interested parties.

There is nothing objectionable about the process in the proposed revised conditions. There is nothing in the proposed revised conditions that does not comply with the criteria or LUBA's mandate on remand. There is nothing in the proposed revised conditions that creates a special policy or allows Applicant to avoid compliance with engineering standards. Opponents provide no evidence or authority to explain why Applicant must propose and the City engineer must approve multiple plans to address *every* potential contingency. This is not realistic. The council can inquire of staff exactly what such a requirement would mean in terms of hours, efficiency, and practicality. Rather than taking this unrealistic approach, the Development Code is properly read to require a plan, with the ability to address contingencies that may arise, such as the inability to obtain an easement.

Non-criteria concerns:

Doctor Santelmann's letter gives no basis for the opinions expressed therein. We have no idea of her background knowledge of the site. Her letter refers to "research," but no practical background in designing drainage. It also refers to an imaginary "if" the proposed bioswale is insufficient, then there are enumerated potential results. This testimony provides no evidence that the proposed plan is insufficient. Applicant's engineer and the City engineer have provided evidence that it is sufficient and Doctor Santelmann has no engineering training or qualifications that would allow her to credibly question that evidence. In fact, she does *not* raise any doubt regarding that evidence. Her letter gives no input relevant to the criteria of whether the plan is shown on the plat and is approved by the City engineer.

The letters submitted by Andrew Blaustein and Susan Beilke do not address the criteria in the code. Ms. Beilke raises a concern about the system in the lake being out of balance and, as a result, development of property that drains into the lake should be restricted. In other words, as a result of the impacts of past development, the rights of other property owners should be restricted, even though the current requirements for drainage are far more difficult to meet than past requirements.

Opponents' objection on the basis of additional pollutants possibly reaching West Thornton Lake is disingenuous at best and simply adds another red herring for consideration. Drainage goes to the Lake with or without development. As the evidence showed during the recent Thornton Lakes subdivision hearings, the stormwater drainage from virtually ALL existing development around East and West Thornton Lakes is not treated before discharge into the lakes. The proposed plan goes beyond what is usually required, what is required by the Code, and what the City has required for its own projects. There are no city or state requirements for additional studies, especially of the lake itself.

Trees:

Opponents raise a concern regarding the trees that may be removed when constructing drainage improvements, particularly the piping from the subdivision. Although this condition was placed on the approval by the Council and not originally proposed by Applicant, Applicant will still have to go through the City's tree removal application process if such removal is necessary to meet the condition. Again, piping drainage down the hill is not a condition that was challenged at LUBA, including any necessary removal of trees in that drainageway. All issues involving trees were dispensed with at LUBA and are not subject to review on this remand.

Easements:

Opponents focus on the requirement for easements for all public storm drainage. This issue is not in dispute. The easements at issue in this case are south of West Thornton Lake Drive. If Applicant cannot obtain these easements, it is necessary to design, propose, and prove to the satisfaction of the City engineer that an alternative is acceptable. That proposal would go through a notice and hearing process. Any part of the plan or potential alternative that requires construction of infrastructure must also include easements for construction and maintenance. Applicant concurs with this position. Simply because opponents create and attribute to Applicant ridiculous and fictional arguments, do not be fooled into believing Applicant is actually making such arguments. Each argument submitted by Applicant is supported by Oregon law and Albany's Development Code.

Drainage Law:

Applicant is required to control the drainage. It is not disputed that impervious services from development may increase the volume of drainage. It is also undisputed that a property owner may not drain a larger area and artificially transport the water from that larger area into a different drainage basin. However, under Oregon law, an uphill property owner has the absolute right to direct surface water upon the land of an adjacent owner if that water would naturally flow there and may even increase the flow in any natural channels, as is proposed in Applicant's plan. The only legal restriction is that the uphill owner cannot redirect water that would not flow in that direction, which Applicant does not do.

Credibility:

Opponents are concerned that the Applicant questions the motives of some opponents. It is difficult to believe that the motives of all opponents are purely altruistic when, considering the time and effort spent in opposition, there has not been a single constructive recommendation for alteration to the drainage plan that opponents believe would comply with the criteria. All of the effort by opponents and their experts has resulted in nothing other than objections to the drainage plan. In fact, it has resulted in objections to conditions that were previously requested by opponents and the Council. It is difficult to believe that someone with altruistic motives would not be able to make *any* constructive proposals.

CONCLUSION

Applicant asks that the Council focus on the criteria in the Development Code and LUBA's mandate on remand: 1) Does Albany Comprehensive Plan Goal 7, Implementation Measure 10, apply to this application; 2) Does the proposed subdivision provide for access to adjacent properties under ADC 11.180(2); and 3) Does Applicant show the proposed storm sewer plans and systems on the tentative subdivision plat and have those plans been approved by the City Engineer as required by ADC 12.530. There is substantial evidence in the record that these issues have been adequately, and exhaustively, addressed by Applicant. Consider the evidence submitted and analyzed by the experts, including both the parties and the City's own experts. Do not focus on arguments that fail to address the criteria or rely on assertions unsupported by evidence.

This is a small subdivision of urban property with only three issues to address on remand. Those issues have been addressed at a level of detail the City does not normally see. Applicant asks the Council to approve this application, with the conditions of approval recommended by staff and proposed conditions of approval 4.2 and 4.7.

Thank you for your consideration in this matter.

Very truly yours,

Andrew J. Bean

AJB:jlr
cc: Client
jlr:N:\ATTY\AJB\Clients\Fabian Estates\Councilors.ltr11-15-07.doc

K & D ENGINEERING, Inc.

Engineers • Planners • Surveyors

November 20, 2008

Mr. Don Donovan, Planning Manager
City of Albany
P.O. Box 490
Albany, OR 97321

RECEIVED
NOV 20 2008

RE: Fabian Estates Tentative Map and Tree Felling
Files SD-07-07 and SP-19-07
Response to Tentative Plat Drainage Material Review
(Gary Bliss, November 11, 2008, and November 17, 2008)

Dear Mr. Donovan:

Please accept this response to the documents referenced above and the updated studies attached.

Summary

Mr. Bliss correctly identified an input error that resulted in the model showing the bioswale (Grassy Swale) with a slope of 10.49% in the model. The plans correctly show the bioswale as having a 2% slope. Fortunately, we had performed a redundant calculation (included in the report, spreadsheet titled minimum Grassy Swale Designs) that clearly shows that the velocities in the swale as designed will not exceed 1 foot per second (fps) in the treatment design storm nor will 1 fps be exceeded in the High Flow storm event (25-year event per Portland Standards). Attached, we also included calculations for the 100-year storm event and find that the velocities in the swale are approximately 1.1 fps. Therefore, the peak flow during the 100 year event will not "flush out" the bioswale since the flows are well below the maximum allowed velocity of 3 fps.

Mr. Bliss' contention that Drainage Area sub-14 should have been 16.56 acres rather than 0.53 is incorrect. He apparently confused the two separate computer runs (the program we used self names basins). 0.53 acres was the correct area where used in our model.

Mr. Bliss' concern over the 16.56 acres led us to discover that that area was omitted from the contributing areas of the downstream system. We had originally included the west drainage area in the model to intercept the drainage from the existing 18 inch diameter culvert in previous models and version of the study. During staff's first plan review after the remand, we were asked to bypass the existing culvert with the proposed storm drainage system. Those changes were incorporated into the plans and the model revised. After further consultation with staff, it was decided to intercept the runoff from the 18 inch culvert, the plans were again revised at the last minute, but that area did not get included back into the model. **The same facilities, (i.e. pipe size slope and bio-swale configuration) work for both cases.** We have added that area back into the Final Developed Model with Detention and the 100-year Storm Downstream

276 N.W. Hickory Street • P.O. Box 725 • Albany, OR 97321 • (541) 928-2583 • Fax: (541) 967-3458

Analysis. We have revised the models to reflect this and the slope error and re-submit the reports herewith with those revisions.

After review of Mr. Bliss' comments, we find that the storm drainage system shown on the plans will meet the needs of the project and surrounded drainage areas and also meet the Albany storm drainage system design requirements including Division E, "Storm Water Management Standards" of the City's Engineering Standards.

Table E 302 – A, specifies that design storms for public systems as 25 year for collectors and 50 year for trunks. This system is designed for the 100 year rainfall event.

We provide these specific responses to the statements made in Mr. Bliss' "Tentative Map Drainage Review", dated November 11, 2008. We have provided our comments under the headings and numbering system of his review.

General Conclusions

Mr. Bliss states "I found the design construction drawings to be satisfactory at this stage of the approval process". He further states that they "do not meet the criteria in the "Stormwater Management Engineering Standards" (SWM). Section E 12.101 states in part: "The Engineering Standards cannot provide for all situations" and further states "If the Engineer anticipates challenges in meeting these standards, they should contact the City prior to extensive design efforts." We have coordinated with the City extensively throughout this design process.

Specific Comments Addressing Issues of Design Materials Submitted:

1. The proposed minimum pipe size of 8 inches diameter, as proposed, carries all of the design flows. SWM Section E 4.02 states "Proposed exceptions will be reviewed and considered on a case by case basis." Initial discussions with staff indicated that they would consider the 8" pipe and that is why we proposed the reduced size accompanied with a more durable (and expensive) pipe material than normally required. Condition 4.9 addresses pipe size.
2. The Bio-swale (Grassy Swale) has been designed to meet the requirements of the Portland Storm Water Management Manual dated Aug 1, 2008 primarily because the City standards are silent on bio-swale design criteria. Pages 2-63 and 2-64 of that manual state:

   "A minimum of 1 foot of freeboard above the water surface shall be provided for facilities not protected by high-flow diversion devices"; and "Swales without high-flow diversion devices shall be sized to safely convey the 25-year storm event"; and "Velocity through the facility shall not exceed 3 feet per second (fps) during the high-flow event (i.e., when flows greater that those resulting from the pollution design intensity are not passed around the facility)."

   Clearly high flow bypass is not required if 3 feet per second velocities are not exceeded. The swale, as designed, will pass the 25-year event with one foot minimum of freeboard. This swale will accommodate the 25-year and 100-year events.

Velocities in the swale are computed to be:

Water Quality event	**0.34 fps**
25 – year event (n=0.17)	**0.94 fps**
100 – year event (n=0.17	**1.11 fps**

The velocities are well within the Portland design standards (3.0 fps) to protect against "flush out".

3. Division E 1.01 A, D & H of the SWM.

   SubSection A states: "Be of adequate design to safely manage the stormwater generated upstream and on site for given storm intervals to an approved point of discharge"

   The design accommodates the runoff from both on and offsite sources during the design events, including the 100 – year event.

   SubSection D states: "Prevent the capacity of downstream channels and storm drainage facilities from being exceeded."

   The downstream channel is West Thornton Lake. It does not currently have capacity problems, and, since flows from the project are detained, peak flows will not be increased.

   SubSection H states: "Maintain or improve overall water quality."

   This project proposes to utilize two pollution control facilities: A pollution control manhole on-site; and a bio-swale downstream. The Portland Manual indicates that its design standards provide 70 percent total suspended solids removal from 90 percent of the average annual runoff. The Oregon Department of Environmental Quality's publication titled "Biofilters", dated January 2003 states "Bioswales can remove and immobilize or break down a large portion of pollutants found in storm water runoff" and further states "Bioswales can achieve good removal of metals or nutrients that attached to suspended soil particles through settling of the solids by natural flocculation and vegetation uptake." And further states "A minimum seventy-five percent reduction of oil and grease was found in one study in a bioswale with a residence time of approximately 9 minutes". The Stormceptor Technical Manual cites several different independent studies. Among the statements made are: "Coventry University, UK – 97% removal of oil, 83% removal of sand and 73% removal of peat", and "Westwood Massachusetts (1997), demonstrated >80% TSS removal", and "Como Park (1997), demonstrated 76% TSS removal", among others. The system as designed will maintain overall water quality.

4. Mr. Bliss lists "Division E – SWM 1.06 G – Easement". This section does not relate to easements, we suspect he meant to list subsection D. Subsection D requires an easement to an approved point of discharge. Condition 4.8 requires this easement and the proposed easements are shown on the plans.

5. Division E – SWM – E 3.01G is again cited and Mr. Bliss contends that the contributing water shed will "flush out" the water quality swale during higher peak flows. The peak flows during the 100 year event are approximately 1.1 fps and much lower than the 3 fps maximum to prevent "flush out".

6. Division E – SWM E4.02 is cited referencing the requirement of 10 inch diameter pipes, minimum. This section also states: "Proposed exceptions will be reviewed and considered on a case by case basis." Initial discussions with staff indicated that they

would consider the 8" pipe and that why we proposed the reduced size accompanied with a more durable pipe material. Condition 4.9 addresses pipe size.

Storm Drainage & Detention Study Report, Revised October 31, 2008

1. Mr. Bliss states: "...flows I calculated, using the same computer program HydroFlow 2002". Our report states that we used StormNET software on page 3. Page 1 of the printouts clearly lists "BOSS International StromNET – version 4.11.0". However, the differences he reported should not be as high as 33%. We reviewed our model. We suspect that the differences are related to the runoff curve numbers used in the respective models. We used a curve number that relates to residential development between one third and one quarter acre per lot. Mr. Bliss used a curve number that relates to residential development with a density between one quarter aces and one eighth acre per lot. The density of developed portions of the project (streets plus building envelope area) is 11 lots over 3.34 acres or 0.3 lots per acre. Also, please see #2 below.

2. There are two different models in the Storm Drainage and Detention Study. One model is for the detention analysis, the other model is a capacity analysis of the entire system assuming no detention (the no detention scenario was requested by staff to ensure conservative pipes sizing). The program self names the components and this is why both models have similar numbered features. 0.53 acre is the correct value for sub-14 where in the detention model. For the entire system model (Final Developed Model with Detention) sub-14 refers to a different area. However, there was a difference in areas that should be included. We had originally included the west drainage area in the model to intercept the drainage from the existing 18 inch diameter culvert. In staff's review after the remand, we were asked to bypass the existing culvert. Those changes were incorporated in to the plans and the model revised. After further consultation with staff, it was decided to intercept the runoff from the 18 inch culvert. The plans were revised, but that area did not get included back into the model. The same facilities, (i.e. pipe size slope and bio-swale configuration) work for both cases. We have added that area back in the Developed Model with Detention and the 100-year Storm Downstream Analysis. There are different element counts for each model.

3. Mr. Bliss correctly identified a data input error that resulted in the model showing the bioswale (Grassy Swale) with a slope of 10.49% in the model. The plans correctly show the bioswale as having a 2% slope. Fortunately, we had performed a redundant calculation (included in the report, spreadsheet titled minimum Grassy Swale Designs) that clearly shows that the velocities in the swale as designed will not exceed 1 foot per second (fps) in the treatment design storm nor will 1 fps be exceeded in the High Flow storm event (25-year event per Portland Standards). Attached, we also include calculations for the 100-year storm even and find that the velocities in the swale are approximately 1.1 fps. Therefore, the peak flow during the 100 year event will not "flush out" the bioswale since the flows are well below the maximum allowed velocity of 3 fps.

Water Quality Report Revised October 31, 2008

1. We seem to agree.

2. We reviewed the SCS soils groups including the information supplied by Mr. Bliss. We concur that the Soil Groups are B with the exception of the Duplee Series and we used

soil group B with the exception of Duplee series in our model. The bioswale slope error is recognized and has been revised in the model to match the plans, which show 2%. This does not change the design (previously discussed).

3. Our report uses Soil Group B to establish curve number, we agree on Soil Type.
4. The Soils Groups relate to selection of Curve Number and not having them listed in the model run has no effect on the model.
5. Same as 4.
6. The updated bioswale flow is 0.41 cfs, and the bioswale treatment capacity is 0.60 cfs as shown on the spreadsheet, therefore the bioswale has excess treatment flow capacity. Sub-13 basin physically contributes along the length of the length of the bioswale but is assigned to the upper end to be conservative in evaluating capacity. A re-run of model eliminates the Con 45 inconsistency.

Mr. Bliss' November 17, 2008 letter:

This letter relates to "n" values used for natural swales. We concur that the "Handbook of Hydraulics" is relevant and that "n" value decreases as depth increases in a given channel. In addition to using an "n" value of 0.25 for the water quality event in the bioswale as specified by the Portland requirements, we have added a computation that utilizes a "n" value of 0.17 for the 25-year and 100-year events. This "n" value is selected form the Institute of Transportation Studies, "Street and Highway Drainage" manual for a fair stand of any grass 24 inches +/-, depths 0.7 to 1.5 feet, velocities 2 fps. A reduction of "n" values reduces the computed normal depth and increases the computed velocities. Computed velocities for the 100-year event are 1.1 fps for "n"=0.17. Even if we use an "n" value as low as "n"=0.10 (as suggested for 12 inch grass), velocities during the 100-year event would be approximately 1.62 fps. Higher "n" values are conservative for ditch capacity; lower "n" values are conservative for maximum velocities. In all cases the computed velocities are substantially below the 3 fps maximum to protect against "flush out" for all rainfall events.

After considering Mr. Bliss' input we find that drainage system, as designed and shown on the plans, will accommodate all of the design storm events including the 100 year storm without "flush out" of the bioswale. During final design we will be able to make any adjustments necessary to satisfy the City Engineer, project requirements and conditions of approval.

Sincerely,

Dan Watson

Dan Watson, P.E.
Civil Engineer
K&D Engineering, Inc.

nm
Attachments (2)
File: Z: Projects\2006\06-63-e\Donovan ltr 11-20-08.doc

	Minimum Grassy Swale Designs												
Storm	Depth	Base	L side slope	R side slope	top width	xsection area	perimeter	R ^ 2/3	Q	n value	bottom slope	V	Minimum Design L
Water Quality	0.33	4	4	4	6.64	1.7556	6.72125	0.408618	0.603027	0.25	0.020000	0.343487	185.483
25-yr/High Flow	1.09	4	2	2	9.68	7.9572	10.12007	0.851892	5.698211	0.25	0.020000	0.716107	

For a conservative estimate of the flow velocity the Mannings N value was reduced from 0.25 as specified by the City of Portlands Stormwater Management Manual to 0.17 as suggested by the Institue of Transportation Studies: Streets and Highway Drainage Manual Volume 2 for water depths greater than 0.7 feet and velocities under 2 FPS.

25-yr	0.89	4	2	2	8.88	6.1012	9.225646	0.759065	5.725048	0.17	0.020000	0.938348	
100-yr	1.195	4	2	2	10.1	8.99565	10.58965	0.896948	9.974355	0.17	0.020000	1.108798	
100-yr	0.91	4	2	2	8.96	6.2796	9.315089	0.768829	10.14602	0.1	0.020000	1.615711	

11/20/08 letter Attachment 1

FROM: INSTITUTE OF TRANSPORTATION STUDIES
UNIVERSITY OF CALIFORNIA
"STREET AND HIGHWAY DRAINAGE"
VOLUME 2

ATTACHMENT 2

TABLE I-7 (Continued)

	Construction[1] Good	Construction[1] Fair
f. Planed wood, clean	0.011	0.013
g. Concrete lined excavated rock		
(1) Good section	0.017	0.020
(2) Irregular section	0.022	0.027
h. Flumes (steep slope)[4]		

.03 HIGHWAY DITCHES AND SWALES WITH MAINTAINED VEGETATION

	Depth 0.7 ft		Depth 0.7 ft - 1.5 ft	
Velocity in fps	2	6	2	6
a. Bermuda, Kentucky Bluegrass, Buffalo				
(1) Mowed to 2 in.	0.07	0.045	0.05	0.35
(2) Length 4 - 6 in.	0.09	0.05	0.06	0.04
b. Good stand any grass				
(1) Length 12 in. ±	0.18	0.09	0.12	0.07
(2) Length 24 in. ±	0.30	0.15	0.20	0.10
c. Fair stand any grass				
(1) Length 12 in. ±	0.14	0.08	0.10	0.06
(2) Length 24 in. ±	0.25	0.13	0.17	0.09

d. For nonvegetated linings, see paragraph .02.

.04 STREET AND EXPRESSWAY GUTTERS

	Manning's n
a. Concrete gutter, troweled finish	0.012
b. Asphalt pavement	
(1) Smooth	0.013
(2) Rough	0.016
c. Concrete gutter with asphalt pavement	
(1) Smooth	0.013
(2) Rough	0.015
d. Concrete pavement	
(1) Float finish	0.014
(2) Broom finish	0.016
(3) Broom finish, rough	0.020

For gutters with small slope where sediment may accumulate, increase all above values of n by 0.002 to 0.005.

.05 OPEN CHANNELS - EXCAVATED[2] (Straight alignment[3] - Natural Lining)

	Construction[1] Good	Construction[1] Fair
a. Earth, uniform section (best)		
(1) Clean, recently completed	0.016	0.018
(2) Clean, after weathering	0.018	0.020
(3) With short grass, few weeds	0.022	0.027
(4) Gravel, uniform section, clean	0.022	0.025

See footnotes on pages I-10 and I-11.

FOUNDATION ENGINEERING, INC.
Professional Geotechnical Services

Memorandum

Date: November 20, 2008

To: Dan Watson, P.E.
K&D Engineering, Inc.

From: Dave Running, P.E., G.E.

Subject: Geotechnical Consultation for Proposed Storm Drain

Project: Maier Lane Subdivision - Fabian Estates
Project 2071016-101

RECEIVED
NOV 20 2008

This memorandum summarizes our observations and conclusions regarding construction of the proposed storm drain for the above referenced project.

BACKGROUND

A new subdivision is planned on Maier Lane in Albany, Oregon. Fabian Estates LLC is the project owner. K&D Engineering, Inc. (K&D) is the civil designer. Foundation Engineering Inc. (FEI) was retained as the geotechnical consultant.

As part of the project, the City of Albany is requiring storm drainage improvements including a new, 8-inch diameter storm drain extending from Maier Lane to West Thornton Lake Drive. The proposed storm drain will follow an existing drainage. The southern half of the new pipe will follow the bottom of the drainage. Within the northern half of the alignment, a ±200-foot long section of the pipe will cross relatively steep terrain. Trenching for the new pipe will typically extend ±5 to 7 feet below the current grades. Deeper trenching to ±10 to 12 feet will be required in the flatter terrain between ±Sta. 14+00 and ±Sta. 15.25. The City has requested an evaluation of whether the construction of the new storm drain is likely to lead to slope instability within the existing drainage.

SITE OBSERVATIONS

At your request, we visited the site on November 19, 2008, to observe the alignment for the proposed storm drain. A topographic map provided by K&D indicates that the elevation along the proposed storm drain alignment varies from ±El. 398 at the intersection with Maier Lane to ±El. 215 at the outlet in a ditch adjacent to West Thornton Lake Drive. The bottom of the existing drainage slopes to the south at ±8 to 24%. The side slopes of the drainage are as steep as ±50% in some areas.

The ground surface within the drainage is typically covered by underbrush including short grass, moss, ferns and scattered blackberry bushes. Several fir and oak trees area also present.

820 NW Cornell Avenue • Corvallis, Oregon 97330 • Bus. (541) 757-7645 • Fax (541) 757-7650

ANTICIPATED SUBSURFACE CONDITIONS

FEI previously dug test pits in the proposed building areas at Fabian Estates. That exploration suggests the property is underlain by a thin mantle of topsoil over residual soil (i.e., bedrock that has decomposed to the consistency of medium stiff to very stiff soil). The residual soil grades to sandstone with depth. Sandstone was encountered as shallow as ±2 to 3 feet in some of our test pits. During our recent site visit, we observed bedrock exposed on the cut slopes adjacent to the gravel driveway in the southern portion of the proposed storm drain alignment.

Based on our observations, we anticipate that the subsurface conditions within the drainage are similar to conditions at Fabian Estates. Therefore, the utility trenches are likely to encounter a thin mantle of topsoil followed by residual soil and relatively shallow bedrock.

CONCLUSIONS REGARDING SLOPE STABILITY

The presence of a thin soil mantle and shallow bedrock typically precludes the formation of large-scale, deep rotational failures. Slope failures in these conditions are generally limited to shallow surficial events. We noted no visible movement, instability or existing scarps along the slopes within the drainage.

Based on the anticipated subsurface conditions and the lack of active slope failures, it is our opinion that there is a low potential for landslides or instability associated with the construction of the proposed storm line provided the work is completed carefully. To limit the potential for slope instability, we recommend the following:

- Construction of the storm drain should be completed in the dry summer months to minimize disturbance to the surficial soils.
- Trench backfill should be properly compacted in lifts and the ground surface restored to the current grades.
- Vegetation should be reestablished prior to the onset of wet weather.

We trust this information meets your present needs. Please do not hesitate to call if you have any questions.

STORM DRAINAGE AND DETENTION STUDY

FABIAN ESTATES SUBDIVISION

City of Albany

RECEIVED
NOV 20 2008

REGISTERED PROFESSIONAL ENGINEER
17,612
OREGON
Jan. 17, 1995
DANIEL K. WATSON
RENEWAL DATE: 6/30/10

Prepared by: Nolan Nelson, EIT
K&D Engineering
PO Box 725
Albany, Oregon 97321

Client: Gary Davenport, Fabian Estates LLC

Project No. 06-63E

Date: November 19, 2008

PROJECT DESCRIPTION

The proposed site is approximately 4.6 acres on the south end of Maier Lane. The tax lot is TL 3300 of Map 10-04-36 in the City of Albany, Benton County, Oregon. This study was prepared to determine the detention required on site in order to minimize impact on downstream drainage facilities.

For this project the City of Albany requires that 5 through 100 year storm events be detained. Because of the steep slopes on site, pipe detention was the more feasible option than a surface detention pond.

METHODS

Peak flows were calculated using the SCS Urban Hydrograph Method as described in the NRCS Engineering Handbook. This method uses an equation based on land use, slope, and soil conditions. Calculations for flow, required detention, pipe capacities, and orifice sizes were performed using the StormNET software.

General Requirements:

The City of Albany specifies storm water detention guidelines in their Engineering Standards Division E, Stormwater Management, under section 7.01. Below is a list of applicable requirements for this project.

- The storm water that will be generated by the proposed development shall be controlled and conveyed in accordance with all City of Albany Standards. Detention Basins will be required to detain the runoff from storms up to the 100 year twenty four hour storm to pre-development rates.
- The *minimum* allowable orifice size shall be 2 inches.
- Detention basins shall be open basins or ponds or underground storage, or a combination of the above.
- All aspects of the on-site drainage system must be properly designed to handle flows on site and all flows and that flow through the site.
- All aspects of public health must be carefully reviewed. Protective measures may be required.
- The impact of a system failure should be analyzed in terms of on-site and off-site effects.
- The frequency and difficultly of maintaining the facility should be kept to a minimum.
- All detention facilities shall have emergency overflow facilities. The overflow shall be capable of passing the 100 year storm.

Closed Detention System Requirements

The City of Albany has given specific guidelines for a closed detention system. In this project the detention shall be achieved using underground pipe storage. These guidelines are therefore applicable to this design.

- A minimum grade of .003 ft/ft shall be used in all pipes.
- The outfall control structure shall meet the standards set forth in the standard construction specifications or as approved by the city engineer.
- Access to the detention system shall be provided at the up and downstream terminus of the system. The maximum distance between detention access points shall be 400 feet.
- Facility maintenance personal and equipment must be able to access the system year around.

INCLUDED AREAS

The areas included in this report are areas found on the 4.6 acre Fabian Estates Subdivision and contributing upstream areas. The pre-developed areas included in the project area are classified as undeveloped. The developed flow areas include all the pre-developed areas except they have been modeled using developed conditions with medium sized lots (between 1/3 acre and ¼ acre lots).

PRE-DEVELOPED FLOWS

Pre-developed flows and times of concentration were determined using the StormNET software and are based on the guidelines set forth by SCS Method. Flows were calculated using the storm events specified for the City of Albany for 5 through 100 year storm events. The pre-developed areas included an undeveloped area that is a mix of forest and grass with a curve numbers of 70. The storm events used were 5 year, 10 year, 25 year, 50 year, and 100 year 24 hour Type 1A storms that are 2.86 in., 3.32 in., 3.93 in., 4.40 in. and 4.86 in. respectively. The total peak flows for the pre-developed conditions were calculated to be 0.35 cfs, 0.60 cfs, 0.89 cfs, 1.27 cfs, and 1.59 cfs for 5, 10, 25, 50, and 100 year storm events respectively.

DEVELOPED FLOWS

The developed curve numbers for the SCS method were based on the NRCS Engineering Handbook. The Curve number used for all of the developed sub basins was 73 for subdivision with medium sized lots (slightly smaller than 1/3 of an acre). Total developed flows for a 5 year, 10 year, 25 year, 50 year, and 100 year storm are 0.66 cfs, 0.96 cfs, 1.41 cfs, 1.77 cfs, and 2.18 cfs respectively.

DETENTION

Detention was designed to limit the total flow leaving the site to the pre-developed flows for a 5 through 100 year storm. There are two detention systems on site. One system is for the improved Maier Lane and Lots 1-7 in the Fabian Estates subdivision. The other system will be constructed on the west side of the Fabian Estates subdivision along the back of lots 8-11 in order to drain and detain the drainage from those lots. A portion of offsite street runoff will discharge below the detention system and will not be detained but are included in system runoff total outflow computations.

The first detention system will be constructed within Fabian Way and will consist of a control manhole, 5 detention manholes, and 330 Feet of 36 inch diameter pipe for a total storage volume of 2603.5 cubic feet. The control manhole will consist of three orifices are for multiple stage discharges. As the incoming flows increase the control manhole will discharge increased flows in order to closely model the pre-developed flows. The first orifice will be at the same invert elevation as the detention pipe and will be 3.1 inches in diameter. The second orifice will be 3 inches in diameter and the invert will be 1.25 feet higher than the first orifice. The third orifice will be 4.1 inches in diameter and the invert will be 1.81 feet higher than the first orifice. The predeveloped flows for the main system are 0.29 cfs, 0.49 cfs, 0.71 cfs, 1.03 cfs, and 1.28 for 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr storms respectively. The constructed detention pipe will discharge 0.20 cfs, 0.26 cfs, 0.42 cfs, 0.56 cfs and 0.80 cfs for 5-yr, 10-yr, 25-yr, 50-yr and 100-yr storms respectively. The total storage required for the main proposed system is 2,041 cubic feet; therefore the pipe system has adequate storage for 5 through 100 year storm events. If the maximum storage capacity is exceeded the system will overflow the flow control system and discharge through the pipe system.

The detention system for lots 8-11 will be constructed within back of the lots and will consist of a control manhole, 118 Feet of 24 inch diameter pipe, and approximately for a total storage volume of 370.5 cubic feet. The control manhole will contain one orifice and an overflow pipe as the incoming flows increase the control manhole will discharge increased flows in order to closely model the pre-developed flows. The orifice will be at the same invert elevation as the detention pipe and will be 2.0 inches in diameter. The overflow pipe will be an 8 inch pipe with an elevation 3.5 feet higher than the invert of the orifice. The pre-developed flows for the system are 0.06 cfs, 0.11 cfs, 0.18 cfs, 0.24 cfs, and 0.31 for 5-yr, 10-yr, 25-yr, 50-yr, and 100-yr storms respectively. The constructed detention pipe will discharge 0.07 cfs, 0.09 cfs, 0.12 cfs, 0.16 cfs and 0.19 cfs for 5-yr, 10-yr, 25-yr, 50-yr and 100-yr storms respectively. The total storage required for the main proposed system including manholes is 373 cubic feet; therefore the pipe system has adequate storage for 5 through 100 year storm events. If the maximum storage capacity is exceeded the system will overflow the flow control system and discharge through the pipe system.

The maintenance access will meet Albany standards. There should not be an excess vector control problem in this system. The site will be a residential subdivision, so no hazardous materials should enter the system. The main pollutants are expected to be oils and sediment from vehicle traffic. These pollutants are common in subdivisions and are not unexpected. The system is designed so that no intermittent low spots are in place. This will allow all excess runoff to collect at the existing low area and discharge at desired location. Roof runoffs for lots 1-5 will be collected through weep holes in the curb. Roof runoffs for lots 6 and 7 may need to be piped to the street. Roof runoffs for lots 8-11 will be collected in the detention system along the west side of the property. A minimum grade of .003 ft/ft has been implemented throughout the detention system. The outfall structure will be designed and constructed as approved by the city engineering department.

PIPE DESIGN

The pipe system that drains to West Thornton Lake was designed to allow the 100 year storm flows to pass under gravity flow conditions. The 100 year flow that enters this drainage system with detention is a maximum of 1.6 cfs. This is accommodated with 10 inch pipes on site and an 8 inch pipe running at a steep angle down the hillside. An 18 inch pipe is needed where existing and new flows combine in the manhole in West Thornton Lake Drive. Pipe capacities and discharges are listed in the StormNET output report.

WATER QUALITY

Pre-treatment facilities proposed for the project are detailed in the report titled "Water Quality Report, Fabian Estates Subdivision", prepared by K & D Engineering Inc. dated June 18, 2008.

SUMMARY

- The pre-developed flows through this site range from 0.35 cfs for a 5 year storm to 1.59 cfs for a 100 year storm.
- The developed flows through this site range from 0.66 cfs for a 5 year storm to 2.18 cfs for a 100 year storm.
- The developed flows after detention through this site range from 0.42 cfs for a 5 year storm to 1.22 cfs for a 100 year storm
- The total maximum detention requirement is approximately 2,414 cubic feet during a 100 year storm. The detention will be provided in 24inch and 36 inch diameter pipes constructed within the public street right-of-way and along the backsides of lots 8-11.

Table 1: Project Flows (cfs) and Detention Height Summary (ft)

	5 year	10 year	25 year	50 year	100 year
Pre-developed	0.35	0.60	0.89	1.27	1.59
Developed	0.66	0.96	1.41	1.77	2.18
Detention outflow	0.27	0.35	0.54	0.72	0.99
Total Outflow*	0.42	0.55	0.72	0.92	1.22
Peak Height above outlet (Main detention)	0.72	1.13	1.58	1.93	2.19
Peak Height above outlet (Lot detention)	0.47	0.80	1.38	2.42	3.15

*System outflow does not exceed predeveloped flows for 10-100 year events

Table 2: Downstream Model Summary (cfs)**

	Water Quality	25 year	100 year
8" Pipe (Con-43)	0.04	1.17	1.94
18" Pipe Upstream of Existing Ditch Connection (Con-44)	0.04	1.17	1.94
18" Pipe Downstream of Existing Ditch Connection (Con-41)	0.13	4.23	7.84
Bioswale	0.41	5.70	9.28
Outlet into West Thornton Lake (Jun-11)	0.41	5.69	9.97

**Assumes no reduction in flows due to detention as requested by the city in order to be conservative in sizing the pipes.

Pre-Developed StormNET Runoff Reports

Fabian Pre-developed Runoff

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****

```
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00
```

****
Element Count
****

```
Number of rain gages ...... 1
Number of subbasins ....... 5
Number of nodes ........... 6
Number of links ........... 4
```

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	5 year	CUMULATIVE	0.10

****
Subbasin Summary
****

Subbasin ID	Total Area acres
Sub-14	0.53
Sub-15	0.19
Sub-16	0.25
Sub-17	0.76
Sub-2	2.58

****

Fabian Pre-developed Runoff

Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	9.73	1.50	0.00	
Jun-35	JUNCTION	6.30	1.50	0.00	
Jun-36	JUNCTION	3.87	1.50	0.00	
Jun-37	JUNCTION	1.57	1.50	0.00	
Out-6	OUTFALL	0.00	1.50	0.00	
Out-7	OUTFALL	0.00	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-36	Jun-35	Jun-36	CONDUIT	48.6	5.0000	0.0150
Con-37	Jun-36	Out-6	CONDUIT	76.8	5.0358	0.0150
Con-38	Jun-34	Jun-35	CONDUIT	68.5	5.0044	0.0150
Con-39	Jun-37	Out-7	CONDUIT	31.5	4.9889	0.0150

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-36	CIRCULAR	1.50	1.50	1	1.77	0.38	20.36
Con-37	CIRCULAR	1.50	1.50	1	1.77	0.38	20.43
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	20.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	20.33

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	1.023	2.849
Surface Runoff	0.009	0.002
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons

Fabian Pre-developed Runoff

External Inflow	0.000	0.000
External Outflow	0.265	0.086
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.028	

****
Composite Curve Number Computations Report
****

Subbasin Sub-14

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	70.00
Composite Area & Weighted CN	0.53		70.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.19	A	98.00
Composite Area & Weighted CN	0.19		98.00

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.25	-	70.00
Composite Area & Weighted CN	0.25		70.00

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.76	-	70.00
Composite Area & Weighted CN	0.76		70.00

Subbasin Sub-2

	Area	Soil

Fabian Pre-developed Runoff

Soil/Surface Description	(acres)	Group	CN
-	2.58	B	70.00
Composite Area & Weighted CN	2.58		70.00

```
***************************************************
SCS TR-55 Time of Concentration Computations Report
***************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
```

V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.25	0.00	0.00
Computed Flow Time (minutes):	1.97	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.30	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-16

Fabian Pre-developed Runoff

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.10	0.00	0.00
Computed Flow Time (minutes):	4.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	1.63	0.00	0.00
Total TOC (minutes):	6.48		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	10.10	0.00	0.00
Total TOC (minutes):	10.10		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00

Fabian Pre-developed Runoff

Flow Length (ft):	250.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.16	0.00	0.00
Computed Flow Time (minutes):	26.46	0.00	0.00
Total TOC (minutes):	26.46		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	2.860	0.638	0.040	70.000	0	00:08:26
Sub-15	2.860	2.628	0.130	98.000	0	00:05:00
Sub-16	2.860	0.638	0.020	70.000	0	00:06:29
Sub-17	2.860	0.638	0.060	70.000	0	00:10:05
Sub-2	2.860	0.638	0.170	70.000	0	00:26:27
Averages / Totals	2.860	0.726	0.37			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.07	0.12	9.85	0	08:21	0	0	0:00:00
Jun-35	0.07	0.12	6.42	0	08:22	0	0	0:00:00
Jun-36	0.07	0.13	4.00	0	08:08	0	0	0:00:00
Jun-37	0.03	0.06	1.63	0	08:08	0	0	0:00:00
Out-6	0.07	0.12	0.12	0	08:21	0	0	0:00:00
Out-7	0.03	0.06	0.06	0	08:08	0	0	0:00:00

****
Node Flow Summary
****

Fabian Pre-developed Runoff

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-34	JUNCTION	0.25	0.24	0	08:08	0.00		
Jun-35	JUNCTION	0.02	0.26	0	08:08	0.00		
Jun-36	JUNCTION	0.04	0.29	0	08:08	0.00		
Jun-37	JUNCTION	0.06	0.06	0	08:08	0.00		
Out-6	OUTFALL	0.00	0.29	0	08:21	0.00		
Out-7	OUTFALL	0.00	0.06	0	08:08	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Out-6	94.71	0.12	0.29
Out-7	68.20	0.03	0.06
System	81.45	0.15	0.35

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-36	CONDUIT	0	08:22	3.70	1.00	0.25	20.36	0.01	0.08	0
Con-37	CONDUIT	0	08:21	4.06	1.00	0.29	20.43	0.01	0.08	0
Con-38	CONDUIT	0	08:21	3.73	1.00	0.24	20.37	0.01	0.08	0
Con-39	CONDUIT	0	08:08	2.51	1.00	0.06	20.33	0.00	0.04	0

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis begun on: Fri Oct 31 08:19:35 2008

```
Analysis ended on:  Fri Oct 31 08:19:37 2008
Total elapsed time: 00:00:02
```

Fabian Pre-developed Runoff

```
BOSS International StormNET® - Version 4.11.0 (Build 13753)
-------------------------------------------------------------


****************
Analysis Options
****************
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00


*************
Element Count
*************
Number of rain gages ...... 1
Number of subbasins ....... 5
Number of nodes ........... 6
Number of links ........... 4


****************
Raingage Summary
****************
Gage                Data                Data         Interval
ID                  Source              Type            hours
-------------------------------------------------------------
Gage-1              10 year             CUMULATIVE       0.10


****************
Subbasin Summary
****************
Subbasin                  Total
                           Area
ID                        acres
-------------------------------
Sub-14                     0.53
Sub-15                     0.19
Sub-16                     0.25
Sub-17                     0.76
Sub-2                      2.58


************
```

254

Fabian Pre-developed Runoff

Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	9.73	1.50	0.00	
Jun-35	JUNCTION	6.30	1.50	0.00	
Jun-36	JUNCTION	3.87	1.50	0.00	
Jun-37	JUNCTION	1.57	1.50	0.00	
Out-6	OUTFALL	0.00	1.50	0.00	
Out-7	OUTFALL	0.00	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-36	Jun-35	Jun-36	CONDUIT	48.6	5.0000	0.0150
Con-37	Jun-36	Out-6	CONDUIT	76.8	5.0358	0.0150
Con-38	Jun-34	Jun-35	CONDUIT	68.5	5.0044	0.0150
Con-39	Jun-37	Out-7	CONDUIT	31.5	4.9889	0.0150

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-36	CIRCULAR	1.50	1.50	1	1.77	0.38	20.36
Con-37	CIRCULAR	1.50	1.50	1	1.77	0.38	20.43
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	20.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	20.33

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	1.188	3.307
Surface Runoff	0.012	0.003
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons

Fabian Pre-developed Runoff

```
External Inflow ..........        0.000        0.000
External Outflow .........        0.365        0.119
Initial Stored Volume ....        0.000        0.000
Final Stored Volume ......        0.000        0.000
Continuity Error (%) .....       -0.031
```

```
******************************************
Composite Curve Number Computations Report
******************************************
```

Subbasin Sub-14

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	70.00
Composite Area & Weighted CN	0.53		70.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.19	A	98.00
Composite Area & Weighted CN	0.19		98.00

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.25	-	70.00
Composite Area & Weighted CN	0.25		70.00

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.76	-	70.00
Composite Area & Weighted CN	0.76		70.00

Subbasin Sub-2

Area Soil

256

Fabian Pre-developed Runoff

Soil/Surface Description	(acres)	Group	CN
-	2.58	B	70.00
Composite Area & Weighted CN	2.58		70.00

```
*****************************************************
SCS TR-55 Time of Concentration Computations Report
*****************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
```

Fabian Pre-developed Runoff

V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.25	0.00	0.00
Computed Flow Time (minutes):	1.97	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.30	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-16

Fabian Pre-developed Runoff

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.10	0.00	0.00
Computed Flow Time (minutes):	4.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	1.63	0.00	0.00
Total TOC (minutes):	6.48		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	10.10	0.00	0.00
Total TOC (minutes):	10.10		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00

Fabian Pre-developed Runoff

Flow Length (ft):	250.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.16	0.00	0.00
Computed Flow Time (minutes):	26.46	0.00	0.00
Total TOC (minutes):	26.46		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	3.320	0.899	0.080	70.000	0	00:08:26
Sub-15	3.320	3.087	0.150	98.000	0	00:05:00
Sub-16	3.320	0.898	0.040	70.000	0	00:06:29
Sub-17	3.320	0.899	0.110	70.000	0	00:10:05
Sub-2	3.320	0.899	0.310	70.000	0	00:26:27
Averages / Totals	3.320	0.995	0.62			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.08	0.15	9.88	0	08:17	0	0	0:00:00
Jun-35	0.08	0.15	6.45	0	08:18	0	0	0:00:00
Jun-36	0.08	0.16	4.03	0	08:08	0	0	0:00:00
Jun-37	0.04	0.08	1.65	0	08:08	0	0	0:00:00
Out-6	0.08	0.17	0.17	0	08:08	0	0	0:00:00
Out-7	0.03	0.08	0.08	0	08:08	0	0	0:00:00

****
Node Flow Summary
****

Fabian Pre-developed Runoff

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-34	JUNCTION	0.41	0.40	0	08:08	0.00		
Jun-35	JUNCTION	0.04	0.43	0	08:08	0.00		
Jun-36	JUNCTION	0.08	0.49	0	08:08	0.00		
Jun-37	JUNCTION	0.11	0.11	0	08:08	0.00		
Out-6	OUTFALL	0.00	0.49	0	08:08	0.00		
Out-7	OUTFALL	0.00	0.11	0	08:08	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Out-6	95.24	0.16	0.49
Out-7	70.11	0.04	0.11
System	82.68	0.20	0.59

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-36	CONDUIT	0	08:18	4.29	1.00	0.42	20.36	0.02	0.10	0
Con-37	CONDUIT	0	08:08	4.60	1.00	0.49	20.43	0.02	0.11	0
Con-38	CONDUIT	0	08:17	4.32	1.00	0.40	20.37	0.02	0.10	0
Con-39	CONDUIT	0	08:08	2.97	1.00	0.11	20.33	0.01	0.05	0

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis begun on: Fri Oct 31 08:21:07 2008

Fabian Pre-developed Runoff

```
Analysis ended on:  Fri Oct 31 08:21:09 2008
Total elapsed time: 00:00:02
```

Fabian Pre-developed Runoff

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****

```
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00
```

****
Element Count
****

```
Number of rain gages ...... 1
Number of subbasins ....... 5
Number of nodes ........... 6
Number of links ........... 4
```

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	25 year	CUMULATIVE	0.10

****
Subbasin Summary
****

Subbasin ID	Total Area acres
Sub-14	0.53
Sub-15	0.19
Sub-16	0.25
Sub-17	0.76
Sub-2	2.58

****

263

Fabian Pre-developed Runoff

Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	9.73	1.50	0.00	
Jun-35	JUNCTION	6.30	1.50	0.00	
Jun-36	JUNCTION	3.87	1.50	0.00	
Jun-37	JUNCTION	1.57	1.50	0.00	
Out-6	OUTFALL	0.00	1.50	0.00	
Out-7	OUTFALL	0.00	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-36	Jun-35	Jun-36	CONDUIT	48.6	5.0000	0.0150
Con-37	Jun-36	Out-6	CONDUIT	76.8	5.0358	0.0150
Con-38	Jun-34	Jun-35	CONDUIT	68.5	5.0044	0.0150
Con-39	Jun-37	Out-7	CONDUIT	31.5	4.9889	0.0150

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-36	CIRCULAR	1.50	1.50	1	1.77	0.38	20.36
Con-37	CIRCULAR	1.50	1.50	1	1.77	0.38	20.43
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	20.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	20.33

************************** Runoff Quantity Continuity **************************	Volume acre-ft	Depth inches
Total Precipitation	1.406	3.915
Surface Runoff	0.016	0.005
Continuity Error (%)	-0.000	

************************** Flow Routing Continuity **************************	Volume acre-ft	Volume Mgallons

Fabian Pre-developed Runoff

External Inflow	0.000	0.000
External Outflow	0.508	0.166
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.029	

****
Composite Curve Number Computations Report
****

Subbasin Sub-14

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	70.00
Composite Area & Weighted CN	0.53		70.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.19	A	98.00
Composite Area & Weighted CN	0.19		98.00

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.25	-	70.00
Composite Area & Weighted CN	0.25		70.00

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.76	-	70.00
Composite Area & Weighted CN	0.76		70.00

Subbasin Sub-2

Area Soil

Fabian Pre-developed Runoff

Soil/Surface Description	(acres)	Group	CN
-	2.58	B	70.00
Composite Area & Weighted CN	2.58		70.00

```
***************************************************
SCS TR-55 Time of Concentration Computations Report
***************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
```

V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.25	0.00	0.00
Computed Flow Time (minutes):	1.97	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.30	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-16

Fabian Pre-developed Runoff

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.10	0.00	0.00
Computed Flow Time (minutes):	4.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	1.63	0.00	0.00
Total TOC (minutes):	6.48		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	10.10	0.00	0.00
Total TOC (minutes):	10.10		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00

Fabian Pre-developed Runoff

Flow Length (ft):	250.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.16	0.00	0.00
Computed Flow Time (minutes):	26.46	0.00	0.00
Total TOC (minutes):	26.46		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	3.930	1.283	0.130	70.000	0	00:08:26
Sub-15	3.930	3.695	0.180	98.000	0	00:05:00
Sub-16	3.930	1.283	0.060	70.000	0	00:06:29
Sub-17	3.930	1.283	0.180	70.000	0	00:10:05
Sub-2	3.930	1.283	0.530	70.000	0	00:26:27
Averages / Totals	3.930	1.389	0.93			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.09	0.18	9.91	0	08:19	0	0	0:00:00
Jun-35	0.09	0.19	6.49	0	08:21	0	0	0:00:00
Jun-36	0.10	0.20	4.07	0	08:08	0	0	0:00:00
Jun-37	0.04	0.10	1.67	0	08:08	0	0	0:00:00
Out-6	0.10	0.19	0.19	0	08:08	0	0	0:00:00
Out-7	0.04	0.10	0.10	0	08:08	0	0	0:00:00

****
Node Flow Summary
****

Fabian Pre-developed Runoff

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-34	JUNCTION	0.61	0.59	0	08:19	0.00		
Jun-35	JUNCTION	0.06	0.62	0	08:21	0.00		
Jun-36	JUNCTION	0.13	0.72	0	08:04	0.00		
Jun-37	JUNCTION	0.18	0.18	0	08:04	0.00		
Out-6	OUTFALL	0.00	0.71	0	08:08	0.00		
Out-7	OUTFALL	0.00	0.18	0	08:08	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Out-6	95.89	0.22	0.71
Out-7	72.94	0.06	0.18
System	84.42	0.28	0.89

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	Time of Peak Flow Occurrence hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-36	CONDUIT	0	08:24	4.75	1.00	0.62	20.36	0.03	0.13	0
Con-37	CONDUIT	0	08:08	5.29	1.00	0.71	20.43	0.03	0.13	0
Con-38	CONDUIT	0	08:21	4.83	1.00	0.59	20.37	0.03	0.12	0
Con-39	CONDUIT	0	08:08	3.46	1.00	0.18	20.33	0.01	0.07	0

****
Highest Flow Instability Indexes
****
All links are stable.

Analysis begun on: Fri Oct 31 08:21:44 2008

Fabian Pre-developed Runoff

```
Analysis ended on:  Fri Oct 31 08:21:46 2008
Total elapsed time: 00:00:02
```

Fabian Pre-developed Runoff

```
BOSS International StormNET® - Version 4.11.0 (Build 13753)
-------------------------------------------------------------

****************
Analysis Options
****************
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00

*************
Element Count
*************
Number of rain gages ...... 1
Number of subbasins ....... 5
Number of nodes ........... 6
Number of links ........... 4

****************
Raingage Summary
****************
Gage                Data                Data         Interval
ID                  Source              Type            hours
-------------------------------------------------------------
Gage-1              50 year             CUMULATIVE       0.10

****************
Subbasin Summary
****************
Subbasin                   Total
                            Area
ID                         acres
--------------------------------
Sub-14                      0.53
Sub-15                      0.19
Sub-16                      0.25
Sub-17                      0.76
Sub-2                       2.58

************
```

273

Fabian Pre-developed Runoff

Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	9.73	1.50	0.00	
Jun-35	JUNCTION	6.30	1.50	0.00	
Jun-36	JUNCTION	3.87	1.50	0.00	
Jun-37	JUNCTION	1.57	1.50	0.00	
Out-6	OUTFALL	0.00	1.50	0.00	
Out-7	OUTFALL	0.00	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-36	Jun-35	Jun-36	CONDUIT	48.6	5.0000	0.0150
Con-37	Jun-36	Out-6	CONDUIT	76.8	5.0358	0.0150
Con-38	Jun-34	Jun-35	CONDUIT	68.5	5.0044	0.0150
Con-39	Jun-37	Out-7	CONDUIT	31.5	4.9889	0.0150

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-36	CIRCULAR	1.50	1.50	1	1.77	0.38	20.36
Con-37	CIRCULAR	1.50	1.50	1	1.77	0.38	20.43
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	20.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	20.33

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	1.574	4.383
Surface Runoff	0.020	0.006
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons

Fabian Pre-developed Runoff

```
External Inflow ..........        0.000        0.000
External Outflow .........        0.629        0.205
Initial Stored Volume ....        0.000        0.000
Final Stored Volume ......        0.000        0.000
Continuity Error (%) .....       -0.028

******************************************
Composite Curve Number Computations Report
******************************************

--------------
Subbasin Sub-14
--------------
                                                  Area          Soil
Soil/Surface Description                         (acres)        Group           CN
--------------------------------------------------------------------------------
-                                                  0.53            -        70.00
Composite Area & Weighted CN                       0.53                     70.00

--------------
Subbasin Sub-15
--------------
                                                  Area          Soil
Soil/Surface Description                         (acres)        Group           CN
--------------------------------------------------------------------------------
Paved roads with curbs & sewers                    0.19            A        98.00
Composite Area & Weighted CN                       0.19                     98.00

--------------
Subbasin Sub-16
--------------
                                                  Area          Soil
Soil/Surface Description                         (acres)        Group           CN
--------------------------------------------------------------------------------
-                                                  0.25            -        70.00
Composite Area & Weighted CN                       0.25                     70.00

--------------
Subbasin Sub-17
--------------
                                                  Area          Soil
Soil/Surface Description                         (acres)        Group           CN
--------------------------------------------------------------------------------
-                                                  0.76            -        70.00
Composite Area & Weighted CN                       0.76                     70.00

--------------
Subbasin Sub-2
--------------
                                                  Area          Soil
```

Fabian Pre-developed Runoff

Soil/Surface Description	(acres)	Group	CN
-	2.58	B	70.00
Composite Area & Weighted CN	2.58		70.00

```
**************************************************
SCS TR-55 Time of Concentration Computations Report
**************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
```

```
V  = Velocity (ft/sec)
Sf = Slope (ft/ft)
n  = Manning's Roughness
```

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.25	0.00	0.00
Computed Flow Time (minutes):	1.97	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.30	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-16

Fabian Pre-developed Runoff

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.10	0.00	0.00
Computed Flow Time (minutes):	4.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	1.63	0.00	0.00
Total TOC (minutes):	6.48		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	10.10	0.00	0.00
Total TOC (minutes):	10.10		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00

Fabian Pre-developed Runoff

Flow Length (ft):	250.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.16	0.00	0.00
Computed Flow Time (minutes):	26.46	0.00	0.00
Total TOC (minutes):	26.46		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	4.400	1.603	0.170	70.000	0	00:08:26
Sub-15	4.400	4.164	0.200	98.000	0	00:05:00
Sub-16	4.400	1.603	0.080	70.000	0	00:06:29
Sub-17	4.400	1.603	0.250	70.000	0	00:10:05
Sub-2	4.400	1.603	0.720	70.000	0	00:26:27
Averages / Totals	4.400	1.716	1.32			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.10	0.21	9.94	0	08:16	0	0	0:00:00
Jun-35	0.10	0.22	6.52	0	08:18	0	0	0:00:00
Jun-36	0.11	0.24	4.11	0	08:04	0	0	0:00:00
Jun-37	0.05	0.12	1.69	0	08:04	0	0	0:00:00
Out-6	0.11	0.23	0.23	0	08:15	0	0	0:00:00
Out-7	0.05	0.12	0.12	0	08:04	0	0	0:00:00

****
Node Flow Summary
****

Fabian Pre-developed Runoff

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-34	JUNCTION	0.86	0.84	0	08:15	0.00		
Jun-35	JUNCTION	0.08	0.89	0	08:04	0.00		
Jun-36	JUNCTION	0.17	1.04	0	08:04	0.00		
Jun-37	JUNCTION	0.25	0.25	0	08:04	0.00		
Out-6	OUTFALL	0.00	1.03	0	08:15	0.00		
Out-7	OUTFALL	0.00	0.24	0	08:04	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Out-6	96.35	0.28	1.03
Out-7	74.79	0.07	0.24
System	85.57	0.35	1.27

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-36	CONDUIT	0	08:18	5.21	1.00	0.89	20.36	0.04	0.15	0
Con-37	CONDUIT	0	08:15	5.85	1.00	1.03	20.43	0.05	0.16	0
Con-38	CONDUIT	0	08:16	5.28	1.00	0.83	20.37	0.04	0.14	0
Con-39	CONDUIT	0	08:04	3.79	1.00	0.24	20.33	0.01	0.08	0

****
Highest Flow Instability Indexes
****

All links are stable.

Analysis begun on: Fri Oct 31 08:22:10 2008

Fabian Pre-developed Runoff

```
Analysis ended on:  Fri Oct 31 08:22:12 2008
Total elapsed time: 00:00:02
```

Fabian Pre-developed Runoff

```
BOSS International StormNET® - Version 4.11.0 (Build 13753)
-------------------------------------------------------------

****************
Analysis Options
****************
Flow Units ............... cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00

*************
Element Count
*************
Number of rain gages ...... 1
Number of subbasins ....... 5
Number of nodes ........... 6
Number of links ........... 4

****************
Raingage Summary
****************
Gage                Data                Data        Interval
ID                  Source              Type           hours
------------------------------------------------------------
Gage-1              100 year            CUMULATIVE      0.10

****************
Subbasin Summary
****************
Subbasin                 Total
                          Area
ID                       acres
------------------------------
Sub-14                    0.53
Sub-15                    0.19
Sub-16                    0.25
Sub-17                    0.76
Sub-2                     2.58

************
```

Fabian Pre-developed Runoff

Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	9.73	1.50	0.00	
Jun-35	JUNCTION	6.30	1.50	0.00	
Jun-36	JUNCTION	3.87	1.50	0.00	
Jun-37	JUNCTION	1.57	1.50	0.00	
Out-6	OUTFALL	0.00	1.50	0.00	
Out-7	OUTFALL	0.00	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-36	Jun-35	Jun-36	CONDUIT	48.6	5.0000	0.0150
Con-37	Jun-36	Out-6	CONDUIT	76.8	5.0358	0.0150
Con-38	Jun-34	Jun-35	CONDUIT	68.5	5.0044	0.0150
Con-39	Jun-37	Out-7	CONDUIT	31.5	4.9889	0.0150

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-36	CIRCULAR	1.50	1.50	1	1.77	0.38	20.36
Con-37	CIRCULAR	1.50	1.50	1	1.77	0.38	20.43
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	20.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	20.33

************************** Runoff Quantity Continuity **************************	Volume acre-ft	Depth inches
Total Precipitation	1.739	4.841
Surface Runoff	0.024	0.007
Continuity Error (%)	-0.000	

************************** Flow Routing Continuity **************************	Volume acre-ft	Volume Mgallons

Fabian Pre-developed Runoff

```
External Inflow ..........        0.000        0.000
External Outflow .........        0.752        0.245
Initial Stored Volume ....        0.000        0.000
Final Stored Volume ......        0.000        0.000
Continuity Error (%) .....       -0.028
```

```
******************************************
Composite Curve Number Computations Report
******************************************
```

```
--------------
Subbasin Sub-14
--------------
```

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	70.00
Composite Area & Weighted CN	0.53		70.00

```
--------------
Subbasin Sub-15
--------------
```

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.19	A	98.00
Composite Area & Weighted CN	0.19		98.00

```
--------------
Subbasin Sub-16
--------------
```

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.25	-	70.00
Composite Area & Weighted CN	0.25		70.00

```
--------------
Subbasin Sub-17
--------------
```

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.76	-	70.00
Composite Area & Weighted CN	0.76		70.00

```
--------------
Subbasin Sub-2
--------------
```

Area Soil

285

Fabian Pre-developed Runoff

Soil/Surface Description	(acres)	Group	CN
-	2.58	B	70.00
Composite Area & Weighted CN	2.58		70.00

```
***************************************************
SCS TR-55 Time of Concentration Computations Report
***************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
```

V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.25	0.00	0.00
Computed Flow Time (minutes):	1.97	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.30	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-16

Fabian Pre-developed Runoff

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.10	0.00	0.00
Computed Flow Time (minutes):	4.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	500.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	1.63	0.00	0.00
Total TOC (minutes):	6.48		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	10.10	0.00	0.00
Total TOC (minutes):	10.10		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00

Flow Length (ft):	250.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.16	0.00	0.00
Computed Flow Time (minutes):	26.46	0.00	0.00
Total TOC (minutes):	26.46		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	4.860	1.933	0.220	70.000	0	00:08:26
Sub-15	4.860	4.623	0.220	98.000	0	00:05:00
Sub-16	4.860	1.933	0.100	70.000	0	00:06:29
Sub-17	4.860	1.933	0.310	70.000	0	00:10:05
Sub-2	4.860	1.933	0.920	70.000	0	00:26:27
Averages / Totals	4.860	2.052	1.66			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.11	0.24	9.97	0	08:16	0	0	0:00:00
Jun-35	0.11	0.25	6.55	0	08:19	0	0	0:00:00
Jun-36	0.12	0.27	4.14	0	08:04	0	0	0:00:00
Jun-37	0.05	0.13	1.70	0	08:04	0	0	0:00:00
Out-6	0.12	0.26	0.26	0	08:15	0	0	0:00:00
Out-7	0.05	0.13	0.13	0	08:04	0	0	0:00:00

****
Node Flow Summary
****

Fabian Pre-developed Runoff

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-34	JUNCTION	1.08	1.05	0	08:15	0.00		
Jun-35	JUNCTION	0.10	1.11	0	08:04	0.00		
Jun-36	JUNCTION	0.22	1.30	0	08:04	0.00		
Jun-37	JUNCTION	0.31	0.31	0	08:04	0.00		
Out-6	OUTFALL	0.00	1.28	0	08:15	0.00		
Out-7	OUTFALL	0.00	0.31	0	08:04	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Out-6	96.68	0.35	1.28
Out-7	76.54	0.09	0.31
System	86.61	0.44	1.58

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-36	CONDUIT	0	08:19	5.51	1.00	1.10	20.36	0.05	0.17	0
Con-37	CONDUIT	0	08:15	6.20	1.00	1.28	20.43	0.06	0.17	0
Con-38	CONDUIT	0	08:17	5.60	1.00	1.04	20.37	0.05	0.16	0
Con-39	CONDUIT	0	08:04	4.03	1.00	0.31	20.33	0.02	0.09	0

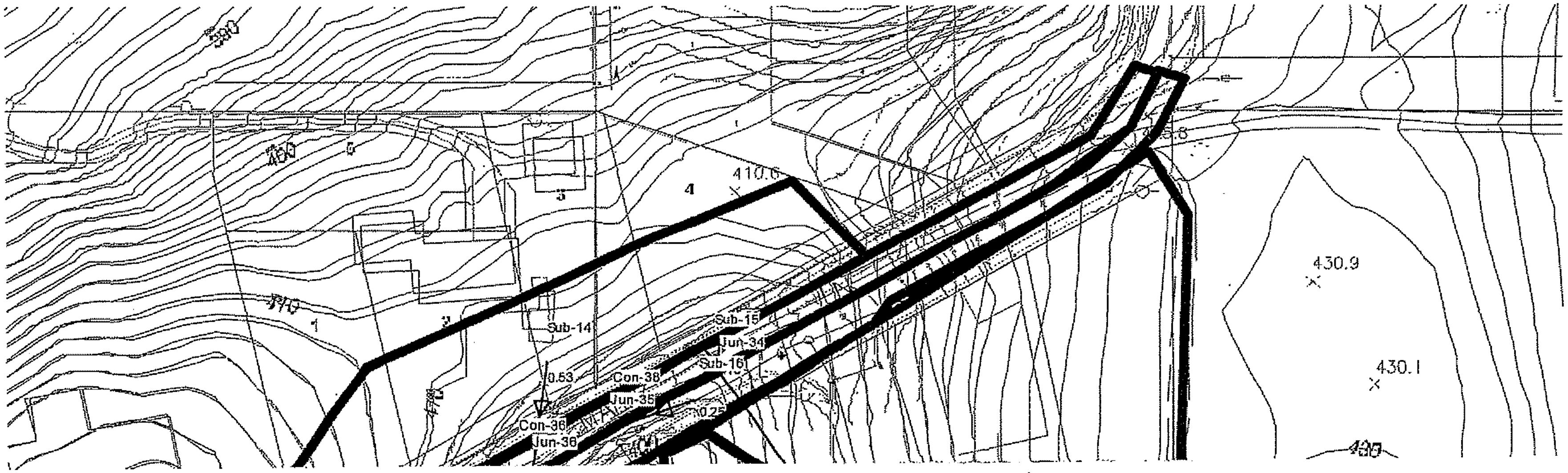
****
Highest Flow Instability Indexes
****
All links are stable.

Analysis begun on: Fri Oct 31 08:22:41 2008

Fabian Pre-developed Runoff

```
Analysis ended on:  Fri Oct 31 08:22:43 2008
Total elapsed time: 00:00:02
```

Fabian Pre-developed Runoff Areas



Not to Scale (for Modeling Purposes Only)

Developed StormNET Runoff Reports

Fabian Developed Model with Detention

BOSS International StormNET® - Version 4.11.0 (Build 13753)

```
----------------------------------------------------------------


****************
Analysis Options
****************
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00


*************
Element Count
*************
Number of rain gages ...... 1
Number of subbasins ....... 6
Number of nodes ........... 17
Number of links ........... 19


****************
Raingage Summary
****************
Gage                Data                Data         Interval
ID                  Source              Type            hours
-------------------------------------------------------------
Gage-1              5 year              CUMULATIVE       0.10


****************
Subbasin Summary
****************
Subbasin                 Total
                          Area
ID                       acres
------------------------------
Sub-14                    0.53
Sub-15                    0.08
Sub-16                    0.08
Sub-17                    0.82
Sub-18                    0.26
Sub-2                     2.54
```

Fabian Developed Model with Detention

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	12.34	1.50	0.00	
Jun-35	JUNCTION	16.46	1.50	0.00	
Jun-36	JUNCTION	4.93	7.00	0.00	
Jun-37	JUNCTION	5.70	1.50	0.00	
Jun-39	JUNCTION	10.96	1.50	0.00	
Jun-40	JUNCTION	3.39	2.00	0.00	
Jun-41	JUNCTION	3.45	1.00	0.00	
Jun-42	JUNCTION	2.93	1.00	0.00	
Jun-43	JUNCTION	-1.64	1.00	0.00	
Jun-44	JUNCTION	3.19	1.00	0.00	
Lot Detention Outlet	JUNCTION	-1.12	4.17	0.00	
Main Detention Outlet	JUNCTION	4.52	2.15	0.00	
Out-7	JUNCTION	0.00	1.00	0.00	
Out-8	JUNCTION	-1.29	1.50	0.00	
Total Outflow	OUTFALL	-2.83	0.83	0.00	
Back of Lot Detention	STORAGE	1.08	3.20	0.00	
Main Detention	STORAGE	4.77	3.60	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-38	Jun-35	Jun-34	CONDUIT	34.3	12.0117	0.0150
Con-39	Jun-36	Main Detention	CONDUIT	6.6	2.4353	0.0150
Con-40	Main Detention Outlet	Jun-42	CONDUIT	63.4	2.5067	0.0150
Con-41	Jun-37	Jun-40	CONDUIT	203.0	1.1379	0.0150
Con-42	Lot Detention Outlet	Out-8	CONDUIT	15.9	1.0726	0.0150
Con-43	Jun-39	Jun-37	CONDUIT	263.0	2.0002	0.0150
Con-44	Jun-40	Back of Lot Detention	CONDUIT	28.3	8.1683	0.0150
Con-47	Jun-42	Out-7	CONDUIT	17.2	17.0250	0.0150
Con-48	Jun-41	Jun-44	CONDUIT	22.5	1.1566	0.0150
Con-49	Jun-34	Jun-36	CONDUIT	61.8	11.9961	0.0150
Con-50	Out-8	Jun-43	CONDUIT	17.4	2.0127	0.0150
Con-51	Out-7	Jun-43	CONDUIT	20.5	7.9844	0.0150
Con-52	Jun-43	Total Outflow	CONDUIT	14.9	7.9705	0.0150
Con-53	Jun-44	Jun-42	CONDUIT	3.7	7.0845	0.0150
Reg-1	Main Detention	Main Detention Outlet	ORIFICE			
Reg-2	Back of Lot Detention	Lot Detention Outlet	ORIFICE			
Reg-4	Main Detention	Main Detention Outlet	ORIFICE			
Reg-5	Main Detention	Main Detention Outlet	ORIFICE			
Reg-8	Back of Lot Detention	Lot Detention Outlet	ORIFICE			

Fabian Developed Model with Detention

```
*********************
Cross Section Summary
*********************
```

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	31.55
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	14.21
Con-40	CIRCULAR	0.83	0.83	1	0.55	0.21	3.01
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	9.71
Con-42	CIRCULAR	1.50	1.50	1	1.77	0.38	9.43
Con-43	CIRCULAR	1.50	1.50	1	1.77	0.38	12.88
Con-44	CIRCULAR	2.00	2.00	1	3.14	0.50	56.03
Con-47	CIRCULAR	0.83	0.83	1	0.55	0.21	7.83
Con-48	CIRCULAR	0.83	0.83	1	0.55	0.21	2.04
Con-49	CIRCULAR	1.50	1.50	1	1.77	0.38	31.53
Con-50	CIRCULAR	0.83	0.83	1	0.55	0.21	2.69
Con-51	CIRCULAR	0.83	0.83	1	0.55	0.21	5.37
Con-52	CIRCULAR	0.83	0.83	1	0.55	0.21	5.36
Con-53	CIRCULAR	0.83	0.83	1	0.55	0.21	5.05

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	1.023	2.849
Surface Runoff	0.001	0.003
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	0.342	0.111
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.003	0.001
Continuity Error (%)	-0.013	

```
******************************************
Composite Curve Number Computations Report
******************************************

--------------
Subbasin Sub-14
--------------
```

296

Fabian Developed Model with Detention

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	73.00
Composite Area & Weighted CN	0.53		73.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.08	A	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.08	-	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.82	-	73.00
Composite Area & Weighted CN	0.82		73.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.26	-	98.00
Composite Area & Weighted CN	0.26		98.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
1/3 acre lots, 30% impervious	2.54	B	73.00
Composite Area & Weighted CN	2.54		73.00

```
**************************************************
SCS TR-55 Time of Concentration Computations Report
**************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
        n  = Manning's Roughness

--------------
```

Fabian Developed Model with Detention

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.11	0.00	0.00
Computed Flow Time (minutes):	8.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	1.74	0.00	0.00
Total TOC (minutes):	10.59		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	3.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00
Total TOC (minutes):	5.00		

Fabian Developed Model with Detention

Subbasin Sub-16

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	9.24	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	0.65	0.00	0.00
Total TOC (minutes):	9.89		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.15	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.21	0.00	0.00
Computed Flow Time (minutes):	6.08	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	2.32	0.00	0.00

Fabian Developed Model with Detention

Total TOC (minutes):	8.40

Subbasin Sub-18

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.84	0.00	0.00
Computed Flow Time (minutes):	0.60	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00

Total TOC (minutes):	5.00

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	153.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.09	0.00	0.00
Computed Flow Time (minutes):	27.01	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	520.00	0.00	0.00
Slope (%):	10.00	0.00	0.00

Fabian Developed Model with Detention

Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.35	0.00	0.00
Total TOC (minutes):	28.36		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	2.860	0.772	0.070	73.000	0	00:10:35
Sub-15	2.860	2.627	0.060	98.000	0	00:05:00
Sub-16	2.860	2.627	0.060	98.000	0	00:09:53
Sub-17	2.860	0.772	0.100	73.000	0	00:08:23
Sub-18	2.860	2.629	0.180	98.000	0	00:05:00
Sub-2	2.860	0.773	0.260	73.000	0	00:28:21
Averages / Totals	2.860	0.953	0.64			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.03	0.06	12.40	0	08:00	0	0	0:00:00
Jun-35	0.02	0.05	16.51	0	07:58	0	0	0:00:00
Jun-36	0.20	0.56	5.49	0	09:08	0	0	0:00:00
Jun-37	0.05	0.12	5.82	0	08:06	0	0	0:00:00
Jun-39	0.00	0.00	10.96	0	00:00	0	0	0:00:00
Jun-40	0.03	0.06	3.45	0	08:07	0	0	0:00:00
Jun-41	0.05	0.10	3.55	0	08:05	0	0	0:00:00
Jun-42	0.07	0.13	3.06	0	08:05	0	0	0:00:00
Jun-43	0.10	0.18	-1.46	0	08:05	0	0	0:00:00
Jun-44	0.06	0.16	3.35	0	08:05	0	0	0:00:00
Lot Detention Outlet	0.05	0.10	-1.02	0	08:26	0	0	0:00:00
Main Detention Outlet	0.10	0.16	4.68	0	09:19	0	0	0:00:00
Out-7	0.09	0.15	0.15	0	08:05	0	0	0:00:00
Out-8	0.05	0.09	-1.20	0	08:26	0	0	0:00:00

Fabian Developed Model with Detention

Total Outflow	0.09	0.16	-2.67	0	08:05	0	0	0:00:00
Back of Lot Detention	0.15	0.47	1.55	0	08:25	0	0	0:00:00
Main Detention	0.32	0.72	5.49	0	09:15	0	0	0:00:00

```
*****************
Node Flow Summary
*****************
```

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-34	JUNCTION	0.06	0.11	0	08:00	0.00		
Jun-35	JUNCTION	0.06	0.06	0	07:55	0.00		
Jun-36	JUNCTION	0.26	0.33	0	08:15	0.00		
Jun-37	JUNCTION	0.10	0.10	0	08:05	0.00		
Jun-39	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-40	JUNCTION	0.00	0.10	0	08:06	0.00		
Jun-41	JUNCTION	0.06	0.06	0	08:05	0.00		
Jun-42	JUNCTION	0.00	0.37	0	08:05	0.00		
Jun-43	JUNCTION	0.00	0.42	0	08:05	0.00		
Jun-44	JUNCTION	0.18	0.23	0	08:05	0.00		
Lot Detention Outlet	JUNCTION	0.00	0.07	0	08:25	0.00		
Main Detention Outlet	JUNCTION	0.00	0.20	0	09:15	0.00		
Out-7	JUNCTION	0.00	0.37	0	08:05	0.00		
Out-8	JUNCTION	0.00	0.07	0	08:26	0.00		
Total Outflow	OUTFALL	0.00	0.42	0	08:05	0.00		
Back of Lot Detention	STORAGE	0.00	0.10	0	08:07	0.00		
Main Detention	STORAGE	0.00	0.32	0	08:15	0.00		

```
**********************
Detention Pond Summary
**********************
```

Detention Pond ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Pond Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Back of Lot Detention	0.065	0	0 08:25	0.014	0	0.07	0.00	0:00:00	0.000
Main Detention	0.475	25	0 09:15	0.163	9	0.20	0.00	0:00:00	0.000

```
***********************
Outfall Loading Summary
***********************
```

Fabian Developed Model with Detention

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Total Outflow	95.12	0.18	0.42
System	95.12	0.18	0.42

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-38	CONDUIT	0 07:58	2.64	1.00	0.06	31.55	0.00	0.04	0
Con-39	CONDUIT	0 08:15	1.48	1.00	0.32	14.21	0.02	0.43	0
Con-40	CONDUIT	0 09:16	3.55	1.00	0.20	3.01	0.07	0.16	0
Con-41	CONDUIT	0 08:06	2.30	1.00	0.10	9.71	0.01	0.06	0
Con-42	CONDUIT	0 08:26	1.47	1.00	0.07	9.43	0.01	0.06	0
Con-43	CONDUIT	0 00:00	0.00	1.00	0.00	12.88	0.00	0.04	0
Con-44	CONDUIT	0 08:07	1.03	1.00	0.10	56.03	0.00	0.13	0
Con-47	CONDUIT	0 08:05	6.04	1.00	0.37	7.83	0.05	0.17	0
Con-48	CONDUIT	0 08:05	1.27	1.00	0.06	2.04	0.03	0.16	0
Con-49	CONDUIT	0 08:00	2.45	1.00	0.11	31.53	0.00	0.20	0
Con-50	CONDUIT	0 08:26	1.26	1.00	0.07	2.69	0.02	0.16	0
Con-51	CONDUIT	0 08:05	4.75	1.00	0.37	5.37	0.07	0.20	0
Con-52	CONDUIT	0 08:05	5.37	1.00	0.42	5.36	0.08	0.20	0
Con-53	CONDUIT	0 08:05	3.80	1.00	0.23	5.05	0.05	0.17	0
Reg-1	ORIFICE	0 09:15			0.20			1.00	
Reg-2	ORIFICE	0 00:00			0.00			0.00	
Reg-4	ORIFICE	0 00:00			0.00			0.00	
Reg-5	ORIFICE	0 00:00			0.00			0.00	
Reg-8	ORIFICE	0 08:25			0.07			1.00	

****
Highest Flow Instability Indexes
****
All links are stable.

Fabian Developed Model with Detention

```
Analysis begun on:  Wed Nov 19 10:53:40 2008
Analysis ended on:  Wed Nov 19 10:53:46 2008
Total elapsed time: 00:00:06
```

Fabian Developed Model with Detention

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****

```
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00
```

****
Element Count
****

```
Number of rain gages ...... 1
Number of subbasins ....... 6
Number of nodes ........... 17
Number of links ........... 19
```

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	10 year	CUMULATIVE	0.10

****
Subbasin Summary
****

Subbasin ID	Total Area acres
Sub-14	0.53
Sub-15	0.08
Sub-16	0.08
Sub-17	0.82
Sub-18	0.26
Sub-2	2.54

Fabian Developed Model with Detention

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	12.34	1.50	0.00	
Jun-35	JUNCTION	16.46	1.50	0.00	
Jun-36	JUNCTION	4.93	7.00	0.00	
Jun-37	JUNCTION	5.70	1.50	0.00	
Jun-39	JUNCTION	10.96	1.50	0.00	
Jun-40	JUNCTION	3.39	2.00	0.00	
Jun-41	JUNCTION	3.45	1.00	0.00	
Jun-42	JUNCTION	2.93	1.00	0.00	
Jun-43	JUNCTION	-1.64	1.00	0.00	
Jun-44	JUNCTION	3.19	1.00	0.00	
Lot Detention Outlet	JUNCTION	-1.12	4.17	0.00	
Main Detention Outlet	JUNCTION	4.52	2.15	0.00	
Out-7	JUNCTION	0.00	1.00	0.00	
Out-8	JUNCTION	-1.29	1.50	0.00	
Total Outflow	OUTFALL	-2.83	0.83	0.00	
Back of Lot Detention	STORAGE	1.08	3.20	0.00	
Main Detention	STORAGE	4.77	3.60	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-38	Jun-35	Jun-34	CONDUIT	34.3	12.0117	0.0150
Con-39	Jun-36	Main Detention	CONDUIT	6.6	2.4353	0.0150
Con-40	Main Detention Outlet	Jun-42	CONDUIT	63.4	2.5067	0.0150
Con-41	Jun-37	Jun-40	CONDUIT	203.0	1.1379	0.0150
Con-42	Lot Detention Outlet	Out-8	CONDUIT	15.9	1.0726	0.0150
Con-43	Jun-39	Jun-37	CONDUIT	263.0	2.0002	0.0150
Con-44	Jun-40	Back of Lot Detention	CONDUIT	28.3	8.1683	0.0150
Con-47	Jun-42	Out-7	CONDUIT	17.2	17.0250	0.0150
Con-48	Jun-41	Jun-44	CONDUIT	22.5	1.1566	0.0150
Con-49	Jun-34	Jun-36	CONDUIT	61.8	11.9961	0.0150
Con-50	Out-8	Jun-43	CONDUIT	17.4	2.0127	0.0150
Con-51	Out-7	Jun-43	CONDUIT	20.5	7.9844	0.0150
Con-52	Jun-43	Total Outflow	CONDUIT	14.9	7.9705	0.0150
Con-53	Jun-44	Jun-42	CONDUIT	3.7	7.0845	0.0150
Reg-1	Main Detention	Main Detention Outlet	ORIFICE			
Reg-2	Back of Lot Detention	Lot Detention Outlet	ORIFICE			
Reg-4	Main Detention	Main Detention Outlet	ORIFICE			
Reg-5	Main Detention	Main Detention Outlet	ORIFICE			
Reg-8	Back of Lot Detention	Lot Detention Outlet	ORIFICE			

Fabian Developed Model with Detention

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft^2	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	31.55
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	14.21
Con-40	CIRCULAR	0.83	0.83	1	0.55	0.21	3.01
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	9.71
Con-42	CIRCULAR	1.50	1.50	1	1.77	0.38	9.43
Con-43	CIRCULAR	1.50	1.50	1	1.77	0.38	12.88
Con-44	CIRCULAR	2.00	2.00	1	3.14	0.50	56.03
Con-47	CIRCULAR	0.83	0.83	1	0.55	0.21	7.83
Con-48	CIRCULAR	0.83	0.83	1	0.55	0.21	2.04
Con-49	CIRCULAR	1.50	1.50	1	1.77	0.38	31.53
Con-50	CIRCULAR	0.83	0.83	1	0.55	0.21	2.69
Con-51	CIRCULAR	0.83	0.83	1	0.55	0.21	5.37
Con-52	CIRCULAR	0.83	0.83	1	0.55	0.21	5.36
Con-53	CIRCULAR	0.83	0.83	1	0.55	0.21	5.05

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	1.188	3.307
Surface Runoff	0.001	0.004
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	0.447	0.146
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.005	0.002
Continuity Error (%)	-0.006	

****
Composite Curve Number Computations Report
****

Subbasin Sub-14

Fabian Developed Model with Detention

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	73.00
Composite Area & Weighted CN	0.53		73.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.08	A	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.08	-	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.82	-	73.00
Composite Area & Weighted CN	0.82		73.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.26	-	98.00
Composite Area & Weighted CN	0.26		98.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
1/3 acre lots, 30% impervious	2.54	B	73.00
Composite Area & Weighted CN	2.54		73.00

Fabian Developed Model with Detention

```
*************************************************
SCS TR-55 Time of Concentration Computations Report
*************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
        n  = Manning's Roughness

--------------
```

Fabian Developed Model with Detention

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.11	0.00	0.00
Computed Flow Time (minutes):	8.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	1.74	0.00	0.00
Total TOC (minutes):	10.59		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	3.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00
Total TOC (minutes):	5.00		

Fabian Developed Model with Detention

Subbasin Sub-16

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	9.24	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	0.65	0.00	0.00
Total TOC (minutes):	9.89		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.15	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.21	0.00	0.00
Computed Flow Time (minutes):	6.08	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	2.32	0.00	0.00

Fabian Developed Model with Detention

Total TOC (minutes):	8.40

Subbasin Sub-18

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.84	0.00	0.00
Computed Flow Time (minutes):	0.60	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00

Total TOC (minutes):	5.00

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	153.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.09	0.00	0.00
Computed Flow Time (minutes):	27.01	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	520.00	0.00	0.00
Slope (%):	10.00	0.00	0.00

Fabian Developed Model with Detention

	Paved	Unpaved	Unpaved
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.35	0.00	0.00
Total TOC (minutes):	28.36		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	3.320	1.060	0.100	73.000	0	00:10:35
Sub-15	3.320	3.085	0.070	98.000	0	00:05:00
Sub-16	3.320	3.085	0.060	98.000	0	00:09:53
Sub-17	3.320	1.060	0.160	73.000	0	00:08:23
Sub-18	3.320	3.087	0.210	98.000	0	00:05:00
Sub-2	3.320	1.060	0.420	73.000	0	00:28:21
Averages / Totals	3.320	1.257	0.93			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.03	0.07	12.41	0	08:00	0	0	0:00:00
Jun-35	0.02	0.05	16.51	0	07:58	0	0	0:00:00
Jun-36	0.36	0.97	5.90	0	09:18	0	0	0:00:00
Jun-37	0.06	0.15	5.85	0	08:05	0	0	0:00:00
Jun-39	0.00	0.00	10.96	0	00:00	0	0	0:00:00
Jun-40	0.03	0.08	3.47	0	08:06	0	0	0:00:00
Jun-41	0.05	0.13	3.58	0	08:05	0	0	0:00:00
Jun-42	0.08	0.14	3.07	0	08:05	0	0	0:00:00
Jun-43	0.12	0.21	-1.43	0	08:05	0	0	0:00:00
Jun-44	0.07	0.19	3.38	0	08:05	0	0	0:00:00
Lot Detention Outlet	0.06	0.11	-1.01	0	08:30	0	0	0:00:00
Main Detention Outlet	0.12	0.18	4.70	0	09:30	0	0	0:00:00
Out-7	0.10	0.18	0.18	0	08:05	0	0	0:00:00
Out-8	0.06	0.10	-1.19	0	08:30	0	0	0:00:00

Fabian Developed Model with Detention

Total Outflow	0.11	0.18	-2.65	0	08:05	0	0	0:00:00
Back of Lot Detention	0.24	0.80	1.88	0	08:30	0	0	0:00:00
Main Detention	0.48	1.13	5.90	0	09:23	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	Time of Peak Inflow Occurrence hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	Time of Peak Flooding Occurrence hh:mm
Jun-34	JUNCTION	0.07	0.13	0	08:00	0.00		
Jun-35	JUNCTION	0.07	0.07	0	07:55	0.00		
Jun-36	JUNCTION	0.42	0.50	0	08:15	0.00		
Jun-37	JUNCTION	0.16	0.16	0	08:05	0.00		
Jun-39	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-40	JUNCTION	0.00	0.16	0	08:05	0.00		
Jun-41	JUNCTION	0.10	0.10	0	08:05	0.00		
Jun-42	JUNCTION	0.00	0.47	0	08:05	0.00		
Jun-43	JUNCTION	0.00	0.55	0	08:05	0.00		
Jun-44	JUNCTION	0.21	0.30	0	08:05	0.00		
Lot Detention Outlet	JUNCTION	0.00	0.09	0	08:30	0.00		
Main Detention Outlet	JUNCTION	0.00	0.26	0	09:23	0.00		
Out-7	JUNCTION	0.00	0.47	0	08:05	0.00		
Out-8	JUNCTION	0.00	0.09	0	08:30	0.00		
Total Outflow	OUTFALL	0.00	0.55	0	08:05	0.00		
Back of Lot Detention	STORAGE	0.00	0.16	0	08:06	0.00		
Main Detention	STORAGE	0.00	0.49	0	08:15	0.00		

****
Detention Pond Summary
****

Detention Pond ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	Time of Max Ponded Volume hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Pond Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Back of Lot Detention	0.139	0	0	08:30	0.030	0	0.09	0.00	0:00:00	0.000
Main Detention	0.897	48	0	09:23	0.302	16	0.26	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Fabian Developed Model with Detention

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Total Outflow	95.69	0.24	0.55
System	95.69	0.24	0.55

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days	hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-38	CONDUIT	0	07:58	2.76	1.00	0.06	31.55	0.00	0.04	0
Con-39	CONDUIT	0	08:15	1.41	1.00	0.49	14.21	0.03	0.70	0
Con-40	CONDUIT	0	09:24	3.83	1.00	0.26	3.01	0.09	0.18	0
Con-41	CONDUIT	0	08:05	2.64	1.00	0.16	9.71	0.02	0.08	0
Con-42	CONDUIT	0	08:30	1.60	1.00	0.09	9.43	0.01	0.07	0
Con-43	CONDUIT	0	00:00	0.00	1.00	0.00	12.88	0.00	0.05	0
Con-44	CONDUIT	0	08:06	0.91	1.00	0.16	56.03	0.00	0.22	0
Con-47	CONDUIT	0	08:05	6.43	1.00	0.47	7.83	0.06	0.19	0
Con-48	CONDUIT	0	08:05	1.51	1.00	0.10	2.04	0.05	0.19	0
Con-49	CONDUIT	0	08:00	2.26	1.00	0.13	31.53	0.00	0.34	0
Con-50	CONDUIT	0	08:30	1.41	1.00	0.09	2.69	0.03	0.18	0
Con-51	CONDUIT	0	08:05	4.99	1.00	0.47	5.37	0.09	0.23	0
Con-52	CONDUIT	0	08:05	5.71	1.00	0.55	5.36	0.10	0.23	0
Con-53	CONDUIT	0	08:05	3.98	1.00	0.30	5.05	0.06	0.20	0
Reg-1	ORIFICE	0	09:23			0.26			1.00	
Reg-2	ORIFICE	0	00:00			0.00			0.00	
Reg-4	ORIFICE	0	00:00			0.00			0.00	
Reg-5	ORIFICE	0	00:00			0.00			0.00	
Reg-8	ORIFICE	0	08:30			0.09			1.00	

****
Highest Flow Instability Indexes
****

All links are stable.

Fabian Developed Model with Detention

```
Analysis begun on:  Wed Nov 19 10:54:48 2008
Analysis ended on:  Wed Nov 19 10:54:55 2008
Total elapsed time: 00:00:07
```

Fabian Developed Model with Detention

```
BOSS International StormNET® - Version 4.11.0 (Build 13753)
-------------------------------------------------------------


****************
Analysis Options
****************
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00


*************
Element Count
*************
Number of rain gages ...... 1
Number of subbasins ....... 6
Number of nodes ........... 17
Number of links ........... 19


****************
Raingage Summary
****************
Gage                Data                Data        Interval
ID                  Source              Type           hours
------------------------------------------------------------
Gage-1              25 year             CUMULATIVE      0.10


****************
Subbasin Summary
****************
Subbasin                  Total
                           Area
ID                        acres
-------------------------------
Sub-14                     0.53
Sub-15                     0.08
Sub-16                     0.08
Sub-17                     0.82
Sub-18                     0.26
Sub-2                      2.54
```

Fabian Developed Model with Detention

```
************
Node Summary
************
Node                 Element              Invert  Maximum   Ponded    External
ID                   Type              Elevation    Depth     Area    Inflow
                                              ft       ft      ft²
------------------------------------------------------------------------------
Jun-34               JUNCTION              12.34     1.50     0.00
Jun-35               JUNCTION              16.46     1.50     0.00
Jun-36               JUNCTION               4.93     7.00     0.00
Jun-37               JUNCTION               5.70     1.50     0.00
Jun-39               JUNCTION              10.96     1.50     0.00
Jun-40               JUNCTION               3.39     2.00     0.00
Jun-41               JUNCTION               3.45     1.00     0.00
Jun-42               JUNCTION               2.93     1.00     0.00
Jun-43               JUNCTION              -1.64     1.00     0.00
Jun-44               JUNCTION               3.19     1.00     0.00
Lot Detention OutletJUNCTION              -1.12     4.17     0.00
Main Detention OutletJUNCTION              4.52     2.15     0.00
Out-7                JUNCTION               0.00     1.00     0.00
Out-8                JUNCTION              -1.29     1.50     0.00
Total Outflow        OUTFALL               -2.83     0.83     0.00
Back of Lot DetentionSTORAGE                1.08     3.20     0.00
Main Detention       STORAGE                4.77     3.60     0.00


************
Link Summary
************
Link            From Node       To Node         Element          Length    Slope  Manning's
ID                                              Type                 ft        %  Roughness
--------------------------------------------------------------------------------------------
Con-38          Jun-35          Jun-34          CONDUIT            34.3  12.0117     0.0150
Con-39          Jun-36          Main Detention  CONDUIT             6.6   2.4353     0.0150
Con-40          Main Detention OutletJun-42          CONDUIT       63.4   2.5067     0.0150
Con-41          Jun-37          Jun-40          CONDUIT           203.0   1.1379     0.0150
Con-42          Lot Detention OutletOut-8          CONDUIT         15.9   1.0726     0.0150
Con-43          Jun-39          Jun-37          CONDUIT           263.0   2.0002     0.0150
Con-44          Jun-40          Back of Lot DetentionCONDUIT         28.3   8.1683     0.0150
Con-47          Jun-42          Out-7           CONDUIT            17.2  17.0250     0.0150
Con-48          Jun-41          Jun-44          CONDUIT            22.5   1.1566     0.0150
Con-49          Jun-34          Jun-36          CONDUIT            61.8  11.9961     0.0150
Con-50          Out-8           Jun-43          CONDUIT            17.4   2.0127     0.0150
Con-51          Out-7           Jun-43          CONDUIT            20.5   7.9844     0.0150
Con-52          Jun-43          Total Outflow   CONDUIT            14.9   7.9705     0.0150
Con-53          Jun-44          Jun-42          CONDUIT             3.7   7.0845     0.0150
Reg-1           Main Detention  Main Detention OutletORIFICE
Reg-2           Back of Lot DetentionLot Detention OutletORIFICE
Reg-4           Main Detention  Main Detention OutletORIFICE
Reg-5           Main Detention  Main Detention OutletORIFICE
Reg-8           Back of Lot DetentionLot Detention OutletORIFICE
```

Fabian Developed Model with Detention

```
*********************
Cross Section Summary
*********************
```

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	31.55
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	14.21
Con-40	CIRCULAR	0.83	0.83	1	0.55	0.21	3.01
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	9.71
Con-42	CIRCULAR	1.50	1.50	1	1.77	0.38	9.43
Con-43	CIRCULAR	1.50	1.50	1	1.77	0.38	12.88
Con-44	CIRCULAR	2.00	2.00	1	3.14	0.50	56.03
Con-47	CIRCULAR	0.83	0.83	1	0.55	0.21	7.83
Con-48	CIRCULAR	0.83	0.83	1	0.55	0.21	2.04
Con-49	CIRCULAR	1.50	1.50	1	1.77	0.38	31.53
Con-50	CIRCULAR	0.83	0.83	1	0.55	0.21	2.69
Con-51	CIRCULAR	0.83	0.83	1	0.55	0.21	5.37
Con-52	CIRCULAR	0.83	0.83	1	0.55	0.21	5.36
Con-53	CIRCULAR	0.83	0.83	1	0.55	0.21	5.05

```
**************************
Runoff Quantity Continuity
**************************
```

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	1.406	3.915
Surface Runoff	0.002	0.006
Continuity Error (%)	-0.000	

```
**************************
Flow Routing Continuity
**************************
```

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	0.596	0.194
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.009	0.003
Continuity Error (%)	0.000	

```
******************************************
Composite Curve Number Computations Report
******************************************

--------------
Subbasin Sub-14
--------------
```

320

Fabian Developed Model with Detention

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	73.00
Composite Area & Weighted CN	0.53		73.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.08	A	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.08	-	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.82	-	73.00
Composite Area & Weighted CN	0.82		73.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.26	-	98.00
Composite Area & Weighted CN	0.26		98.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
1/3 acre lots, 30% impervious	2.54	B	73.00
Composite Area & Weighted CN	2.54		73.00

Fabian Developed Model with Detention

```
**************************************************
SCS TR-55 Time of Concentration Computations Report
**************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
        n  = Manning's Roughness

--------------
```

Fabian Developed Model with Detention

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.11	0.00	0.00
Computed Flow Time (minutes):	8.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	1.74	0.00	0.00
Total TOC (minutes):	10.59		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	3.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-16

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	9.24	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	0.65	0.00	0.00

Total TOC (minutes): 9.89

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.15	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.21	0.00	0.00
Computed Flow Time (minutes):	6.08	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	2.32	0.00	0.00

Fabian Developed Model with Detention

Total TOC (minutes):	8.40

Subbasin Sub-18

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.84	0.00	0.00
Computed Flow Time (minutes):	0.60	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00

Total TOC (minutes):	5.00

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	153.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.09	0.00	0.00
Computed Flow Time (minutes):	27.01	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	520.00	0.00	0.00
Slope (%):	10.00	0.00	0.00

Fabian Developed Model with Detention

	Paved	Unpaved	Unpaved
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.35	0.00	0.00
Total TOC (minutes):	28.36		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	3.930	1.477	0.160	73.000	0	00:10:35
Sub-15	3.930	3.693	0.080	98.000	0	00:05:00
Sub-16	3.930	3.693	0.080	98.000	0	00:09:53
Sub-17	3.930	1.477	0.250	73.000	0	00:08:23
Sub-18	3.930	3.695	0.250	98.000	0	00:05:00
Sub-2	3.930	1.477	0.660	73.000	0	00:28:21
Averages / Totals	3.930	1.693	1.35			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.03	0.08	12.42	0	08:00	0	0	0:00:00
Jun-35	0.02	0.05	16.51	0	07:55	0	0	0:00:00
Jun-36	0.58	1.42	6.35	0	09:04	0	0	0:00:00
Jun-37	0.07	0.18	5.88	0	08:05	0	0	0:00:00
Jun-39	0.00	0.00	10.96	0	00:00	0	0	0:00:00
Jun-40	0.04	0.10	3.49	0	08:05	0	0	0:00:00
Jun-41	0.07	0.16	3.61	0	08:05	0	0	0:00:00
Jun-42	0.10	0.17	3.10	0	08:05	0	0	0:00:00
Jun-43	0.14	0.24	-1.40	0	08:05	0	0	0:00:00
Jun-44	0.08	0.22	3.41	0	08:00	0	0	0:00:00
Lot Detention Outlet	0.07	0.13	-0.99	0	08:35	0	0	0:00:00
Main Detention Outlet	0.13	0.23	4.75	0	09:08	0	0	0:00:00
Out-7	0.12	0.20	0.20	0	08:05	0	0	0:00:00
Out-8	0.07	0.12	-1.17	0	08:35	0	0	0:00:00

Fabian Developed Model with Detention

Total Outflow	0.13	0.21	-2.62	0	08:05	0	0	0:00:00
Back of Lot Detention	0.40	1.38	2.46	0	08:35	0	0	0:00:00
Main Detention	0.71	1.58	6.35	0	09:04	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-34	JUNCTION	0.08	0.15	0	08:00	0.00		
Jun-35	JUNCTION	0.08	0.08	0	07:55	0.00		
Jun-36	JUNCTION	0.66	0.76	0	08:10	0.00		
Jun-37	JUNCTION	0.25	0.25	0	08:05	0.00		
Jun-39	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-40	JUNCTION	0.00	0.25	0	08:05	0.00		
Jun-41	JUNCTION	0.16	0.16	0	08:05	0.00		
Jun-42	JUNCTION	0.00	0.62	0	08:05	0.00		
Jun-43	JUNCTION	0.00	0.72	0	08:05	0.00		
Jun-44	JUNCTION	0.25	0.40	0	08:05	0.00		
Lot Detention Outlet	JUNCTION	0.00	0.12	0	08:35	0.00		
Main Detention Outlet	JUNCTION	0.00	0.42	0	09:04	0.00		
Out-7	JUNCTION	0.00	0.62	0	08:05	0.00		
Out-8	JUNCTION	0.00	0.12	0	08:35	0.00		
Total Outflow	OUTFALL	0.00	0.72	0	08:05	0.00		
Back of Lot Detention	STORAGE	0.00	0.25	0	08:05	0.00		
Main Detention	STORAGE	0.00	0.73	0	08:15	0.00		

****
Detention Pond Summary
****

Detention Pond ID	Maximum Ponded Volume 1000 ft^3	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	hh:mm	Average Ponded Volume 1000 ft^3	Average Ponded Volume (%)	Maximum Pond Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft^3
Back of Lot Detention	0.275	0	0	08:35	0.064	0	0.12	0.00	0:00:00	0.000
Main Detention	1.383	74	0	09:04	0.524	28	0.42	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Fabian Developed Model with Detention

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Total Outflow	96.26	0.32	0.72
System	96.26	0.32	0.72

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-38	CONDUIT	0 07:55	2.90	1.00	0.08	31.55	0.00	0.04	0
Con-39	CONDUIT	0 08:15	1.48	1.00	0.73	14.21	0.05	0.97	0
Con-40	CONDUIT	0 09:08	4.35	1.00	0.42	3.01	0.14	0.23	0
Con-41	CONDUIT	0 08:05	3.01	1.00	0.25	9.71	0.03	0.09	0
Con-42	CONDUIT	0 08:35	1.73	1.00	0.12	9.43	0.01	0.08	0
Con-43	CONDUIT	0 00:00	0.00	1.00	0.00	12.88	0.00	0.06	0
Con-44	CONDUIT	0 08:05	1.00	1.00	0.25	56.03	0.00	0.36	0
Con-47	CONDUIT	0 08:05	6.82	1.00	0.62	7.83	0.08	0.22	0
Con-48	CONDUIT	0 08:05	1.76	1.00	0.16	2.04	0.08	0.23	0
Con-49	CONDUIT	0 08:00	2.12	1.00	0.15	31.53	0.00	0.49	0
Con-50	CONDUIT	0 08:35	1.48	1.00	0.12	2.69	0.05	0.22	0
Con-51	CONDUIT	0 08:05	5.26	1.00	0.62	5.37	0.11	0.27	0
Con-52	CONDUIT	0 08:05	6.08	1.00	0.72	5.36	0.13	0.27	0
Con-53	CONDUIT	0 08:05	4.18	1.00	0.40	5.05	0.08	0.23	0
Reg-1	ORIFICE	0 09:04			0.31			1.00	
Reg-2	ORIFICE	0 00:00			0.00			0.00	
Reg-4	ORIFICE	0 09:04			0.11			1.00	
Reg-5	ORIFICE	0 00:00			0.00			0.00	
Reg-8	ORIFICE	0 08:35			0.12			1.00	

****
Highest Flow Instability Indexes
****
All links are stable.

Fabian Developed Model with Detention

```
Analysis begun on:  Wed Nov 19 10:55:17 2008
Analysis ended on:  Wed Nov 19 10:55:24 2008
Total elapsed time: 00:00:07
```

Fabian Developed Model with Detention

```
BOSS International StormNET® - Version 4.11.0 (Build 13753)
------------------------------------------------------------


****************
Analysis Options
****************
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00


*************
Element Count
*************
Number of rain gages ...... 1
Number of subbasins ....... 6
Number of nodes ........... 17
Number of links ........... 19


****************
Raingage Summary
****************
Gage                 Data                 Data        Interval
ID                   Source               Type           hours
--------------------------------------------------------------
Gage-1               50 year              CUMULATIVE      0.10


****************
Subbasin Summary
****************
Subbasin                  Total
                           Area
ID                        acres
-------------------------------
Sub-14                     0.53
Sub-15                     0.08
Sub-16                     0.08
Sub-17                     0.82
Sub-18                     0.26
Sub-2                      2.54
```

330

Fabian Developed Model with Detention

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	12.34	1.50	0.00	
Jun-35	JUNCTION	16.46	1.50	0.00	
Jun-36	JUNCTION	4.93	7.00	0.00	
Jun-37	JUNCTION	5.70	1.50	0.00	
Jun-39	JUNCTION	10.96	1.50	0.00	
Jun-40	JUNCTION	3.39	2.00	0.00	
Jun-41	JUNCTION	3.45	1.00	0.00	
Jun-42	JUNCTION	2.93	1.00	0.00	
Jun-43	JUNCTION	-1.64	1.00	0.00	
Jun-44	JUNCTION	3.19	1.00	0.00	
Lot Detention Outlet	JUNCTION	-1.12	4.17	0.00	
Main Detention Outlet	JUNCTION	4.52	2.15	0.00	
Out-7	JUNCTION	0.00	1.00	0.00	
Out-8	JUNCTION	-1.29	1.50	0.00	
Total Outflow	OUTFALL	-2.83	0.83	0.00	
Back of Lot Detention	STORAGE	1.08	3.20	0.00	
Main Detention	STORAGE	4.77	3.60	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-38	Jun-35	Jun-34	CONDUIT	34.3	12.0117	0.0150
Con-39	Jun-36	Main Detention	CONDUIT	6.6	2.4353	0.0150
Con-40	Main Detention Outlet	Jun-42	CONDUIT	63.4	2.5067	0.0150
Con-41	Jun-37	Jun-40	CONDUIT	203.0	1.1379	0.0150
Con-42	Lot Detention Outlet	Out-8	CONDUIT	15.9	1.0726	0.0150
Con-43	Jun-39	Jun-37	CONDUIT	263.0	2.0002	0.0150
Con-44	Jun-40	Back of Lot Detention	CONDUIT	28.3	8.1683	0.0150
Con-47	Jun-42	Out-7	CONDUIT	17.2	17.0250	0.0150
Con-48	Jun-41	Jun-44	CONDUIT	22.5	1.1566	0.0150
Con-49	Jun-34	Jun-36	CONDUIT	61.8	11.9961	0.0150
Con-50	Out-8	Jun-43	CONDUIT	17.4	2.0127	0.0150
Con-51	Out-7	Jun-43	CONDUIT	20.5	7.9844	0.0150
Con-52	Jun-43	Total Outflow	CONDUIT	14.9	7.9705	0.0150
Con-53	Jun-44	Jun-42	CONDUIT	3.7	7.0845	0.0150
Reg-1	Main Detention	Main Detention Outlet	ORIFICE			
Reg-2	Back of Lot Detention	Lot Detention Outlet	ORIFICE			
Reg-4	Main Detention	Main Detention Outlet	ORIFICE			
Reg-5	Main Detention	Main Detention Outlet	ORIFICE			
Reg-8	Back of Lot Detention	Lot Detention Outlet	ORIFICE			

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	31.55
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	14.21
Con-40	CIRCULAR	0.83	0.83	1	0.55	0.21	3.01
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	9.71
Con-42	CIRCULAR	1.50	1.50	1	1.77	0.38	9.43
Con-43	CIRCULAR	1.50	1.50	1	1.77	0.38	12.88
Con-44	CIRCULAR	2.00	2.00	1	3.14	0.50	56.03
Con-47	CIRCULAR	0.83	0.83	1	0.55	0.21	7.83
Con-48	CIRCULAR	0.83	0.83	1	0.55	0.21	2.04
Con-49	CIRCULAR	1.50	1.50	1	1.77	0.38	31.53
Con-50	CIRCULAR	0.83	0.83	1	0.55	0.21	2.69
Con-51	CIRCULAR	0.83	0.83	1	0.55	0.21	5.37
Con-52	CIRCULAR	0.83	0.83	1	0.55	0.21	5.36
Con-53	CIRCULAR	0.83	0.83	1	0.55	0.21	5.05

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	1.574	4.383
Surface Runoff	0.002	0.007
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	0.721	0.235
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.013	0.004
Continuity Error (%)	-0.003	

****
Composite Curve Number Computations Report
****

Subbasin Sub-14

Fabian Developed Model with Detention

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	73.00
Composite Area & Weighted CN	0.53		73.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.08	A	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.08	-	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.82	-	73.00
Composite Area & Weighted CN	0.82		73.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.26	-	98.00
Composite Area & Weighted CN	0.26		98.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
1/3 acre lots, 30% impervious	2.54	B	73.00
Composite Area & Weighted CN	2.54		73.00

Fabian Developed Model with Detention

```
****************************************************
SCS TR-55 Time of Concentration Computations Report
****************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
        n  = Manning's Roughness

--------------
```

Fabian Developed Model with Detention

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.11	0.00	0.00
Computed Flow Time (minutes):	8.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	1.74	0.00	0.00
Total TOC (minutes):	10.59		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	3.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-16

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	9.24	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	0.65	0.00	0.00
Total TOC (minutes):	9.89		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.15	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.21	0.00	0.00
Computed Flow Time (minutes):	6.08	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	2.32	0.00	0.00

Fabian Developed Model with Detention

Total TOC (minutes):	8.40

Subbasin Sub-18

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.84	0.00	0.00
Computed Flow Time (minutes):	0.60	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00

Total TOC (minutes):	5.00

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	153.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.09	0.00	0.00
Computed Flow Time (minutes):	27.01	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	520.00	0.00	0.00
Slope (%):	10.00	0.00	0.00

Fabian Developed Model with Detention

Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	1.35	0.00	0.00
Total TOC (minutes):	28.36		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	4.400	1.820	0.210	73.000	0	00:10:35
Sub-15	4.400	4.163	0.090	98.000	0	00:05:00
Sub-16	4.400	4.162	0.090	98.000	0	00:09:53
Sub-17	4.400	1.821	0.320	73.000	0	00:08:23
Sub-18	4.400	4.164	0.280	98.000	0	00:05:00
Sub-2	4.400	1.821	0.860	73.000	0	00:28:21
Averages / Totals	4.400	2.049	1.71			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.03	0.08	12.42	0	08:00	0	0	0:00:00
Jun-35	0.02	0.06	16.52	0	07:57	0	0	0:00:00
Jun-36	0.76	1.77	6.70	0	08:56	0	0	0:00:00
Jun-37	0.08	0.21	5.91	0	08:05	0	0	0:00:00
Jun-39	0.00	0.00	10.96	0	00:00	0	0	0:00:00
Jun-40	0.04	0.12	3.51	0	08:32	0	0	0:00:00
Jun-41	0.07	0.18	3.63	0	08:05	0	0	0:00:00
Jun-42	0.11	0.19	3.12	0	08:55	0	0	0:00:00
Jun-43	0.16	0.28	-1.36	0	08:56	0	0	0:00:00
Jun-44	0.09	0.24	3.43	0	08:00	0	0	0:00:00
Lot Detention Outlet	0.08	0.15	-0.97	0	08:32	0	0	0:00:00
Main Detention Outlet	0.15	0.27	4.79	0	08:58	0	0	0:00:00
Out-7	0.13	0.23	0.23	0	08:56	0	0	0:00:00
Out-8	0.08	0.14	-1.15	0	08:32	0	0	0:00:00

Fabian Developed Model with Detention

Total Outflow	0.14	0.23	-2.60	0	08:56	0	0	0:00:00
Back of Lot Detention	0.60	2.42	3.50	0	08:32	0	0	0:00:00
Main Detention	0.89	1.93	6.70	0	08:55	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-34	JUNCTION	0.09	0.17	0	08:00	0.00		
Jun-35	JUNCTION	0.09	0.09	0	07:55	0.00		
Jun-36	JUNCTION	0.86	0.98	0	08:10	0.00		
Jun-37	JUNCTION	0.32	0.32	0	08:05	0.00		
Jun-39	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-40	JUNCTION	0.00	0.32	0	08:05	0.00		
Jun-41	JUNCTION	0.21	0.21	0	08:05	0.00		
Jun-42	JUNCTION	0.00	0.76	0	08:43	0.00		
Jun-43	JUNCTION	0.00	0.92	0	08:56	0.00		
Jun-44	JUNCTION	0.28	0.47	0	08:04	0.00		
Lot Detention Outlet	JUNCTION	0.00	0.16	0	08:32	0.00		
Main Detention Outlet	JUNCTION	0.00	0.56	0	08:56	0.00		
Out-7	JUNCTION	0.00	0.76	0	08:56	0.00		
Out-8	JUNCTION	0.00	0.16	0	08:32	0.00		
Total Outflow	OUTFALL	0.00	0.92	0	08:56	0.00		
Back of Lot Detention	STORAGE	0.00	0.32	0	08:05	0.00		
Main Detention	STORAGE	0.00	0.95	0	08:15	0.00		

****
Detention Pond Summary
****

Detention Pond ID	Maximum Ponded Volume 1000 ft³	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	hh:mm	Average Ponded Volume 1000 ft³	Average Ponded Volume (%)	Maximum Pond Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft³
Back of Lot Detention	0.373	0	0	09:06	0.099	0	0.16	0.00	0:00:00	0.000
Main Detention	1.765	94	0	08:55	0.709	38	0.56	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Fabian Developed Model with Detention

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Total Outflow	96.64	0.39	0.92
System	96.64	0.39	0.92

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-38	CONDUIT	0 07:57	2.98	1.00	0.09	31.55	0.00	0.05	0
Con-39	CONDUIT	0 08:15	1.48	1.00	0.95	14.21	0.07	1.00	104
Con-40	CONDUIT	0 08:56	4.68	1.00	0.56	3.01	0.19	0.27	0
Con-41	CONDUIT	0 08:05	3.25	1.00	0.32	9.71	0.03	0.10	0
Con-42	CONDUIT	0 08:32	1.87	1.00	0.16	9.43	0.02	0.10	0
Con-43	CONDUIT	0 00:00	0.00	1.00	0.00	12.88	0.00	0.07	0
Con-44	CONDUIT	0 08:05	0.98	1.00	0.32	56.03	0.01	0.53	0
Con-47	CONDUIT	0 08:56	7.16	1.00	0.76	7.83	0.10	0.25	0
Con-48	CONDUIT	0 08:05	1.91	1.00	0.21	2.04	0.10	0.25	0
Con-49	CONDUIT	0 08:00	2.14	1.00	0.17	31.53	0.01	0.52	0
Con-50	CONDUIT	0 08:32	1.56	1.00	0.16	2.69	0.06	0.25	0
Con-51	CONDUIT	0 08:56	5.43	1.00	0.76	5.37	0.14	0.31	0
Con-52	CONDUIT	0 08:56	6.42	1.00	0.92	5.36	0.17	0.31	0
Con-53	CONDUIT	0 08:04	4.32	1.00	0.47	5.05	0.09	0.26	0
Reg-1	ORIFICE	0 08:56			0.35			1.00	
Reg-2	ORIFICE	0 00:00			0.00			0.00	
Reg-4	ORIFICE	0 08:56			0.18			1.00	
Reg-5	ORIFICE	0 08:56			0.04			0.34	
Reg-8	ORIFICE	0 08:32			0.16			1.00	

****
Highest Flow Instability Indexes
****
All links are stable.

Fabian Developed Model with Detention

```
Analysis begun on:  Wed Nov 19 10:55:59 2008
Analysis ended on:  Wed Nov 19 10:56:06 2008
Total elapsed time: 00:00:07
```

Fabian Developed Model with Detention

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****

```
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-55
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. MAR-21-2008 00:00:00
Ending Date ............... MAR-22-2008 00:00:00
Report Time Step .......... 00:05:00
```

****
Element Count
****

```
Number of rain gages ...... 1
Number of subbasins ....... 6
Number of nodes ........... 17
Number of links ........... 19
```

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	100 year	CUMULATIVE	0.10

****
Subbasin Summary
****

Subbasin ID	Total Area acres
Sub-14	0.53
Sub-15	0.08
Sub-16	0.08
Sub-17	0.82
Sub-18	0.26
Sub-2	2.54

Fabian Developed Model with Detention

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-34	JUNCTION	12.34	1.50	0.00	
Jun-35	JUNCTION	16.46	1.50	0.00	
Jun-36	JUNCTION	4.93	7.00	0.00	
Jun-37	JUNCTION	5.70	1.50	0.00	
Jun-39	JUNCTION	10.96	1.50	0.00	
Jun-40	JUNCTION	3.39	2.00	0.00	
Jun-41	JUNCTION	3.45	1.00	0.00	
Jun-42	JUNCTION	2.93	1.00	0.00	
Jun-43	JUNCTION	-1.64	1.00	0.00	
Jun-44	JUNCTION	3.19	1.00	0.00	
Lot Detention Outlet	JUNCTION	-1.12	4.17	0.00	
Main Detention Outlet	JUNCTION	4.52	2.15	0.00	
Out-7	JUNCTION	0.00	1.00	0.00	
Out-8	JUNCTION	-1.29	1.50	0.00	
Total Outflow	OUTFALL	-2.83	0.83	0.00	
Back of Lot Detention	STORAGE	1.08	3.20	0.00	
Main Detention	STORAGE	4.77	3.60	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Con-38	Jun-35	Jun-34	CONDUIT	34.3	12.0117	0.0150
Con-39	Jun-36	Main Detention	CONDUIT	6.6	2.4353	0.0150
Con-40	Main Detention Outlet	Jun-42	CONDUIT	63.4	2.5067	0.0150
Con-41	Jun-37	Jun-40	CONDUIT	203.0	1.1379	0.0150
Con-42	Lot Detention Outlet	Out-8	CONDUIT	15.9	1.0726	0.0150
Con-43	Jun-39	Jun-37	CONDUIT	263.0	2.0002	0.0150
Con-44	Jun-40	Back of Lot Detention	CONDUIT	28.3	8.1683	0.0150
Con-47	Jun-42	Out-7	CONDUIT	17.2	17.0250	0.0150
Con-48	Jun-41	Jun-44	CONDUIT	22.5	1.1566	0.0150
Con-49	Jun-34	Jun-36	CONDUIT	61.8	11.9961	0.0150
Con-50	Out-8	Jun-43	CONDUIT	17.4	2.0127	0.0150
Con-51	Out-7	Jun-43	CONDUIT	20.5	7.9844	0.0150
Con-52	Jun-43	Total Outflow	CONDUIT	14.9	7.9705	0.0150
Con-53	Jun-44	Jun-42	CONDUIT	3.7	7.0845	0.0150
Reg-1	Main Detention	Main Detention Outlet	ORIFICE			
Reg-2	Back of Lot Detention	Lot Detention Outlet	ORIFICE			
Reg-4	Main Detention	Main Detention Outlet	ORIFICE			
Reg-5	Main Detention	Main Detention Outlet	ORIFICE			
Reg-8	Back of Lot Detention	Lot Detention Outlet	ORIFICE			

```
********************
Cross Section Summary
********************
```

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	31.55
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	14.21
Con-40	CIRCULAR	0.83	0.83	1	0.55	0.21	3.01
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	9.71
Con-42	CIRCULAR	1.50	1.50	1	1.77	0.38	9.43
Con-43	CIRCULAR	1.50	1.50	1	1.77	0.38	12.88
Con-44	CIRCULAR	2.00	2.00	1	3.14	0.50	56.03
Con-47	CIRCULAR	0.83	0.83	1	0.55	0.21	7.83
Con-48	CIRCULAR	0.83	0.83	1	0.55	0.21	2.04
Con-49	CIRCULAR	1.50	1.50	1	1.77	0.38	31.53
Con-50	CIRCULAR	0.83	0.83	1	0.55	0.21	2.69
Con-51	CIRCULAR	0.83	0.83	1	0.55	0.21	5.37
Con-52	CIRCULAR	0.83	0.83	1	0.55	0.21	5.36
Con-53	CIRCULAR	0.83	0.83	1	0.55	0.21	5.05

Runoff Quantity Continuity	Volume acre-ft	Depth inches
Total Precipitation	1.739	4.841
Surface Runoff	0.003	0.008
Continuity Error (%)	-0.000	

Flow Routing Continuity	Volume acre-ft	Volume Mgallons
External Inflow	0.000	0.000
External Outflow	0.847	0.276
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.019	0.006
Continuity Error (%)	-0.006	

```
*****************************************
Composite Curve Number Computations Report
*****************************************

--------------
Subbasin Sub-14
--------------
```

344

Fabian Developed Model with Detention

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.53	-	73.00
Composite Area & Weighted CN	0.53		73.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
Paved roads with curbs & sewers	0.08	A	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-16

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.08	-	98.00
Composite Area & Weighted CN	0.08		98.00

Subbasin Sub-17

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.82	-	73.00
Composite Area & Weighted CN	0.82		73.00

Subbasin Sub-18

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.26	-	98.00
Composite Area & Weighted CN	0.26		98.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
1/3 acre lots, 30% impervious	2.54	B	73.00
Composite Area & Weighted CN	2.54		73.00

Fabian Developed Model with Detention

```
****************************************************
SCS TR-55 Time of Concentration Computations Report
****************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
        n  = Manning's Roughness

--------------
```

Fabian Developed Model with Detention

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.11	0.00	0.00
Computed Flow Time (minutes):	8.85	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	1.74	0.00	0.00
Total TOC (minutes):	10.59		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.13	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	3.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-16

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	9.24	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	0.65	0.00	0.00
Total TOC (minutes):	9.89		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.15	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.21	0.00	0.00
Computed Flow Time (minutes):	6.08	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	2.87	0.00	0.00
Computed Flow Time (minutes):	2.32	0.00	0.00

Fabian Developed Model with Detention

Total TOC (minutes):	8.40

Subbasin Sub-18

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	30.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.84	0.00	0.00
Computed Flow Time (minutes):	0.60	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	6.43	0.00	0.00
Computed Flow Time (minutes):	0.52	0.00	0.00

Total TOC (minutes):	5.00

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.30	0.00	0.00
Flow Length (ft):	153.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.09	0.00	0.00
Computed Flow Time (minutes):	27.01	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	520.00	0.00	0.00
Slope (%):	10.00	0.00	0.00

Fabian Developed Model with Detention

	Surface Type:	Paved	Unpaved	Unpaved
	Velocity (ft/sec):	6.43	0.00	0.00
	Computed Flow Time (minutes):	1.35	0.00	0.00
	Total TOC (minutes):	28.36		

```
***********************
Subbasin Runoff Summary
***********************
```

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-14	4.860	2.171	0.260	73.000	0	00:10:35
Sub-15	4.860	4.622	0.100	98.000	0	00:05:00
Sub-16	4.860	4.622	0.100	98.000	0	00:09:53
Sub-17	4.860	2.171	0.400	73.000	0	00:08:23
Sub-18	4.860	4.623	0.310	98.000	0	00:05:00
Sub-2	4.860	2.171	1.070	73.000	0	00:28:21
Averages / Totals	4.860	2.410	2.07			

```
******************
Node Depth Summary
******************
```

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-34	0.04	0.08	12.42	0	08:00	0	0	0:00:00
Jun-35	0.03	0.06	16.52	0	07:55	0	0	0:00:00
Jun-36	0.89	2.05	6.98	0	08:42	0	0	0:00:00
Jun-37	0.09	0.23	5.93	0	08:05	0	0	0:00:00
Jun-39	0.00	0.00	10.96	0	00:00	0	0	0:00:00
Jun-40	0.10	0.83	4.22	0	08:42	0	0	0:00:00
Jun-41	0.08	0.21	3.66	0	08:05	0	0	0:00:00
Jun-42	0.12	0.22	3.15	0	08:33	0	0	0:00:00
Jun-43	0.17	0.34	-1.30	0	08:33	0	0	0:00:00
Jun-44	0.09	0.27	3.46	0	08:00	0	0	0:00:00
Lot Detention Outlet	0.09	0.16	-0.96	0	08:34	0	0	0:00:00
Main Detention Outlet	0.16	0.33	4.85	0	08:43	0	0	0:00:00
Out-7	0.14	0.27	0.27	0	08:33	0	0	0:00:00
Out-8	0.08	0.15	-1.14	0	08:43	0	0	0:00:00

Fabian Developed Model with Detention

Total Outflow	0.15	0.27	-2.56	0	08:33	0	0	0:00:00
Back of Lot Detention	0.85	3.15	4.23	0	08:34	0	0	0:00:00
Main Detention	1.02	2.19	6.96	0	08:42	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow cfs	Maximum Total Inflow cfs	Time of Peak Inflow Occurrence days	hh:mm	Maximum Flooding Overflow cfs	Time of Peak Flooding Occurrence days	hh:mm
Jun-34	JUNCTION	0.10	0.19	0	08:00	0.00		
Jun-35	JUNCTION	0.10	0.10	0	07:55	0.00		
Jun-36	JUNCTION	1.07	1.20	0	08:10	0.00		
Jun-37	JUNCTION	0.40	0.40	0	08:05	0.00		
Jun-39	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-40	JUNCTION	0.00	0.43	0	08:08	0.00		
Jun-41	JUNCTION	0.26	0.26	0	08:05	0.00		
Jun-42	JUNCTION	0.00	1.04	0	08:33	0.00		
Jun-43	JUNCTION	0.00	1.22	0	08:33	0.00		
Jun-44	JUNCTION	0.30	0.55	0	08:00	0.00		
Lot Detention Outlet	JUNCTION	0.00	0.19	0	08:34	0.00		
Main Detention Outlet	JUNCTION	0.00	0.80	0	08:42	0.00		
Out-7	JUNCTION	0.00	1.04	0	08:33	0.00		
Out-8	JUNCTION	0.00	0.19	0	08:34	0.00		
Total Outflow	OUTFALL	0.00	1.22	0	08:33	0.00		
Back of Lot Detention	STORAGE	0.00	0.40	0	08:05	0.00		
Main Detention	STORAGE	0.00	1.19	0	08:11	0.00		

****
Detention Pond Summary
****

Detention Pond ID	Maximum Ponded Volume 1000 ft^3	Maximum Ponded Volume (%)	Time of Max Ponded Volume days	hh:mm	Average Ponded Volume 1000 ft^3	Average Ponded Volume (%)	Maximum Pond Outflow cfs	Maximum Exfiltration Rate cfm	Time of Max. Exfiltration Rate hh:mm:ss	Total Exfiltrated Volume 1000 ft^3
Back of Lot Detention	0.373	0	0	10:04	0.091	0	0.19	0.00	0:00:00	0.000
Main Detention	2.041	108	0	08:42	0.849	45	0.80	0.00	0:00:00	0.000

****
Outfall Loading Summary
****

Fabian Developed Model with Detention

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Total Outflow	96.98	0.46	1.22
System	96.98	0.46	1.22

****
Link Flow Summary
****

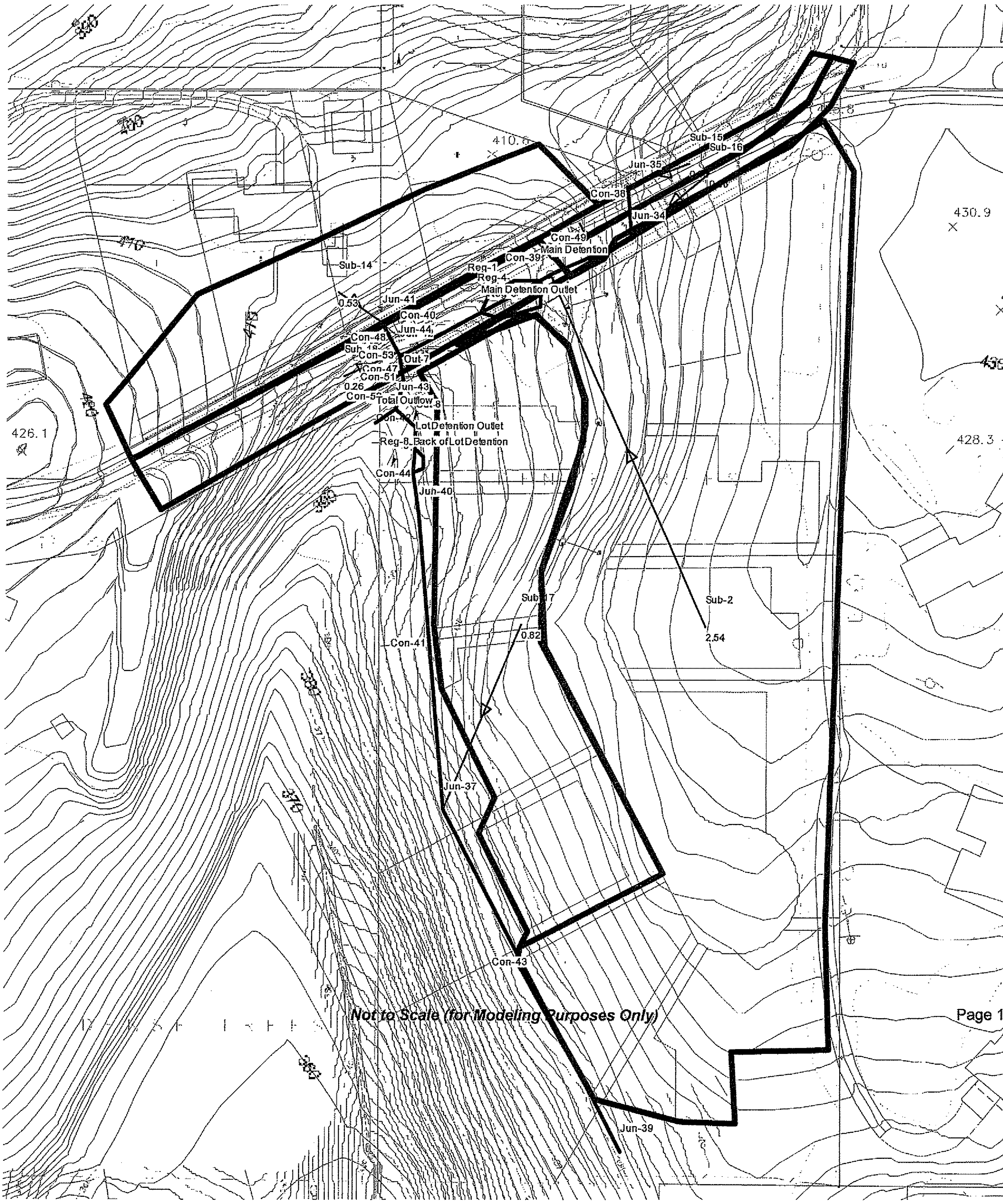
Link ID	Element Type	Time of Peak Flow Occurrence days hh:mm	Maximum Velocity Attained ft/sec	Length Factor	Peak Flow during Analysis cfs	Design Flow Capacity cfs	Ratio of Maximum /Design Flow	Ratio of Maximum Flow Depth	Total Time Surcharged Minutes
Con-38	CONDUIT	0 07:55	3.08	1.00	0.10	31.55	0.00	0.05	0
Con-39	CONDUIT	0 08:11	1.48	1.00	1.19	14.21	0.08	1.00	161
Con-40	CONDUIT	0 08:42	5.11	1.00	0.80	3.01	0.27	0.33	0
Con-41	CONDUIT	0 08:08	3.46	1.00	0.43	9.71	0.04	0.33	0
Con-42	CONDUIT	0 08:34	1.94	1.00	0.19	9.43	0.02	0.10	0
Con-43	CONDUIT	0 00:00	0.00	1.00	0.00	12.88	0.00	0.08	0
Con-44	CONDUIT	0 08:05	0.99	1.00	0.40	56.03	0.01	0.71	0
Con-47	CONDUIT	0 08:33	7.61	1.00	1.04	7.83	0.13	0.30	0
Con-48	CONDUIT	0 08:05	2.01	1.00	0.26	2.04	0.13	0.28	0
Con-49	CONDUIT	0 08:00	2.18	1.00	0.19	31.53	0.01	0.53	0
Con-50	CONDUIT	0 08:42	1.62	1.00	0.19	2.69	0.07	0.29	0
Con-51	CONDUIT	0 08:33	5.74	1.00	1.04	5.37	0.19	0.37	0
Con-52	CONDUIT	0 08:33	6.82	1.00	1.22	5.36	0.23	0.36	0
Con-53	CONDUIT	0 08:00	4.44	1.00	0.55	5.05	0.11	0.28	0
Reg-1	ORIFICE	0 08:42			0.37			1.00	
Reg-2	ORIFICE	0 00:00			0.00			0.00	
Reg-4	ORIFICE	0 08:42			0.22			1.00	
Reg-5	ORIFICE	0 08:42			0.21			1.00	
Reg-8	ORIFICE	0 08:34			0.19			1.00	

****
Highest Flow Instability Indexes
****
All links are stable.

Fabian Developed Model with Detention

```
Analysis begun on:  Wed Nov 19 10:56:25 2008
Analysis ended on:  Wed Nov 19 10:56:33 2008
Total elapsed time: 00:00:08
```

Fabian Developed Model with Detention



354

100-year Storm
Downstream Analysis
StormNET Runoff Reports

Downstream System

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****

```
Flow Units ................ cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. JUN-21-2008 00:00:00
Ending Date ............... JUN-22-2008 00:00:00
Report Time Step .......... 00:05:00
```

****
Element Count
****

```
Number of rain gages ...... 1
Number of subbasins ....... 9
Number of nodes ........... 25
Number of links ........... 24
```

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	100 year storm	CUMULATIVE	0.10

****
Subbasin Summary
****

Subbasin ID	Total Area acres
Sub-1	3.07
Sub-13	2.24
Sub-14	0.96
Sub-15	1.26
Sub-17	11.30
Sub-2	3.34
Sub-4	1.32
Sub-5	1.51

Downstream System

Sub-6	3.15

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-10	JUNCTION	280.00	3.00	0.00	
Jun-12	JUNCTION	234.93	1.50	0.00	
Jun-13	JUNCTION	236.41	1.50	0.00	
Jun-14	JUNCTION	236.54	3.00	0.00	
Jun-15	JUNCTION	328.00	3.00	0.00	
Jun-17	JUNCTION	389.02	6.00	0.00	
Jun-19	JUNCTION	361.00	3.00	0.00	
Jun-2	JUNCTION	398.59	1.00	0.00	
Jun-24	JUNCTION	409.00	1.00	0.00	
Jun-35	JUNCTION	207.16	2.00	0.00	
Jun-38	JUNCTION	212.00	1.50	0.00	
Jun-39	JUNCTION	216.23	1.50	0.00	
Jun-40	JUNCTION	223.93	1.50	0.00	
Jun-41	JUNCTION	228.02	1.50	0.00	
Jun-42	JUNCTION	233.76	1.50	0.00	
Jun-43	JUNCTION	288.44	1.00	0.00	
Jun-44	JUNCTION	203.26	3.00	0.00	
Jun-45	JUNCTION	380.80	1.00	0.00	
Jun-46	JUNCTION	347.36	1.00	0.00	
Jun-47	JUNCTION	325.87	1.00	0.00	
Jun-6	JUNCTION	401.03	1.25	0.00	
Jun-7	JUNCTION	401.10	1.25	0.00	
Jun-8	JUNCTION	408.16	1.00	0.00	
Jun-9	JUNCTION	290.00	3.00	0.00	
Jun-11	OUTFALL	194.73	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Bioswale	Jun-35	Jun-44	CONDUIT	198.0	1.9701	0.1700
Con-10	Jun-14	Jun-13	CONDUIT	30.5	0.4264	0.0110
Con-11	Jun-13	Jun-12	CONDUIT	93.5	1.5831	0.0110
Con-12	Jun-12	Jun-41	CONDUIT	33.9	20.4015	0.0110
Con-13	Jun-10	Jun-14	CONDUIT	275.4	15.7778	0.0320
Con-16	Jun-2	Jun-17	CONDUIT	55.7	17.1721	0.0110
Con-17	Jun-19	Jun-15	CONDUIT	250.1	13.1942	0.0320
Con-2	Jun-8	Jun-6	CONDUIT	57.2	12.4694	0.0110

Con-3	Jun-7	Jun-6	CONDUIT	33.3	0.2100	0.0110
Con-33	Jun-24	Jun-8	CONDUIT	35.2	2.3850	0.0110
Con-38	Jun-38	Jun-35	CONDUIT	149.1	3.2468	0.0110
Con-39	Jun-39	Jun-38	CONDUIT	63.3	6.6793	0.0110
Con-4	Jun-6	Jun-2	CONDUIT	98.9	2.4674	0.0110
Con-40	Jun-40	Jun-38	CONDUIT	103.2	11.5657	0.0110
Con-41	Jun-41	Jun-40	CONDUIT	145.9	2.8039	0.0110
Con-42	Jun-17	Jun-45	CONDUIT	256.4	3.2054	0.0110
Con-43	Jun-43	Jun-42	CONDUIT	396.9	13.7761	0.0110
Con-44	Jun-42	Jun-41	CONDUIT	92.0	6.2385	0.0110
Con-45	Jun-44	Jun-11	CONDUIT	121.9	6.9981	0.0150
Con-46	Jun-45	Jun-46	CONDUIT	168.3	19.8681	0.0110
Con-47	Jun-46	Jun-47	CONDUIT	108.2	19.8669	0.0110
Con-48	Jun-47	Jun-43	CONDUIT	274.1	13.6561	0.0110
Con-8	Jun-9	Jun-10	CONDUIT	67.5	14.8126	0.0110
Con-9	Jun-15	Jun-9	CONDUIT	350.3	10.8466	0.0320

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Bioswale	IRREGULAR	2.00	15.32	1	22.42	1.38	34.09
Con-10	CIRCULAR	1.50	1.50	1	1.77	0.38	8.11
Con-11	CIRCULAR	1.50	1.50	1	1.77	0.38	15.62
Con-12	CIRCULAR	1.50	1.50	1	1.77	0.38	56.07
Con-13	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	258.92
Con-16	CIRCULAR	0.83	0.83	1	0.55	0.21	10.73
Con-17	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	236.77
Con-2	CIRCULAR	0.83	0.83	1	0.55	0.21	9.14
Con-3	CIRCULAR	1.25	1.25	1	1.23	0.31	3.50
Con-33	CIRCULAR	1.00	1.00	1	0.79	0.25	6.50
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	22.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	32.08
Con-4	CIRCULAR	0.83	0.83	1	0.55	0.21	4.07
Con-40	CIRCULAR	1.50	1.50	1	1.77	0.38	42.22
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	20.79
Con-42	CIRCULAR	0.67	0.67	1	0.35	0.17	2.56
Con-43	CIRCULAR	0.67	0.67	1	0.35	0.17	5.30
Con-44	CIRCULAR	1.50	1.50	1	1.77	0.38	31.01
Con-45	CIRCULAR	1.50	1.50	1	1.77	0.38	24.08
Con-46	CIRCULAR	0.67	0.67	1	0.35	0.17	6.37
Con-47	CIRCULAR	0.67	0.67	1	0.35	0.17	6.37
Con-48	CIRCULAR	0.67	0.67	1	0.35	0.17	5.28
Con-8	CIRCULAR	1.25	1.25	1	1.23	0.31	29.38
Con-9	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	214.68

Downstream System

```
****************
Transect Summary
****************

Transect XS-1
Area:
          0.0110     0.0225     0.0347     0.0474     0.0607
          0.0745     0.0889     0.1039     0.1194     0.1351
          0.1512     0.1675     0.1842     0.2011     0.2183
          0.2358     0.2535     0.2716     0.2899     0.3085
          0.3275     0.3466     0.3661     0.3859     0.4059
          0.4263     0.4469     0.4678     0.4890     0.5105
          0.5322     0.5543     0.5766     0.5993     0.6222
          0.6454     0.6688     0.6926     0.7166     0.7410
          0.7656     0.7905     0.8157     0.8412     0.8669
          0.8930     0.9193     0.9459     0.9728     1.0000
Hrad:
          0.0281     0.0548     0.0803     0.1048     0.1284
          0.1512     0.1732     0.1947     0.2182     0.2422
          0.2657     0.2888     0.3115     0.3339     0.3559
          0.3776     0.3990     0.4201     0.4410     0.4615
          0.4819     0.5019     0.5218     0.5414     0.5609
          0.5801     0.5992     0.6181     0.6368     0.6553
          0.6737     0.6919     0.7100     0.7279     0.7458
          0.7634     0.7810     0.7985     0.8158     0.8330
          0.8501     0.8671     0.8841     0.9009     0.9176
          0.9343     0.9508     0.9673     0.9837     1.0000
Width:
          0.4125     0.4334     0.4543     0.4752     0.4961
          0.5170     0.5379     0.5587     0.5718     0.5822
          0.5927     0.6031     0.6136     0.6240     0.6345
          0.6449     0.6554     0.6658     0.6762     0.6867
          0.6971     0.7076     0.7180     0.7285     0.7389
          0.7493     0.7598     0.7702     0.7807     0.7911
          0.8016     0.8120     0.8225     0.8329     0.8433
          0.8538     0.8642     0.8747     0.8851     0.8956
          0.9060     0.9164     0.9269     0.9373     0.9478
          0.9582     0.9687     0.9791     0.9896     1.0000

**************************        Volume         Depth
Runoff Quantity Continuity       acre-ft        inches
**************************     ---------       -------
Total Precipitation ......        11.357         4.841
Surface Runoff ...........         0.431         0.006
Continuity Error (%) .....        -0.000

**************************        Volume        Volume
Flow Routing Continuity          acre-ft      Mgallons
```

Downstream System

*************************	---------	---------
External Inflow	0.000	0.000
External Outflow	4.281	1.395
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.021	0.007
Continuity Error (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin Sub-1

Soil/Surface Description	Area (acres)	Soil Group	CN
Woods & grass combination, Fair	3.07	B	65.00
Composite Area & Weighted CN	3.07		65.00

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Pasture, grassland, or range, Fair	2.24	B	69.00
Composite Area & Weighted CN	2.24		69.00

Subbasin Sub-14

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.96	-	73.00
Composite Area & Weighted CN	0.96		73.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.26	-	98.00
Composite Area & Weighted CN	1.26		98.00

Subbasin Sub-17

Downstream System

Soil/Surface Description	Area (acres)	Soil Group	CN
-	11.30	-	65.00
Composite Area & Weighted CN	11.30		65.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.34	-	73.00
Composite Area & Weighted CN	3.34		73.00

Subbasin Sub-4

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.32	-	70.00
Composite Area & Weighted CN	1.32		70.00

Subbasin Sub-5

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.51	-	70.00
Composite Area & Weighted CN	1.51		70.00

Subbasin Sub-6

Soil/Surface Description	Area (acres)	Soil Group	CN
Woods & grass combination, Fair	3.15	B	65.00
Composite Area & Weighted CN	3.15		65.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

$$Tc = (0.007 * ((n * Lf)^{0.8})) / ((P^{0.5}) * (Sf^{0.4}))$$

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft²)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin Sub-1

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	45.00	0.00	0.00

Downstream System

2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.71	0.00	0.00
Computed Flow Time (minutes):	0.59	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	260.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft²):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.17	0.00	0.00

Total TOC (minutes):	5.00

Subbasin Sub-13

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.15	0.00	0.00
Computed Flow Time (minutes):	1.09	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	120.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	0.32	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	1.00	0.00	0.00
Cross Section Area (ft^2):	1.00	0.00	0.00
Wetted Perimeter (ft):	0.11	0.00	0.00
Velocity (ft/sec):	59.01	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	25.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	7.98	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00

Downstream System

	Subarea A	Subarea B	Subarea C
Slope (%):	5.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	3.61	0.00	0.00
Computed Flow Time (minutes):	1.85	0.00	0.00
Total TOC (minutes):	9.83		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.10	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.38	0.00	0.00
Computed Flow Time (minutes):	13.32	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	800.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	2.61	0.00	0.00
Total TOC (minutes):	15.94		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	12.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	0.30	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	1.11	0.00	0.00
Computed Flow Time (minutes):	1.50	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	475.00	0.00	0.00
Slope (%):	0.30	0.00	0.00
Cross Section Area (ft^2):	0.13	0.00	0.00
Wetted Perimeter (ft):	2.00	0.00	0.00
Velocity (ft/sec):	1.17	0.00	0.00
Computed Flow Time (minutes):	6.78	0.00	0.00
Total TOC (minutes):	21.04		

Subbasin Sub-4

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	68.00	0.00	0.00
Slope (%):	30.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.49	0.00	0.00
Computed Flow Time (minutes):	0.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	164.00	0.00	0.00

Downstream System

Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.11	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-5

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	45.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.71	0.00	0.00
Computed Flow Time (minutes):	0.59	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.13	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-6

Downstream System

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	80.00	0.00	0.00
Slope (%):	60.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	2.03	0.00	0.00
Computed Flow Time (minutes):	0.66	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	330.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.21	0.00	0.00
Total TOC (minutes):	5.00		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-1	4.860	1.561	0.920	65.000	0	00:05:00
Sub-13	4.860	1.856	0.880	69.000	0	00:05:00
Sub-14	4.860	2.171	0.470	73.000	0	00:08:26
Sub-15	4.860	4.623	1.450	98.000	0	00:09:49
Sub-17	4.860	1.561	3.120	65.000	0	00:15:56
Sub-2	4.860	2.171	1.500	73.000	0	00:21:02
Sub-4	4.860	1.933	0.550	70.000	0	00:05:00

Downstream System

Sub-5	4.860	1.933	0.630	70.000	0	00:05:00
Sub-6	4.860	1.561	0.950	65.000	0	00:05:00
Averages / Totals	4.860	1.852	10.05			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-10	0.16	0.33	280.33	0	08:04	0	0	0:00:00
Jun-12	0.19	0.35	235.28	0	08:05	0	0	0:00:00
Jun-13	0.26	0.52	236.93	0	08:03	0	0	0:00:00
Jun-14	0.37	0.75	237.29	0	08:04	0	0	0:00:00
Jun-15	0.10	0.21	328.21	0	08:00	0	0	0:00:00
Jun-17	0.23	0.52	389.54	0	08:10	0	0	0:00:00
Jun-19	0.06	0.13	361.13	0	08:00	0	0	0:00:00
Jun-2	0.12	0.24	398.83	0	08:10	0	0	0:00:00
Jun-24	0.00	0.00	409.00	0	00:00	0	0	0:00:00
Jun-35	0.65	1.26	208.42	0	08:07	0	0	0:00:00
Jun-38	0.35	0.70	212.70	0	08:06	0	0	0:00:00
Jun-39	0.10	0.22	216.45	0	08:04	0	0	0:00:00
Jun-40	0.24	0.45	224.38	0	08:06	0	0	0:00:00
Jun-41	0.39	0.79	228.81	0	08:06	0	0	0:00:00
Jun-42	0.13	0.25	234.01	0	08:11	0	0	0:00:00
Jun-43	0.14	0.29	288.73	0	08:11	0	0	0:00:00
Jun-44	0.37	0.74	204.00	0	08:08	0	0	0:00:00
Jun-45	0.13	0.26	381.06	0	08:10	0	0	0:00:00
Jun-46	0.13	0.26	347.62	0	08:10	0	0	0:00:00
Jun-47	0.14	0.29	326.16	0	08:10	0	0	0:00:00
Jun-6	0.20	0.41	401.44	0	08:10	0	0	0:00:00
Jun-7	0.32	0.63	401.73	0	08:10	0	0	0:00:00
Jun-8	0.00	0.00	408.16	0	00:00	0	0	0:00:00
Jun-9	0.12	0.22	290.22	0	08:01	0	0	0:00:00
Jun-11	0.35	0.67	195.40	0	08:08	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow	Maximum Total Inflow	Time of Peak Inflow Occurrence	Maximum Flooding Overflow	Time of Peak Flooding Occurrence

		cfs	cfs	days	hh:mm	cfs	days	hh:mm
Jun-10	JUNCTION	0.91	2.96	0	08:04	0.00		
Jun-12	JUNCTION	3.11	5.98	0	08:05	0.00		
Jun-13	JUNCTION	0.00	2.97	0	08:05	0.00		
Jun-14	JUNCTION	0.00	2.96	0	08:04	0.00		
Jun-15	JUNCTION	0.63	1.16	0	08:00	0.00		
Jun-17	JUNCTION	0.00	1.95	0	08:10	0.00		
Jun-19	JUNCTION	0.54	0.54	0	08:00	0.00		
Jun-2	JUNCTION	0.47	1.95	0	08:10	0.00		
Jun-24	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-35	JUNCTION	0.87	9.99	0	08:06	0.00		
Jun-38	JUNCTION	0.00	9.28	0	08:06	0.00		
Jun-39	JUNCTION	1.45	1.45	0	08:04	0.00		
Jun-40	JUNCTION	0.00	7.84	0	08:06	0.00		
Jun-41	JUNCTION	0.00	7.84	0	08:06	0.00		
Jun-42	JUNCTION	0.00	1.94	0	08:11	0.00		
Jun-43	JUNCTION	0.00	1.94	0	08:10	0.00		
Jun-44	JUNCTION	0.00	9.97	0	08:07	0.00		
Jun-45	JUNCTION	0.00	1.94	0	08:10	0.00		
Jun-46	JUNCTION	0.00	1.94	0	08:10	0.00		
Jun-47	JUNCTION	0.00	1.94	0	08:10	0.00		
Jun-6	JUNCTION	0.00	1.50	0	08:10	0.00		
Jun-7	JUNCTION	1.50	1.50	0	08:10	0.00		
Jun-8	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-9	JUNCTION	0.94	2.07	0	08:01	0.00		
Jun-11	OUTFALL	0.00	9.95	0	08:08	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Jun-11	99.28	3.10	9.95
System	99.28	3.10	9.95

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence	Maximum Velocity Attained	Length Factor	Peak Flow during Analysis	Design Flow Capacity	Ratio of Maximum /Design	Ratio of Maximum Flow	Total Time Surcharged

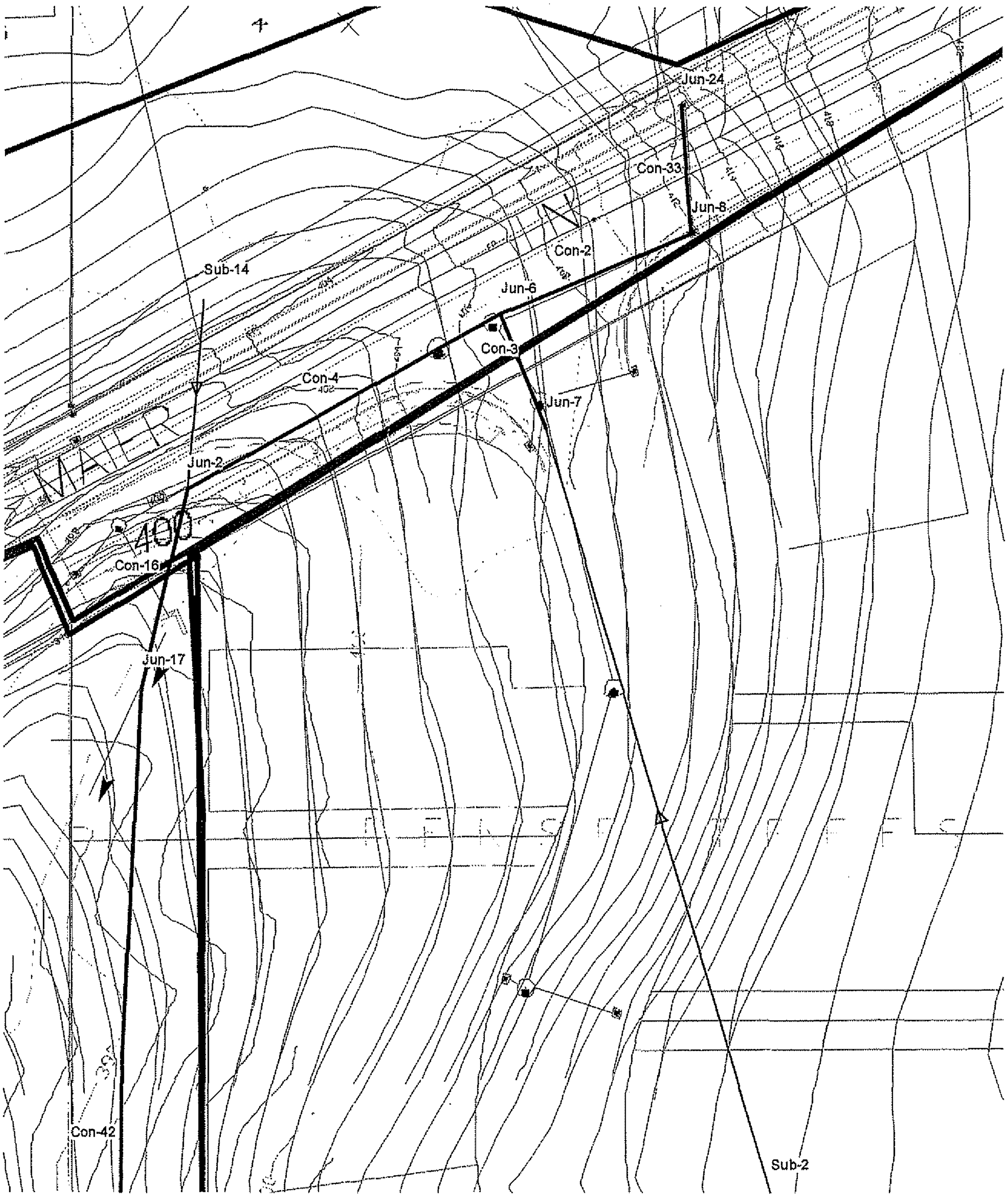
Downstream System

		days	hh:mm	ft/sec		cfs	cfs	Flow	Depth	Minutes
Bioswale	CHANNEL	0	08:07	1.10	1.00	9.97	34.09	0.29	0.50	0
Con-10	CONDUIT	0	08:05	4.16	1.00	2.97	8.11	0.37	0.42	0
Con-11	CONDUIT	0	08:05	6.99	1.00	2.97	15.62	0.19	0.29	0
Con-12	CONDUIT	0	08:05	9.75	1.00	5.98	56.07	0.11	0.38	0
Con-13	CONDUIT	0	08:04	3.58	1.00	2.96	258.92	0.01	0.18	0
Con-16	CONDUIT	0	08:10	8.12	1.00	1.95	10.73	0.18	0.45	0
Con-17	CONDUIT	0	08:00	2.75	1.00	0.54	236.77	0.00	0.06	0
Con-2	CONDUIT	0	00:00	0.00	1.00	0.00	9.14	0.00	0.25	0
Con-3	CONDUIT	0	08:10	3.10	1.00	1.50	3.50	0.43	0.42	0
Con-33	CONDUIT	0	00:00	0.00	1.00	0.00	6.50	0.00	0.00	0
Con-38	CONDUIT	0	08:06	7.57	1.00	9.28	22.37	0.41	0.65	0
Con-39	CONDUIT	0	08:05	5.17	1.00	1.45	32.08	0.05	0.31	0
Con-4	CONDUIT	0	08:10	7.57	1.00	1.50	4.07	0.37	0.39	0
Con-40	CONDUIT	0	08:06	12.59	1.00	7.84	42.22	0.19	0.38	0
Con-41	CONDUIT	0	08:06	11.47	1.00	7.84	20.79	0.38	0.41	0
Con-42	CONDUIT	0	08:10	9.22	1.00	1.94	2.56	0.76	0.58	0
Con-43	CONDUIT	0	08:11	14.48	1.00	1.94	5.30	0.37	0.41	0
Con-44	CONDUIT	0	08:11	3.78	1.00	1.94	31.01	0.06	0.35	0
Con-45	CONDUIT	0	08:08	12.15	1.00	9.95	24.08	0.41	0.47	0
Con-46	CONDUIT	0	08:10	15.36	1.00	1.94	6.37	0.31	0.39	0
Con-47	CONDUIT	0	08:10	14.44	1.00	1.94	6.37	0.31	0.41	0
Con-48	CONDUIT	0	08:10	13.47	1.00	1.94	5.28	0.37	0.43	0
Con-8	CONDUIT	0	08:01	10.31	1.00	2.07	29.38	0.07	0.22	0
Con-9	CONDUIT	0	08:00	4.36	1.00	1.16	214.68	0.01	0.07	0

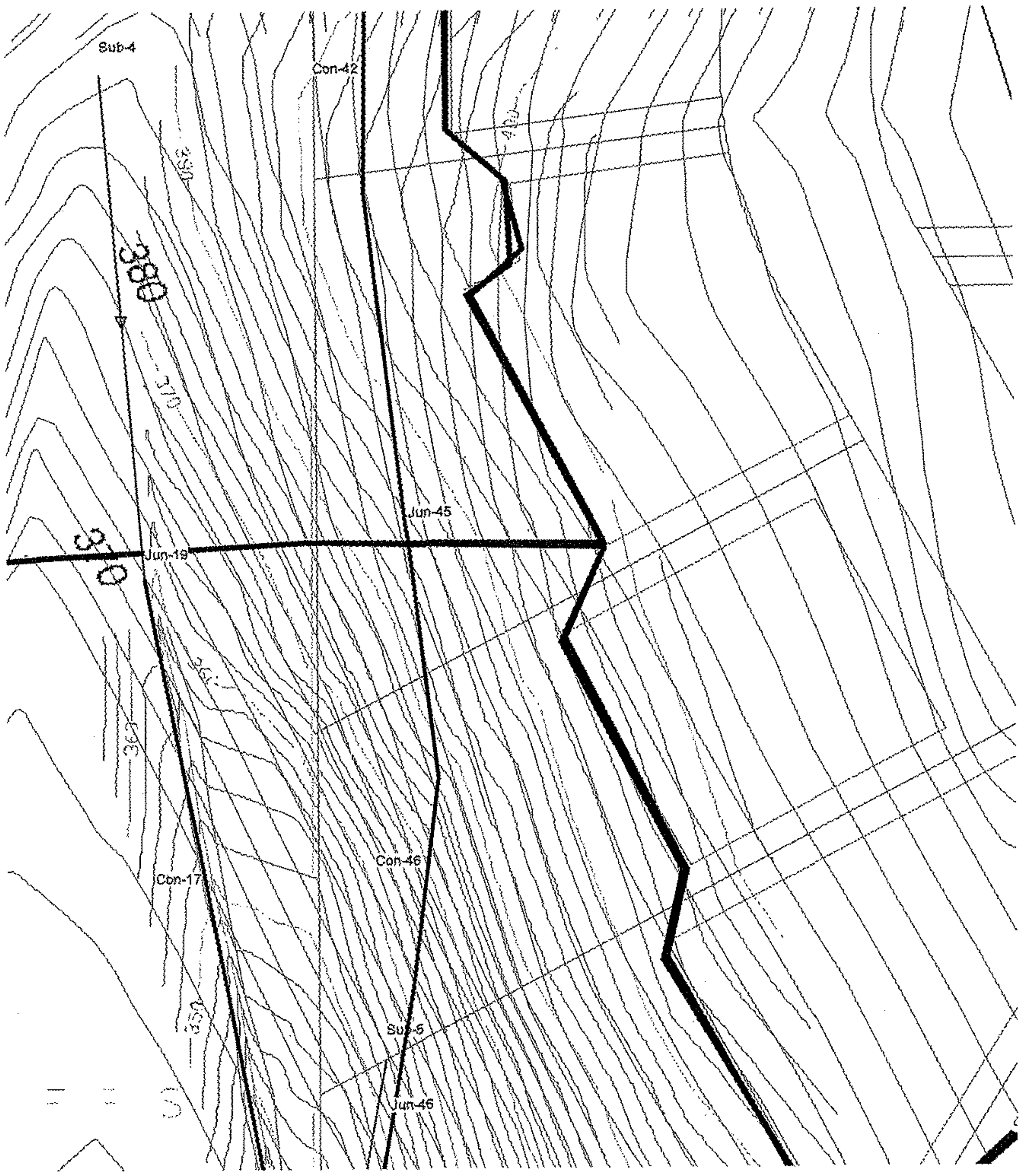
```
*******************************
Highest Flow Instability Indexes
*******************************
Link Con-39 (2)
Link Con-38 (2)


Analysis begun on:  Wed Nov 19 11:01:48 2008
Analysis ended on:  Wed Nov 19 11:01:51 2008
Total elapsed time: 00:00:03
```

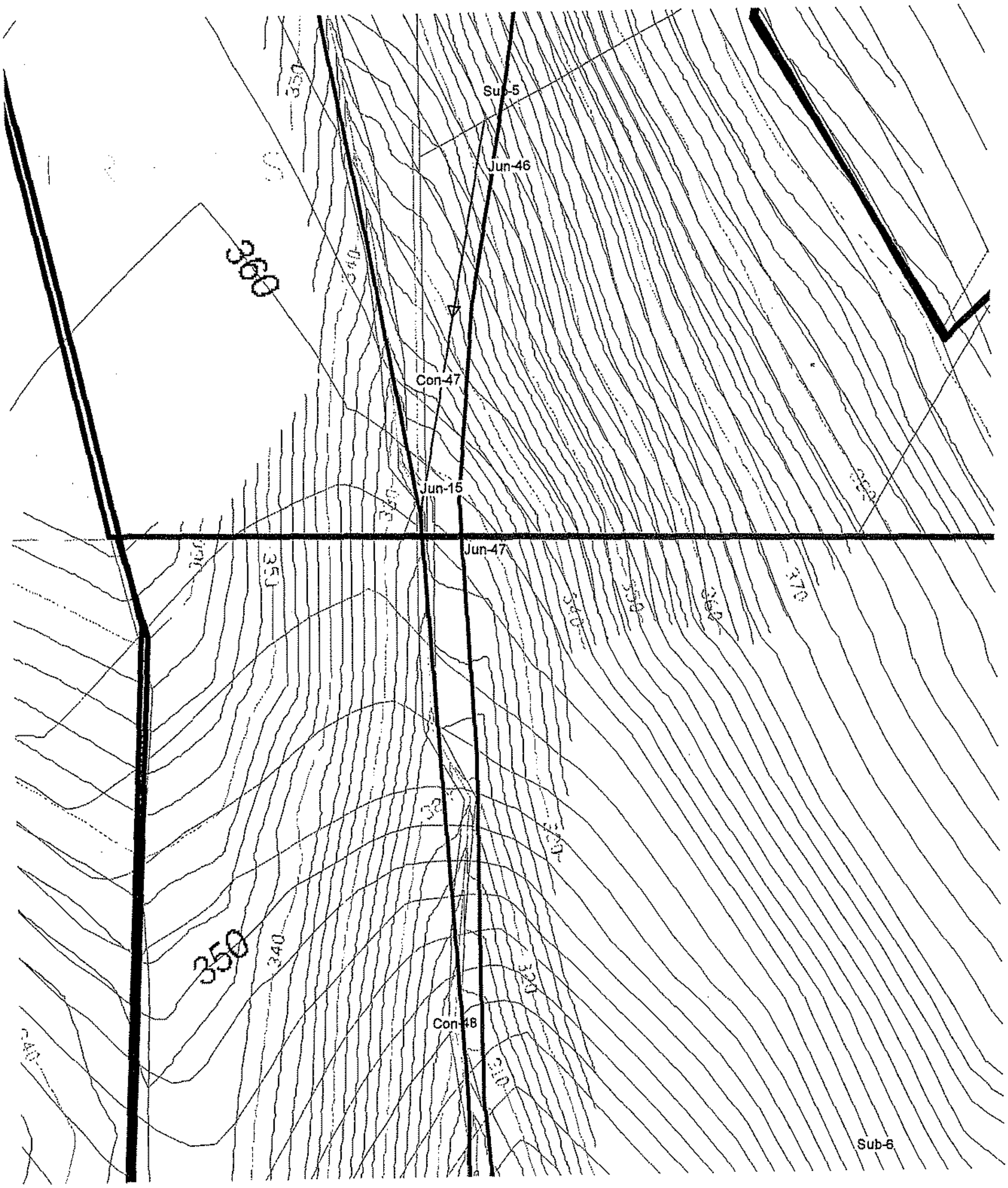
Downstream System



Downstream System

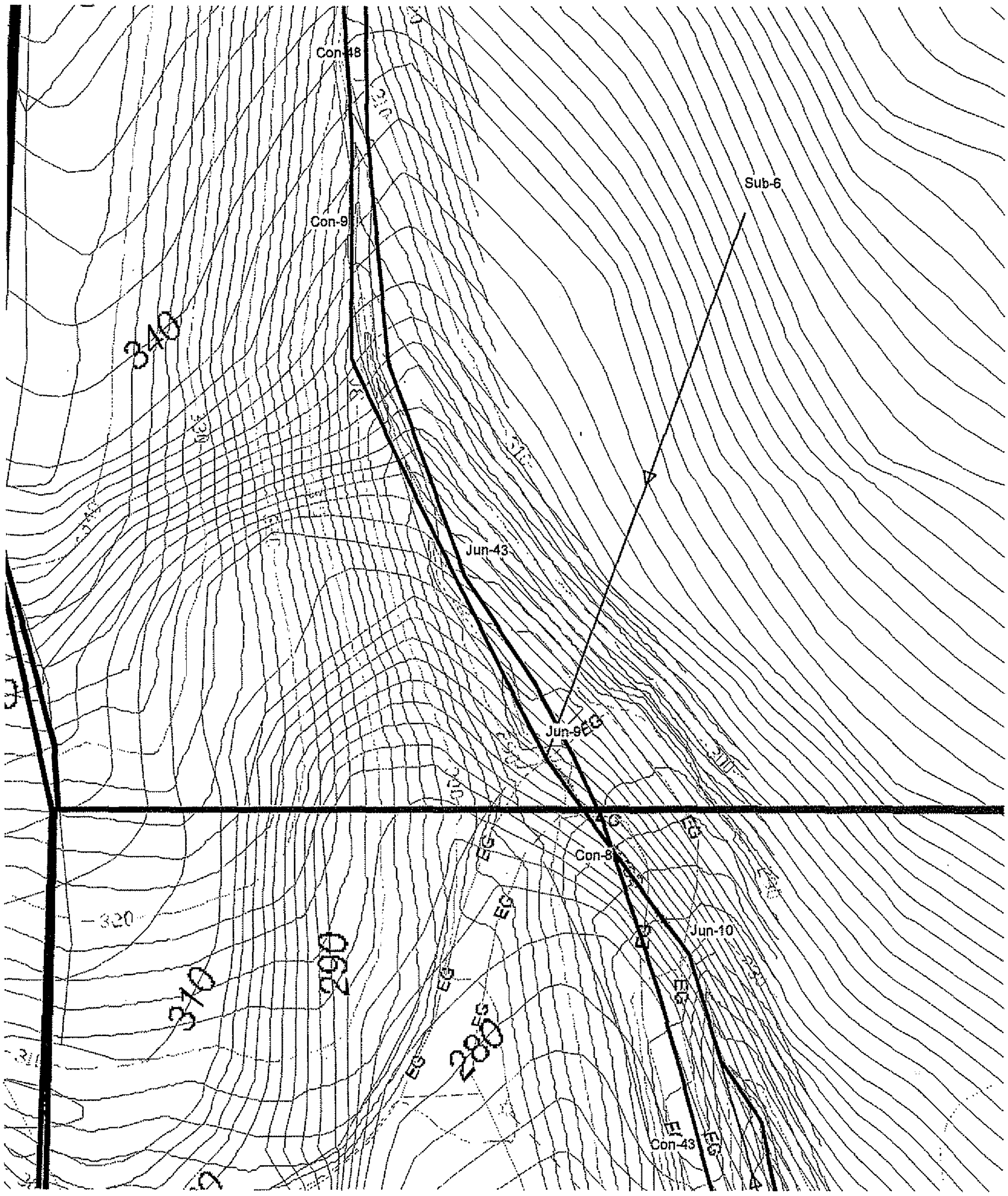


Downstream System



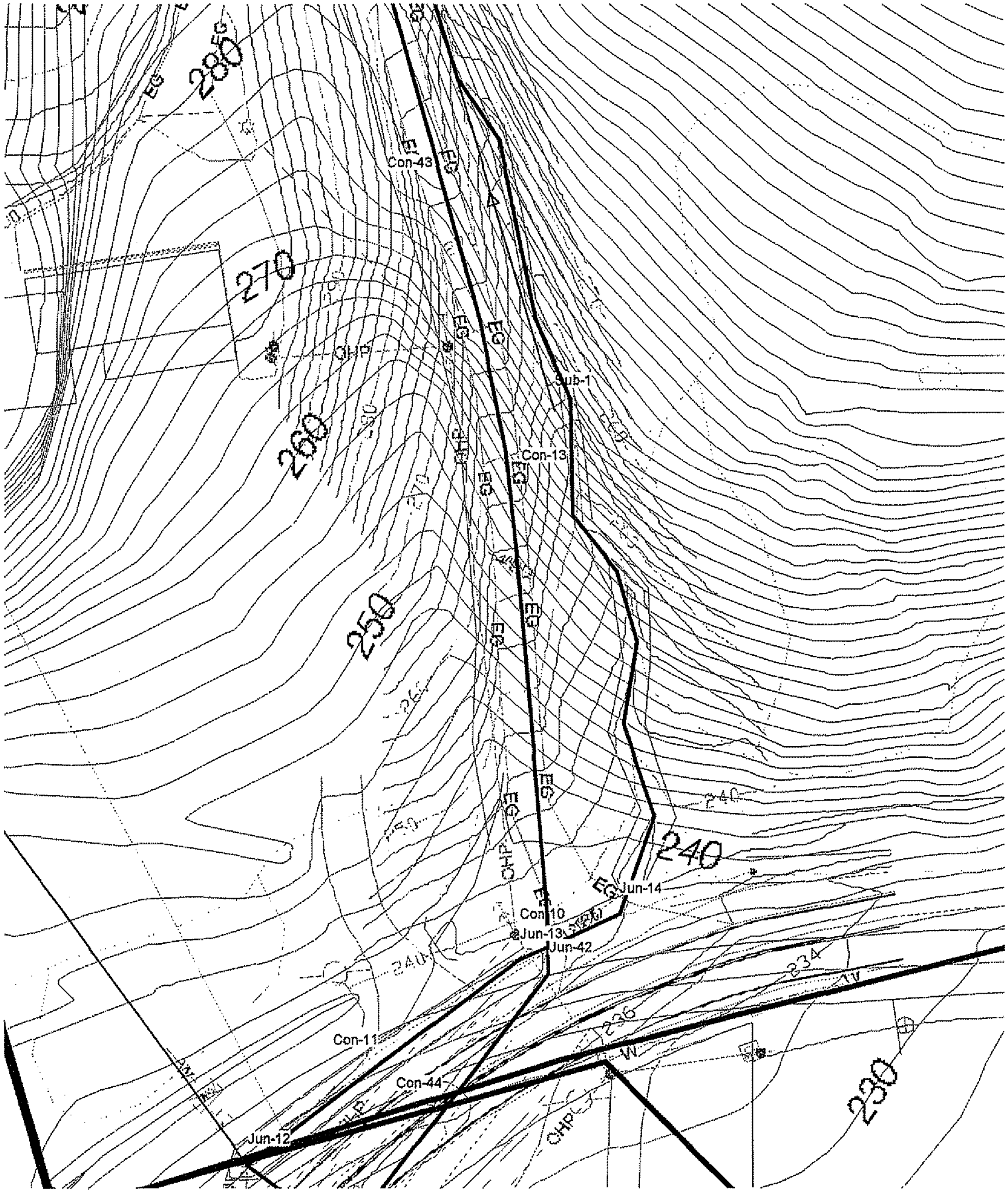
Element Labels (Enlarged)

Downstream System



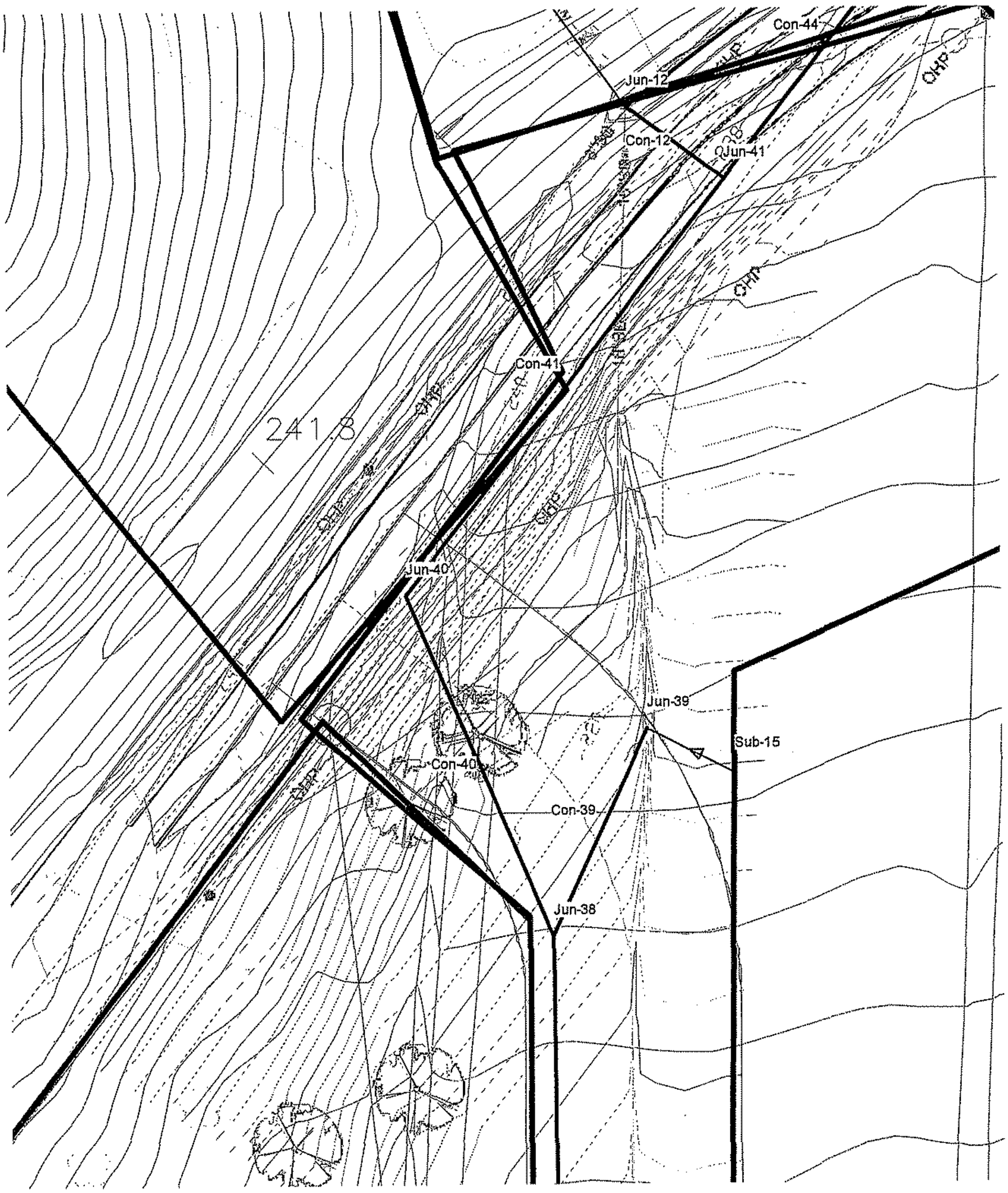
Element Labels (Enlarged)

Downstream System



Element Labels (Enlarged)

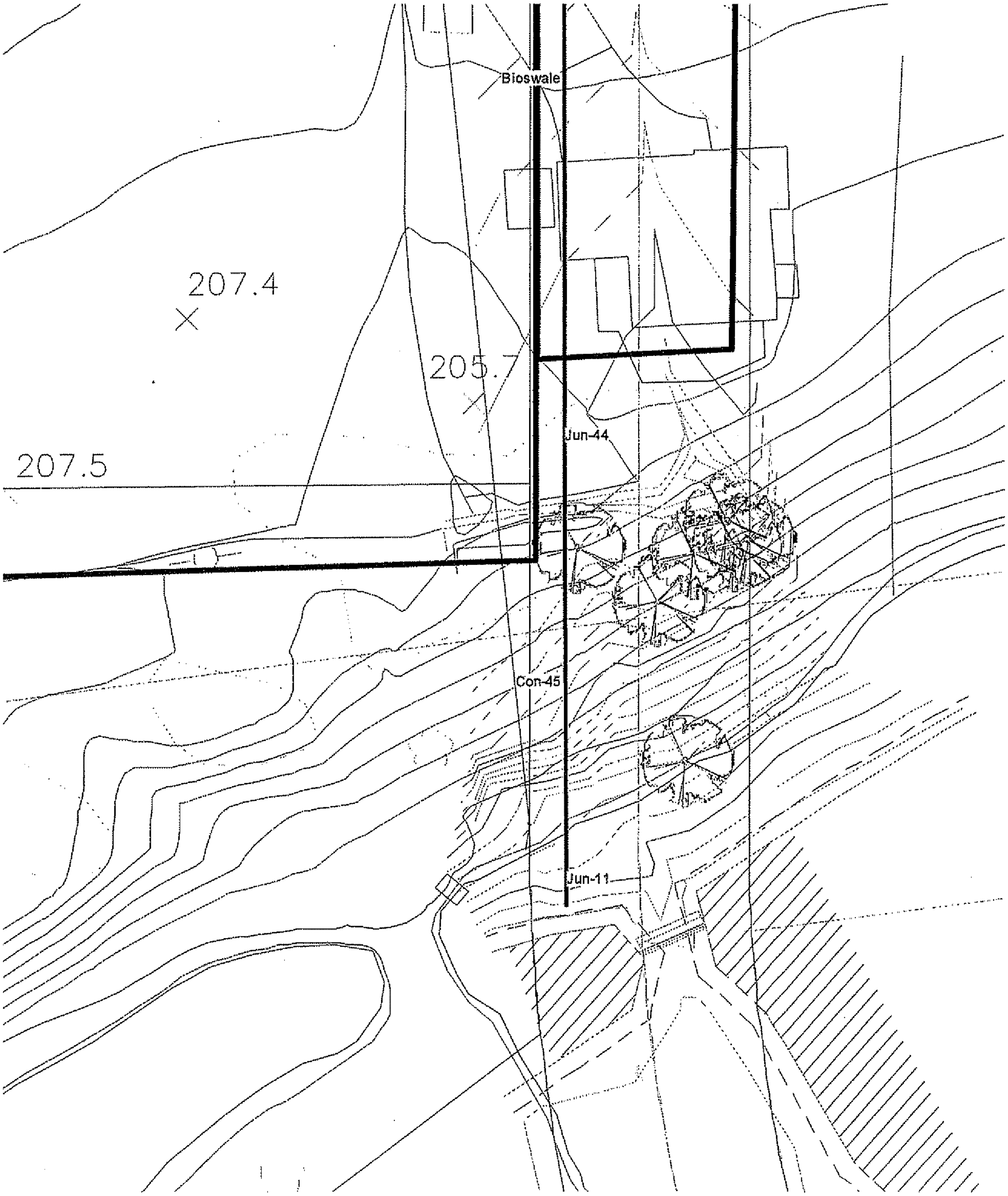
Downstream System



Downstream System

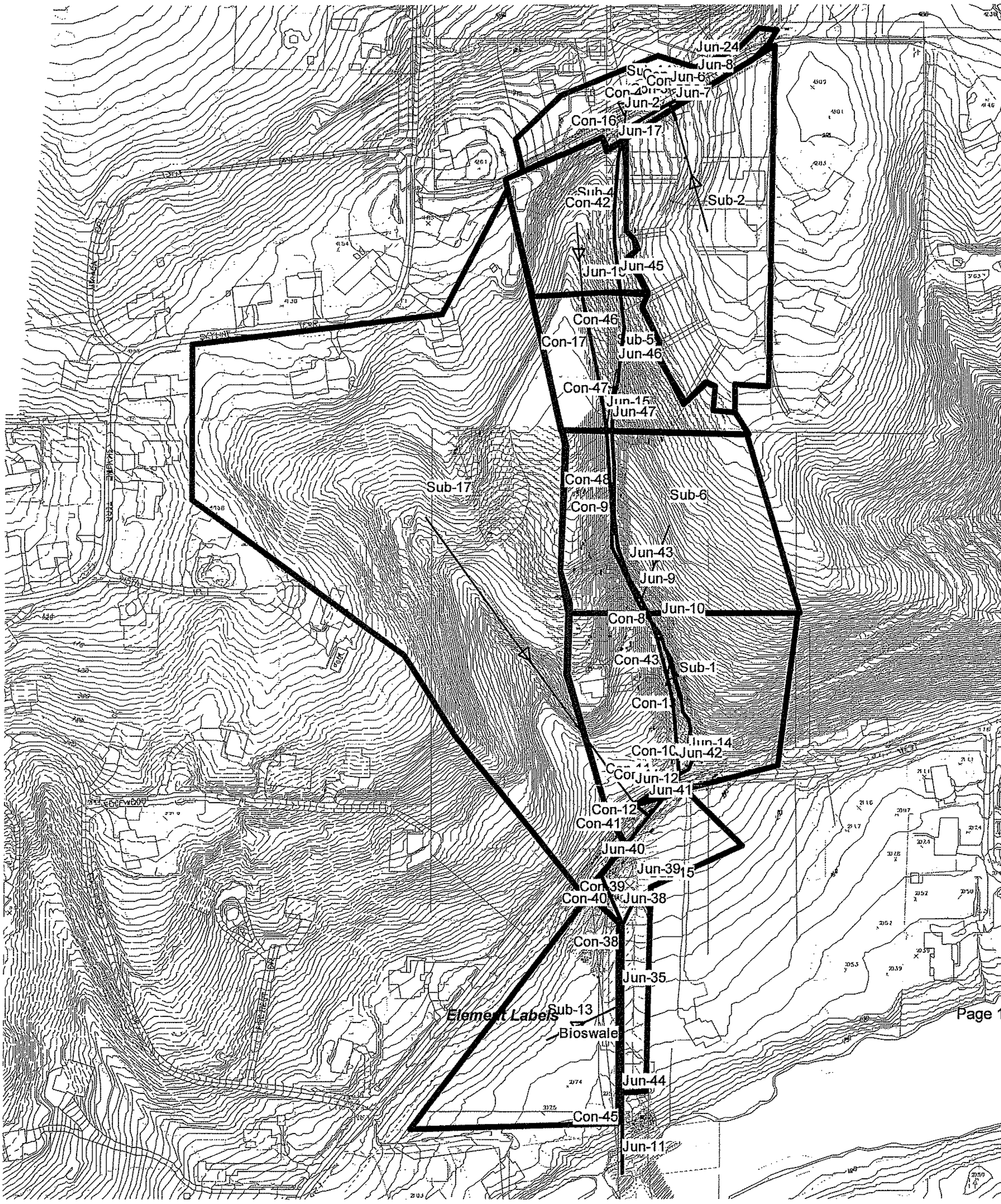
Element Labels (Enlarged)

Downstream System



Element Labels (Enlarged)

Downstream System



Page 1

K&D

Fabian Estates
06-83 E
Sheet 13a MH #2 Hydraulic Jump Calc

MH #2 w/ 18" out

Assume worst case scenerio where water is slowed to 0 ft/sec in manhole before discharging into 18" pipe

Normal Depth of 18" = 5.04" = 0.42'

$V_1 = 14.17$ ft/sec
$V_2 = 5.17$ ft/sec

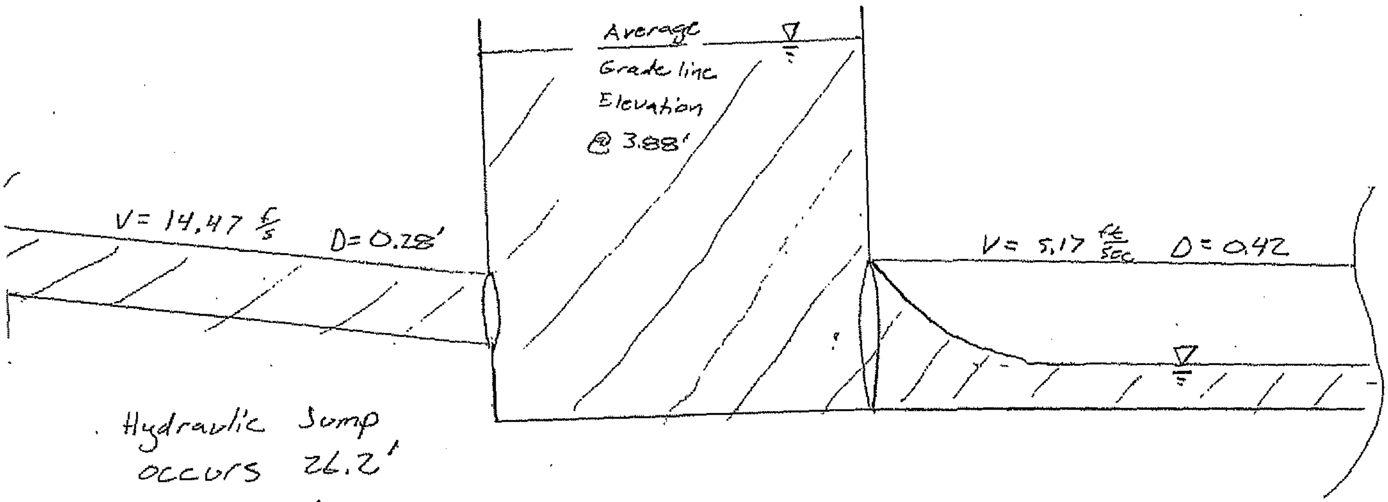
Entrance Loss $= \frac{V^2}{2g} = \frac{(14.47 \frac{ft}{sec})^2}{2 \cdot 32.2 \frac{ft}{sec^2}} = 3.25'$

Exit loss $= 0.5 \frac{V^2}{2g} = 0.5 \cdot \frac{5.17^2}{2 \cdot 32.2} = 0.21$

Total loss = 3.46

Total Depth = 0.42' + 3.46 = 3.88'

MH Depth = 4.18'
Water will not exceed the limits of the MH But it is recommend that a bolt down lid be installed



Hydraulic Jump
occurs 26.2'
from manhole
in 8" pipe

WATER QUALITY REPORT
FABIAN ESTATES SUBDIVISION
ALBANY, OR 97321

RECEIVED
NOV 20 2008

REGISTERED PROFESSIONAL ENGINEER
17,612
OREGON
Jan. 17, 1995
DANIEL K. WATSON
RENEWAL DATE: 6/30/10

Prepared By: Nolan Nelson, E.I.T

Checked By: Daniel Watson, P.E.
K&D Engineering,
P.O. Box 725
Albany, OR 97321

Client: Gary Davenport
Fabian Estates, LLC

Project No.: 06-63-E

Date: November 19, 2008

Contents:

PROJECT DESCRIPTION

The proposed subdivision Fabian Estates is approximately 4.6 acres on the south side of Maier Lane. The tax lot is TL 3300 of Map 10-04-36 in the City of Albany, Benton County, Oregon. This study was done to determine the storm water quality flows to be treated in order to minimize impacts downstream of the project site.

TREATMENT

The flows from the public streets associated with Fabian Estates will be routed through a Stormceptor (or Downstream Defender) pollution control manhole. The flows will then be routed by culverts to a bioswale before discharge into West Thornton Lake.

METHODS

Peak flows were calculated using the SCS Urban Hydrograph Method as described in the NRCS Engineering Handbook. This method uses equations based on land use, slope, and soil conditions. Calculations for flow were performed using the Stormnet software, swale capacities were determined using Manning's Equation for open channel flow.

INCLUDED AREAS

The areas included in this report are the Fabian Estates subdivision site, the areas down stream of Fabian estates and the areas surrounding the access road down to West Thornton Lake.

WATER QUALITY FLOWS

Water Quality flows and times of concentration were determined using the Stormnet software based on the guidelines set forth by the City of Portland. A time of concentration was developed for each area using the NRCS TR-55. Flows were calculated using a 1.5 inch 24 hour Type 1A storm which is 75% of the 2 year storm. The curve numbers for the SCS method were based on the NRCS Engineering Handbook. The curve numbers ranged from 65 for the undeveloped areas and 98 for impervious areas. Individual hydrographs for sub basins' discharges are attached to this report. The maximum water quality flow is 0.41 cfs. The storm water will ultimately discharge into the West Thornton Lake.

DESIGN

This design is intended for pollution control of runoff leaving the Fabian Estates Subdivision. The runoff enters the storm drain system in Fabian Estates and flows through a pollution control manhole before entering into a vegetated swale and eventually is discharged into West Thornton Lake.

The swale was designed by City of Portland 2008 Standards under the performance approach. The City of Portland requirements are as follows:

The swale width and profile shall be designed to convey runoff from the pollution reduction design storm intensity at:

- Maximum design depth of 0.33 feet.
- Maximum design velocity of 0.9 feet per second for treatment.
- Minimum hydraulic residence time (time for Q_{design} to pass through the swale) of 9 minutes.
- Minimum longitudinal slope of 0.5 percent, maximum slope of 5 percent. For slopes greater than 5 percent, check dams shall be used (one 6-inch high dam every 10 feet).
- Designed using a Manning "n" value of 0.25.
- 4:1 (or flatter) side slopes in the treatment area (up to 0.33 feet of depth).
- Minimum length of 100 feet.
- A minimum of 1 foot of freeboard above the water surface shall be provided for facilities not protected by high-flow storm diversion devices.
- Swales without high-flow diversion devices shall be sized to safely convey the 25-year storm event
- Velocity through the facility shall not exceed 3 feet per second (fps) during the high-flow events
- The swale shall incorporate a flow-spreading device at the inlet. In swales with a bottom width greater than 6 feet, a flow spreader shall be installed at least every 50 feet.
- To minimize flow channelization, the swale bottom shall be smooth, with uniform longitudinal slope,
- a minimum bottom width of 4 feet.
- Maximum bottom width shall be 8 feet.

The swale was designed at a slope of 2% with a bottom width of 4 feet. The swale can convey up to 0.6 cfs and still maintain City of Portland requirements for treatment. The maximum water quality flow will be 0.41 cfs with a maximum velocity of 0.34 feet per second. Because the minimum residence time is 9 minutes this swale has a minimum length of 185 feet. The actual swale will be 195 feet in length. Freeboard was designed to be 1.5 feet above the treatment area. High Flow velocities for a 25 year storm are approximately 0.72 feet per second at a depth of 1.1 feet. (See Minimum Grassy Swale Design spreadsheet). To be conservative an analysis was also done using an "n" value of 0.17 and a 100 year storm event. High Flows for a 100 year storm are approximately 9.97 cfs at a depth of 1.2 feet and a velocity of 1.11 feet per second

INSTALLATION AND MAINTENANCE

Installation will be the responsibility of the developer. The swale will be installed during construction of the public facilities. All the swales should be constructed under the City of Portland's standards for a grassy swale. As called out by the Washington County Clean Water Services Standards, plantings for the bottom of the swale shall be either:

Mix 1

75-89% Tall or meadow Fescue
10-15% Seaside Creeping Bentgrass or Colonial Bentgrass
5-10% Redtop
or,

Mix 2

60-70% Tall Fesue
10-15% Seaside Creeping Bentgrass or Colonial Bentgrass
10-15% Meadow Foxtail
6-10% Alsike Clover
1-5% Marshfield Big Trefoil
1-6% Redtop

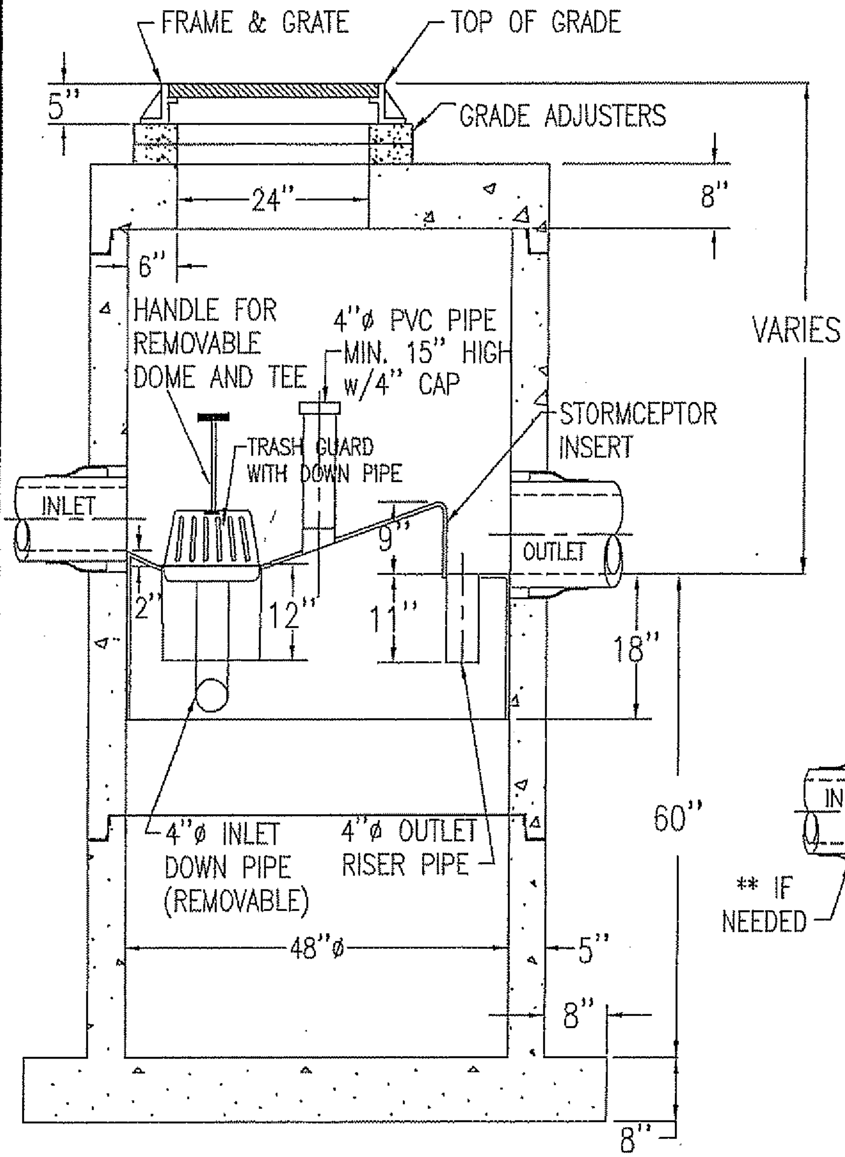
Swales will be maintained long term by the City of Albany.

Storm	Depth	Base	L side slope	R side slope	top width	xsection area	perimeter	R ^ 2/3	Q	n value	bottom slope	V	Minimum Design L
	Minimum Grassy Swale Designs												
Water Quality	0.33	4	4	4	6.64	1.7556	6.72125	0.408618	0.603027	0.25	0.020000	0.343487	185.483
25-yr/High Flow	1.09	4	2	2	9.68	7.9572	10.12007	0.851892	5.698211	0.25	0.020000	0.716107	

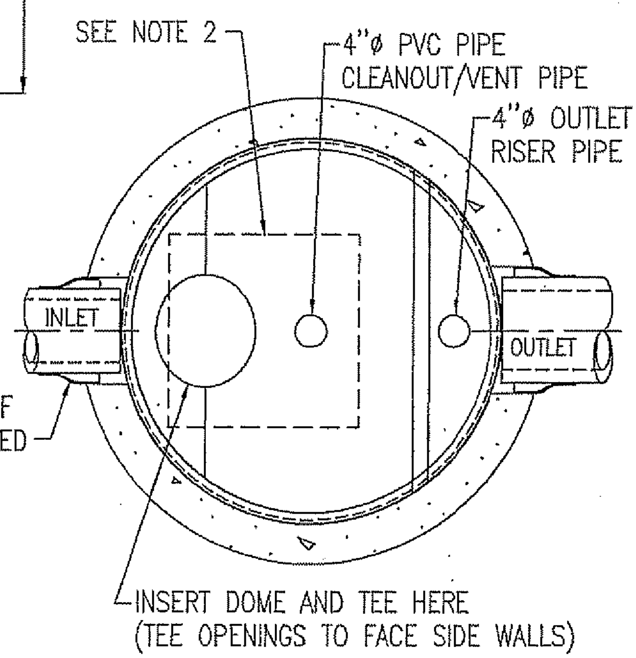
For a conservative estimate of the flow velocity the Mannings N value was reduced from 0.25 as specified by the City of Portlands Stormwater Management Manual to 0.17 as suggested by the Institue of Transportation Studies: Streets and Highway Drainage Manual Volume 2 for water depths greater than 0.7 feet and velocities under 2 FPS.

25-yr	0.89	4	2	2	8.88	6.1012	9.225646	0.759065	5.725048	0.17	0.020000	0.938348	
100-yr	1.195	4	2	2	10.1	8.99565	10.58965	0.896948	9.974355	0.17	0.020000	1.108798	

CSR	Hydro Conduit	DR. BY: N. BALDWIN
		CK. BY:
	STC 450i Precast Concrete Stormceptor (450 US Gallon Capacity)	DATE: MARCH 20, 2001
	PROJECT:	SCALE: N.T.S.
	LOCATION:	DWG.#



SECTION THRU CHAMBER



SECTION THRU PLAN VIEW

NOTE :

1. THE USE OF FLEXIBLE CONNECTIONS IS RECOMMENDED AT THE OUTLET WHERE APPLICABLE.
2. THE COVER SHOULD BE POSITIONED OVER THE 4"ø CLEANOUT/VENT PIPE AND THE 4"ø INLET DOWN PIPE.
3. THE STORMCEPTOR SYSTEM IS PROTECTED BY ONE OR MORE OFF THE FOLLOWING U.S. PATENTS: #4985148, #5498331, #5725760, #5753115, #5849181.
4. CONTRACTOR TO PROVIDE CRANE TO SET UNIT (HEAVIEST SECTION WEIGHS 5000 LB)

Downstream System

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****

Flow Units .... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration...... SCS TR-55
Link Routing Method .... Hydrodynamic
Pond Exfiltration.......... None
Starting Date JUN-21-2008 00:00:00
Ending Date JUN-22-2008 00:00:00
Report Time Step 00:05:00

****
Element Count
****

Number of rain gages 1
Number of subbasins 9
Number of nodes 25
Number of links 24

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	Water Quality Storm	CUMULATIVE	0.10

****
Subbasin Summary
****

Subbasin ID	Total Area acres
Sub-1	3.07
Sub-13	2.24
Sub-14	0.96
Sub-15	1.26
Sub-17	11.30
Sub-2	3.34
Sub-4	1.32
Sub-5	1.51

389

Downstream System

Sub-6 3.15

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-10	JUNCTION	280.00	3.00	0.00	
Jun-12	JUNCTION	234.93	1.50	0.00	
Jun-13	JUNCTION	236.41	1.50	0.00	
Jun-14	JUNCTION	236.54	3.00	0.00	
Jun-15	JUNCTION	328.00	3.00	0.00	
Jun-17	JUNCTION	389.02	6.00	0.00	
Jun-19	JUNCTION	361.00	3.00	0.00	
Jun-2	JUNCTION	398.59	1.00	0.00	
Jun-24	JUNCTION	409.00	1.00	0.00	
Jun-35	JUNCTION	207.16	2.00	0.00	
Jun-38	JUNCTION	212.00	1.50	0.00	
Jun-39	JUNCTION	216.23	1.50	0.00	
Jun-40	JUNCTION	223.93	1.50	0.00	
Jun-41	JUNCTION	228.02	1.50	0.00	
Jun-42	JUNCTION	233.76	1.50	0.00	
Jun-43	JUNCTION	288.44	1.00	0.00	
Jun-44	JUNCTION	203.26	3.00	0.00	
Jun-45	JUNCTION	380.80	1.00	0.00	
Jun-46	JUNCTION	347.36	1.00	0.00	
Jun-47	JUNCTION	325.87	1.00	0.00	
Jun-6	JUNCTION	401.03	1.25	0.00	
Jun-7	JUNCTION	401.10	1.25	0.00	
Jun-8	JUNCTION	408.16	1.00	0.00	
Jun-9	JUNCTION	290.00	3.00	0.00	
Jun-11	OUTFALL	194.73	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Bioswale	Jun-35	Jun-44	CONDUIT	198.0	1.9701	0.1700
Con-10	Jun-14	Jun-13	CONDUIT	30.5	0.4264	0.0110
Con-11	Jun-13	Jun-12	CONDUIT	93.5	1.5831	0.0110
Con-12	Jun-12	Jun-41	CONDUIT	33.9	20.4015	0.0110
Con-13	Jun-10	Jun-14	CONDUIT	275.4	15.7778	0.0320
Con-16	Jun-2	Jun-17	CONDUIT	55.7	17.1721	0.0110
Con-17	Jun-19	Jun-15	CONDUIT	250.1	13.1942	0.0320
Con-2	Jun-8	Jun-6	CONDUIT	57.2	12.4694	0.0110

Downstream System

Con-3	Jun-7	Jun-6	CONDUIT	33.3	0.2100	0.0110
Con-33	Jun-24	Jun-8	CONDUIT	35.2	2.3850	0.0110
Con-38	Jun-38	Jun-35	CONDUIT	149.1	3.2468	0.0110
Con-39	Jun-39	Jun-38	CONDUIT	63.3	6.6793	0.0110
Con-4	Jun-6	Jun-2	CONDUIT	98.9	2.4674	0.0110
Con-40	Jun-40	Jun-38	CONDUIT	103.2	11.5657	0.0110
Con-41	Jun-41	Jun-40	CONDUIT	145.9	2.8039	0.0110
Con-42	Jun-17	Jun-45	CONDUIT	256.4	3.2054	0.0110
Con-43	Jun-43	Jun-42	CONDUIT	396.9	13.7761	0.0110
Con-44	Jun-42	Jun-41	CONDUIT	92.0	6.2385	0.0110
Con-45	Jun-44	Jun-11	CONDUIT	121.9	6.9981	0.0150
Con-46	Jun-45	Jun-46	CONDUIT	168.3	19.8681	0.0110
Con-47	Jun-46	Jun-47	CONDUIT	108.2	19.8669	0.0110
Con-48	Jun-47	Jun-43	CONDUIT	274.1	13.6561	0.0110
Con-8	Jun-9	Jun-10	CONDUIT	67.5	14.8126	0.0110
Con-9	Jun-15	Jun-9	CONDUIT	350.3	10.8466	0.0320

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Bioswale	IRREGULAR	2.00	15.32	1	22.42	1.38	34.09
Con-10	CIRCULAR	1.50	1.50	1	1.77	0.38	8.11
Con-11	CIRCULAR	1.50	1.50	1	1.77	0.38	15.62
Con-12	CIRCULAR	1.50	1.50	1	1.77	0.38	56.07
Con-13	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	258.92
Con-16	CIRCULAR	0.83	0.83	1	0.55	0.21	10.73
Con-17	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	236.77
Con-2	CIRCULAR	0.83	0.83	1	0.55	0.21	9.14
Con-3	CIRCULAR	1.25	1.25	1	1.23	0.31	3.50
Con-33	CIRCULAR	1.00	1.00	1	0.79	0.25	6.50
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	22.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	32.08
Con-4	CIRCULAR	0.83	0.83	1	0.55	0.21	4.07
Con-40	CIRCULAR	1.50	1.50	1	1.77	0.38	42.22
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	20.79
Con-42	CIRCULAR	0.67	0.67	1	0.35	0.17	2.56
Con-43	CIRCULAR	0.67	0.67	1	0.35	0.17	5.30
Con-44	CIRCULAR	1.50	1.50	1	1.77	0.38	31.01
Con-45	CIRCULAR	1.50	1.50	1	1.77	0.38	24.08
Con-46	CIRCULAR	0.67	0.67	1	0.35	0.17	6.37
Con-47	CIRCULAR	0.67	0.67	1	0.35	0.17	6.37
Con-48	CIRCULAR	0.67	0.67	1	0.35	0.17	5.28
Con-8	CIRCULAR	1.25	1.25	1	1.23	0.31	29.38
Con-9	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	214.68

Downstream System

```
****************
Transect Summary
****************

Transect XS-1
Area:
          0.0110     0.0225     0.0347     0.0474     0.0607
          0.0745     0.0889     0.1039     0.1194     0.1351
          0.1512     0.1675     0.1842     0.2011     0.2183
          0.2358     0.2535     0.2716     0.2899     0.3085
          0.3275     0.3466     0.3661     0.3859     0.4059
          0.4263     0.4469     0.4678     0.4890     0.5105
          0.5322     0.5543     0.5766     0.5993     0.6222
          0.6454     0.6688     0.6926     0.7166     0.7410
          0.7656     0.7905     0.8157     0.8412     0.8669
          0.8930     0.9193     0.9459     0.9728     1.0000
Hrad:
          0.0281     0.0548     0.0803     0.1048     0.1284
          0.1512     0.1732     0.1947     0.2182     0.2422
          0.2657     0.2888     0.3115     0.3339     0.3559
          0.3776     0.3990     0.4201     0.4410     0.4615
          0.4819     0.5019     0.5218     0.5414     0.5609
          0.5801     0.5992     0.6181     0.6368     0.6553
          0.6737     0.6919     0.7100     0.7279     0.7458
          0.7634     0.7810     0.7985     0.8158     0.8330
          0.8501     0.8671     0.8841     0.9009     0.9176
          0.9343     0.9508     0.9673     0.9837     1.0000
Width:
          0.4125     0.4334     0.4543     0.4752     0.4961
          0.5170     0.5379     0.5587     0.5718     0.5822
          0.5927     0.6031     0.6136     0.6240     0.6345
          0.6449     0.6554     0.6658     0.6762     0.6867
          0.6971     0.7076     0.7180     0.7285     0.7389
          0.7493     0.7598     0.7702     0.7807     0.7911
          0.8016     0.8120     0.8225     0.8329     0.8433
          0.8538     0.8642     0.8747     0.8851     0.8956
          0.9060     0.9164     0.9269     0.9373     0.9478
          0.9582     0.9687     0.9791     0.9896     1.0000


**************************        Volume         Depth
Runoff Quantity Continuity       acre-ft        inches
**************************     ---------       -------
Total Precipitation ......         3.505         1.494
Surface Runoff ...........         0.026         0.000
Continuity Error (%) .....        -0.000


**************************        Volume        Volume
Flow Routing Continuity          acre-ft      Mgallons
```

```
*************************      ---------      ---------
External Inflow .........          0.000          0.000
External Outflow ........          0.249          0.081
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.005          0.002
Continuity Error (%) .....         0.003


*****************************************
Composite Curve Number Computations Report
*****************************************

--------------
Subbasin Sub-1
--------------
                                                  Area          Soil
Soil/Surface Description                        (acres)         Group          CN
-----------------------------------------------------------------------------------
Woods & grass combination, Fair                   3.07            B         65.00
Composite Area & Weighted CN                      3.07                      65.00

--------------
Subbasin Sub-13
--------------
                                                  Area          Soil
Soil/Surface Description                        (acres)         Group          CN
-----------------------------------------------------------------------------------
Pasture, grassland, or range, Fair                2.24            B         69.00
Composite Area & Weighted CN                      2.24                      69.00

--------------
Subbasin Sub-14
--------------
                                                  Area          Soil
Soil/Surface Description                        (acres)         Group          CN
-----------------------------------------------------------------------------------
-                                                 0.96            -         73.00
Composite Area & Weighted CN                      0.96                      73.00

--------------
Subbasin Sub-15
--------------
                                                  Area          Soil
Soil/Surface Description                        (acres)         Group          CN
-----------------------------------------------------------------------------------
-                                                 1.26            -         98.00
Composite Area & Weighted CN                      1.26                      98.00

--------------
Subbasin Sub-17
--------------
```

393

Downstream System

Soil/Surface Description	Area (acres)	Soil Group	CN
-	11.30	-	65.00
Composite Area & Weighted CN	11.30		65.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.34	-	73.00
Composite Area & Weighted CN	3.34		73.00

Subbasin Sub-4

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.32	-	70.00
Composite Area & Weighted CN	1.32		70.00

Subbasin Sub-5

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.51	-	70.00
Composite Area & Weighted CN	1.51		70.00

Subbasin Sub-6

Soil/Surface Description	Area (acres)	Soil Group	CN
Woods & grass combination, Fair	3.15	B	65.00
Composite Area & Weighted CN	3.15		65.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

$$Tc = (0.007 * ((n * Lf)^{0.8})) / ((P^{0.5}) * (Sf^{0.4}))$$

```
        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
        n  = Manning's Roughness

--------------
Subbasin Sub-1
--------------

Sheet Flow Computations
-----------------------
```

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	45.00	0.00	0.00

Downstream System

2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.71	0.00	0.00
Computed Flow Time (minutes):	0.59	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	260.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft²):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.17	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-13

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.15	0.00	0.00
Computed Flow Time (minutes):	1.09	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	120.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	0.32	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	1.00	0.00	0.00
Cross Section Area (ft^2):	1.00	0.00	0.00
Wetted Perimeter (ft):	0.11	0.00	0.00
Velocity (ft/sec):	59.01	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	25.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	7.98	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00

Downstream System

	Subarea A	Subarea B	Subarea C
Slope (%):	5.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	3.61	0.00	0.00
Computed Flow Time (minutes):	1.85	0.00	0.00
Total TOC (minutes):	9.83		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.10	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.38	0.00	0.00
Computed Flow Time (minutes):	13.32	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	800.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	2.61	0.00	0.00
Total TOC (minutes):	15.94		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	12.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	0.30	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	1.11	0.00	0.00
Computed Flow Time (minutes):	1.50	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	475.00	0.00	0.00
Slope (%):	0.30	0.00	0.00
Cross Section Area (ft^2):	0.13	0.00	0.00
Wetted Perimeter (ft):	2.00	0.00	0.00
Velocity (ft/sec):	1.17	0.00	0.00
Computed Flow Time (minutes):	6.78	0.00	0.00
Total TOC (minutes):	21.04		

Subbasin Sub-4

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	68.00	0.00	0.00
Slope (%):	30.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.49	0.00	0.00
Computed Flow Time (minutes):	0.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	164.00	0.00	0.00

399

Downstream System

Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.11	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-5

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	45.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.71	0.00	0.00
Computed Flow Time (minutes):	0.59	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.13	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-6

Downstream System

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	80.00	0.00	0.00
Slope (%):	60.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	2.03	0.00	0.00
Computed Flow Time (minutes):	0.66	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	330.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft²):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.21	0.00	0.00

Total TOC (minutes): 5.00

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-1	1.500	0.031	0.010	65.000	0	00:05:00
Sub-13	1.500	0.071	0.020	69.000	0	00:05:00
Sub-14	1.500	0.130	0.010	73.000	0	00:08:26
Sub-15	1.500	1.280	0.420	98.000	0	00:09:49
Sub-17	1.500	0.031	0.050	65.000	0	00:15:56
Sub-2	1.500	0.130	0.030	73.000	0	00:21:02
Sub-4	1.500	0.084	0.010	70.000	0	00:05:00

Downstream System

Sub-5	1.500	0.084	0.010	70.000	0	00:05:00
Sub-6	1.500	0.031	0.010	65.000	0	00:05:00
Averages / Totals	1.500	0.111	0.42			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-10	0.01	0.03	280.03	0	21:40	0	0	0:00:00
Jun-12	0.02	0.05	234.98	0	22:15	0	0	0:00:00
Jun-13	0.03	0.06	236.47	0	22:09	0	0	0:00:00
Jun-14	0.04	0.09	236.63	0	22:10	0	0	0:00:00
Jun-15	0.01	0.02	328.02	0	20:22	0	0	0:00:00
Jun-17	0.04	0.07	389.09	0	17:11	0	0	0:00:00
Jun-19	0.01	0.01	361.01	0	18:12	0	0	0:00:00
Jun-2	0.02	0.04	398.63	0	17:07	0	0	0:00:00
Jun-24	0.00	0.00	409.00	0	00:00	0	0	0:00:00
Jun-35	0.09	0.21	207.37	0	08:02	0	0	0:00:00
Jun-38	0.07	0.14	212.14	0	07:55	0	0	0:00:00
Jun-39	0.05	0.12	216.35	0	08:03	0	0	0:00:00
Jun-40	0.03	0.06	223.99	0	22:16	0	0	0:00:00
Jun-41	0.04	0.09	228.11	0	21:38	0	0	0:00:00
Jun-42	0.02	0.04	233.80	0	17:13	0	0	0:00:00
Jun-43	0.02	0.04	288.48	0	17:13	0	0	0:00:00
Jun-44	0.07	0.14	203.40	0	08:05	0	0	0:00:00
Jun-45	0.02	0.04	380.84	0	17:13	0	0	0:00:00
Jun-46	0.02	0.04	347.40	0	17:11	0	0	0:00:00
Jun-47	0.02	0.04	325.91	0	17:10	0	0	0:00:00
Jun-6	0.03	0.06	401.09	0	17:07	0	0	0:00:00
Jun-7	0.06	0.10	401.20	0	17:05	0	0	0:00:00
Jun-8	0.00	0.00	408.16	0	00:00	0	0	0:00:00
Jun-9	0.02	0.03	290.03	0	21:37	0	0	0:00:00
Jun-11	0.07	0.14	194.87	0	08:05	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow	Maximum Total Inflow	Time of Peak Inflow Occurrence	Maximum Flooding Overflow	Time of Peak Flooding Occurrence

		cfs	cfs	days	hh:mm	cfs	days	hh:mm
Jun-10	JUNCTION	0.01	0.05	0	21:38	0.00		
Jun-12	JUNCTION	0.05	0.09	0	22:15	0.00		
Jun-13	JUNCTION	0.00	0.05	0	22:16	0.00		
Jun-14	JUNCTION	0.00	0.05	0	21:40	0.00		
Jun-15	JUNCTION	0.01	0.02	0	20:20	0.00		
Jun-17	JUNCTION	0.00	0.04	0	17:07	0.00		
Jun-19	JUNCTION	0.01	0.01	0	17:35	0.00		
Jun-2	JUNCTION	0.01	0.04	0	17:07	0.00		
Jun-24	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-35	JUNCTION	0.01	0.42	0	07:57	0.00		
Jun-38	JUNCTION	0.00	0.42	0	07:53	0.00		
Jun-39	JUNCTION	0.42	0.42	0	08:00	0.00		
Jun-40	JUNCTION	0.00	0.13	0	21:38	0.00		
Jun-41	JUNCTION	0.00	0.13	0	21:38	0.00		
Jun-42	JUNCTION	0.00	0.04	0	17:13	0.00		
Jun-43	JUNCTION	0.00	0.04	0	17:12	0.00		
Jun-44	JUNCTION	0.00	0.41	0	08:03	0.00		
Jun-45	JUNCTION	0.00	0.04	0	17:11	0.00		
Jun-46	JUNCTION	0.00	0.04	0	17:12	0.00		
Jun-47	JUNCTION	0.00	0.04	0	17:12	0.00		
Jun-6	JUNCTION	0.00	0.03	0	17:06	0.00		
Jun-7	JUNCTION	0.03	0.03	0	17:05	0.00		
Jun-8	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-9	JUNCTION	0.01	0.03	0	21:25	0.00		
Jun-11	OUTFALL	0.00	0.41	0	08:05	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Jun-11	90.49	0.14	0.41
System	90.49	0.14	0.41

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence	Maximum Velocity Attained	Length Factor	Peak Flow during Analysis	Design Flow Capacity	Ratio of Maximum /Design	Ratio of Maximum Flow	Total Time Surcharged

404

Downstream System

		days	hh:mm	ft/sec		cfs	cfs	Flow	Depth	Minutes
Bioswale	CHANNEL	0	08:03	0.36	1.00	0.41	34.09	0.01	0.09	0
Con-10	CONDUIT	0	22:16	1.35	1.00	0.05	8.11	0.01	0.05	0
Con-11	CONDUIT	0	22:11	2.25	1.00	0.05	15.62	0.00	0.04	0
Con-12	CONDUIT	0	22:15	3.15	1.00	0.09	56.07	0.00	0.05	0
Con-13	CONDUIT	0	21:40	0.75	1.00	0.05	258.92	0.00	0.02	0
Con-16	CONDUIT	0	17:07	3.09	1.00	0.04	10.73	0.00	0.06	0
Con-17	CONDUIT	0	18:12	0.64	1.00	0.01	236.77	0.00	0.01	0
Con-2	CONDUIT	0	00:00	0.00	1.00	0.00	9.14	0.00	0.03	0
Con-3	CONDUIT	0	17:06	1.02	1.00	0.03	3.50	0.01	0.06	0
Con-33	CONDUIT	0	00:00	0.00	1.00	0.00	6.50	0.00	0.00	0
Con-38	CONDUIT	0	07:57	3.95	1.00	0.42	22.37	0.02	0.12	0
Con-39	CONDUIT	0	07:53	5.57	1.00	0.42	32.08	0.01	0.09	0
Con-4	CONDUIT	0	17:07	2.68	1.00	0.03	4.07	0.01	0.06	0
Con-40	CONDUIT	0	21:39	3.80	1.00	0.13	42.22	0.00	0.05	0
Con-41	CONDUIT	0	21:38	3.86	1.00	0.13	20.79	0.01	0.05	0
Con-42	CONDUIT	0	17:11	3.42	1.00	0.04	2.56	0.02	0.08	0
Con-43	CONDUIT	0	17:13	4.64	1.00	0.04	5.30	0.01	0.06	0
Con-44	CONDUIT	0	17:14	2.17	1.00	0.04	31.01	0.00	0.04	0
Con-45	CONDUIT	0	08:05	5.05	1.00	0.41	24.08	0.02	0.09	0
Con-46	CONDUIT	0	17:12	5.22	1.00	0.04	6.37	0.01	0.06	0
Con-47	CONDUIT	0	17:12	4.89	1.00	0.04	6.37	0.01	0.06	0
Con-48	CONDUIT	0	17:12	4.57	1.00	0.04	5.28	0.01	0.06	0
Con-8	CONDUIT	0	21:38	4.33	1.00	0.03	29.38	0.00	0.02	0
Con-9	CONDUIT	0	20:22	0.80	1.00	0.02	214.68	0.00	0.01	0

```
********************************
Highest Flow Instability Indexes
********************************
Link Con-39 (12)
Link Con-38 (10)


Analysis begun on:  Wed Nov 19 11:16:55 2008
Analysis ended on:  Wed Nov 19 11:16:56 2008
Total elapsed time: 00:00:01
```

Downstream System

```
BOSS International StormNET® - Version 4.11.0 (Build 13753)
-------------------------------------------------------------


****************
Analysis Options
****************
Flow Units ............... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration...... SCS TR-55
Link Routing Method ....... Hydrodynamic
Pond Exfiltration.......... None
Starting Date ............. JUN-21-2008 00:00:00
Ending Date ............... JUN-22-2008 00:00:00
Report Time Step .......... 00:05:00


*************
Element Count
*************
Number of rain gages ...... 1
Number of subbasins ....... 9
Number of nodes ........... 25
Number of links ........... 24


****************
Raingage Summary
****************
Gage                Data                Data        Interval
ID                  Source              Type           hours
------------------------------------------------------------
Gage-1              25 year storm       CUMULATIVE      0.10


****************
Subbasin Summary
****************
Subbasin                 Total
                          Area
ID                       acres
------------------------------
Sub-1                     3.07
Sub-13                    2.24
Sub-14                    0.96
Sub-15                    1.26
Sub-17                   11.30
Sub-2                     3.34
Sub-4                     1.32
Sub-5                     1.51
```

405

Downstream System

Sub-6 3.15

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-10	JUNCTION	280.00	3.00	0.00	
Jun-12	JUNCTION	234.93	1.50	0.00	
Jun-13	JUNCTION	236.41	1.50	0.00	
Jun-14	JUNCTION	236.54	3.00	0.00	
Jun-15	JUNCTION	328.00	3.00	0.00	
Jun-17	JUNCTION	389.02	6.00	0.00	
Jun-19	JUNCTION	361.00	3.00	0.00	
Jun-2	JUNCTION	398.59	1.00	0.00	
Jun-24	JUNCTION	409.00	1.00	0.00	
Jun-35	JUNCTION	207.16	2.00	0.00	
Jun-38	JUNCTION	212.00	1.50	0.00	
Jun-39	JUNCTION	216.23	1.50	0.00	
Jun-40	JUNCTION	223.93	1.50	0.00	
Jun-41	JUNCTION	228.02	1.50	0.00	
Jun-42	JUNCTION	233.76	1.50	0.00	
Jun-43	JUNCTION	288.44	1.00	0.00	
Jun-44	JUNCTION	203.26	3.00	0.00	
Jun-45	JUNCTION	380.80	1.00	0.00	
Jun-46	JUNCTION	347.36	1.00	0.00	
Jun-47	JUNCTION	325.87	1.00	0.00	
Jun-6	JUNCTION	401.03	1.25	0.00	
Jun-7	JUNCTION	401.10	1.25	0.00	
Jun-8	JUNCTION	408.16	1.00	0.00	
Jun-9	JUNCTION	290.00	3.00	0.00	
Jun-11	OUTFALL	194.73	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Bioswale	Jun-35	Jun-44	CONDUIT	198.0	1.9701	0.1700
Con-10	Jun-14	Jun-13	CONDUIT	30.5	0.4264	0.0110
Con-11	Jun-13	Jun-12	CONDUIT	93.5	1.5831	0.0110
Con-12	Jun-12	Jun-41	CONDUIT	33.9	20.4015	0.0110
Con-13	Jun-10	Jun-14	CONDUIT	275.4	15.7778	0.0320
Con-16	Jun-2	Jun-17	CONDUIT	55.7	17.1721	0.0110
Con-17	Jun-19	Jun-15	CONDUIT	250.1	13.1942	0.0320
Con-2	Jun-8	Jun-6	CONDUIT	57.2	12.4694	0.0110

Con-3	Jun-7	Jun-6	CONDUIT	33.3	0.2100	0.0110
Con-33	Jun-24	Jun-8	CONDUIT	35.2	2.3850	0.0110
Con-38	Jun-38	Jun-35	CONDUIT	149.1	3.2468	0.0110
Con-39	Jun-39	Jun-38	CONDUIT	63.3	6.6793	0.0110
Con-4	Jun-6	Jun-2	CONDUIT	98.9	2.4674	0.0110
Con-40	Jun-40	Jun-38	CONDUIT	103.2	11.5657	0.0110
Con-41	Jun-41	Jun-40	CONDUIT	145.9	2.8039	0.0110
Con-42	Jun-17	Jun-45	CONDUIT	256.4	3.2054	0.0110
Con-43	Jun-43	Jun-42	CONDUIT	396.9	13.7761	0.0110
Con-44	Jun-42	Jun-41	CONDUIT	92.0	6.2385	0.0110
Con-45	Jun-44	Jun-11	CONDUIT	121.9	6.9981	0.0150
Con-46	Jun-45	Jun-46	CONDUIT	168.3	19.8681	0.0110
Con-47	Jun-46	Jun-47	CONDUIT	108.2	19.8669	0.0110
Con-48	Jun-47	Jun-43	CONDUIT	274.1	13.6561	0.0110
Con-8	Jun-9	Jun-10	CONDUIT	67.5	14.8126	0.0110
Con-9	Jun-15	Jun-9	CONDUIT	350.3	10.8466	0.0320

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Bioswale	IRREGULAR	2.00	15.32	1	22.42	1.38	34.09
Con-10	CIRCULAR	1.50	1.50	1	1.77	0.38	8.11
Con-11	CIRCULAR	1.50	1.50	1	1.77	0.38	15.62
Con-12	CIRCULAR	1.50	1.50	1	1.77	0.38	56.07
Con-13	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	258.92
Con-16	CIRCULAR	0.83	0.83	1	0.55	0.21	10.73
Con-17	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	236.77
Con-2	CIRCULAR	0.83	0.83	1	0.55	0.21	9.14
Con-3	CIRCULAR	1.25	1.25	1	1.23	0.31	3.50
Con-33	CIRCULAR	1.00	1.00	1	0.79	0.25	6.50
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	22.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	32.08
Con-4	CIRCULAR	0.83	0.83	1	0.55	0.21	4.07
Con-40	CIRCULAR	1.50	1.50	1	1.77	0.38	42.22
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	20.79
Con-42	CIRCULAR	0.67	0.67	1	0.35	0.17	2.56
Con-43	CIRCULAR	0.67	0.67	1	0.35	0.17	5.30
Con-44	CIRCULAR	1.50	1.50	1	1.77	0.38	31.01
Con-45	CIRCULAR	1.50	1.50	1	1.77	0.38	24.08
Con-46	CIRCULAR	0.67	0.67	1	0.35	0.17	6.37
Con-47	CIRCULAR	0.67	0.67	1	0.35	0.17	6.37
Con-48	CIRCULAR	0.67	0.67	1	0.35	0.17	5.28
Con-8	CIRCULAR	1.25	1.25	1	1.23	0.31	29.38
Con-9	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	214.68

Downstream System

```
****************
Transect Summary
****************

Transect XS-1
Area:
          0.0110    0.0225    0.0347    0.0474    0.0607
          0.0745    0.0889    0.1039    0.1194    0.1351
          0.1512    0.1675    0.1842    0.2011    0.2183
          0.2358    0.2535    0.2716    0.2899    0.3085
          0.3275    0.3466    0.3661    0.3859    0.4059
          0.4263    0.4469    0.4678    0.4890    0.5105
          0.5322    0.5543    0.5766    0.5993    0.6222
          0.6454    0.6688    0.6926    0.7166    0.7410
          0.7656    0.7905    0.8157    0.8412    0.8669
          0.8930    0.9193    0.9459    0.9728    1.0000
Hrad:
          0.0281    0.0548    0.0803    0.1048    0.1284
          0.1512    0.1732    0.1947    0.2182    0.2422
          0.2657    0.2888    0.3115    0.3339    0.3559
          0.3776    0.3990    0.4201    0.4410    0.4615
          0.4819    0.5019    0.5218    0.5414    0.5609
          0.5801    0.5992    0.6181    0.6368    0.6553
          0.6737    0.6919    0.7100    0.7279    0.7458
          0.7634    0.7810    0.7985    0.8158    0.8330
          0.8501    0.8671    0.8841    0.9009    0.9176
          0.9343    0.9508    0.9673    0.9837    1.0000
Width:
          0.4125    0.4334    0.4543    0.4752    0.4961
          0.5170    0.5379    0.5587    0.5718    0.5822
          0.5927    0.6031    0.6136    0.6240    0.6345
          0.6449    0.6554    0.6658    0.6762    0.6867
          0.6971    0.7076    0.7180    0.7285    0.7389
          0.7493    0.7598    0.7702    0.7807    0.7911
          0.8016    0.8120    0.8225    0.8329    0.8433
          0.8538    0.8642    0.8747    0.8851    0.8956
          0.9060    0.9164    0.9269    0.9373    0.9478
          0.9582    0.9687    0.9791    0.9896    1.0000

**************************        Volume         Depth
Runoff Quantity Continuity       acre-ft        inches
**************************     ---------       -------
Total Precipitation ......         9.184         3.915
Surface Runoff ...........         0.287         0.004
Continuity Error (%) .....        -0.000

**************************        Volume        Volume
Flow Routing Continuity          acre-ft      Mgallons
```

Downstream System

*************************	---------	---------
External Inflow	0.000	0.000
External Outflow	2.843	0.927
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.017	0.006
Continuity Error (%)	0.000	

****
Composite Curve Number Computations Report
****

Subbasin Sub-1

Soil/Surface Description	Area (acres)	Soil Group	CN
Woods & grass combination, Fair	3.07	B	65.00
Composite Area & Weighted CN	3.07		65.00

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Pasture, grassland, or range, Fair	2.24	B	69.00
Composite Area & Weighted CN	2.24		69.00

Subbasin Sub-14

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.96	-	73.00
Composite Area & Weighted CN	0.96		73.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.26	-	98.00
Composite Area & Weighted CN	1.26		98.00

Subbasin Sub-17

409

Downstream System

Soil/Surface Description	Area (acres)	Soil Group	CN
-	11.30	-	65.00
Composite Area & Weighted CN	11.30		65.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.34	-	73.00
Composite Area & Weighted CN	3.34		73.00

Subbasin Sub-4

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.32	-	70.00
Composite Area & Weighted CN	1.32		70.00

Subbasin Sub-5

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.51	-	70.00
Composite Area & Weighted CN	1.51		70.00

Subbasin Sub-6

Soil/Surface Description	Area (acres)	Soil Group	CN
Woods & grass combination, Fair	3.15	B	65.00
Composite Area & Weighted CN	3.15		65.00

****
SCS TR-55 Time of Concentration Computations Report
****

Sheet Flow Equation

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where:

Tc = Time of Concentration (hrs)
n = Manning's Roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation

```
V  = 16.1345 * (Sf^0.5) (unpaved surface)
V  = 20.3282 * (Sf^0.5) (paved surface)
Tc = (Lf / V) / (3600 sec/hr)
```

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation

```
V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R  = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)
```

Where:

Tc = Time of Concentration (hrs)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's Roughness

Subbasin Sub-1

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	45.00	0.00	0.00

411

Downstream System

2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.71	0.00	0.00
Computed Flow Time (minutes):	0.59	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	260.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.17	0.00	0.00

Total TOC (minutes):	5.00

Subbasin Sub-13

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.15	0.00	0.00
Computed Flow Time (minutes):	1.09	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	120.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	0.32	0.00	0.00

Downstream System

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	1.00	0.00	0.00
Cross Section Area (ft²):	1.00	0.00	0.00
Wetted Perimeter (ft):	0.11	0.00	0.00
Velocity (ft/sec):	59.01	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	25.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	7.98	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00

413

Downstream System

Slope (%):	5.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	3.61	0.00	0.00
Computed Flow Time (minutes):	1.85	0.00	0.00
Total TOC (minutes):	9.83		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.10	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.38	0.00	0.00
Computed Flow Time (minutes):	13.32	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	800.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	2.61	0.00	0.00
Total TOC (minutes):	15.94		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	12.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	0.30	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	1.11	0.00	0.00
Computed Flow Time (minutes):	1.50	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	475.00	0.00	0.00
Slope (%):	0.30	0.00	0.00
Cross Section Area (ft²):	0.13	0.00	0.00
Wetted Perimeter (ft):	2.00	0.00	0.00
Velocity (ft/sec):	1.17	0.00	0.00
Computed Flow Time (minutes):	6.78	0.00	0.00

Total TOC (minutes): 21.04

Subbasin Sub-4

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	68.00	0.00	0.00
Slope (%):	30.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.49	0.00	0.00
Computed Flow Time (minutes):	0.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	164.00	0.00	0.00

Downstream System

	Subarea A	Subarea B	Subarea C
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft²):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.11	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-5

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	45.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.71	0.00	0.00
Computed Flow Time (minutes):	0.59	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft²):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.13	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-6

Downstream System

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	80.00	0.00	0.00
Slope (%):	60.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	2.03	0.00	0.00
Computed Flow Time (minutes):	0.66	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	330.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.21	0.00	0.00
Total TOC (minutes):	5.00		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	hh:mm:ss
Sub-1	3.930	0.988	0.480	65.000	0	00:05:00
Sub-13	3.930	1.221	0.520	69.000	0	00:05:00
Sub-14	3.930	1.477	0.290	73.000	0	00:08:26
Sub-15	3.930	3.695	1.170	98.000	0	00:09:49
Sub-17	3.930	0.988	1.560	65.000	0	00:15:56
Sub-2	3.930	1.477	0.930	73.000	0	00:21:02
Sub-4	3.930	1.283	0.330	70.000	0	00:05:00

417

Downstream System

Sub-5	3.930	1.283	0.380	70.000	0	00:05:00
Sub-6	3.930	0.988	0.490	65.000	0	00:05:00
Averages / Totals	3.930	1.232	5.83			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-10	0.12	0.23	280.23	0	08:05	0	0	0:00:00
Jun-12	0.15	0.24	235.17	0	08:06	0	0	0:00:00
Jun-13	0.21	0.38	236.79	0	08:05	0	0	0:00:00
Jun-14	0.29	0.53	237.07	0	08:05	0	0	0:00:00
Jun-15	0.07	0.15	328.15	0	08:02	0	0	0:00:00
Jun-17	0.18	0.36	389.38	0	08:10	0	0	0:00:00
Jun-19	0.04	0.09	361.09	0	08:05	0	0	0:00:00
Jun-2	0.10	0.19	398.78	0	08:10	0	0	0:00:00
Jun-24	0.00	0.00	409.00	0	00:00	0	0	0:00:00
Jun-35	0.51	0.95	208.11	0	08:07	0	0	0:00:00
Jun-38	0.28	0.49	212.49	0	08:06	0	0	0:00:00
Jun-39	0.08	0.20	216.43	0	07:55	0	0	0:00:00
Jun-40	0.19	0.32	224.25	0	08:07	0	0	0:00:00
Jun-41	0.30	0.54	228.56	0	08:07	0	0	0:00:00
Jun-42	0.11	0.20	233.96	0	08:11	0	0	0:00:00
Jun-43	0.12	0.22	288.66	0	08:11	0	0	0:00:00
Jun-44	0.29	0.53	203.79	0	08:08	0	0	0:00:00
Jun-45	0.11	0.20	381.00	0	08:10	0	0	0:00:00
Jun-46	0.10	0.20	347.56	0	08:10	0	0	0:00:00
Jun-47	0.11	0.22	326.09	0	08:11	0	0	0:00:00
Jun-6	0.16	0.31	401.34	0	08:10	0	0	0:00:00
Jun-7	0.26	0.48	401.58	0	08:10	0	0	0:00:00
Jun-8	0.00	0.00	408.16	0	00:00	0	0	0:00:00
Jun-9	0.10	0.17	290.17	0	08:05	0	0	0:00:00
Jun-11	0.28	0.50	195.23	0	08:08	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow	Maximum Total Inflow	Time of Peak Inflow Occurrence	Maximum Flooding Overflow	Time of Peak Flooding Occurrence

		cfs	cfs	days	hh:mm	cfs	days	hh:mm
Jun-10	JUNCTION	0.47	1.63	0	08:05	0.00		
Jun-12	JUNCTION	1.55	3.08	0	08:06	0.00		
Jun-13	JUNCTION	0.00	1.62	0	08:05	0.00		
Jun-14	JUNCTION	0.00	1.63	0	08:05	0.00		
Jun-15	JUNCTION	0.37	0.68	0	08:00	0.00		
Jun-17	JUNCTION	0.00	1.17	0	08:10	0.00		
Jun-19	JUNCTION	0.33	0.33	0	08:04	0.00		
Jun-2	JUNCTION	0.29	1.17	0	08:10	0.00		
Jun-24	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-35	JUNCTION	0.51	5.73	0	08:05	0.00		
Jun-38	JUNCTION	0.00	5.25	0	08:06	0.00		
Jun-39	JUNCTION	1.16	1.16	0	07:55	0.00		
Jun-40	JUNCTION	0.00	4.23	0	08:07	0.00		
Jun-41	JUNCTION	0.00	4.23	0	08:07	0.00		
Jun-42	JUNCTION	0.00	1.17	0	08:11	0.00		
Jun-43	JUNCTION	0.00	1.17	0	08:11	0.00		
Jun-44	JUNCTION	0.00	5.70	0	08:07	0.00		
Jun-45	JUNCTION	0.00	1.17	0	08:10	0.00		
Jun-46	JUNCTION	0.00	1.17	0	08:10	0.00		
Jun-47	JUNCTION	0.00	1.17	0	08:10	0.00		
Jun-6	JUNCTION	0.00	0.92	0	08:10	0.00		
Jun-7	JUNCTION	0.92	0.92	0	08:10	0.00		
Jun-8	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-9	JUNCTION	0.48	1.16	0	08:04	0.00		
Jun-11	OUTFALL	0.00	5.69	0	08:08	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Jun-11	99.03	1.99	5.69
System	99.03	1.99	5.69

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence	Maximum Velocity Attained	Length Factor	Peak Flow during Analysis	Design Flow Capacity	Ratio of Maximum /Design	Ratio of Maximum Flow	Total Time Surcharged

Downstream System

		days	hh:mm	ft/sec		cfs	cfs	Flow	Depth	Minutes
Bioswale	CHANNEL	0	08:07	0.91	1.00	5.70	34.09	0.17	0.37	0
Con-10	CONDUIT	0	08:05	3.59	1.00	1.62	8.11	0.20	0.30	0
Con-11	CONDUIT	0	08:06	6.24	1.00	1.62	15.62	0.10	0.20	0
Con-12	CONDUIT	0	08:06	8.47	1.00	3.08	56.07	0.05	0.26	0
Con-13	CONDUIT	0	08:05	3.09	1.00	1.63	258.92	0.01	0.13	0
Con-16	CONDUIT	0	08:10	7.56	1.00	1.17	10.73	0.11	0.33	0
Con-17	CONDUIT	0	08:05	2.32	1.00	0.32	236.77	0.00	0.04	0
Con-2	CONDUIT	0	00:00	0.00	1.00	0.00	9.14	0.00	0.19	0
Con-3	CONDUIT	0	08:10	2.76	1.00	0.92	3.50	0.26	0.32	0
Con-33	CONDUIT	0	00:00	0.00	1.00	0.00	6.50	0.00	0.00	0
Con-38	CONDUIT	0	08:06	6.27	1.00	5.25	22.37	0.23	0.48	0
Con-39	CONDUIT	0	07:55	5.18	1.00	1.16	32.08	0.04	0.23	0
Con-4	CONDUIT	0	08:10	6.80	1.00	0.92	4.07	0.23	0.30	0
Con-40	CONDUIT	0	08:07	10.96	1.00	4.23	42.22	0.10	0.27	0
Con-41	CONDUIT	0	08:07	10.09	1.00	4.23	20.79	0.20	0.29	0
Con-42	CONDUIT	0	08:10	8.46	1.00	1.17	2.56	0.46	0.42	0
Con-43	CONDUIT	0	08:11	12.51	1.00	1.17	5.30	0.22	0.31	0
Con-44	CONDUIT	0	08:11	3.59	1.00	1.17	31.01	0.04	0.25	0
Con-45	CONDUIT	0	08:08	10.63	1.00	5.69	24.08	0.24	0.34	0
Con-46	CONDUIT	0	08:10	13.51	1.00	1.17	6.37	0.18	0.30	0
Con-47	CONDUIT	0	08:10	12.70	1.00	1.17	6.37	0.18	0.31	0
Con-48	CONDUIT	0	08:11	11.83	1.00	1.17	5.28	0.22	0.33	0
Con-8	CONDUIT	0	08:05	9.12	1.00	1.16	29.38	0.04	0.16	0
Con-9	CONDUIT	0	08:02	3.63	1.00	0.68	214.68	0.00	0.05	0

```
********************************
Highest Flow Instability Indexes
********************************
Link Con-39 (3)
Link Con-38 (2)


Analysis begun on:  Wed Nov 19 11:17:54 2008
Analysis ended on:  Wed Nov 19 11:17:56 2008
Total elapsed time: 00:00:02
```

Downstream System

BOSS International StormNET® - Version 4.11.0 (Build 13753)

****
Analysis Options
****

Flow Units .... cfs
Subbasin Hydrograph Method. SCS TR-20
Time of Concentration...... SCS TR-55
Link Routing Method .... Hydrodynamic
Pond Exfiltration.......... None
Starting Date JUN-21-2008 00:00:00
Ending Date JUN-22-2008 00:00:00
Report Time Step 00:05:00

****
Element Count
****

Number of rain gages 1
Number of subbasins 9
Number of nodes 25
Number of links 24

****
Raingage Summary
****

Gage ID	Data Source	Data Type	Interval hours
Gage-1	100 year storm	CUMULATIVE	0.10

****
Subbasin Summary
****

Subbasin ID	Total Area acres
Sub-1	3.07
Sub-13	2.24
Sub-14	0.96
Sub-15	1.26
Sub-17	11.30
Sub-2	3.34
Sub-4	1.32
Sub-5	1.51

Downstream System

Sub-6 3.15

****
Node Summary
****

Node ID	Element Type	Invert Elevation ft	Maximum Depth ft	Ponded Area ft²	External Inflow
Jun-10	JUNCTION	280.00	3.00	0.00	
Jun-12	JUNCTION	234.93	1.50	0.00	
Jun-13	JUNCTION	236.41	1.50	0.00	
Jun-14	JUNCTION	236.54	3.00	0.00	
Jun-15	JUNCTION	328.00	3.00	0.00	
Jun-17	JUNCTION	389.02	6.00	0.00	
Jun-19	JUNCTION	361.00	3.00	0.00	
Jun-2	JUNCTION	398.59	1.00	0.00	
Jun-24	JUNCTION	409.00	1.00	0.00	
Jun-35	JUNCTION	207.16	2.00	0.00	
Jun-38	JUNCTION	212.00	1.50	0.00	
Jun-39	JUNCTION	216.23	1.50	0.00	
Jun-40	JUNCTION	223.93	1.50	0.00	
Jun-41	JUNCTION	228.02	1.50	0.00	
Jun-42	JUNCTION	233.76	1.50	0.00	
Jun-43	JUNCTION	288.44	1.00	0.00	
Jun-44	JUNCTION	203.26	3.00	0.00	
Jun-45	JUNCTION	380.80	1.00	0.00	
Jun-46	JUNCTION	347.36	1.00	0.00	
Jun-47	JUNCTION	325.87	1.00	0.00	
Jun-6	JUNCTION	401.03	1.25	0.00	
Jun-7	JUNCTION	401.10	1.25	0.00	
Jun-8	JUNCTION	408.16	1.00	0.00	
Jun-9	JUNCTION	290.00	3.00	0.00	
Jun-11	OUTFALL	194.73	1.50	0.00	

****
Link Summary
****

Link ID	From Node	To Node	Element Type	Length ft	Slope %	Manning's Roughness
Bioswale	Jun-35	Jun-44	CONDUIT	198.0	1.9701	0.1700
Con-10	Jun-14	Jun-13	CONDUIT	30.5	0.4264	0.0110
Con-11	Jun-13	Jun-12	CONDUIT	93.5	1.5831	0.0110
Con-12	Jun-12	Jun-41	CONDUIT	33.9	20.4015	0.0110
Con-13	Jun-10	Jun-14	CONDUIT	275.4	15.7778	0.0320
Con-16	Jun-2	Jun-17	CONDUIT	55.7	17.1721	0.0110
Con-17	Jun-19	Jun-15	CONDUIT	250.1	13.1942	0.0320
Con-2	Jun-8	Jun-6	CONDUIT	57.2	12.4694	0.0110

Downstream System

Con-3	Jun-7	Jun-6	CONDUIT	33.3	0.2100	0.0110
Con-33	Jun-24	Jun-8	CONDUIT	35.2	2.3850	0.0110
Con-38	Jun-38	Jun-35	CONDUIT	149.1	3.2468	0.0110
Con-39	Jun-39	Jun-38	CONDUIT	63.3	6.6793	0.0110
Con-4	Jun-6	Jun-2	CONDUIT	98.9	2.4674	0.0110
Con-40	Jun-40	Jun-38	CONDUIT	103.2	11.5657	0.0110
Con-41	Jun-41	Jun-40	CONDUIT	145.9	2.8039	0.0110
Con-42	Jun-17	Jun-45	CONDUIT	256.4	3.2054	0.0110
Con-43	Jun-43	Jun-42	CONDUIT	396.9	13.7761	0.0110
Con-44	Jun-42	Jun-41	CONDUIT	92.0	6.2385	0.0110
Con-45	Jun-44	Jun-11	CONDUIT	121.9	6.9981	0.0150
Con-46	Jun-45	Jun-46	CONDUIT	168.3	19.8681	0.0110
Con-47	Jun-46	Jun-47	CONDUIT	108.2	19.8669	0.0110
Con-48	Jun-47	Jun-43	CONDUIT	274.1	13.6561	0.0110
Con-8	Jun-9	Jun-10	CONDUIT	67.5	14.8126	0.0110
Con-9	Jun-15	Jun-9	CONDUIT	350.3	10.8466	0.0320

****
Cross Section Summary
****

Link ID	Shape	Depth/ Diameter ft	Width ft	No. of Barrels	Cross Sectional Area ft²	Full Flow Hydraulic Radius ft	Design Flow Capacity cfs
Bioswale	IRREGULAR	2.00	15.32	1	22.42	1.38	34.09
Con-10	CIRCULAR	1.50	1.50	1	1.77	0.38	8.11
Con-11	CIRCULAR	1.50	1.50	1	1.77	0.38	15.62
Con-12	CIRCULAR	1.50	1.50	1	1.77	0.38	56.07
Con-13	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	258.92
Con-16	CIRCULAR	0.83	0.83	1	0.55	0.21	10.73
Con-17	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	236.77
Con-2	CIRCULAR	0.83	0.83	1	0.55	0.21	9.14
Con-3	CIRCULAR	1.25	1.25	1	1.23	0.31	3.50
Con-33	CIRCULAR	1.00	1.00	1	0.79	0.25	6.50
Con-38	CIRCULAR	1.50	1.50	1	1.77	0.38	22.37
Con-39	CIRCULAR	1.50	1.50	1	1.77	0.38	32.08
Con-4	CIRCULAR	0.83	0.83	1	0.55	0.21	4.07
Con-40	CIRCULAR	1.50	1.50	1	1.77	0.38	42.22
Con-41	CIRCULAR	1.50	1.50	1	1.77	0.38	20.79
Con-42	CIRCULAR	0.67	0.67	1	0.35	0.17	2.56
Con-43	CIRCULAR	0.67	0.67	1	0.35	0.17	5.30
Con-44	CIRCULAR	1.50	1.50	1	1.77	0.38	31.01
Con-45	CIRCULAR	1.50	1.50	1	1.77	0.38	24.08
Con-46	CIRCULAR	0.67	0.67	1	0.35	0.17	6.37
Con-47	CIRCULAR	0.67	0.67	1	0.35	0.17	6.37
Con-48	CIRCULAR	0.67	0.67	1	0.35	0.17	5.28
Con-8	CIRCULAR	1.25	1.25	1	1.23	0.31	29.38
Con-9	TRAPEZOIDAL	3.00	7.00	1	12.00	1.27	214.68

Downstream System

****
Transect Summary
****

Transect XS-1

Area:

0.0110	0.0225	0.0347	0.0474	0.0607
0.0745	0.0889	0.1039	0.1194	0.1351
0.1512	0.1675	0.1842	0.2011	0.2183
0.2358	0.2535	0.2716	0.2899	0.3085
0.3275	0.3466	0.3661	0.3859	0.4059
0.4263	0.4469	0.4678	0.4890	0.5105
0.5322	0.5543	0.5766	0.5993	0.6222
0.6454	0.6688	0.6926	0.7166	0.7410
0.7656	0.7905	0.8157	0.8412	0.8669
0.8930	0.9193	0.9459	0.9728	1.0000

Hrad:

0.0281	0.0548	0.0803	0.1048	0.1284
0.1512	0.1732	0.1947	0.2182	0.2422
0.2657	0.2888	0.3115	0.3339	0.3559
0.3776	0.3990	0.4201	0.4410	0.4615
0.4819	0.5019	0.5218	0.5414	0.5609
0.5801	0.5992	0.6181	0.6368	0.6553
0.6737	0.6919	0.7100	0.7279	0.7458
0.7634	0.7810	0.7985	0.8158	0.8330
0.8501	0.8671	0.8841	0.9009	0.9176
0.9343	0.9508	0.9673	0.9837	1.0000

Width:

0.4125	0.4334	0.4543	0.4752	0.4961
0.5170	0.5379	0.5587	0.5718	0.5822
0.5927	0.6031	0.6136	0.6240	0.6345
0.6449	0.6554	0.6658	0.6762	0.6867
0.6971	0.7076	0.7180	0.7285	0.7389
0.7493	0.7598	0.7702	0.7807	0.7911
0.8016	0.8120	0.8225	0.8329	0.8433
0.8538	0.8642	0.8747	0.8851	0.8956
0.9060	0.9164	0.9269	0.9373	0.9478
0.9582	0.9687	0.9791	0.9896	1.0000

************************** Runoff Quantity Continuity **************************	Volume acre-ft	Depth inches
Total Precipitation	11.357	4.841
Surface Runoff	0.431	0.006
Continuity Error (%)	-0.000	

************************** Flow Routing Continuity	Volume acre-ft	Volume Mgallons

Downstream System

```
**************************     ---------     ---------
External Inflow .........         0.000         0.000
External Outflow ........         4.281         1.395
Initial Stored Volume ....        0.000         0.000
Final Stored Volume ......        0.021         0.007
Continuity Error (%) .....        0.000
```

```
*******************************************
Composite Curve Number Computations Report
*******************************************
```

Subbasin Sub-1

Soil/Surface Description	Area (acres)	Soil Group	CN
Woods & grass combination, Fair	3.07	B	65.00
Composite Area & Weighted CN	3.07		65.00

Subbasin Sub-13

Soil/Surface Description	Area (acres)	Soil Group	CN
Pasture, grassland, or range, Fair	2.24	B	69.00
Composite Area & Weighted CN	2.24		69.00

Subbasin Sub-14

Soil/Surface Description	Area (acres)	Soil Group	CN
-	0.96	-	73.00
Composite Area & Weighted CN	0.96		73.00

Subbasin Sub-15

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.26	-	98.00
Composite Area & Weighted CN	1.26		98.00

Subbasin Sub-17

425

Soil/Surface Description	Area (acres)	Soil Group	CN
-	11.30	-	65.00
Composite Area & Weighted CN	11.30		65.00

Subbasin Sub-2

Soil/Surface Description	Area (acres)	Soil Group	CN
-	3.34	-	73.00
Composite Area & Weighted CN	3.34		73.00

Subbasin Sub-4

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.32	-	70.00
Composite Area & Weighted CN	1.32		70.00

Subbasin Sub-5

Soil/Surface Description	Area (acres)	Soil Group	CN
-	1.51	-	70.00
Composite Area & Weighted CN	1.51		70.00

Subbasin Sub-6

Soil/Surface Description	Area (acres)	Soil Group	CN
Woods & grass combination, Fair	3.15	B	65.00
Composite Area & Weighted CN	3.15		65.00

****

SCS TR-55 Time of Concentration Computations Report

****

Sheet Flow Equation

$$Tc = (0.007 * ((n * Lf)^{0.8})) / ((P^{0.5}) * (Sf^{0.4}))$$

Downstream System

```
        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
        n  = Manning's Roughness

--------------
Subbasin Sub-1
--------------

Sheet Flow Computations
-----------------------
```

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	45.00	0.00	0.00

Downstream System

2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.71	0.00	0.00
Computed Flow Time (minutes):	0.59	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	260.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.17	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-13

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	75.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.15	0.00	0.00
Computed Flow Time (minutes):	1.09	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	120.00	0.00	0.00
Slope (%):	15.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	6.25	0.00	0.00
Computed Flow Time (minutes):	0.32	0.00	0.00

Downstream System

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	1.00	0.00	0.00
Cross Section Area (ft^2):	1.00	0.00	0.00
Wetted Perimeter (ft):	0.11	0.00	0.00
Velocity (ft/sec):	59.01	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-14

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.12	0.00	0.00
Computed Flow Time (minutes):	8.45	0.00	0.00
Total TOC (minutes):	8.45		

Subbasin Sub-15

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	25.00	0.00	0.00
Slope (%):	2.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.05	0.00	0.00
Computed Flow Time (minutes):	7.98	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	400.00	0.00	0.00

Downstream System

	Subarea A	Subarea B	Subarea C
Slope (%):	5.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	3.61	0.00	0.00
Computed Flow Time (minutes):	1.85	0.00	0.00
Total TOC (minutes):	9.83		

Subbasin Sub-17

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.10	0.00	0.00
Flow Length (ft):	300.00	0.00	0.00
Slope (%):	5.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.52	0.00	0.00
Velocity (ft/sec):	0.38	0.00	0.00
Computed Flow Time (minutes):	13.32	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	800.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	5.10	0.00	0.00
Computed Flow Time (minutes):	2.61	0.00	0.00
Total TOC (minutes):	15.94		

Subbasin Sub-2

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.40	0.00	0.00
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	10.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	0.13	0.00	0.00
Computed Flow Time (minutes):	12.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	100.00	0.00	0.00
Slope (%):	0.30	0.00	0.00
Surface Type:	Paved	Unpaved	Unpaved
Velocity (ft/sec):	1.11	0.00	0.00
Computed Flow Time (minutes):	1.50	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.01	0.00	0.00
Flow Length (ft):	475.00	0.00	0.00
Slope (%):	0.30	0.00	0.00
Cross Section Area (ft²):	0.13	0.00	0.00
Wetted Perimeter (ft):	2.00	0.00	0.00
Velocity (ft/sec):	1.17	0.00	0.00
Computed Flow Time (minutes):	6.78	0.00	0.00

Total TOC (minutes): 21.04

Subbasin Sub-4

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	68.00	0.00	0.00
Slope (%):	30.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.49	0.00	0.00
Computed Flow Time (minutes):	0.76	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	164.00	0.00	0.00

Downstream System

	Subarea A	Subarea B	Subarea C
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft²):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.11	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-5

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	60.00	0.00	0.00
Slope (%):	45.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	1.71	0.00	0.00
Computed Flow Time (minutes):	0.59	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft²):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.13	0.00	0.00
Total TOC (minutes):	5.00		

Subbasin Sub-6

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	80.00	0.00	0.00
Slope (%):	60.00	0.00	0.00
2 yr, 24 hr Rainfall (in):	2.50	0.00	0.00
Velocity (ft/sec):	2.03	0.00	0.00
Computed Flow Time (minutes):	0.66	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	1.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	7.22	0.00	0.00
Computed Flow Time (minutes):	0.00	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	330.00	0.00	0.00
Slope (%):	20.00	0.00	0.00
Cross Section Area (ft^2):	12.00	0.00	0.00
Wetted Perimeter (ft):	9.50	0.00	0.00
Velocity (ft/sec):	25.96	0.00	0.00
Computed Flow Time (minutes):	0.21	0.00	0.00
Total TOC (minutes):	5.00		

****
Subbasin Runoff Summary
****

Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Sub-1	4.860	1.561	0.920	65.000	0	00:05:00
Sub-13	4.860	1.856	0.880	69.000	0	00:05:00
Sub-14	4.860	2.171	0.470	73.000	0	00:08:26
Sub-15	4.860	4.623	1.450	98.000	0	00:09:49
Sub-17	4.860	1.561	3.120	65.000	0	00:15:56
Sub-2	4.860	2.171	1.500	73.000	0	00:21:02
Sub-4	4.860	1.933	0.550	70.000	0	00:05:00

Downstream System

Sub-5	4.860	1.933	0.630	70.000	0	00:05:00
Sub-6	4.860	1.561	0.950	65.000	0	00:05:00
Averages / Totals	4.860	1.852	10.05			

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	hh:mm	Maximum Ponded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-10	0.16	0.33	280.33	0	08:04	0	0	0:00:00
Jun-12	0.19	0.35	235.28	0	08:05	0	0	0:00:00
Jun-13	0.26	0.52	236.93	0	08:03	0	0	0:00:00
Jun-14	0.37	0.75	237.29	0	08:04	0	0	0:00:00
Jun-15	0.10	0.21	328.21	0	08:00	0	0	0:00:00
Jun-17	0.23	0.52	389.54	0	08:10	0	0	0:00:00
Jun-19	0.06	0.13	361.13	0	08:00	0	0	0:00:00
Jun-2	0.12	0.24	398.83	0	08:10	0	0	0:00:00
Jun-24	0.00	0.00	409.00	0	00:00	0	0	0:00:00
Jun-35	0.65	1.26	208.42	0	08:07	0	0	0:00:00
Jun-38	0.35	0.70	212.70	0	08:06	0	0	0:00:00
Jun-39	0.10	0.22	216.45	0	08:04	0	0	0:00:00
Jun-40	0.24	0.45	224.38	0	08:06	0	0	0:00:00
Jun-41	0.39	0.79	228.81	0	08:06	0	0	0:00:00
Jun-42	0.13	0.25	234.01	0	08:11	0	0	0:00:00
Jun-43	0.14	0.29	288.73	0	08:11	0	0	0:00:00
Jun-44	0.37	0.74	204.00	0	08:08	0	0	0:00:00
Jun-45	0.13	0.26	381.06	0	08:10	0	0	0:00:00
Jun-46	0.13	0.26	347.62	0	08:10	0	0	0:00:00
Jun-47	0.14	0.29	326.16	0	08:10	0	0	0:00:00
Jun-6	0.20	0.41	401.44	0	08:10	0	0	0:00:00
Jun-7	0.32	0.63	401.73	0	08:10	0	0	0:00:00
Jun-8	0.00	0.00	408.16	0	00:00	0	0	0:00:00
Jun-9	0.12	0.22	290.22	0	08:01	0	0	0:00:00
Jun-11	0.35	0.67	195.40	0	08:08	0	0	0:00:00

****
Node Flow Summary
****

Node ID	Element Type	Maximum Lateral Inflow	Maximum Total Inflow	Time of Peak Inflow Occurrence	Maximum Flooding Overflow	Time of Peak Flooding Occurrence

		cfs	cfs	days	hh:mm	cfs	days	hh:mm
Jun-10	JUNCTION	0.91	2.96	0	08:04	0.00		
Jun-12	JUNCTION	3.11	5.98	0	08:05	0.00		
Jun-13	JUNCTION	0.00	2.97	0	08:05	0.00		
Jun-14	JUNCTION	0.00	2.96	0	08:04	0.00		
Jun-15	JUNCTION	0.63	1.16	0	08:00	0.00		
Jun-17	JUNCTION	0.00	1.95	0	08:10	0.00		
Jun-19	JUNCTION	0.54	0.54	0	08:00	0.00		
Jun-2	JUNCTION	0.47	1.95	0	08:10	0.00		
Jun-24	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-35	JUNCTION	0.87	9.99	0	08:06	0.00		
Jun-38	JUNCTION	0.00	9.28	0	08:06	0.00		
Jun-39	JUNCTION	1.45	1.45	0	08:04	0.00		
Jun-40	JUNCTION	0.00	7.84	0	08:06	0.00		
Jun-41	JUNCTION	0.00	7.84	0	08:06	0.00		
Jun-42	JUNCTION	0.00	1.94	0	08:11	0.00		
Jun-43	JUNCTION	0.00	1.94	0	08:10	0.00		
Jun-44	JUNCTION	0.00	9.97	0	08:07	0.00		
Jun-45	JUNCTION	0.00	1.94	0	08:10	0.00		
Jun-46	JUNCTION	0.00	1.94	0	08:10	0.00		
Jun-47	JUNCTION	0.00	1.94	0	08:10	0.00		
Jun-6	JUNCTION	0.00	1.50	0	08:10	0.00		
Jun-7	JUNCTION	1.50	1.50	0	08:10	0.00		
Jun-8	JUNCTION	0.00	0.00	0	00:00	0.00		
Jun-9	JUNCTION	0.94	2.07	0	08:01	0.00		
Jun-11	OUTFALL	0.00	9.95	0	08:08	0.00		

****
Outfall Loading Summary
****

Outfall Node ID	Flow Frequency (%)	Average Flow cfs	Maximum Flow cfs
Jun-11	99.28	3.10	9.95
System	99.28	3.10	9.95

****
Link Flow Summary
****

Link ID	Element Type	Time of Peak Flow Occurrence	Maximum Velocity Attained	Length Factor	Peak Flow during Analysis	Design Flow Capacity	Ratio of Maximum /Design	Ratio of Maximum Flow	Total Time Surcharged

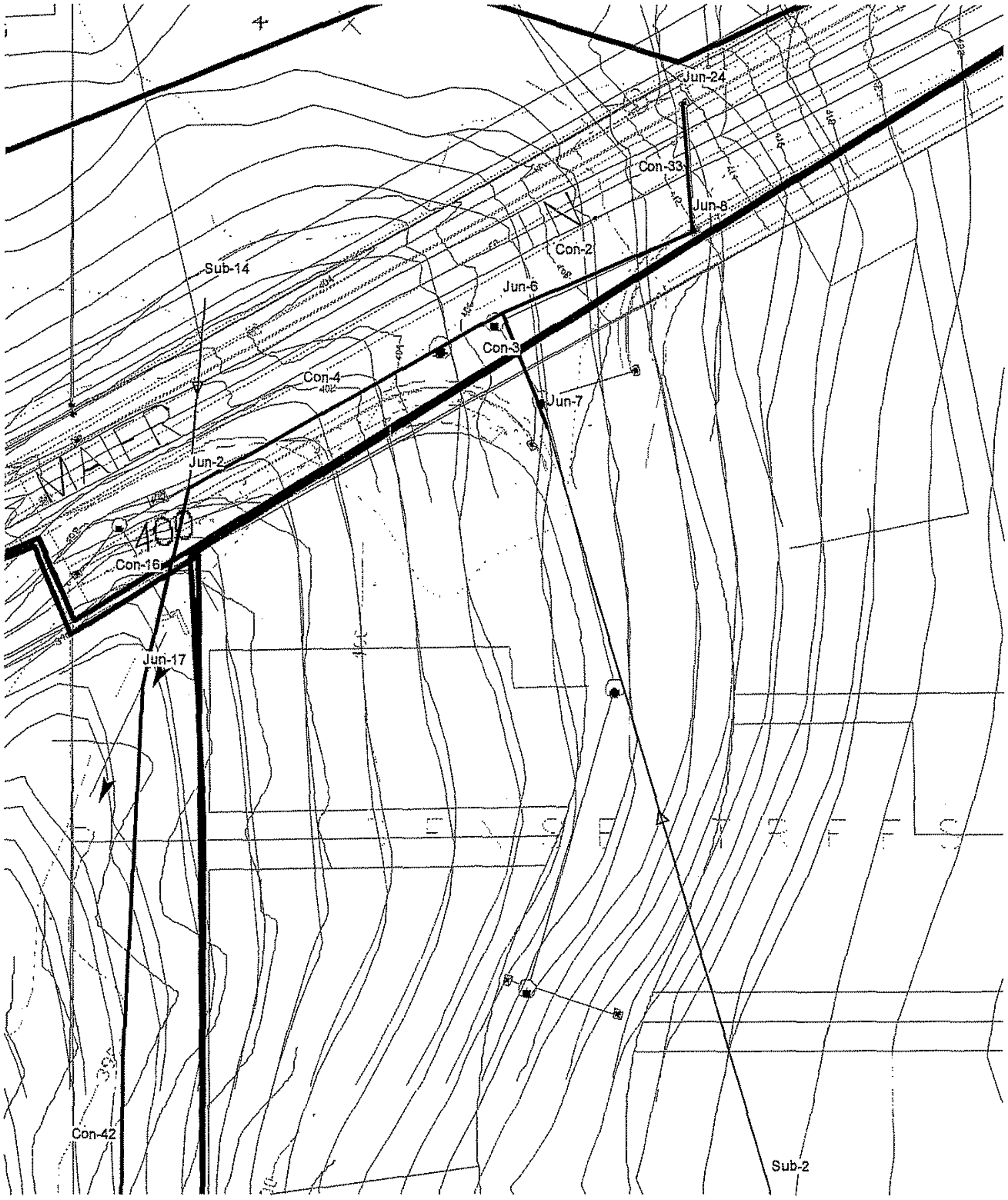
Downstream System

		days	hh:mm	ft/sec		cfs	cfs	Flow	Depth	Minutes
Bioswale	CHANNEL	0	08:07	1.10	1.00	9.97	34.09	0.29	0.50	0
Con-10	CONDUIT	0	08:05	4.16	1.00	2.97	8.11	0.37	0.42	0
Con-11	CONDUIT	0	08:05	6.99	1.00	2.97	15.62	0.19	0.29	0
Con-12	CONDUIT	0	08:05	9.75	1.00	5.98	56.07	0.11	0.38	0
Con-13	CONDUIT	0	08:04	3.58	1.00	2.96	258.92	0.01	0.18	0
Con-16	CONDUIT	0	08:10	8.12	1.00	1.95	10.73	0.18	0.45	0
Con-17	CONDUIT	0	08:00	2.75	1.00	0.54	236.77	0.00	0.06	0
Con-2	CONDUIT	0	00:00	0.00	1.00	0.00	9.14	0.00	0.25	0
Con-3	CONDUIT	0	08:10	3.10	1.00	1.50	3.50	0.43	0.42	0
Con-33	CONDUIT	0	00:00	0.00	1.00	0.00	6.50	0.00	0.00	0
Con-38	CONDUIT	0	08:06	7.57	1.00	9.28	22.37	0.41	0.65	0
Con-39	CONDUIT	0	08:05	5.17	1.00	1.45	32.08	0.05	0.31	0
Con-4	CONDUIT	0	08:10	7.57	1.00	1.50	4.07	0.37	0.39	0
Con-40	CONDUIT	0	08:06	12.59	1.00	7.84	42.22	0.19	0.38	0
Con-41	CONDUIT	0	08:06	11.47	1.00	7.84	20.79	0.38	0.41	0
Con-42	CONDUIT	0	08:10	9.22	1.00	1.94	2.56	0.76	0.58	0
Con-43	CONDUIT	0	08:11	14.48	1.00	1.94	5.30	0.37	0.41	0
Con-44	CONDUIT	0	08:11	3.78	1.00	1.94	31.01	0.06	0.35	0
Con-45	CONDUIT	0	08:08	12.15	1.00	9.95	24.08	0.41	0.47	0
Con-46	CONDUIT	0	08:10	15.36	1.00	1.94	6.37	0.31	0.39	0
Con-47	CONDUIT	0	08:10	14.44	1.00	1.94	6.37	0.31	0.41	0
Con-48	CONDUIT	0	08:10	13.47	1.00	1.94	5.28	0.37	0.43	0
Con-8	CONDUIT	0	08:01	10.31	1.00	2.07	29.38	0.07	0.22	0
Con-9	CONDUIT	0	08:00	4.36	1.00	1.16	214.68	0.01	0.07	0

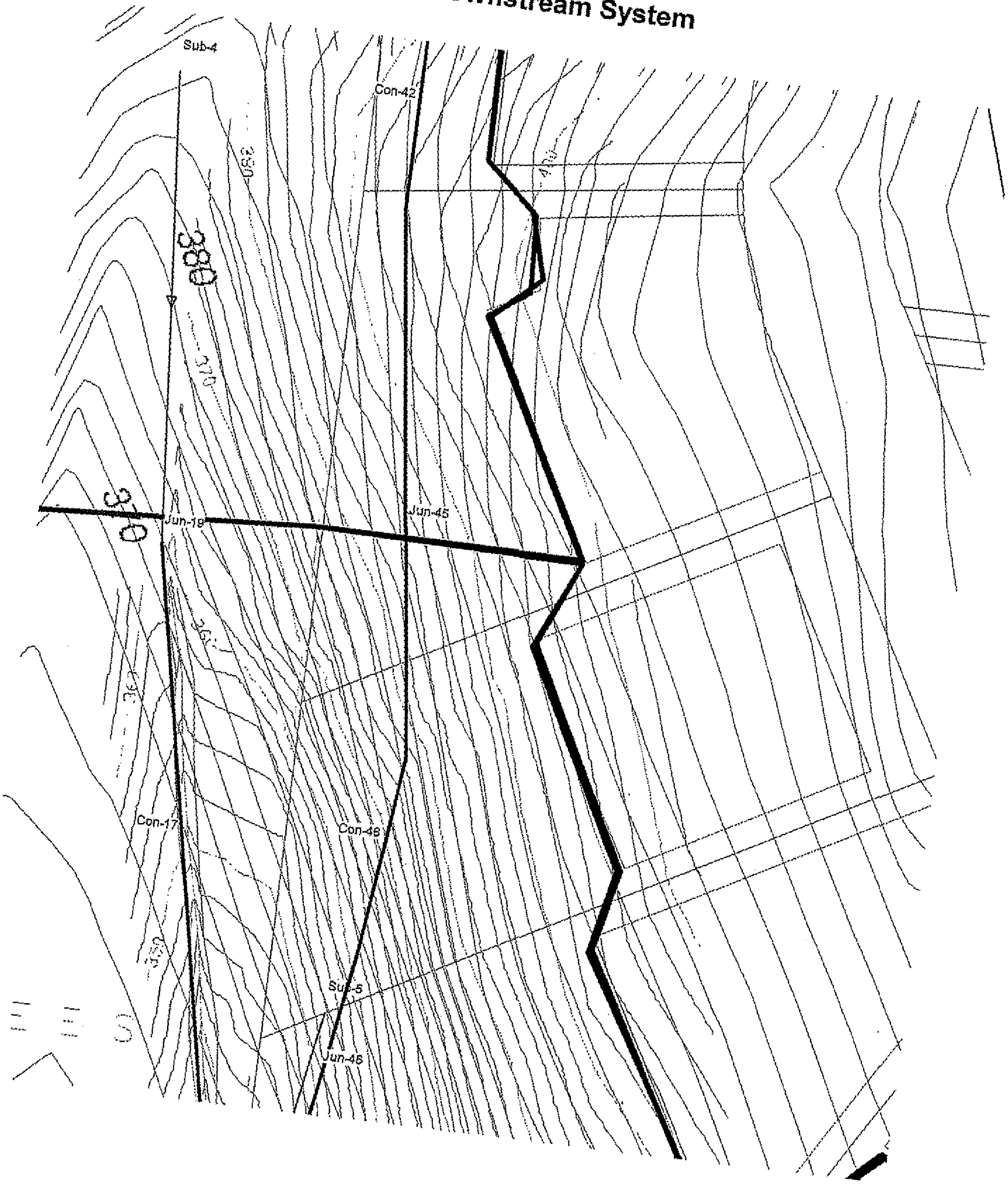
```
********************************
Highest Flow Instability Indexes
********************************
Link Con-39 (2)
Link Con-38 (2)


Analysis begun on:  Wed Nov 19 11:01:48 2008
Analysis ended on:  Wed Nov 19 11:01:51 2008
Total elapsed time: 00:00:03
```

Downstream System

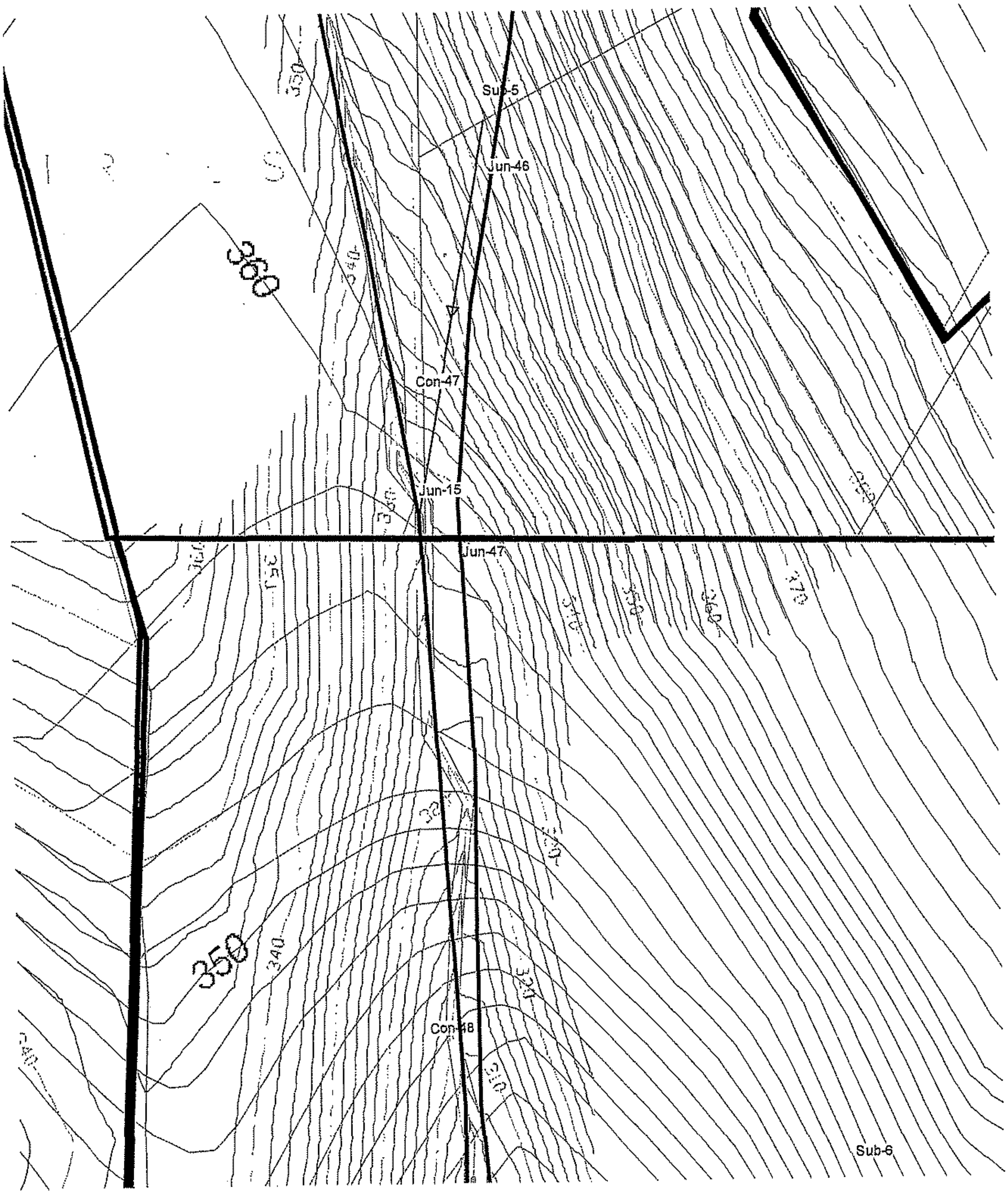


Downstream System

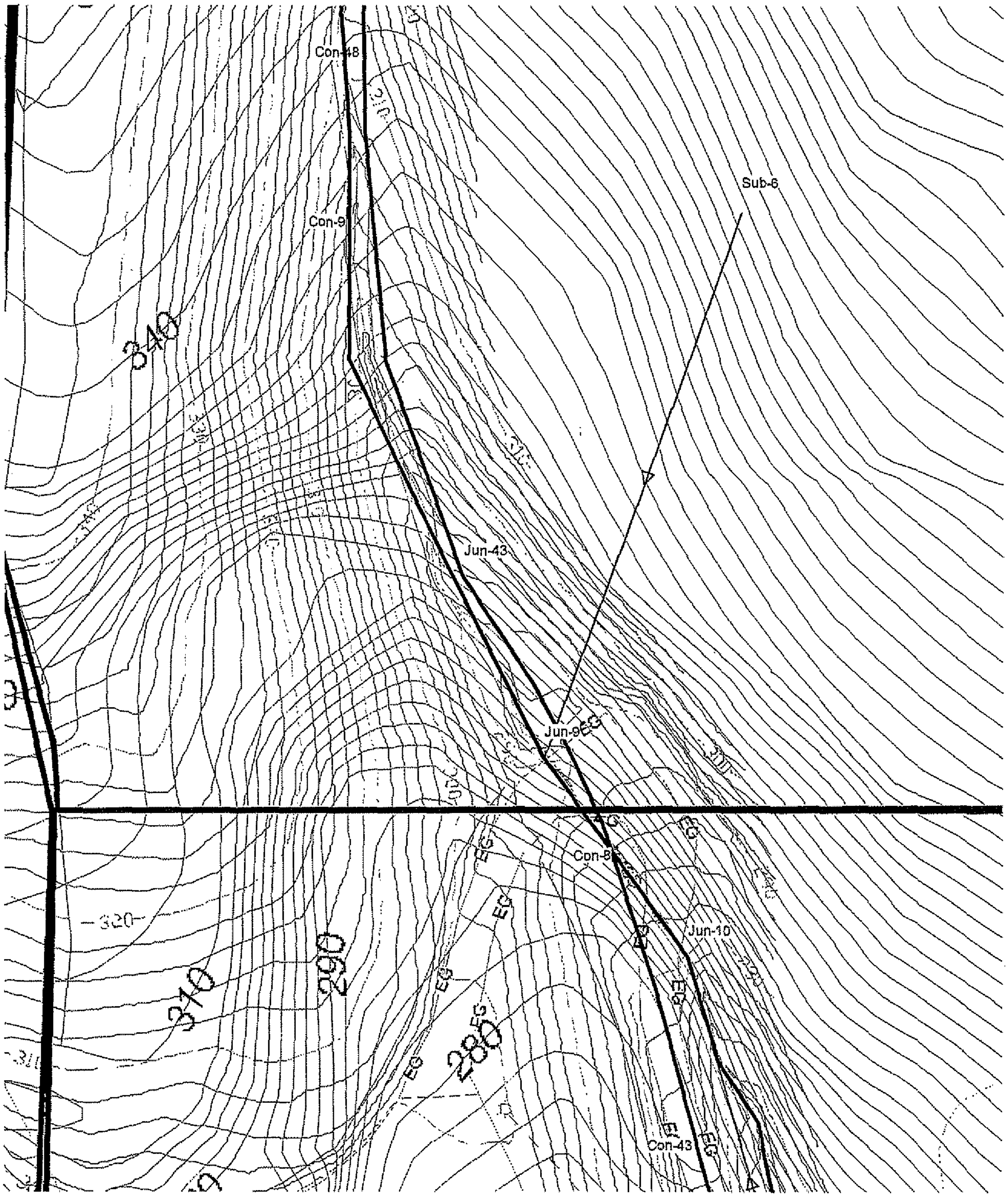


Element Labels (Enlarged)

Downstream System

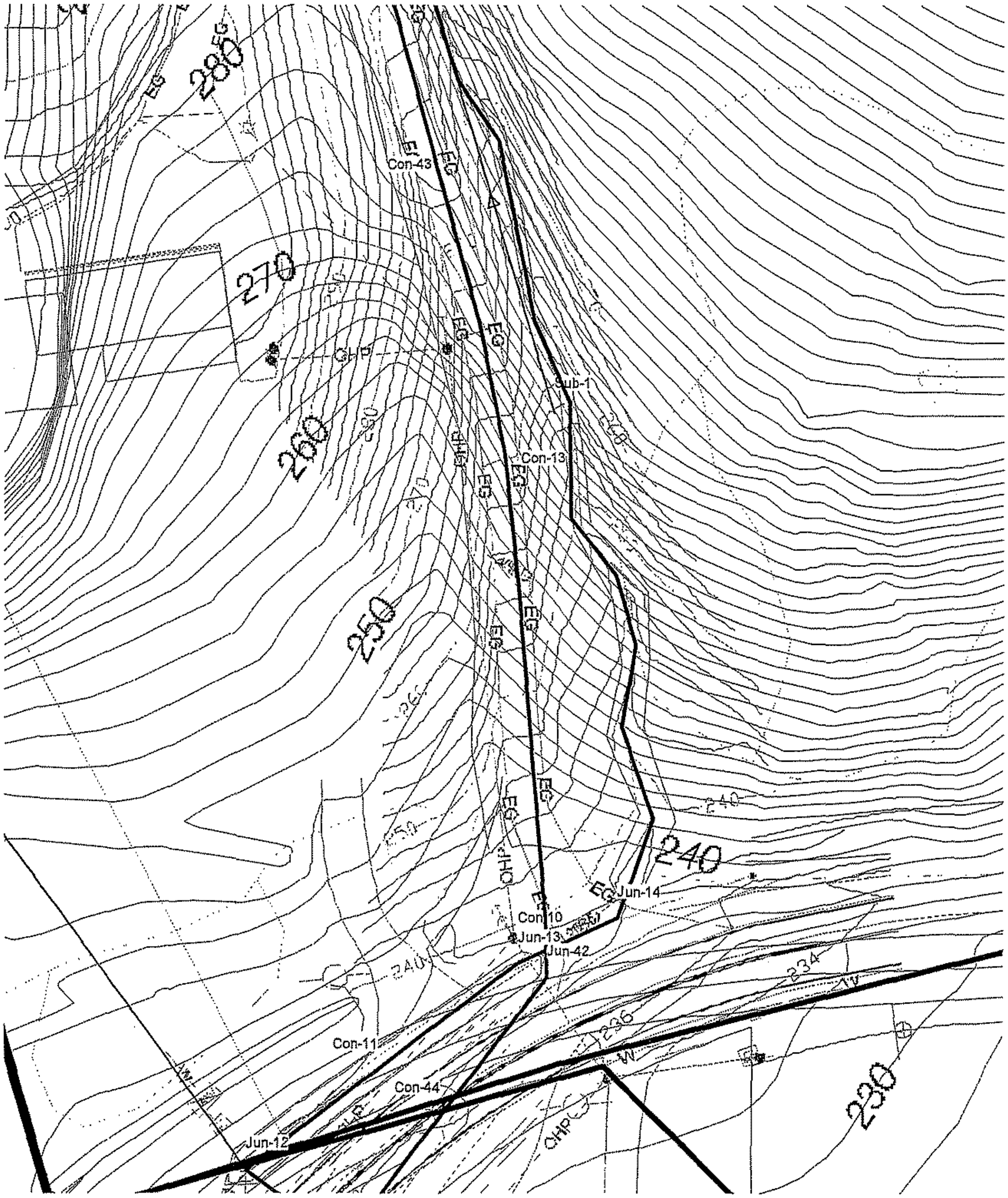


Downstream System

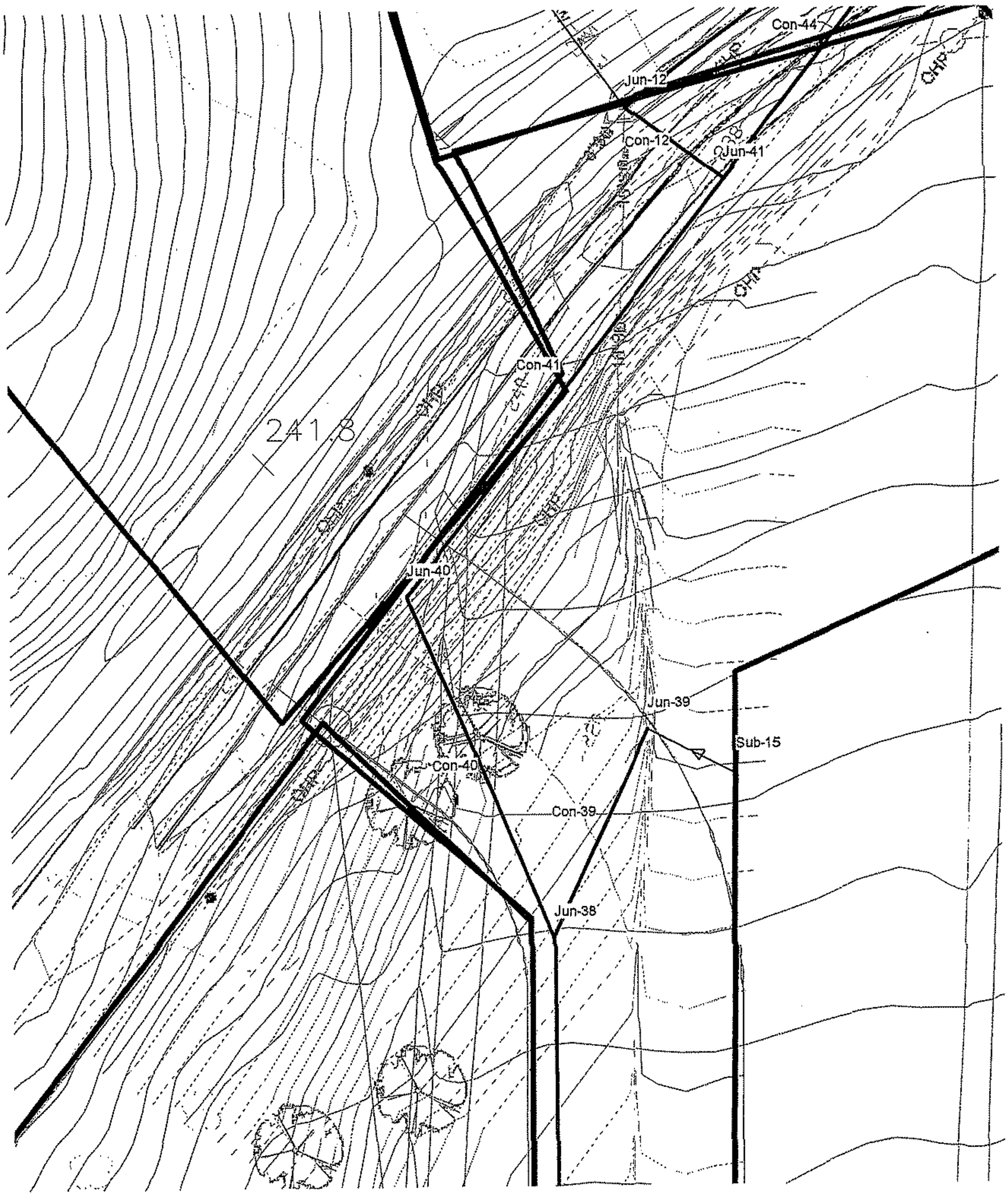


Element Labels (Enlarged)

Downstream System



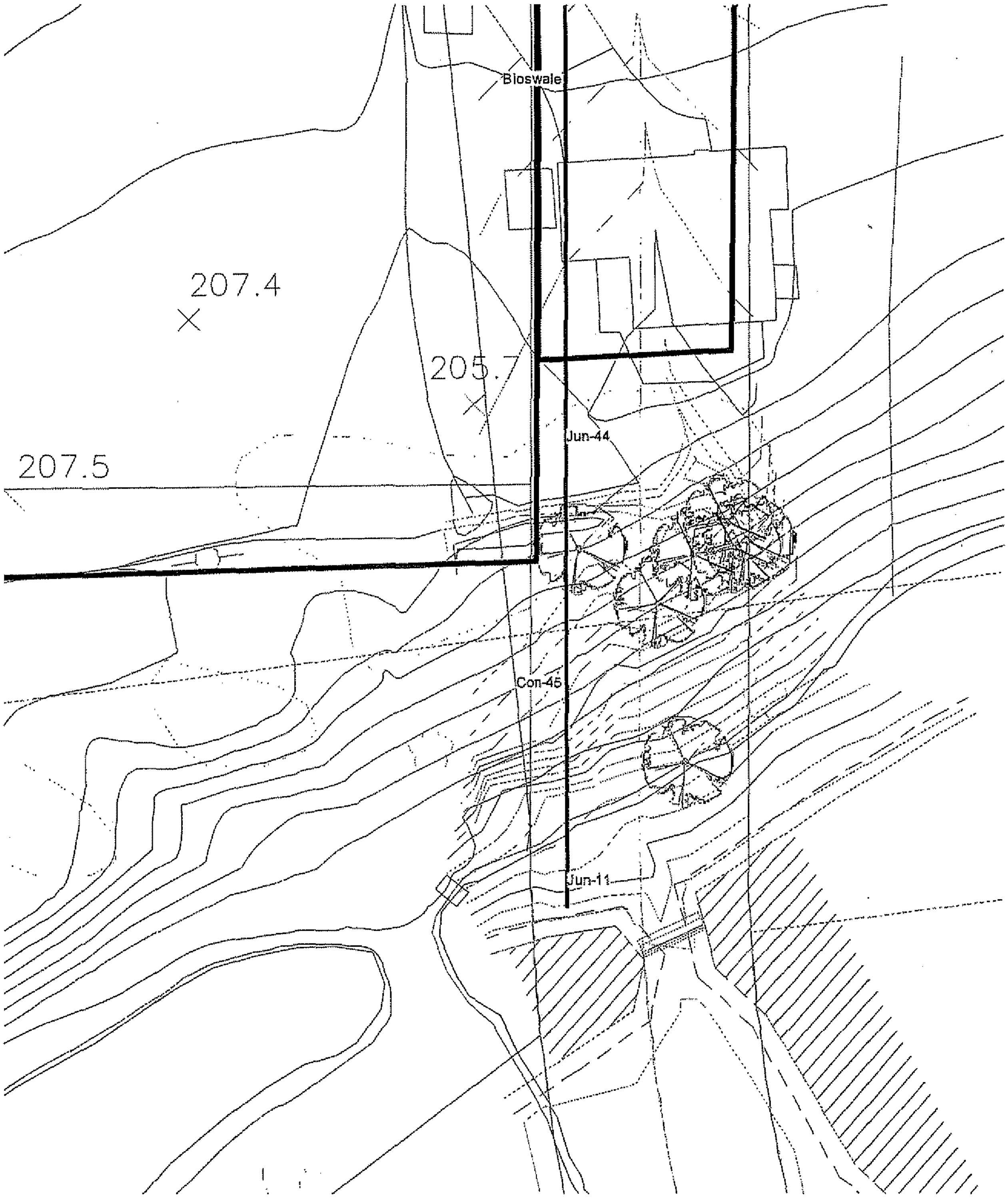
Downstream System



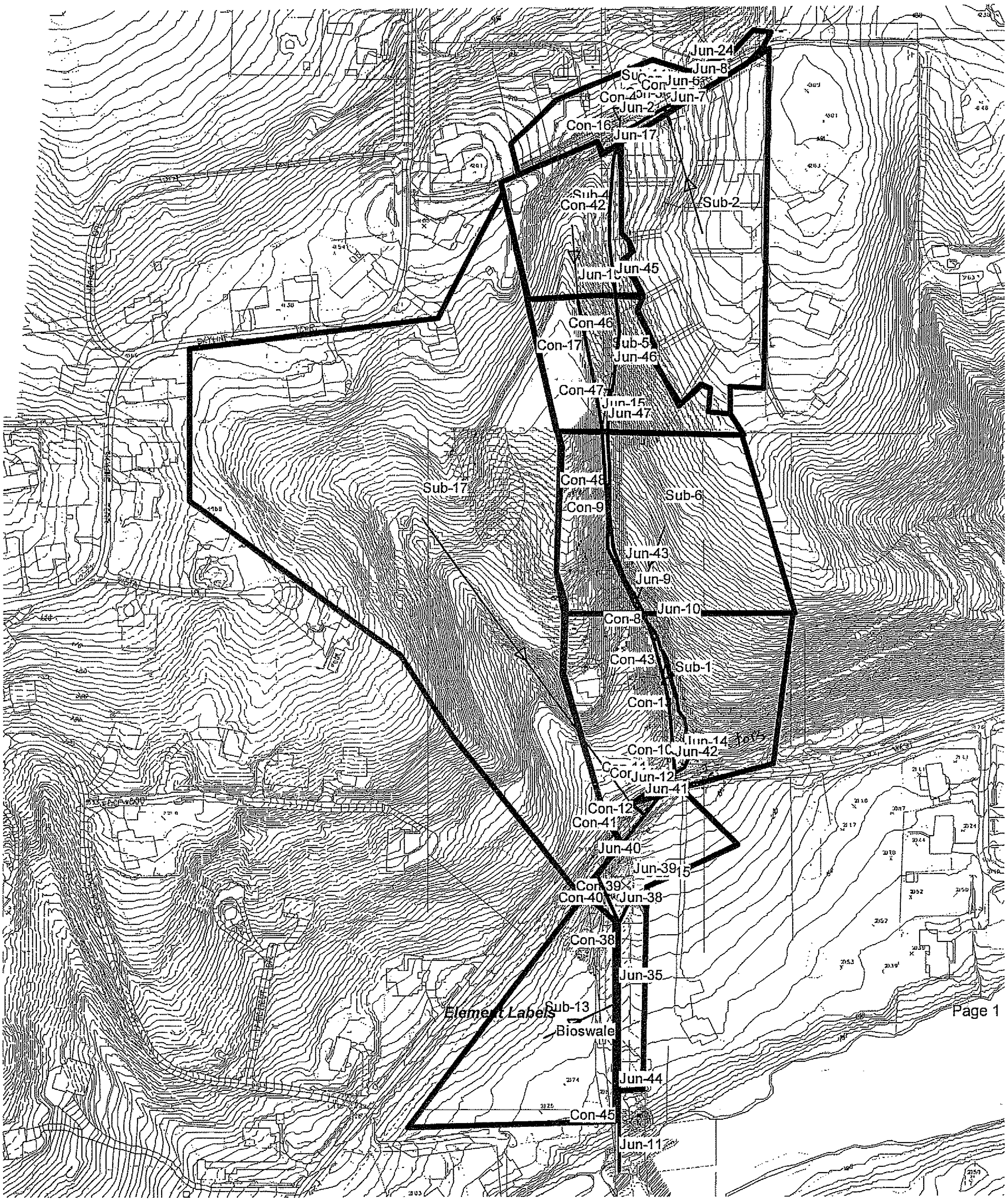
Downstream System

Element Labels (Enlarged)

Downstream System



Downstream System



445

LEGEND:

EXISTING

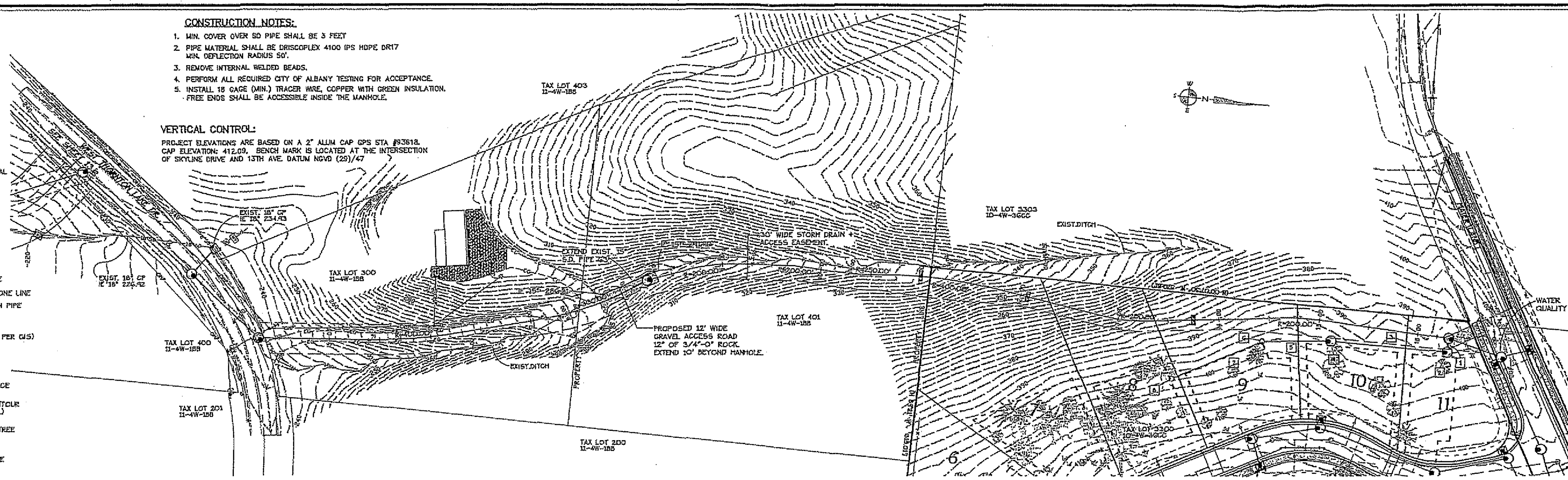
- CURB INLET CB
- SIGN POST
- UTILITY POLE
- GUY WIRE
- PHONE PEDESTAL
- POWER VAULT/PEDESTAL
- WATER VALVE
- AC — ASPHALT CONCRETE
- CP — CONCRETE PIPE
- EP — EDGE OF PAVEMENT
- EG — EDGE OF GRAVEL
- IE — INVERT ELEVATION
- MP — METAL PIPE
- —OHP— OVERHEAD POWER LINE
- —T— UNDERGROUND TELEPHONE LINE
- 12"SD— EXISTING STORM DRAIN PIPE (SIZE AS NOTED)
- —UGP— UNDERGROUND POWER
- —W— WATER LINE (LOCATED PER GIS)
- WV — WATER VAULT
- WATER METER
- 1 — STORM DRAIN REFERENCE
- EXISTING GROUND CONTOUR (2' CONTOUR INTERVAL)
- EXISTING DECIDUOUS TREE
- EXISTING CONIFER TREE

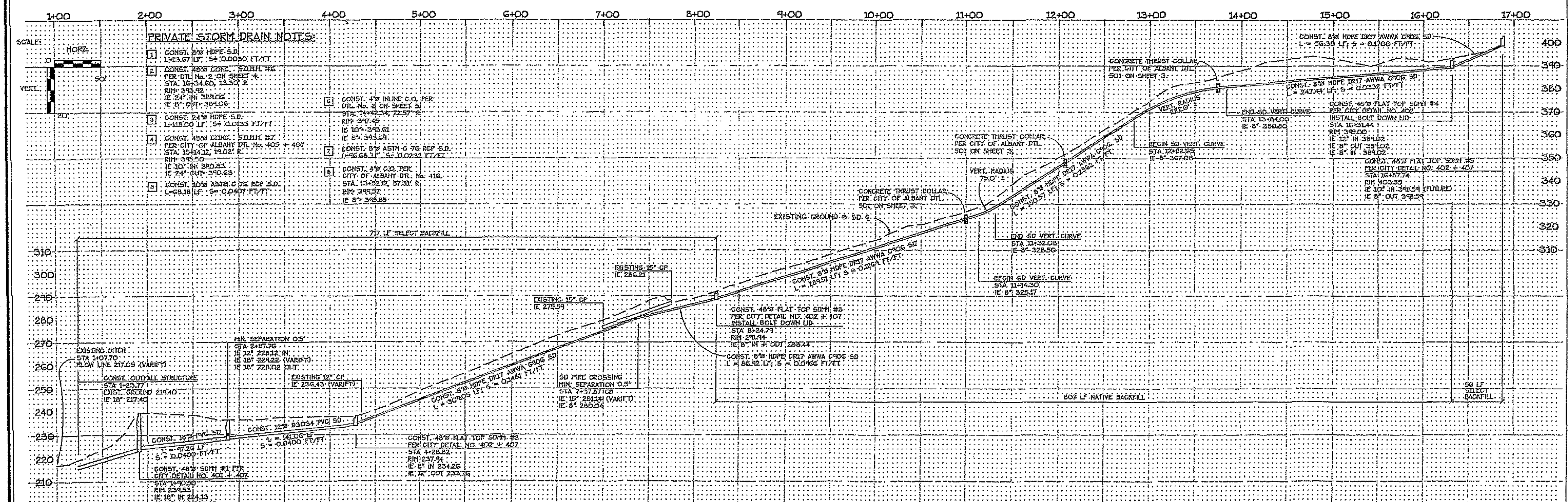
CONSTRUCTION NOTES:

1. MIN. COVER OVER SD PIPE SHALL BE 3 FEET
2. PIPE MATERIAL SHALL BE DRISCOPLEX 4100 IPS HDPE DR17 MIN. DEFLECTION RADIUS 50'.
3. REMOVE INTERNAL WELDED BEADS.
4. PERFORM ALL REQUIRED CITY OF ALBANY TESTING FOR ACCEPTANCE.
5. INSTALL 18 GAGE (MIN.) TRACER WIRE, COPPER WITH GREEN INSULATION. FREE ENDS SHALL BE ACCESSIBLE INSIDE THE MANHOLE.

VERTICAL CONTROL:

PROJECT ELEVATIONS ARE BASED ON A 2" ALUM CAP GPS STA #93618. CAP ELEVATION: 412.09. BENCH MARK IS LOCATED AT THE INTERSECTION OF SKYLINE DRIVE AND 13TH AVE. DATUM NGVD (29)/47





PRIVATE STORM DRAIN NOTES:

1. CONST. 8"Ø HDPE S.D. L=13.67 LF, S=0.0030 FT/FT
2. CONST. 48"Ø CONC. S.D.M.H. #6 PER DTL No. 2 ON SHEET 4. STA. 16+34.60, 13.30' R. RIM=393.92 IE 24" IN: 389.06 IE 8" OUT=389.06
3. CONST. 24"Ø HDPE S.D. L=118.00 LF, S=0.0133 FT/FT
4. CONST. 48"Ø CONC. S.D.M.H. #7 PER CITY OF ALBANY DTL No. 405 + 407 STA. 15+14.12, 19.02' R. RIM=395.50 IE 10" IN: 390.83 IE 24" OUT=390.63
5. CONST. 10"Ø ASTM C 76 RCP S.D. L=68.16 LF, S=0.0407 FT/FT
6. CONST. 4"Ø INLINE C.O. PER DTL No. 2 ON SHEET 5. STA. 14+42.34, 22.57' R. RIM=397.45 IE 10"=393.61 IE 8"=393.69
7. CONST. 8"Ø ASTM C 76 RCP S.D. L=96.68 LF, S=0.0232 FT/FT
8. CONST. 4"Ø C.O. PER CITY OF ALBANY DTL. No. 416. STA. 13+52.12, 57.33' R. RIM=399.52 IE 8"=395.85

Date: 10/21/2008 Time: 11:53 Scale: 1=50(PS) File: dwg\2006\06-63-e\0663e-0832-tp.dwg (Grian) Xrefs: 0832-bw.dwg, 0832-P.dwg	

DATE	REVISIONS	BY

REGISTERED PROFESSIONAL ENGINEER 17,612 OREGON JAN. 17, 1995 DANIEL K. WATSON
RENEWAL DATE 6-30-10

K & D ENGINEERING, INC.
K&D
276 N.W. HICKORY STREET
P.O. BOX 725
ALBANY, OREGON 97321
(541) 928-2583

FABIAN ESTATES

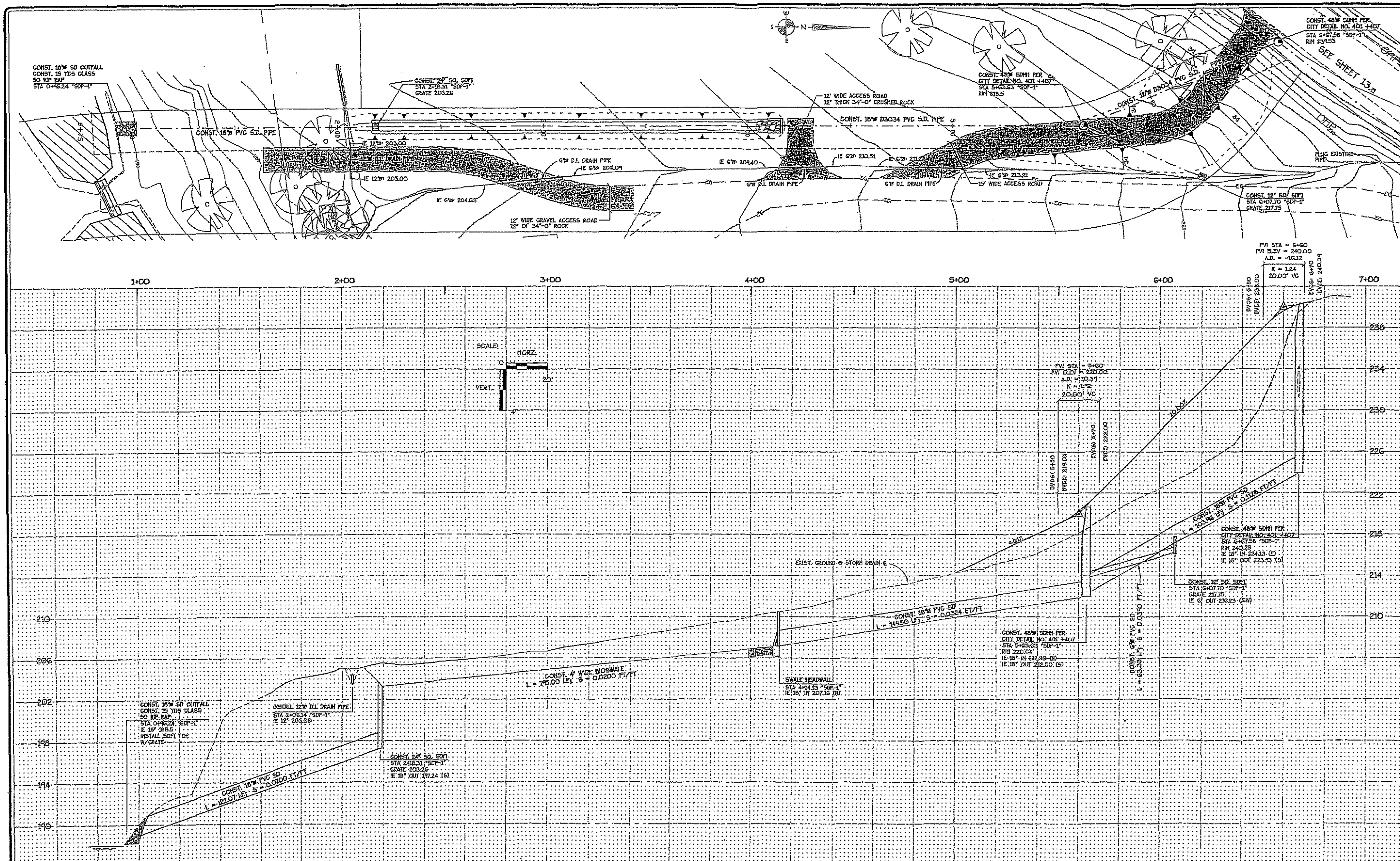
CITY OF ALBANY, BENTON COUNTY, OREGON

PLAN & PROFILE STORM DRAIN PIPE

HORZ. SCALE	1"=50'
VERT. SCALE	1"=20'
SIGN DATE	
DSGN BY:	D.K.W.
DRWN BY:	M.E.H.
CHCK BY:	D.K.W.
PROJECT No.:	08-32

SHEET No. 13.a OF 13

446



Date: 10/31/2008 Time: 11:29
Scale: 1=20(1:8)
File: dwg\2006\06-63-F\06630F-0663F-st.dwg
Xrefs: 0663F-base.dwg, 0663F-p.dwg

DATE	REVISIONS	BY

REGISTERED PROFESSIONAL ENGINEER
17,512
OREGON
JAN. 17, 1992
DANIEL K. WATSON
RENEWAL DATE 6-30-10

K & D ENGINEERING, INC.
276 N.W. HICKORY STREET
P.O. BOX 725
ALBANY, OREGON 97321
(541) 928-2583

FABIAN ESTATES

CITY OF ALBANY, BENTON COUNTY, OREGON

STORM DRAIN CONSTRUCTION

HORIZ. SCALE: 1"=20'
VERT. SCALE: 1"=4'
SIGN DATE: D.K.W.
DSGN BY: NJN
DRWN BY: MEH
CHCK BY: DKW
PROJECT No: 06-63-F

SHEET No. 13.6 OF 13

W R G
DESIGN INC.

MEMORANDUM

To: Jeff Blaine, City of Albany Via: E- Mail

From: Cedomir Jesic, PE, CFM
Principal Water Resources
Kathleen Freeman, EIT, CFM
Water Resources Senior Project Designer

Date: December 1, 2008

Project: **Fabian Estates Drainage Review**
WRG#: **2088682.00**
Re: Review of Drainage Design

The proposed Fabian Estates subdivision, which was originally approved by the City of Albany, has been appealed by LUBA and local citizens. Items raised by the opponents are as follows:

1.) The original Water Quality Report had the grassy swale slope at 10%, which is out of compliance with the City of Portland's design guidelines.
2.) The width of the swale appeared to be out of compliance with the City of Portland's design guidelines.
3.) Storm events greater than the water quality event will scour and flush out pollutants from the swale.
4.) The original Water Quality Report did not vary the Manning's "n" coefficient with an increase in flow and depth of flow.
5.) Post-developed runoff flows were calculated by opponents to be 33% higher than applicants.
6.) All of the contributing drainage basins were not considered.

The purpose of this memorandum is to perform an analysis on the system as designed, as well as perform an independent analysis of the existing conditions.

Existing Conditions
Per the Natural Resources Conservation Service, the soils on the site have been rated as type B soils, which have moderate infiltration rates when thoroughly wet. Although a site visit has not been conducted, aerial photographs as well as ground photographs have been observed which have allowed us to make a determination of the existing ground cover type. The existing site appears to be covered in thick brush with trees. We have classified the cover type using the Technical Release 55-Urban Hydrology for Small Watersheds as Brush-brush-weed-grass mixture with brush the major element and ground cover over 50 to 75% of the area (pervious Curve Number = 65). According to the applicant's Storm Drainage and Detention Study, there is 0.19 acres of impervious surfaces with an associated curve number of 98.

Since we do not have a site plan in a CAD drawing, we assumed that the basin areas delineated by the applicant for the existing site and the time of concentrations were accurate. Additionally, the opposition did not have any issues with onsite basin areas or time of concentration. However, we assigned a lower pervious curve number for the site than both the opposition and applicant; this could be due to the fact that we are basing the ground cover type on photographs rather than an actual site visit.

DEVELOPMENT SERVICES
LAND PLANNING
CIVIL ENGINEERING
LANDSCAPE ARCHITECTURE
LAND SURVEY

5415 SW Westgate Dr.
Suite 100
Portland, OR
97221

PH 503/419-2500
FX 503/419-2600

www.wrgd.com

Post-Developed Conditions
The proposed lots on the site were assumed be 1/3 acres with an average impervious area of 30%. An associated curve number of 72 was used based on the Table 2-2a of the Technical Release 55-Urban Hydrology for Small Watersheds. The site will also contain asphalt pavement with an associated curve number of 98. Again, since we do not have a site plan in a CAD drawing, we assumed that the basin areas delineated by the applicant for the post-developed site and the time of concentrations were accurate.

Design Storm
The computer program xpswmm was used to determine the existing runoff rates, post-developed runoff rates and detention storage required to release the post-developed runoff at or below the 5, 10, 25, 50 and 100 year existing runoff rates (See Attached Runoff Hydrographs). A Type 1A design storm using the SCS method was used to determine the runoff rates. Additionally, we used the same precipitation depths for each storm event that the applicant used.

Table 1 below shows the runoff rates during the existing conditions at the Fabian Estates site, as calculated by WRG Design and the applicant.

Recurrence Interval (years)	Applicant's Existing Runoff Rate (cfs)	WRG's Existing Runoff Rate (cfs)	% Difference
5	0.35	0.14	61.14
10	0.60	0.27	55.67
25	0.89	0.55	38.31
50	1.27	0.81	36.06
100	1.59	1.09	31.19

Table 1 - Existing Runoff Rates

As the table shows, the existing runoff rates as computed by WRG are much lower than the applicant's. This is due to the difference in curve numbers. As stated earlier, we did not conduct a site visit to verify our assumption.

The existing runoff values from the proposed site were used for establishing the release rates for post-developed conditions during the 5, 10, 25 and 50-year storm events for our detention calculations.

Table 2 below shows the runoff rates during the post-developed conditions at the Fabian Estates site, as calculated by WRG Design.

Recurrence Interval (years)	Applicant's Post-Developed Peak Runoff Rate (cfs)	WRG's Post-Developed Peak Runoff Rate (cfs)	% Difference
5	0.66	0.51	23.03
10	0.96	0.77	20.10
25	1.41	1.15	18.23
50	1.77	1.48	16.21
100	2.18	1.82	16.42

Table 2 – Post-Developed Runoff Rates

Runoff rates for the post-developed conditions were lower than the applicants due to differences in curve numbers.

Detention Volume
As stated previously, the existing and post-developed site was modeled in xpswmm to determine the flow rates and required detention volume so the post-developed release rates would not exceed the existing runoff rates. Our investigation assumed the flows would be detained in one facility to determine a detention volume for the entire site. The applicant calculated the total volume based on two detention facilities as the site will not all flow into one facility. This was then compared to the detention provided by the applicant's design as shown in Table 3 below.

Detention Volume Required (as calculated by WRG Design, ft^3)	Detention Volume Provided (as calculated by applicant, ft^3)	Difference (ft^3)
5,655	2,974	2,681

Table 3 – Detention Volume

The difference in volume is due to differences in existing runoff rates calculated.

Proposed Grassy Swale
The applicant has stated that they used the City of Portland's Stormwater Management Manual, issued August of 2008 to design their grassy swale.

Table 4 below shows the dimensions for the proposed grassy swale as described in the applicant's Water Quality Report, dated November 19, 2008.

Storm Event Flow Rate (cfs)	Swale Bottom Width (ft)	Depth (ft)	Swale Length (ft)	Swale Slope (ft/ft)	Velocity (fps)	Side Slopes	Hydraulic Residence Time (min)	Manning's "n"
WQ = 0.41	4	0.27	195.00	0.02	0.30	4H:1V in Treatment Area	10.8	0.25
25YR=5.73	4	0.89	185.48	0.02	0.94	2H:1V aboveTreat-ment Area	-	0.17
100YR=9.97	4	1.20	185.48	0.02	1.11	2H:1V aboveTreat-ment Area	-	0.17
25YR=5.73	4	0.41	185.48	0.02	2.48	2H:1V aboveTreat-ment Area	-	0.04
100YR=9.97	4	0.55	185.48	0.02	3.00	2H:1V aboveTreat-ment Area	-	0.04

Table 4 – Grassy Swale Dimensions

The proposed grassy swale was modeled in xpswmm version 10.6.3. The software allows the user to define the channel based on varying channel side slopes, as well as Manning's "n" coefficients. The swale was modeled with a 4' wide bottom width, side slopes of 4:1 up to 0.33 feet deep, followed by 2:1 side slopes up to a final depth of 1.5 feet. A Manning's "n" coefficient of 0.25 was used in the treatment area, while a coefficient of 0.17 was used above that depth. Additionally, when analyzing the 25 and 100-year flow events, an initial depth of 0.27 feet was put into the upstream node. We also looked at what the velocities would be if the coefficient were decreased to 0.04.

Using the flow rates that the applicant calculated, the proposed grassy swale as designed will treat the water quality event and convey high flow events without exceeding the maximum velocity of 3.0 fps with Manning's "n" coefficients as low as 0.04.

Watershed Basin Analysis

GIS data was obtained to delineate the entire watershed basin which would ultimately drain to the grassy swale (See Attached Watershed Basin Delineation). Additionally, a time of concentration was calculated for the basin and basin flows were computed using StormShed 2G. Table 5 below shows the parameters used to calculate the flows, as well as the flows that were calculated.

Parameter	Total Precipitation Depth (in.)
Watershed Basin	28.32 ac
Curve Number	70.00
Impervious Area	1.26
Tc	30.43
25 Year Flow	6.03
100 Year Flow	10.11

Table 5 – Watershed Basin

Based on the flows that we computed, the 100-year storm event will produce a velocity in the swale of 3.01 fps (using a Manning's "n" coefficient of 0.04) (See Attached Hydrograph).

In addition to changing the Manning's "n" coefficient, we performed a shear stress calculation on the swale. In the calculation we considered the lining of the swale to be Bermuda grass allowed to grow to at least 2.5 inches tall. The calculation showed that the shear stress calculated would be less than the permissible shear stress for Bermuda grass and would therefore be an adequate design for the expected flow rates (See Attached Shear Stress Calculation).

Conclusion

The applicant addressed all of the opponents' comments in the following documents:

- Water Quality Report Fabian Estates Subdivision, Dated November 19, 2008
- Letter to Mr. Donovan, Planning Manager, Dated November 20, 2008
- Storm Drainage and Detention Study Fabian Estates Subdivision, Dated November 19, 2008

The following are our findings which address the items listed at the beginning of this memo from the opponent:

1.) The original Water Quality Report had the grassy swale slope at 10%, which is out of compliance with the City of Portland's design guidelines.

The applicant erroneously entered the wrong slope for the swale. The Storm Drain

Construction Sheet (13.b) and the Water Quality Report correctly state that the swale is at 2%.

2.) The width of the swale appeared to be out of compliance with the City of Portland's design guidelines.

The bottom width of the swale is 4 feet, with side 4:1 side slopes up to 0.33 feet. At 0.33 feet, the side slopes will be 2:1 and will extend another 1.5 feet above the treatment depth. These dimensions are in compliance with the City of Portland's design guidelines.

3.) Storm events greater than the water quality event will scour and flush out pollutants from the swale.

The swale was modeled in xpswmm using the flow rates that the applicant calculated, as well as the 100-year flow rate we calculated. The swale, as designed should not flush out pollutants when high storm events are conveyed.

4.) The original Water Quality Report did not vary the Manning's "n" coefficient with an increase in flow and depth of flow.

The applicant addressed this specifically in the Water Quality Report, dated November 19, 2008. In this report, he used a Manning's "n" value of 0.17 for storm events greater than the water quality event. The value of 0.17 was obtained from the Institute of Transportation Studies. The applicants' analysis showed that the velocities in the swale during the high flow events will not exceed 3.0 fps.

Additionally, WRG decreased the Manning's "n" values down to 0.04 and found that the velocities would not be greater than 3.0 fps for the flow rates the applicant calculated. We calculated a slightly higher flow rate to the swale (10.11 cfs) and used this as a constant flow rate with a Manning's "n" of 0.04. The resulting velocity was 3.01 cfs.

5.) Post-developed runoff flows were calculated by opponents to be 33% higher than applicants.

Our analysis showed that the post-developed runoff rates were actually less than the applicants. We calculated lower runoff rates for existing conditions which is due to lower curve number. This could be contributed to the applicant's greater familiarity with the project specifics. If Council approves this land use application, curve numbers should be verified during design to ensure adequate detention volumes are provided. The lower existing runoff rates attributed to a larger detention volume. Runoff rates for the entire watershed basin were very similar to the applicants.

6.) All of the contributing drainage basins were not considered.

We calculated a slightly larger area for the watershed basin than the applicant did with a difference of 0.17 acres; however, this additional acreage does not impact the design.

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

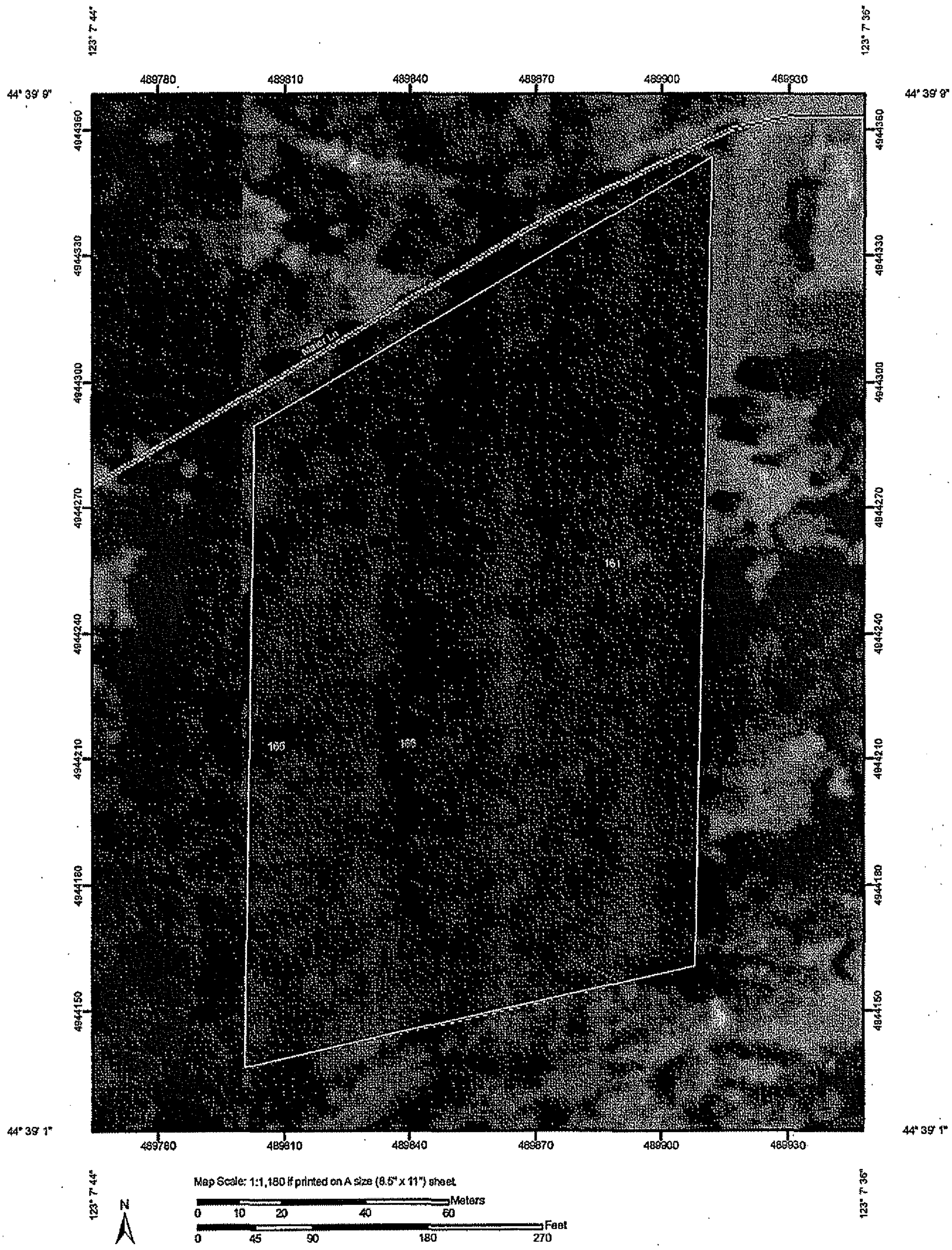
1 Average runoff condition, and $I_a = 0.2S$.
2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description: Cover type	Hydrologic condition	Curve numbers for hydrologic soil group: A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65←	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.
2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.
3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.
4 Actual curve number is less than 30; use CN = 30 for runoff computations.
5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.
6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Hydrologic Soil Group



Map Scale: 1:1,180 if printed on A size (8.5" x 11") sheet.

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:1,180 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Benton County, Oregon
Survey Area Data: Version 6, Sep 19, 2008

Date(s) aerial images were photographed: 7/18/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Benton County, Oregon				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
161	Wellsdale-Willakenzie-Dupee complex, 2 to 12 percent slopes	B	2.2	47.3%
165	Willakenzie loam, 20 to 30 percent slopes	B	0.6	13.7%
166	Willakenzie loam, 30 to 60 percent slopes	B	1.8	39.0%
Totals for Area of Interest			**4.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

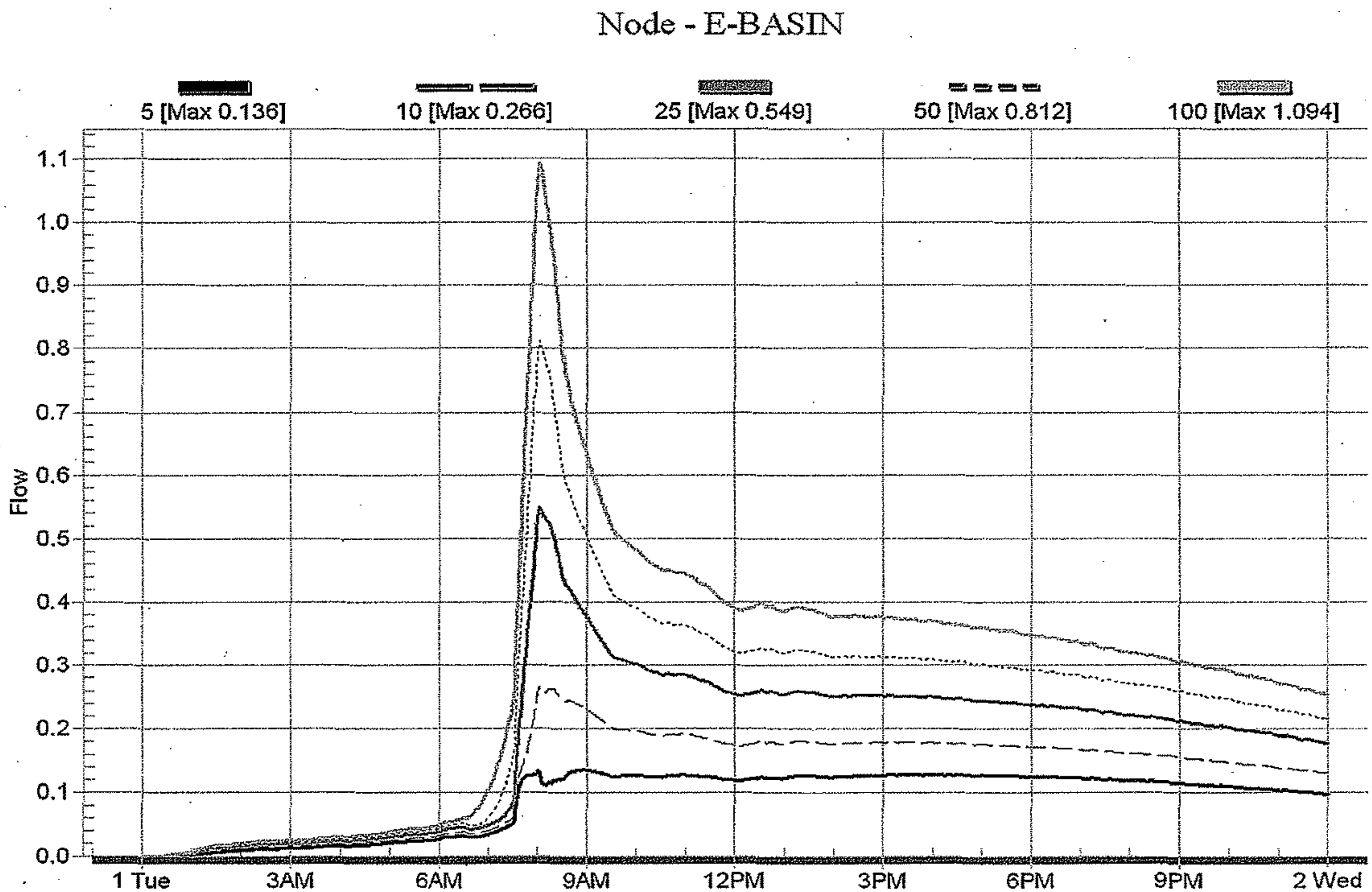
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

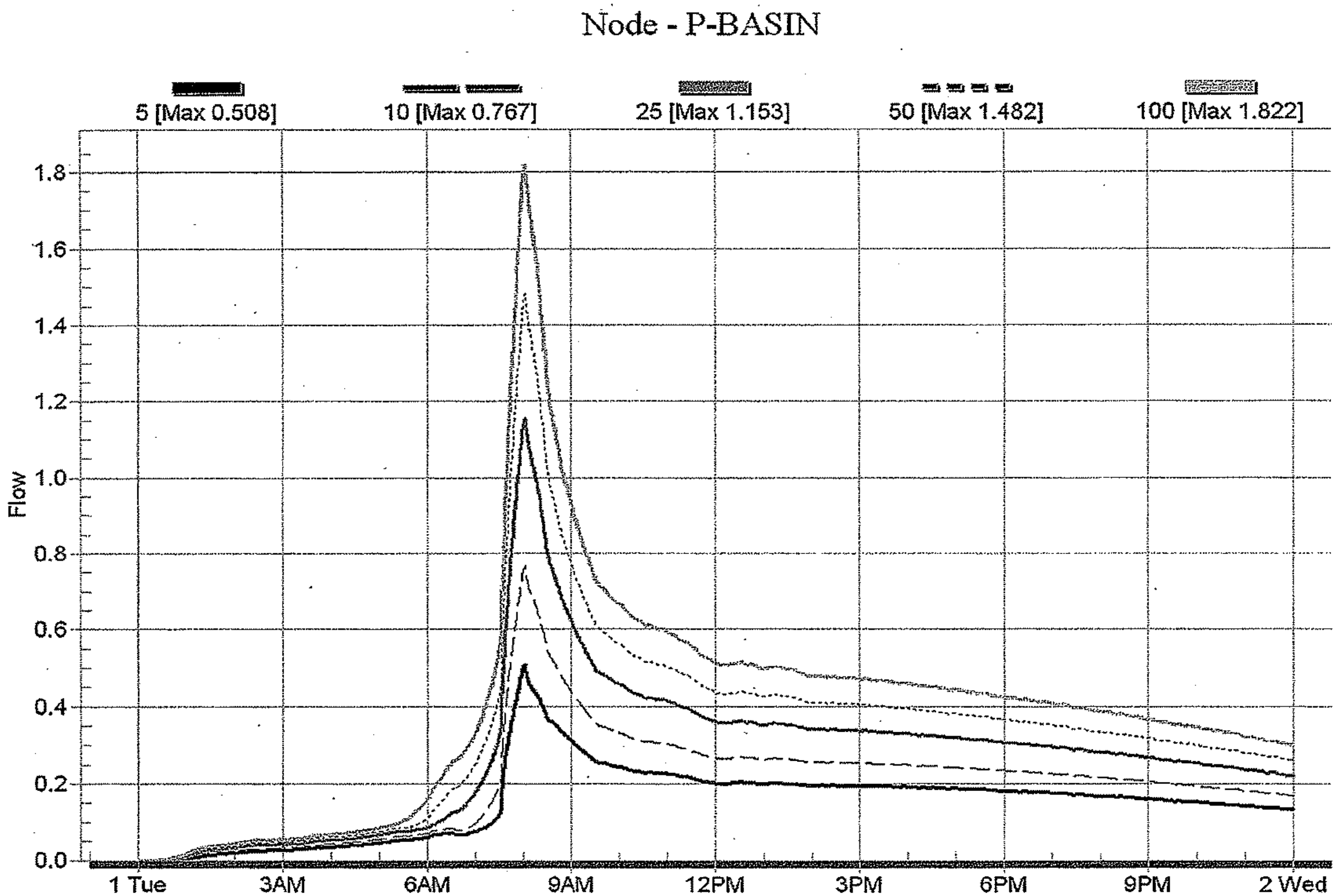
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

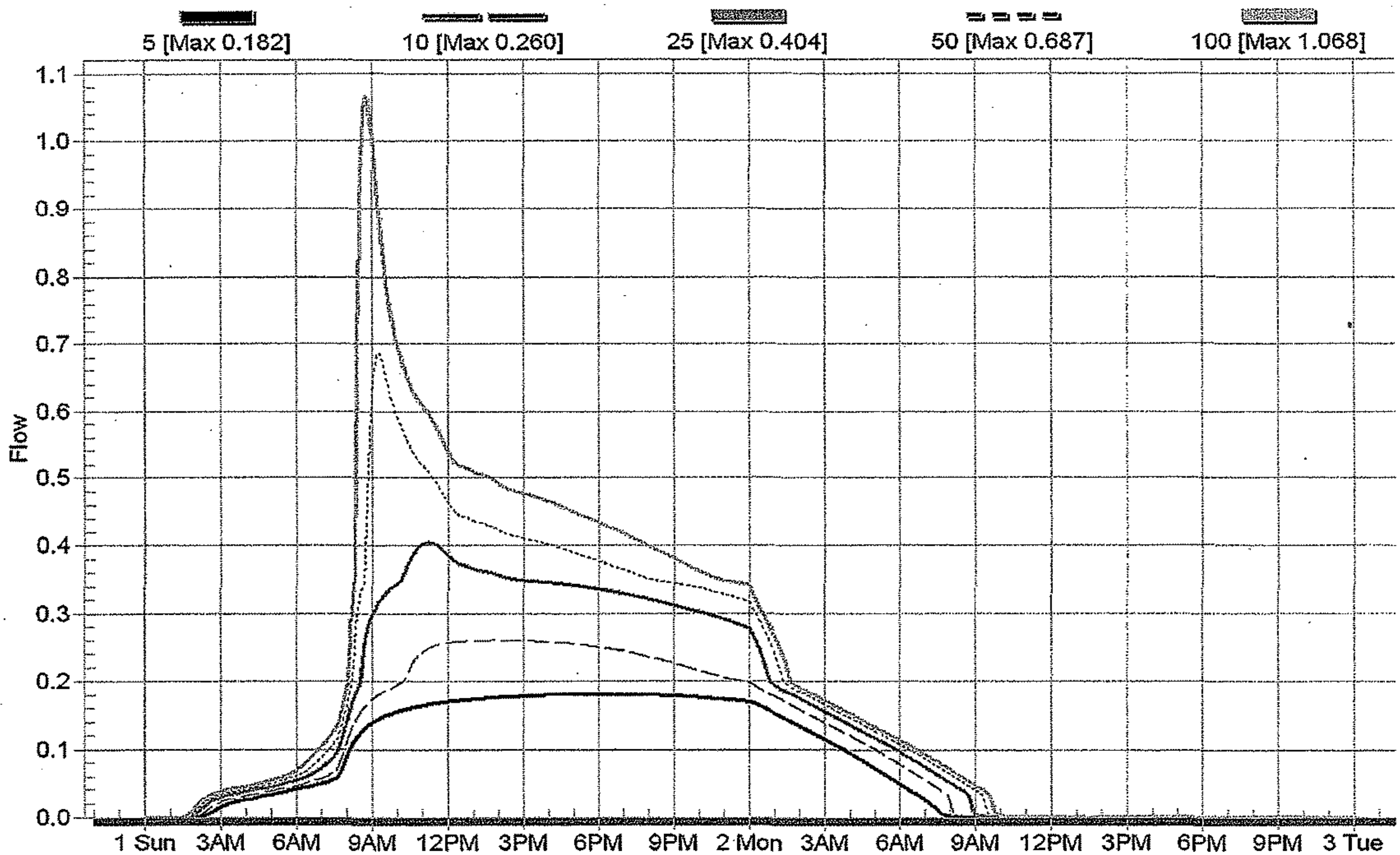
Existing Runoff Hydrographs

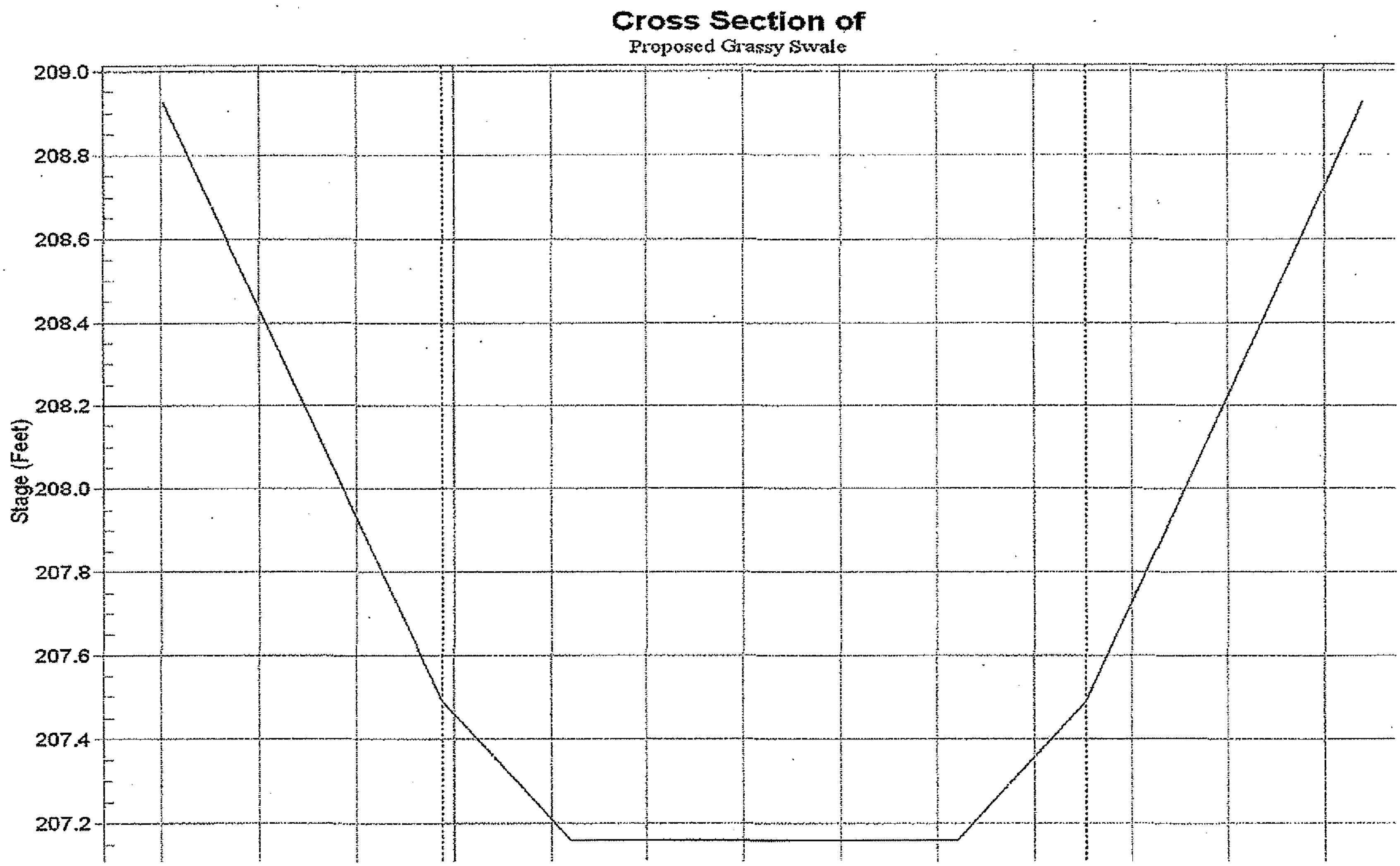


Post-Developed Runoff Hydrographs



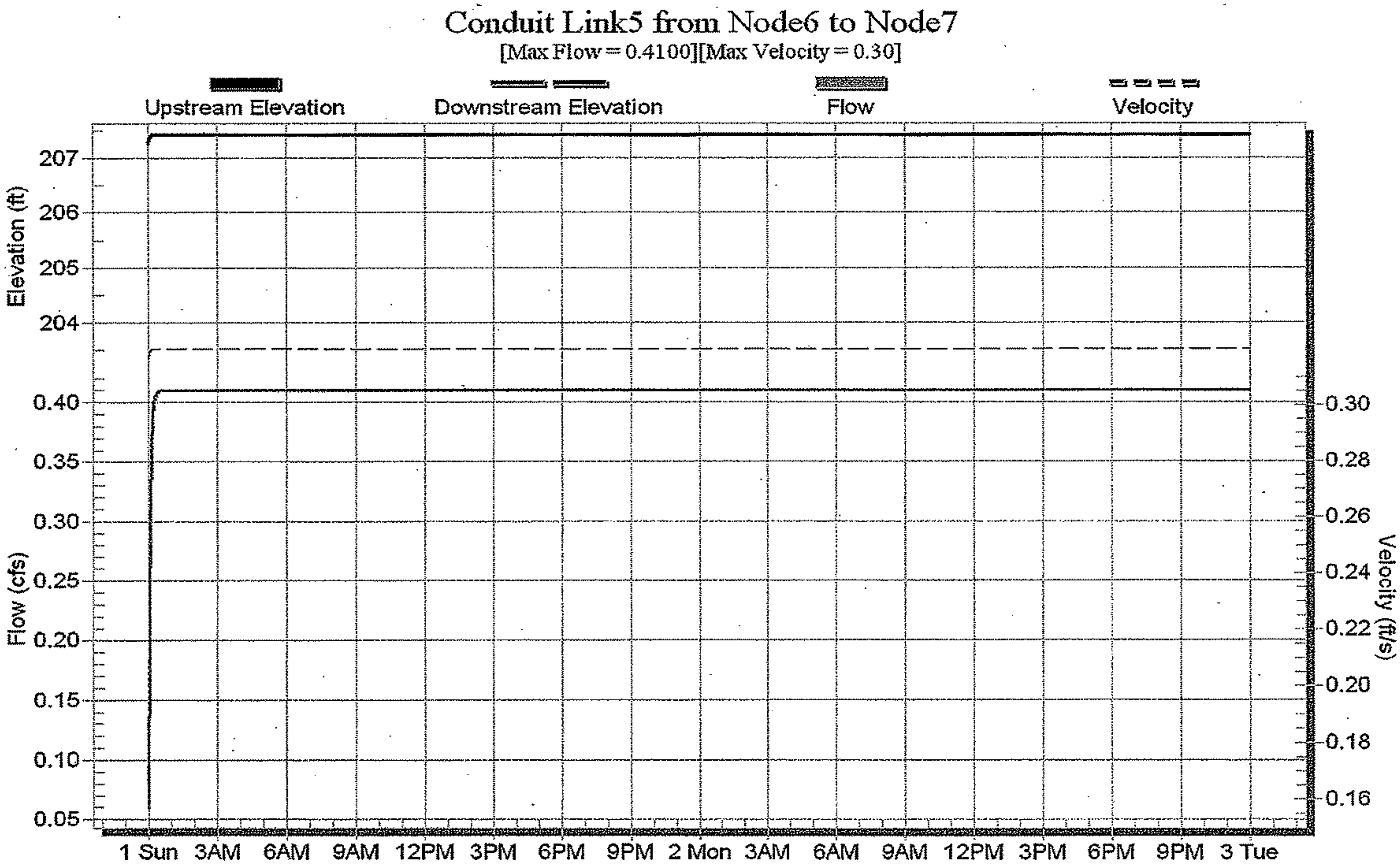
Post-Developed Release Hydrographs Using the Volume from a 36-inch Diameter, 800 foot long pipe





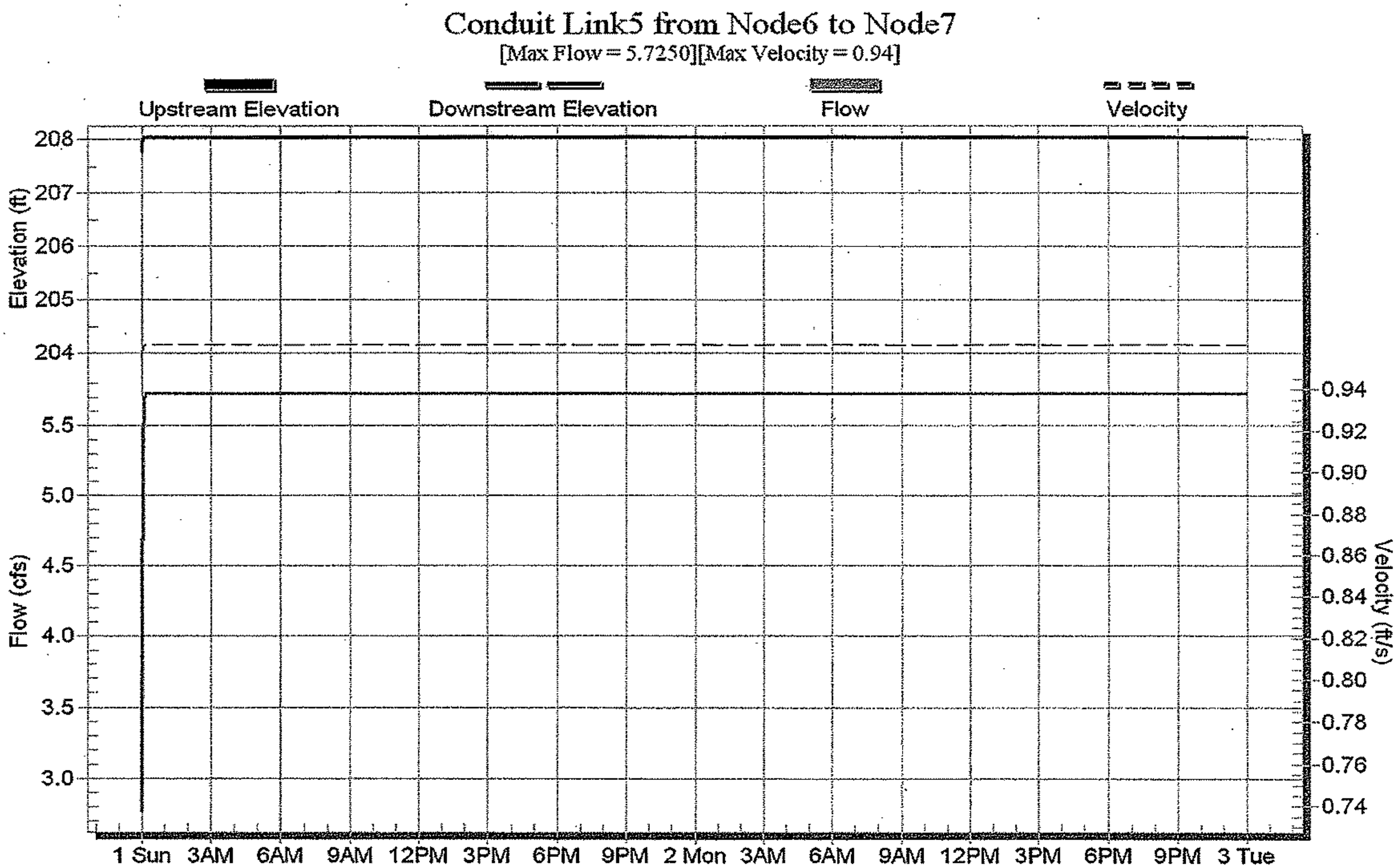
Proposed Swale as Designed: Modeled in xpswmm

Grassy Swale during Water Quality Event



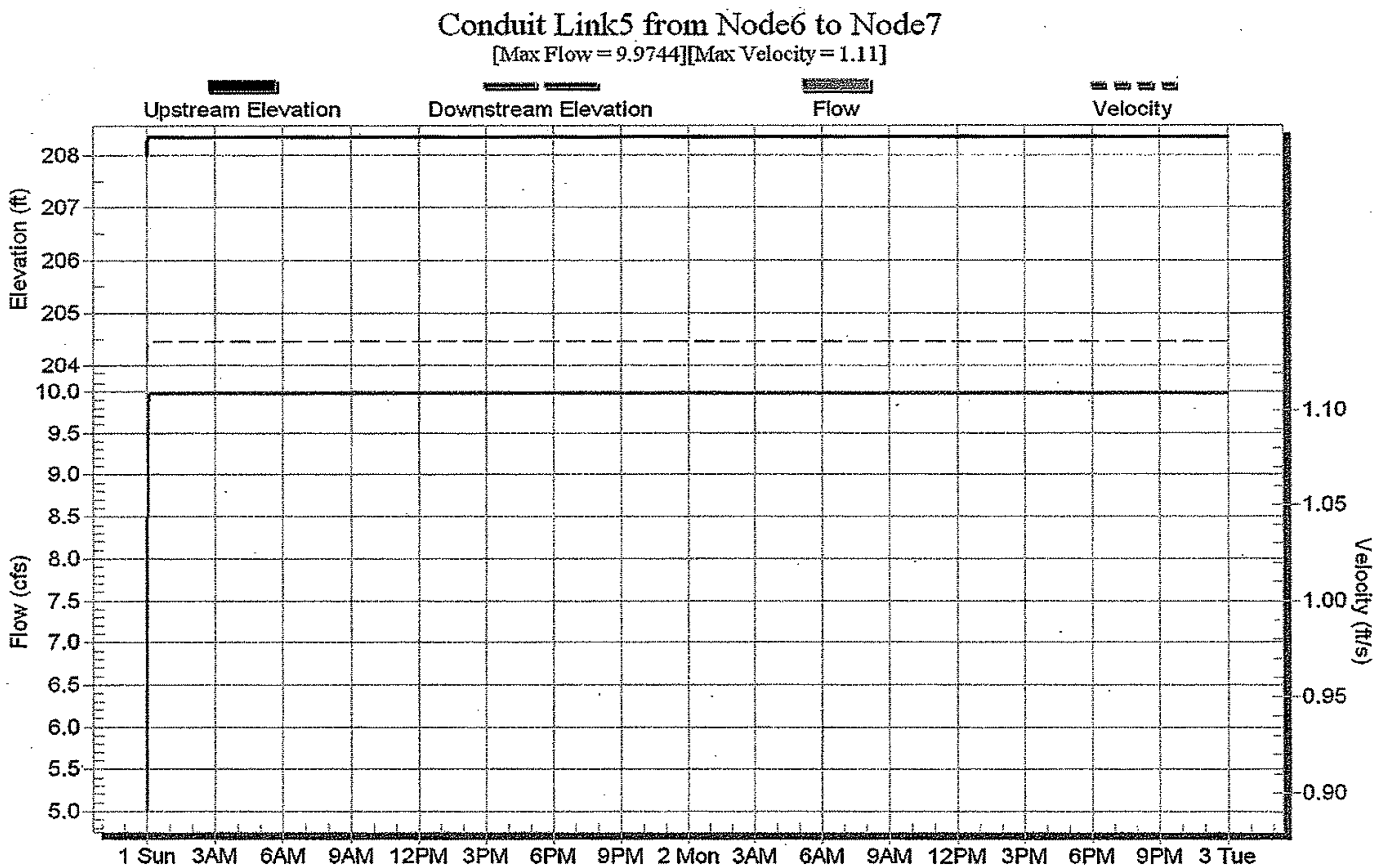
Max Flow and Velocity in Grassy Swale as Designed by the Applicant (Using a constant flow rate of 0.41 cfs)

Grassy Swale during 25-Year Event



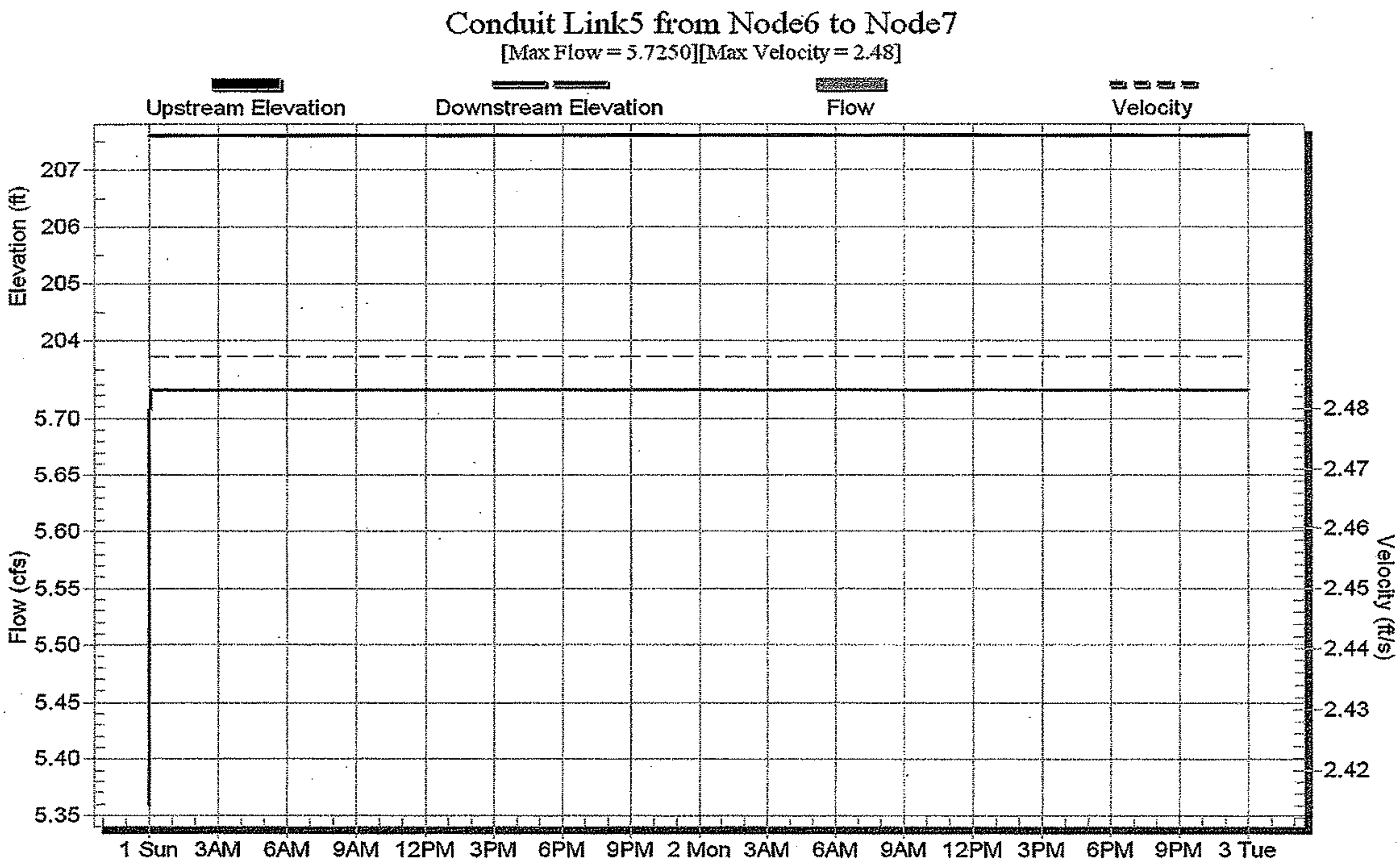
Max Flow and Velocity in Grassy Swale as Designed by the Applicant (Using a constant flow rate of 5.725 cfs and Manning's of 0.17)

Grassy Swale during 100-Year Event



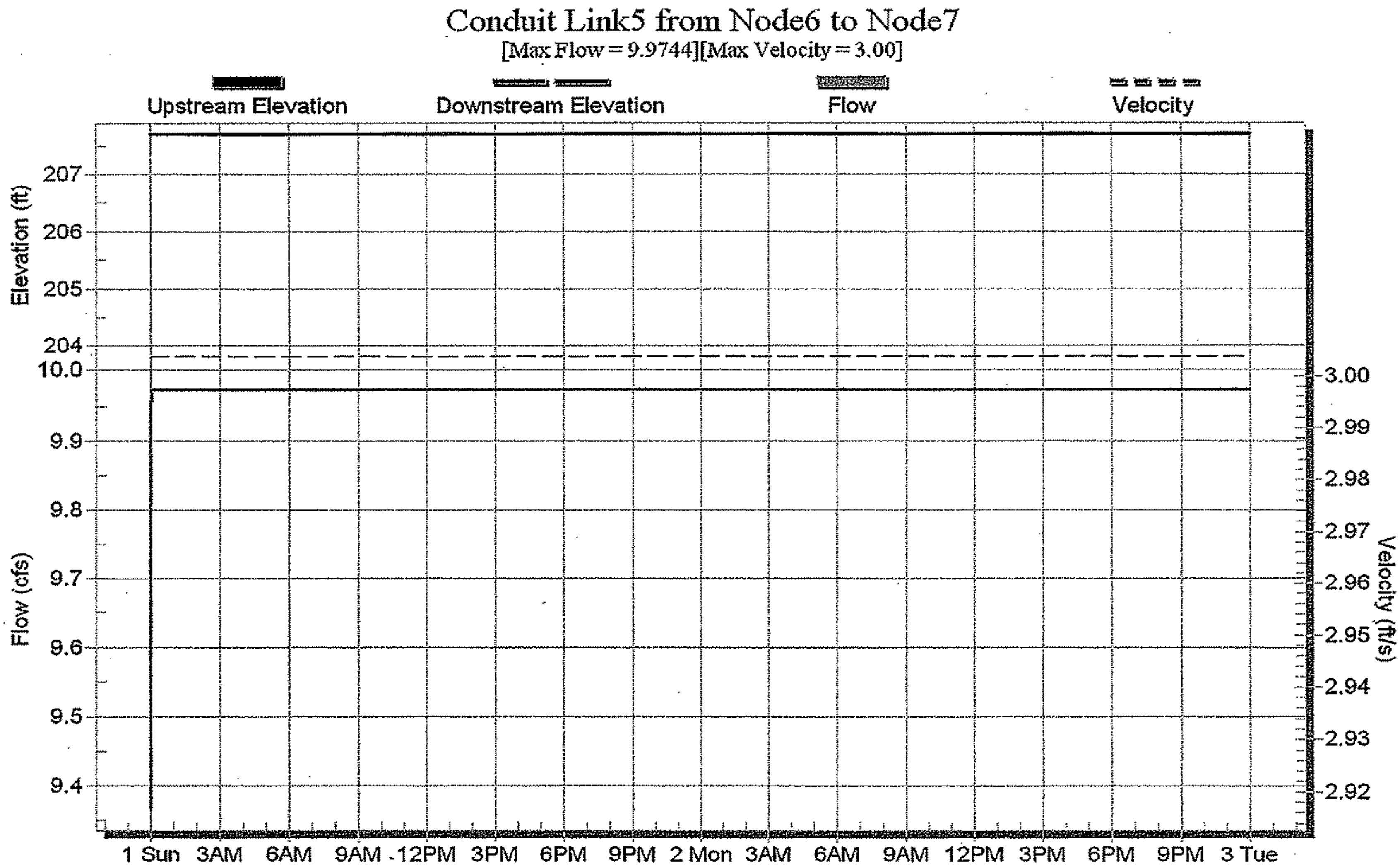
Max Flow and Velocity in Grassy Swale as Designed by the Applicant (Using a constant flow rate of 9.974 cfs and Manning's of 0.17)

Grassy Swale during 25-Year Event



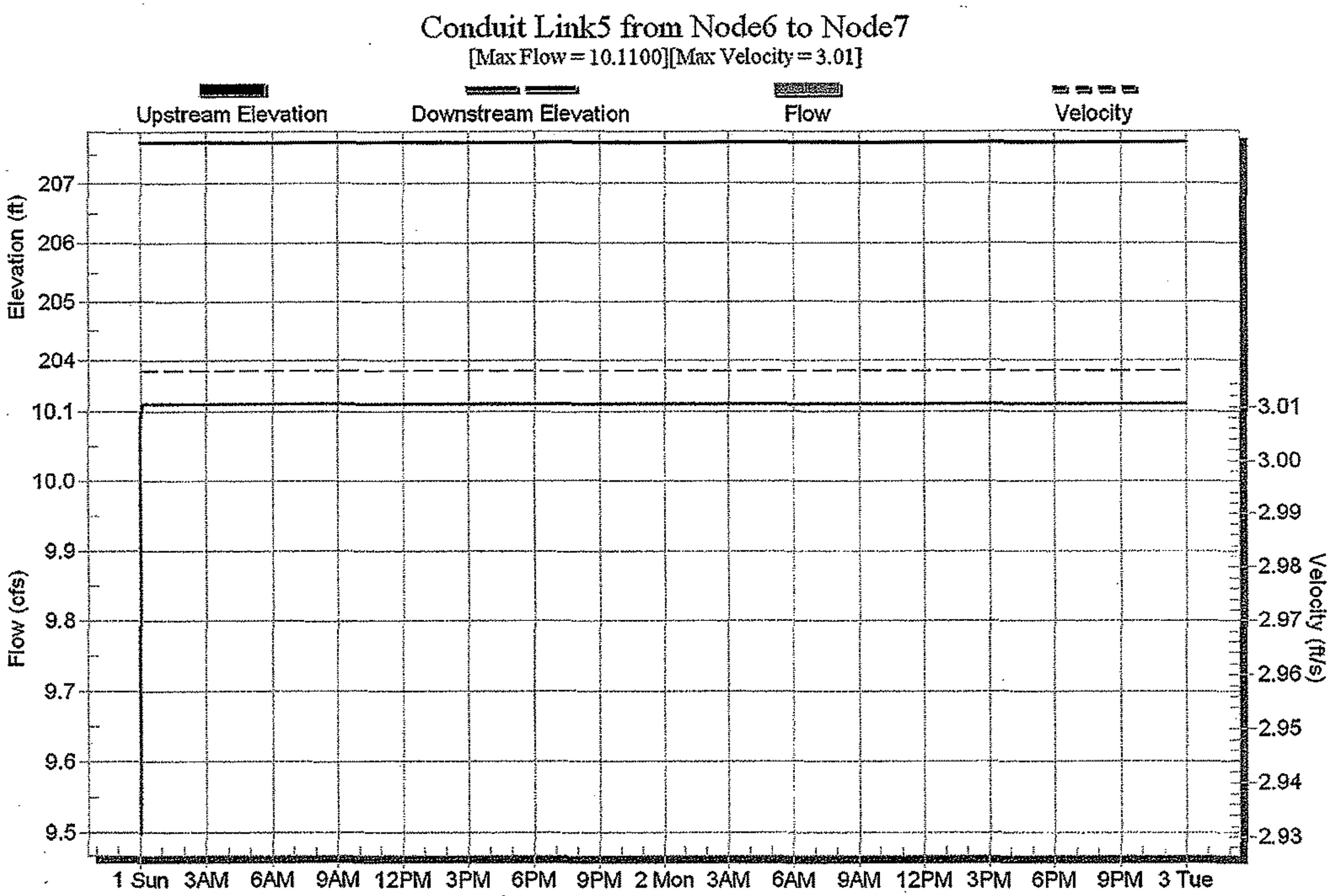
Max Flow and Velocity in Grassy Swale as Designed by the Applicant (Using a constant flow rate of 5.725 cfs and Manning's of 0.04)

Grassy Swale during 100-Year Event



Max Flow and Velocity in Grassy Swale as Designed by the Applicant (Using a constant flow rate of 9.974 cfs and Manning's of 0.04)

Grassy Swale during 100-Year Event Using Flow Rate As Computed by WRG Design



Max Flow and Velocity in Grassy Swale as Designed by Applicant (Using a constant flow rate of 10.11 and Manning's of 0.04)

WATERSHED Event Summary

Event	Peak Q (cfs)	Peak T (hrs)	Hyd Vol (acft)	Area (ac)	Method	Raintype
25 year	6.0303	8.17	3.2626	28.3200	SCS	TYPE1A
100 year	10.1191	8.17	4.8188	28.3200	SCS	TYPE1A

Record Id: WATERSHED

Design Method	SCS	**Rainfall type**	TYPE1A
Hyd Intv	10.00 min	**Peaking Factor**	484.00
		Abstraction Coeff	0.20
Pervious Area (AMC 2)	27.06 ac	**DCIA**	1.26 ac
Pervious CN	70.00	**DC CN**	98.00
Pervious TC	30.43 min	**DC TC**	30.43 min

Pervious CN Calc

Description	SubArea	Sub cn
Residential districts - 1/3 acre	27.06 ac	70.00
Pervious Composited CN (AMC 2)		70.00

Pervious TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Sheet	Smooth Surfaces.: 0.011	300.00 ft	9.33%	0.0110	2.50 in	1.78 min
Shallow	Forest w/ heavy ground litter & meadows (n=0.10)	1796.39 ft	10.60%	0.1000		28.65 min
Pervious TC						30.43 min

Directly Connected CN Calc

Description	SubArea	Sub cn
Impervious surfaces (pavements, roofs, etc)	1.26 ac	98.00
DC Composited CN (AMC 2)		98.00

Directly Connected TC Calc

Type	Description	Length	Slope	Coeff	Misc	TT
Fixed						30.43 min
Directly Connected TC						30.43min

Shear Stress

Project	Checked	Date
Input		Value
A	Cross Sectional Area (ft^2)	**3.36**
P	Wetted Perimeter (ft)	**7.81**
S_o	Slope of Channel (ft/ft)	**0.02**
γ	Unit Weight of Water (lb/ft^3)	62.4
Output		
R	Hydraulic Radius (ft)	0.43
τ_o	Shear Stress (lb/ft2)	0.54
τ_o	Permissible Shear Stress* (lb/ft2)	**0.60**
	Permissible >Actual	TRUE

* See Table 13 Permissible Shear Stress for Lining Materials

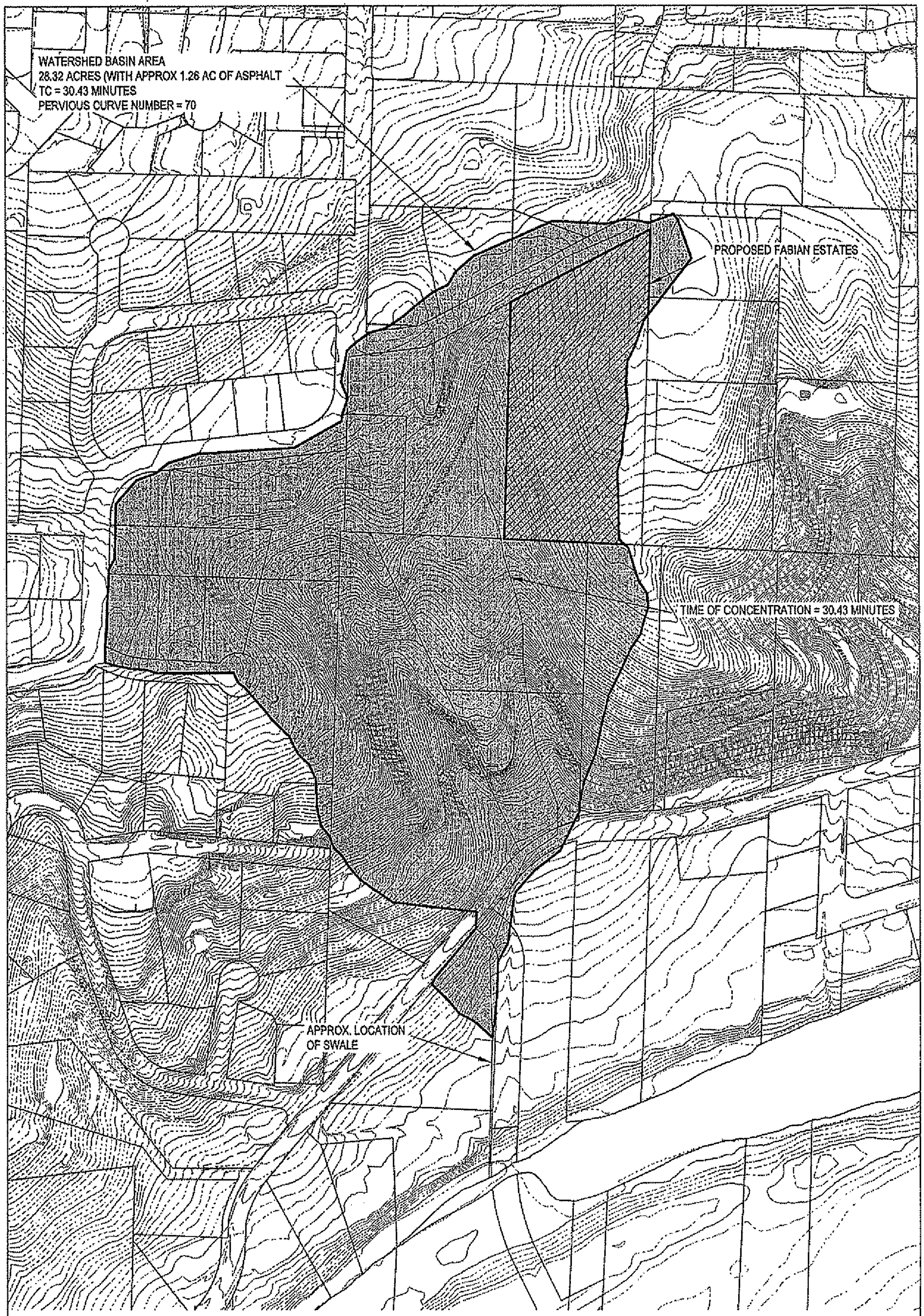
Assumed grassy swale would be planted with Bermuda grass and allowed to grow to at least 2.5 inches high.

Table 13. Permissible Shear Stresses for Lining Materials.[26]			
Lining Category	Lining Type	Permissible Unit Shear Stress	
		(lb/ft²)	(Pa)
Temporary*	Woven Paper Net	0.15	7.2
	Jute Net	0.45	21.6
	Fiberglass Roving:		
	Single	0.60	28.7
	Double	0.85	40.7
	Straw with Net	1.45	69.4
	Curled Wood Mat	1.55	74.2
	Synthetic Mat	2.00	95.8
Vegetative**	Class A	3.70	177.2
	Class B	2.10	100.5
	Class C	1.00	47.9
	Class D	0.60	28.7
	Class E	0.35	16.8
Gravel Riprap	25 mm	0.33	15.8
	50 mm	0.67	32.1
Rock Riprap	150 mm	2.00	95.8
	300	4.00	191.5
Bare Soil	Noncohesive	See "Hydraulic Engineering Circular No. 15"[26]	
	Cohesive		

*Some "temporary" linings become permanent when buried.

**A-E refers to retardance class, with Class A vegetation having high retardance and Class E having low retardance. Typical examples include (HEC-15, Table 1):

Retardance Class	Cover	Condition
A	Weeping lovegrass	Excellent stand, tall (76 cm) (30 in)
B	Weeping lovegrass	Good stand, tall (61 cm) (24 in)
C	Bermuda grass	Good stand, mowed (15 cm) (6 in)
D	Bermuda grass	Good stand, cut (6 cm) (2.5 in)
E	Bermuda grass	Good stand, cut (4 cm) (1.5 in)



PROJECT NO.	2088682.00	
DATE:	12/01/08	
BY:	KEF	
SHEET NO.	3	

WATERSHED BASIN DELINEATION
FABIAN ESTATES DRAINAGE REVIEW

City of Albany
Albany, Oregon

W R G DESIGN INC
PORTLAND • LAS VEGAS • PHOENIX
SACRAMENTO • BOISE • CHARLOTTE

T 206.223.4999
T 877.897.4999 toll free
F 206.223.4990

TO: Albany City Council

VIA: Wes Hare, City Manager
Greg Byrne, Community Development Director

FROM: Melanie Adams, Building Official MMA

DATE: December 3, 2008, for the December 8, 2008, City Council Meeting

SUBJECT: Proposed Building Division fee changes

RELATES TO STRATEGIC PLAN THEME:
- An Effective Government
- A Safe City

Action Requested:

Adopt a resolution adjusting Building Division fees as proposed in the attached fee schedule, with an effective date of January 1, 2009.

Discussion:

At the November 10, 2008, Council Work Session, Building Division staff presented a revised fee schedule for Council's consideration. The reasons for proposing these changes are: 1) to comply with new Consistent Form & Fee Methodology rules promulgated by the State Building Codes Division, which will become effective on January 1, 2009; and 2) to partially offset increases in personnel and overhead costs since the last fee change in 2001.

In light of the number of changes being proposed to Building's fee schedule, staff has made every effort to communicate with stakeholders during this fee change process:

- The proposed fee changes have been posted on the State's website for forty-five days in compliance with noticing requirements;
- Staff met with the leadership team of the local Homebuilders' Association to explain the fee changes and also made a presentation to interested stakeholders at a meeting of the Homebuilders' Association;
- The presentation and memo from the November 10th Work Session were posted on the Building Division webpage; and
- The Building Division hosted an open house at City Hall to provide a forum for open discussion of the fee change proposal. Notice was mailed out to nearly nine hundred contractors inviting them to attend, although only one local contractor stopped by to ask questions.

Budget Impact:

As explained in greater detail in the November 10th Work Session memo, the Building Division expects to see approximately an 18% increase in revenue from these fee changes. This will partially offset the 40-45% increase in personnel and overhead expenditures that have accrued since the last fee change in 2001.

MMA

Attachments: Exhibit A, Proposed Fee Schedule
Resolution

Exhibit A

CITY OF ALBANY BUILDING PERMIT FEES

1. CONSTRUCTION BUILDING PERMITS:

~~1.~~ Non-Residential & Residential

Total Valuation**	Fee
$0 to $25,000	$60.00* for the first $2,000 plus $8.90 for each additional $1,000 or fraction
$25,001 to $50,000	$264.70 for the first $25,000 plus $6.60 for each additional $1,000 or fraction
$50,001 to $100,000	$429.70 for the first $50,000 plus $5.20 for each additional $1,000 or fraction
$100,001 and up	$689.70 for the first $100,000 plus $3.80 for each additional $1,000 or fraction

*Maximum of one inspection.

~~:~~

**See Valuation Table located on previous page.

~~Total Valuation Fee(value of construction is determined by the Building Official)~~

~~$0 to $25,000 $50.00* for the first $2,000 plus $7.40 for each additional $1,000 or fraction~~

~~$25,001 to $50,000 $220.00 for the first $25,000 plus $5.50 for each additional $1,000 or fraction~~

~~$50,001 to $100,000 $360.00 for the first $50,000 plus $4.30 for each additional $1,000 or fraction~~

~~$100,001 and up $575.00687.70 for the first $100,000 plus $3.20 for each additional $1,000 or fraction~~

~~*Maximum of one inspection. See No. 8, MISCELLANEOUS INSPECTIONS, for required additional inspections and plan review fees.~~

Plus 12% state surcharge

Plus $1.00 per square foot residential and $.50 per square foot commercial School Construction Excise Tax.

Plus Document Imaging Charge of $1.00 per page

2. PLUMBING PERMITS:

New 1 & 2 Family Dwelling

Fee includes the first 100 ft of water and sewer service, hose bibbs, icemakers, underfloor low-point drains and rain drain packages that include the piping, gutters, downspouts and perimeter system.

Note: A half bath is equivalent to a single bathroom.

One Bathroom & Kitchen $190.00
Two Bathrooms & Kitchen 250.00
Three Bathrooms & Kitchen 300.00
Each additional Bath/Kitchen 50.00

Commercial, Multifamily, Manufactured Dwellings, 1 & 2 Family Dwelling

New*, Additions, Alterations, Repairs, & Accessory Structures

***Excludes 1 & 2 Family Dwelling, see fee schedule above.**

Backflow preventer (water) $60.00
Backwater valve (storm sewer) 60.00

Base permit fee $60.00
plus Plumbing fixture or items (per fixture or item) 12.00
Includes: Absorption valve, clothes washer, dishwasher, drinking fountain, ejectors/sump, expansion tank, floor drain/sink/hub, garbage disposal, hose bibb, icemaker, primer, sewer cap, sink/basin/lavatory, tub/shower/shower pan, urinal, water closet, water heater (new/replacement), other fixtures or items not named above.

Sewer:
First ~~50~~100 feet .... $~~33.~~40.00
For each additional 100 feet or portion .... ~~28.00~~34.00

Water service:
First ~~50~~100 feet .... $~~33.00~~40.00
For each additional 100 feet or portion .... ~~28.00~~34.00

Storm and rain drain:
First ~~50~~100 feet .... $~~33.00~~40.00
For each additional 100 feet or portion .... ~~28.00~~34.00

Manufactured home space $34.00
Plumbing Plan Review – When required or requested .... 25% of the permit fee
Minimum permit fee 60.00

~~Manufactured home space .... 28.00~~
~~Minor labels (10) .... 110.00~~
~~Gas Water Heater .... 7.00~~
~~Medical gas (per outlet) .... 10.00~~
~~**plus:** medical gas piping .... 22.00/floor~~
~~medical vacuum system .... 22.00/floor~~

Medical Gas Installation

~~:~~

Fees based on valuation of installation costs and system equipment, including but not limited to, inlets, outlets, fixtures and appliances (rounded up to the nearest dollar).

Exhibit A

Total Valuation	Fee
$0 to $25,000	$60.00* for the first $2,000 plus $8.90 for each additional $1,000 or fraction
$25,001 to $50,000	$264.70 for the first $25,000 plus $6.60 for each additional $1,000 or fraction
$50,001 to $100,000	$429.70 for the first $50,000 plus $5.20 for each additional $1,000 or fraction
$100,001 and up	$689.70 for the first $100,000 plus $3.80 for each additional $1,000 or fraction

*Maximum of one inspection.

Minimum permit fee $60.00

Plumbing plan review** .... 25 % of the permit fee
**Plan review is required on all Medical Gas Installations

Plus 12% state surcharge

Plus Document Imaging Charge of $1.00 per page

3. **MECHANICAL PERMITS:**

1& 2 Family Dwelling/ Manufactured Dwellings:

New, Additions, Alterations, Repairs, & Accessory Structures

Base permit fee .... ~~$50.00~~ $60.00

Fee per appliance/equipment

Gas Connections (includes relocation):
Each gas line extension, connection or outlet .... $8.50 ea

HVAC
For the installation, replacement, or relocation of each: Air handling, Air Conditioner, Boiler, Heat Pump, Furnace, Heater (permit includes ducts and vents for the appliance) .... $20.00 ea

Other mechanical equipment:
Vents or ducts (dryer, kitchen hood, exhaust fan) .... $4.00 ea
Decorative fireplace, fireplace insert, or woodstove .... 20.00 ea

Other appliance or equipment not named above .... 20.00 ea
Minimum permit fee 60.00

~~Other appliance or piece of equipment not named above ....0.00~~

~~Wood stove – freestanding/insert (pellet stove)..$17.00~~
~~Gas stoves – freestanding/insert..39.00~~
~~Additional gas appliances ....7.00~~
~~Air conditioner/compressor or forced-air or gravity-type furnace or burner, including ducts and vents~~
~~to and including 100,000 Btu/h ....$7.00~~
~~over 100,000 Btu/h...8.50~~
~~Each ventilation fan connected to a single duct ....5.00~~
~~Other equipment ....7.00 each~~

~~Remodel:~~

~~Each duct line extension ....$7.00~~
~~Each gas line extension or outlet...7.00~~

Commercial & Multifamily: New, Alterations, Additions, Repairs, & Accessory Structures

The valuation used to determine the commercial mechanical permit fee shall include the value (rounded up to the nearest dollar) of all mechanical materials, equipment, labor, overhead and profit.

Total Valuation	Fee
$0 to $25,000	$60.00* for the first $2,000 plus $8.90 for each additional $1,000 or fraction
$25,001 to $50,000	$264.70 for the first $25,000 plus $6.60 for each additional $1,000 or fraction
$50,001 to $100,000	$429.70 for the first $50,000 plus $5.20 for each additional $1,000 or fraction
$100,001 and up	$689.70 for the first $100,000 plus $3.80 for each additional $1,000 or fraction

*Maximum of one inspection.

Minimum permit fee $60.00
Mechanical Plan Review – When required or requested ....25% of the permit fee

Plus 12% state surcharge

Plus Document Imaging Charge of $1.00 per page

4. PLAN REVIEW:

Non-Residential & Residential

Exhibit A

65% of building permit fee PLUS 25% of plumbing when required and mechanical permit fees for the review of applicable requirements such as limit controls, storm drainage, fixture clearances, ventilation, combustion air, etc. Hourly rate for additional or predevelopment consultation plan review/research is ~~$50.00~~ $60.00 per hour. 40% of building permit fee for fire/life safety on commercial permits.

Plus land use plan review for building permits:
Minimum .... ~~$50~~$60/hr (1/2 hr~~.~~ min.)~~[1]~~

Plus floodplain/flood hazard zone review:
5% of building permit fee when project is within flood hazard zone.

Third-party plan review .... ~~50~~60/hr (~~$100.00~~ 2 hr min.)

Application for alternate materials and methods; or~~50~~
~~Or~~ R~~r~~eview of non-code state-approved items..60/hr (~~$100.00~~ 2 hr min.)

5. PARKING LOT PERMITS:

1 - 25,000 square feet .... $0.04/sq. ft.
25,001 - 99,999 square feet .... 0.025/sq. ft.
100,000 and more square feet.. 0.01/sq. ft.
Remodel/review.. 0.02/sq. ft.
plus $~~50~~60/hr review (~~$100~~ 2 hour min.)

New parking lot plan review.. 65% of permit fee

Restriping Only $125.00

Plus Document Imaging Charge of $1.00 per page

6. MANUFACTURED HOME PERMITS:

Manufactured home setup..
~~..$167.00~~$268.00

plus 12% state surcharge..~~11.69~~32.16
State fee 30.00
~~NOTE: See plumbing, electrical and mechanical sections for additional fees.~~

$~~167~~268.00 installation fee allows three inspections total. These include the stand and lot preparation, all support blocking, Earthquake-Resistant Bracing System (ERBS), flood and wind anchoring devices, perimeter skirting, underfloor access and ventilation, mechanical crossovers and terminations and temporary steps. ~~(this fee does not include plumbing or electrical connection permit fees).~~ This fee also includes electrical feeder, plumbing connections, and all cross-over connections. Accessory structures, utility connections beyond 30 lineal feet and/or new or additional electrical services or plumbing may require additional permits. This permit does not include an electrical service.

Plus Document Imaging Charge of $1.00

7. MISCELLANEOUS PERMITS/FEES:

Moving a building .... $~~56~~60.00
Demolition .... ~~40~~60.00
plus plumbing fee also assessed if sewer is to be capped
Change of occupancy .... ~~100.00~~120.00
plus research fee above 2 hours .... ~~$50~~60.00/hr
Temporary Certificate of Occupancy
Commercial, each 30 days 180.00
plus reinspection fee 60.00
Residential, each 30 days 60.00
plus reinspection fee 60.00

Address ~~re~~assignment or change for one to three lots 35.00
Subdivision address assignments four or more lots 120.00
Deferred Submittal* .... 60.00 minimum
*10% of permit fee calculated using value of deferred portion(s) of project.
Phased Project .... In addition to regular permit fees, 10% of total
.... project building permit fee for each phase.
.... $60.00 minimum, not to exceed $1,500 for each phase.
Additional Plan Review due to amendments to the construction documents.......... 60.00/ hr (1 hr min.)

Reinspection Fee .... 60.00/ hr (1 hr min.)
Inspections for which no fee is specifically indicated .... 60.00/ hr (1 hr min.)
Safety Inspection 120.00

Investigation Fee for work done without permits = Equal to and in addition to the permit fee.

Additional Research Fees: Costs for additional inspections/review/engineering required for investigations needed by the Building Official shall be recovered at cost plus 30% overhead. These activities may include, but are not limited to, actions necessary to issue a new or revised Certificate of Occupancy, costs associated with third-party review, complaint investigation, additional inspections, annual reviews, etc.

Expedited Services: Fees are *in addition* to regular permit fees
Plan review .... $75.00 hr/ (2 hr min.)
After Hours inspections .... 75.00 hr/ (2 hr min.)
Minor on-site plan review .... 75.00 hr/ (2 hr min.)

Plus 12% state surcharge

Plus Document Imaging Charge of $1.00 per page

Exhibit A

8. SIGN PERMITS:

Base (Minimum)........ $28.00
Structural inspection and review covered under Construction Permits/Plan Review.
Freestanding and projecting signs (per sq. ft.)........ 0.50
All other signs (per sq. ft.)........ 0.40
Temporary Signs (initial cost)........ 11.00

Plus Document Imaging Charge of $1.00 per page

~~9. MISCELLANEOUS INSPECTIONS:~~

~~Minimum........ $500.00~~

~~Investigation Fees: Costs for additional inspections/review/engineering required for investigations needed by the Building Official shall be recovered at cost plus 30% overhead. These activities may include, but are not limited to, actions necessary to issue a new or revised Certificate of Occupancy, costs associated with third-party review, complaint investigation, additional inspections, annual reviews, etc.~~

~~**Plus 12% state surcharge**~~

9. ELECTRICAL PERMITS:

RESIDENTIAL PER UNIT:

1000 sq. ft. or less........ $~~94.50~~113.50
Each additional 500 sq. ft. or portion........ ~~16.50~~20.00
Limited energy (in conjunction with above or other permit only)........ ~~25~~30.00
Each manufactured home/modular service/feeder........ ~~44.50~~53.50
....

SERVICES OR FEEDERS:

Installation, Alterations or Relocation – no circuits included

200 amps or less........ $~~55.50~~66.50
201 to 400 amps........ ~~66.50~~80.00
401 to 600 amps........ ~~89.00~~107.00
601 to 1000 amps........ ~~144.50~~173.50
~~Over 600 amps or~~ 1000+ amps or volts........ ~~333.50~~400.00
Reconnect only........ ~~39.00~~47.00~~*~~

TEMPORARY SERVICES OR FEEDERS:

Installation, Alterations, or Relocation

200 amps or less........ $ ~~39.00~~47.00
201 to 400 amps........ ~~44.50~~53.50
401 to 600 amps........ ~~89.00~~ 107.00
1000+ ~~600~~ amps or volts ~~1000 volts........ 333.50~~ 400.00

BRANCH CIRCUITS:

New, alteration, or extension per panel

Exhibit A

Branch circuits with purchase of service or feeder fee.. $~~2.25~~ 3.00 each
Branch circuits without purchase of service or feeder fee.. ~~39.00~~47.00
Each additional .... ~~2.25~~3.00

MISCELLANEOUS:

Service or feeder NOT included

~~Minor labels (10) .... $110.00~~
Pump or irrigation circle .... ~~40.00~~$48.00
Sign or outline lighting .... ~~40.00~~48.00
Signal circuits or limited energy panel, alteration/extensions .... ~~40.00~~48.00
Fire alarm panel, see Section 11

ADDITIONAL INSPECTION FEES OVER THE ALLOWABLE IN ANY OF THE ABOVE:

Per inspection .... $~~39.00~~47.00
Miscellaneous hourly fee for inspections and industrial plant inspections.................................. ~~65.00~~78.00
Master Label Permit 120.00
*Each Master Label inspection ....78.00/ hr (1 hr/ min.)

Plus 12% state surcharge

Plus Document Imaging Charge of $1.00 per page

PLAN REVIEW FEE:

25% of electrical permit, if required (see application).

10. FIRE SPRINKLER PERMITS:

Residential Fire Suppression Systems

***Fee includes plan review*~~*SYSTEMS* AND DEVICES:~~**

~~Add/replace valves, attachments or devices.. $ 42.50 each~~
~~Fire pump installation or replacement (less than 1000 gpm) .... 100.00 each~~
~~Fire pump installation or replacement (1000 gpm or more).. 200.00 each~~
~~Hood suppression systems (per hood).. 80.00~~

~~Hydrants (including PIVs)~~
~~1 to 3.. $180.00~~
~~More than 3 .... 60.00 each~~

~~New, lower/raise, and relocate fire sprinkler heads~~
~~1 to 25.. 75.00~~
~~26 to 50.. 125.00~~
~~51 to 100.. 200.00~~
~~101 to 200.. 285.00~~
~~201 to 300.. 325.00~~
~~301 to 500.. 480.00~~
~~501 to 1000.. 1000.00~~
~~1001 to 2000.. 1740.00~~
~~2001 to 3000.. 2250.00~~

RESOLUTION NO.___________

A RESOLUTION AMENDING THE FEE SCHEDULE FOR CERTAIN BUILDING DIVISION FEES AND REPEALING RESOLUTION NO. 4534.

WHEREAS, building fees were last updated on October 24, 2001, by Resolution No. 4534; and

WHEREAS, the City Council reviewed the existing building fees on November 10, 2008, and held a public hearing on the proposed fees on December 8, 2008; and

WHEREAS, increased costs in providing building inspection services necessitate an increase in building division revenues; and

WHEREAS, the existing fee schedule does not conform to Oregon Administrative Rules; and

WHEREAS, it is the City's intent that the cost of inspection services be borne by those persons and entities that generate the need for such services rather than by city taxpayers.

NOW, THEREFORE, BE IT RESOLVED that the building inspection, electrical inspection, and related permit fees shown in Exhibit A, attached hereto, are adopted by the City of Albany.

BE IT FURTHER RESOLVED that the updated fee schedule shall become effective January 1, 2009.

BE IT FURTHER RESOLVED that Resolution No. 4534 is hereby repealed.

DATED AND EFFECTIVE THIS _____DAY OF____________ 2008.

____
Mayor

ATTEST:

____
City Recorder

G:\Fees\Building fee change resolution.docx

APPROVED:

CITY OF ALBANY
CITY COUNCIL (WORK SESSION)
Municipal Court Room
Monday, November 10, 2008
4:00 p.m.

MINUTES

CALL TO ORDER

Mayor Dan Bedore called the meeting to order at 4:00 p.m.

ROLL CALL

Councilors present:	Councilors Floyd Collins, Jeff Christman, Bessie Johnson, Dick Olsen, and Sharon Konopa.
Councilors absent:	Councilor Ralph Reid Jr.

BUSINESS FROM THE PUBLIC

Mike Quinn, 4455 Sunset Ridge Drive, discussed the potential increase in building permit fees. He said he had been in contact with the Interim Building Official over the last few months because he wants to make sure that when the employees get raises, they are still providing customer service. He is concerned that Building's Beginning Balance is being used up and he wants to know its status. He is not satisfied with the financial information provided to him by the current Building Official Manager. In the past, the public received 90 days notice before fees were raised. The proposed fee increases would be implemented in January. The state administrative rules are a benchmark but they are not going to happen on time in all jurisdictions; he has talked to others and they say they will have different fee adoption dates. Quinn said raising permit fees 20 percent might not represent a 20 percent increase in customer service from the Building Department. Given the potential street System Development Charges and the future school excise tax, Quinn asked that the Council not increase permit fees.

Bill Coburn, 6317 Chapman Court, addressed building fees as well but would like to wait until after the staff presentation on the subject. Bedore agreed.

CENSUS 2010

Gladys Romero, Partnership Specialist for the US Census Bureau, said that a census has been conducted every ten years since the first census in 1790. The last one was in 2000. Population data is instrumental in the distribution of $300 billion in federal and state dollars. The US Census Bureau hires 1,000 extra employees during a census year. Community leaders can help by issuing a proclamation in support of census and by helping to count residents that might otherwise be overlooked. It is important to have correct, complete counts. Romero distributed the American Community Survey (see agenda file) and a folder which contained several informational brochures (see agenda file). Romero described the Census forms, which come in English and six other languages.

DISABILITY ACCESS PROGRAM OVERVIEW

Disability Access Coordinator Lisa Bennett has been with the City since 2006. She was hired as a Code Compliance Inspector but was moved to this new position a few months ago.

Bennett reviewed the staff memo and gave a Power Point presentation titled "New Disability Access Program Update" (see agenda file).

Councilor Bessie Johnson asked, what is the best way to bring old curbs into compliance with the American Disabilities Act (ADA) regulations? Bennett said the City can issue an Invitation to Bid for contractors to cut concrete and install a useable ramp. It is expensive, so it is not possible to complete the whole City at the same time, but there needs to be a plan in place.

Councilor Floyd Collins asked, what types of funding sources do other communities use? Public Works Director Diane Taniguchi Dennis said there are several options: a new Transportation Act is being discussed to package whole projects; curb improvements could be included as a part of overlay projects or Capital Improvement Program projects, such as on Jackson Street; and street bond money is available. To compete for broader grants, the City needs to package projects together.

Collins advocates for a systematic approach to fixing the curbs and for how the gas tax is prioritized by the state. Discussion followed.

Building Official Melanie Adams said, having a plan in place will help Albany avoid litigation. Bedore asked, is there a standard for substantial progress, or is it subjective? City Manager Wes Hare said, with the Americans with Disabilities Act (ADA), people don't know what their level of compliance is until they are sued. He described the lawsuit brought by disability access advocates against the city of Bend. Albany should be proactive by addressing ADA accessibility now.

Adams said Bennett has spent a lot of time talking and listening to contractors, groups representing disabled people, and others in the community.
Councilor Jeff Christman asked, does ADA compliance apply to restaurant interiors as well? Bennett said new construction must apply inside the building, but existing construction can only be made to apply to parking lot requirements.

Collins complimented the Building Division for their involvement with the North Albany Community Church parking lot construction. City staff reviewed the design before it was striped, avoiding costly corrections later. They have a proactive approach for compliance.

AMC TITLE 18 UPDATE

Adams referred to the staff report and asked if the Council had any questions.

Christman said there seemed to be a lot of residents that were unaware that enclosing their patio required a permit and asked if that was typically the case – that people are just unaware of the requirements. Adams said that is true; most of the time they are just unaware, which is why her staff takes a slow, measured approach which is heavy on customer service.

Hare said Adams' staff report shows that Albany takes initiative with customer service and gets positive results.

TRANSPORTATION SYSTEM DEVELOPMENT CHARGES

Transportation Systems Analyst Ron Irish explained that so far staff has provided the Council with prioritized project lists, cost estimates, and calculated the System Development Charge (SDC) growth-eligible portion. Tonight, staff would like to step back and discuss transportation SDCs overall. The wastewater treatment plant is an example of how project costs drive the SDC component, but transportation projects are not that way so the Council will need to establish thresholds which staff can apply to the project list.

Irish gave a PowerPoint presentation titled "Transportation SDC Methodology" (see agenda file). Irish also passed out three documents: Transportation SDC for single family chart, Total SDC for single family residence chart, and SDC Funding Eligibility map (see agenda file).

Consultant Debbie Gilardi said the goal is to identify the maximum allowable fee within the state law, and then the Council will decide what to charge within that range. Gilardi continued the PowerPoint presentation.

Collins is concerned about how staff can calculate fees now for a road that will not reach build out until 2030. Irish said there are some streets that will still have capacity past 2030 and can be included in the next Transportation System Program for reimbursement. Collins noted that staff will need to ensure that the City has sufficient right-of-way (ROW) for future capacities.

Councilor Dick Olsen asked, is it true that the higher the growth rate in a city, the higher the fees have to be? Gilardi said, not necessarily; it just might take longer to receive the money to utilize it.

Irish said, once the Council provides the threshold, staff can begin the SDC-I analysis.

Olsen asked, can we increase capacity on roads in North Albany? Irish described possible improvements to Scenic Drive, though they won't really help with congestion problems.

Councilor Sharon Konopa said, growth needs to pay its way. When the City established a fee of $1,700 in 1997, it wasn't enough and projects were removed from the list. If the City takes out projects to cut the cost, we need to say no to certain developments. We have to look at whatever is reduced from maximum allowable. Irish said that in 1997 the Council reduced residential rates by 6 percent and reduced non-residential rates by 26 percent. The difference is between residential and non-residential residential trip rates. Under that structure, the City was charging a fraction of total allowable fee.

Konopa said, even with the depressed economy, we shouldn't undercharge or we will continue to be underfunding projects. Public Works Director Diane Taniguchi Dennis thinks this new method has the flexibility to allow the City to avoid some of the frustrations Konopa has described. The whole project list will be adopted, and the top ones will be within the threshold the Council sets. If the Council wants to complete a project that is outside of the threshold, they can either swap it for one at the top, or increase the fees.

Christman said, the Council needs to prioritize the list we were given at the last work session. Konopa agreed. Collins said he would like to hear from the community about how to prioritize the list.

Dennis said staff will come up with a prioritizing method to use in the community. She suggested the Councilors identify their own priorities as well.

BUILDING INSPECTION FEES INCREASE PROPOSAL

Community Development Director Greg Byrne said there has not been a building permit fee increase since 2001, although there has been a significant increase in costs over the years. With the downturn in permit activity, reserves could be exhausted by year-end. To make matters worse, now the state is mandating a fee restructure as of January 1, 2009. He said the proposed fee increase will partially offset the increase in costs since 2001. Byrne said he and Adams have already made adjustments in their department in anticipation of these events, such as consolidating two administrative positions into one; reducing front counter staff from three to two; recruiting internally for the Building Official Manager and not filling the Assistant Building Manager position. They have also outsourced their scanning staff to other departments and are receiving fees for the service; reduced Code book purchases to the minimum necessary; and changed driving routes to reduce fuel costs. Building also has two of the five work processes to be evaluated under the Six Sigma program.

Adams said a public hearing on the fees has been scheduled for December 8.

Adams gave a PowerPoint presentation titled "Proposed Fee Changes for January 1, 2009" (see agenda file). She noted a correction to the Budget Impact portion of the staff report, which is reflected in the PowerPoint presentation.

City Manager Wes Hare referred to an article in the *Portland Tribune* about the city of Tigard. The November 6 headline is about eight positions being eliminated in the Building Department (see agenda file). This is a trend in Oregon. Albany has been proactive in taking steps to avoid layoffs but is at a point now that we need to do something. Our experience puts into context what is happening in the building industry overall. Byrne said Albany reduced Building staff by five by not filling vacant positions because staff saw this coming. The Department has a core of highly trained employees that they want to keep.

Adams met with the Homeowners Association last week, and will be speaking at their board meeting this week.

Coburn spoke from the audience. He works for an electrical company. He thinks a 20 percent increase in permit fees is not out of line based on the average cost of living increase of three percent each year since 2001, which is the last time the fees were increased. Albany's proposed electrical fee is more than Corvallis' fee but less than Hillsboro or Portland's fees. He suggested Albany look at e-permitting. Coburn noted that the mobile home inspection fees seemed disproportionate to the stick-built home fees. The mobile home permit includes the electrical feeder, although Coburn is not sure why it would.

Regarding e-permitting, Byrne said Albany has applied with the state Building Codes Division to be a beta testing program site. Initially, however, the current permit program will require reprogramming at an estimated cost of $59,000. Until that is completed staff will have to do some fee calculations by hand.

SUSTAINIBILITY REPORT

Byrne said that "sustainability" has become a buzzword of late. Used properly, it incorporates environmental, social, and economical aspects. If applied appropriately, sustainability is an important part of the decision-making process for local government. A resolution supporting the City's leadership in sustainability for Albany is in the agenda packet.

Parks & Facilities Maintenance Manager Craig Carnagey said, the purpose here today is to bring this dialogue to the Council to understand where they would like the City to head in the future.

Carnagey said, sustainability has long been a goal of most local governments, creating attractive places for people to live while being good stewards of the environment. With rising concerns about the environment, changing economies, and rising energy costs, sustainability has recently become an even more important concern to the way cities operate and provide core services. One main area in which city government impacts sustainability is through its internal operations, such as the use of energy in buildings. An informal task force met to establish a dialogue about what sustainability means for the way the City operates. A few of the areas they looked at include:

- Areas of consumables used by City operations (fuel, electricity, gas, water, paper, etc...)
- Efforts to reduce or minimize hazardous or toxic materials by City operations
- Where the City tries to minimize and or eliminate pollution in the transportation system
- Where the City encourages a diverse, stable local economy that supports a high quality of life for residents

Carnagey gave examples of what the task force discovered:

- Extensive paper and other office item recycling
- Electronic documents are promoted over paper
- Energy conservation strategies in City buildings including recent audits to identify waste
- Purchase green cleaning products for City facilities
- Obsolete computer equipment is donated or made available for reuse or recycled
- Composted wood chips and leaf debris for reuse in parks
- Water conserving plantings in parks and ROW smart irrigation controls to conserve water

- Integrated pest management in parks to reduce use of toxics
- Tree Preservation measures and tree planting programs
- Hydropower production at the Vine Street Water Treatment Plant
- Reuse of biosolids from the Wastewater Treatment Plant (WWTP) on local farms
- New WWTP will prevent sewer overflows in the Willamette River
- Regular community cleanups, including river cleanup

Carnagey gave examples of what other cities are doing:

- Goals to achieve a recycling rate of 85 percent by 2015. Recycles and then re-uses thousands of yards of concrete and asphalt, and makes compost out of the leaves picked up by street-sweepers, saving nearly $3 million a year.
- Resolution proposing a 100% landfill waste reduction goal by 2020. Emphasizes closed-loop waste management cycles
- Incorporating renewable energy in public buildings
- Wastewater reuse programs for irrigation of parks and golf courses
- The purchase of hybrid fuel and bio-fuel City vehicles
- Goals to become carbon neutral through use of renewable and sequestration programs

Carnagey said more analysis is needed in order to develop a plan that clearly defines and measures target goals and objectives. Beneficial outcomes might be to reduce operating costs and environmental risk; get ahead of regulations; enhance the organization's standing among residents who are increasingly concerned about these issues; incorporate environmental concerns into the workplace; and build a positive City image.

There will be a brown-bag sustainability lunch for employees. Staff will let the Council know when it is scheduled.

Carnagey said the City will post a list of things it is doing towards sustainability on the website.

Hare said this discussion was initiated by staff a couple of years ago, and it was recognized that there is not a lot of staff time to invest. However, it has been gratifying to see it become a grass-roots campaign within our organization, with staff taking the lead.

Christman commended staff. He would like to see the details and goals for the sustainability program prior to adopting the resolution.

Bedore thinks this is a good first step. The resolution is a general statement that states the City's intent.

Executive Assistant to the City Manager Laura Hyde said this grass-roots project dates back to the early 1990s, when Albany had a sustainability task force focused on recycling. It was a very successful program.

CONSENSUS: There was Council consensus to bring the resolution to the November 24, 2008, Regular Session.

REQUEST TO RESTRICT TURNING MOVEMENTS, OAK STREET AT 11TH AVENUE

Irish explained that 11th Avenue is a local 500 foot long paved street, with a narrow ROW. Following construction of the couplet, residents living in the apartment complex could no longer use 9th Avenue to get to town because Pacific Boulevard was converted to a one-way street. Drivers starting cutting through on 11th Avenue instead. Now that the Albany Boys and Girls Club ball fields and the Lowe's store are under construction, residents along 11th Avenue are again concerned. They are requesting the City convert their street to a one-way, east bound street. Irish said staff suggested restricting turn movements at the intersection instead. The petition presented by the residents is for a one-way street, but Irish thinks they may be in favor of the turn restriction alternative instead.

Christman asked, if there is a third future development, will we have to change the street again? Irish said there is always that potential, but in looking at the traffic pattern the most impact to the neighborhood is the cut-through traffic which would be resolved by the turning movement restrictions. If this solution doesn't fix the problem, we could take a more drastic action such as closing the street. The remedy being proposed is fairly inexpensive.

Olsen asked, can we get ROW from 9th Avenue and Pacific Boulevard and put in a cross street? Irish said that particular project is on the list of TSP projects. ODOT may agree to it, but currently there is a building in the way. The Lowe's traffic study may be looking at that possibility.

MOTION: Collins moved to authorize staff to proceed with a restriction on turn movements from Oak Street onto 11th Avenue. Johnson seconded the motion and it passed 5-0.

COUNCIL COMPENSATION RESOLUTION

Finance Director Stewart Taylor said the last Council compensation resolution was adopted in 1994. It needs to be updated to reflect current practices and regulations.

Johnson asked, is the proposed resolution different than current practice? Hyde said the changes proposed will bring it into line with current practice.

Taylor explained the new regulations surrounding taxable fringe benefits and IRS guidelines. Over the last few years the IRS has been auditing Oregon cities; most recently, the city of Wilsonville.

COUNCILOR COMMENTS

There were no Councilor comments.

CITY MANAGER REPORT

The City Manager had no report.

ADJOURNMENT

There being no other business, the Work Session adjourned at 6:26 p.m.

Respectfully submitted,

Mary A. Dibble, CMC
Deputy City Clerk

Reviewed by,

Stewart Taylor
Finance Director

G:\Mary\CCWorkSession\ccwks 11-10-08.MTS.doc

RESOLUTION NO. ___________

A RESOLUTION ACCEPTING THE FOLLOWING EASEMENT:

Grantor	Purpose
Bob G. Mitchell	A 10-foot by 20-foot wide easement over a public fire hydrant water line for the Mitchell restaurant project.

NOW, THEREFORE, BE IT RESOLVED by the Albany City Council that it does hereby accept this easement.

DATED AND EFFECTIVE THIS 8TH DAY OF DECEMBER 2008.

____
Mayor

ATTEST:

____
City Clerk

EASEMENT FOR PUBLIC UTILITIES

THIS AGREEMENT, made and entered into this 25TH day of NOVEMBER, 2008, by and between, Bob G. Mitchell, hereinafter called Grantor, and the CITY OF ALBANY, a Municipal Corporation, herein called "City."

WITNESSETH:

That for and in consideration of the total compensation to be paid by the City, the grantor has this day bargained and sold and by these presents does bargain, sell, convey, and transfer unto the City of Albany, an easement and right-of-way, including the right to enter upon the real property hereinafter described, and to maintain and repair public utilities for the purpose of conveying public utilities services over, across, through, and under the lands hereinafter described, together with the right to excavate and refill ditches and/or trenches for the location of the said public utilities and the further right to remove trees, bushes, under-growth, and other obstructions interfering with the location and maintenance of the said public utilities.

This agreement is subject to the following terms and conditions:

1. The right-of-way hereby granted consists of:

   A 10-foot by 20-foot wide easement over a public fire hydrant water line for the Mitchell restaurant project. See legal description on attached Exhibit A and map on attached Exhibit B.

2. The permanent easement described herein grants to the City, and to its successors, assigns, authorized agents, or contractors, the perpetual right to enter upon said easement at any time that it may see fit, for construction, maintenance, evaluation and/or repair purposes.

3. The easement granted is in consideration of $1.00, receipt of which is acknowledged by the Grantor, and in further consideration of the public improvements to be placed upon said property and the benefits grantors may obtain therefrom.

4. The Grantor does hereby covenant with the City that they are lawfully seized and possessed of the real property above-described and that they have a good and lawful right to convey it or any part thereof and that they will forever warrant and defend the title thereto against the lawful claims of all persons whomsoever.

5. Upon performing any maintenance, the City shall return the site to original or better condition.

6. No permanent structure shall be constructed on this easement.

IN WITNESS WHEREOF, the Grantor has hereunto fixed their hand and seal the day and year written below.

GRANTOR:

Bob G Mitchell
____
Bob G. Mitchell

STATE OF OR)
County of Linn) ss.
City of Albany)

The foregoing instrument was acknowledged before me this 25 day of November, 2008, by Bob G. Mitchell as his voluntary act and deed.

OFFICIAL SEAL
KIMBERLY KAUFFMAN
NOTARY PUBLIC - OREGON
COMMISSION NO. A409117
MY COMMISSION EXPIRES SEPTEMBER 8, 2010

Kimberly Kauffman
____
Notary Public for OR
My Commission Expires: 9/10/08

CITY OF ALBANY:

STATE OF OREGON)
County of Linn) ss.
City of Albany)

I, Wes Hare as City Manager of the City of Albany, Oregon, pursuant to Resolution Number ______________, do hereby accept on behalf of the City of Albany, the above instrument pursuant to the terms thereof this ________day of ________________ 2008.

____
City Manager

ATTEST:

____
City Clerk

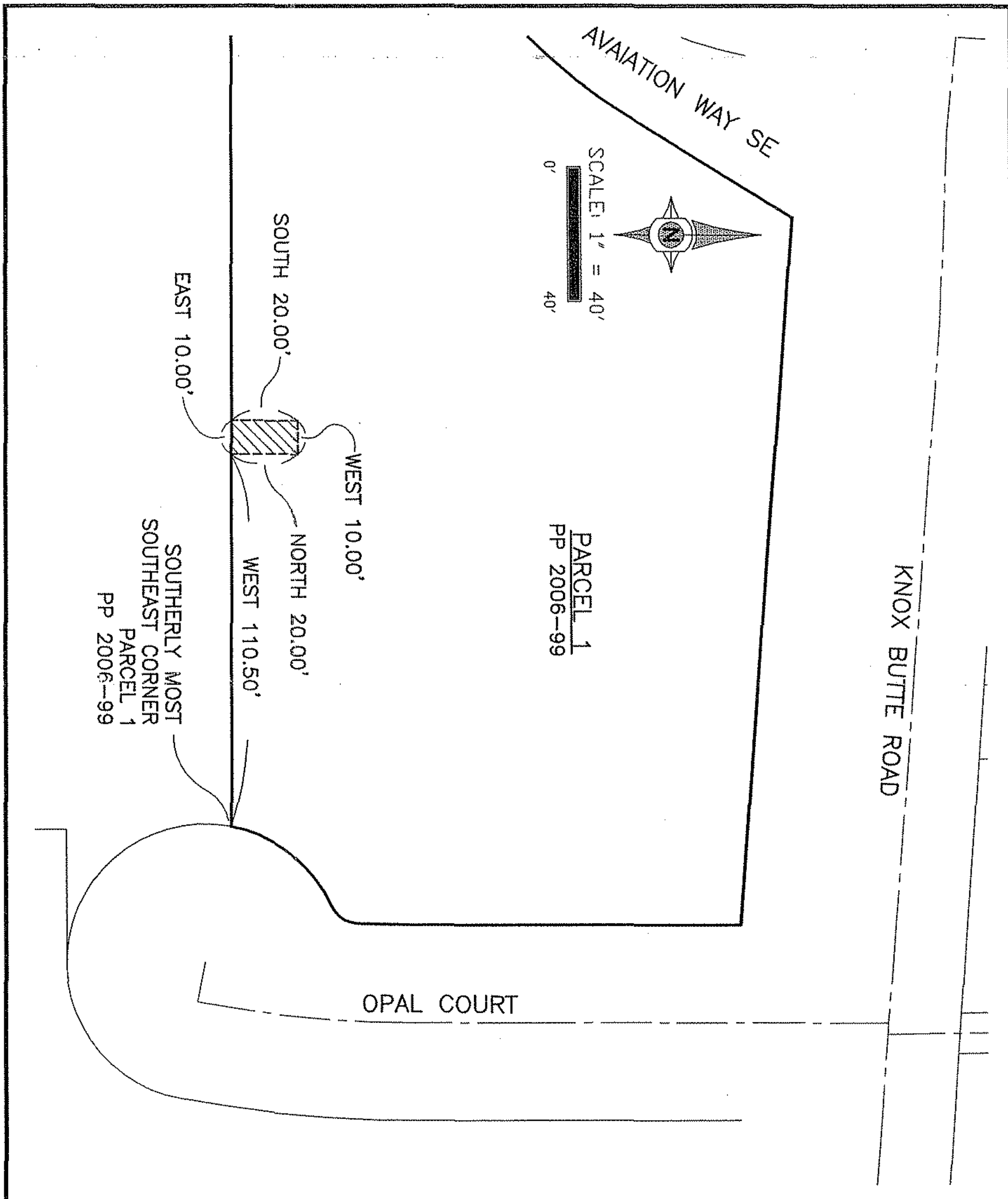
Public Utility Easement

Legal Description

Exhibit "A"

An area of land in the Northwest 1/4 of Section 4, Township 11 South, Range 3 West, Willamette Meridian, City of Albany, Linn County, Oregon being more particularly described as follows:

Beginning at a point on the South line of and West 110.50 feet from the Southerly most Southeast corner of Parcel 1 of Linn County Partition Plat Number 2006-99 in the Northwest 1/4 of Section 4, Township 11 South, Range 3 West, Willamette Meridian, City of Albany, Linn County, Oregon; thence leaving said South line North 20.00 feet; thence West 10.00 feet; thence South 20.00 feet to the said South line; thence along said South line East 10.00 feet to the point of beginning.



SHEET 1 of 1
SCALE: AS NOTED

Date 10-30-08
Project
Drawn by GSG
Checked by ASD

EXHIBIT "B"

PUBLIC UTILITY EASEMENT
ALBANY, OREGON

UDELL ENGINEERING AND LAND SURVEYING, LLC
63 EAST ASH ST.
LEBANON, OREGON, 97355
541-451-5125

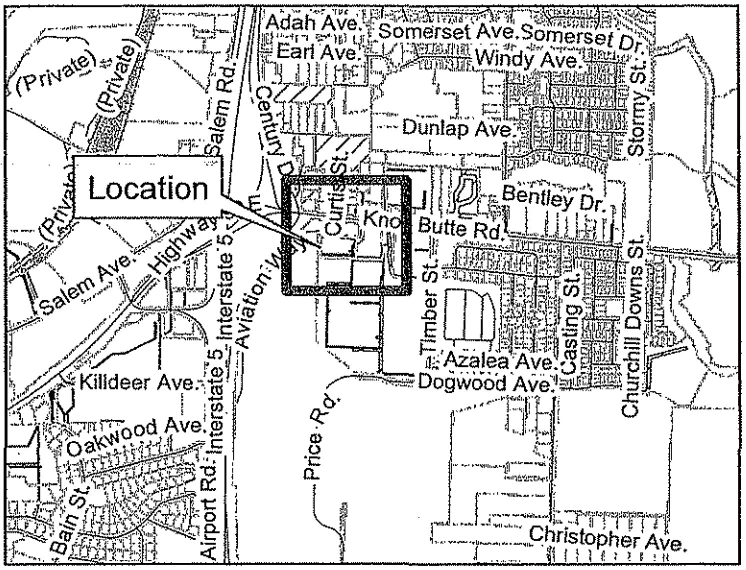


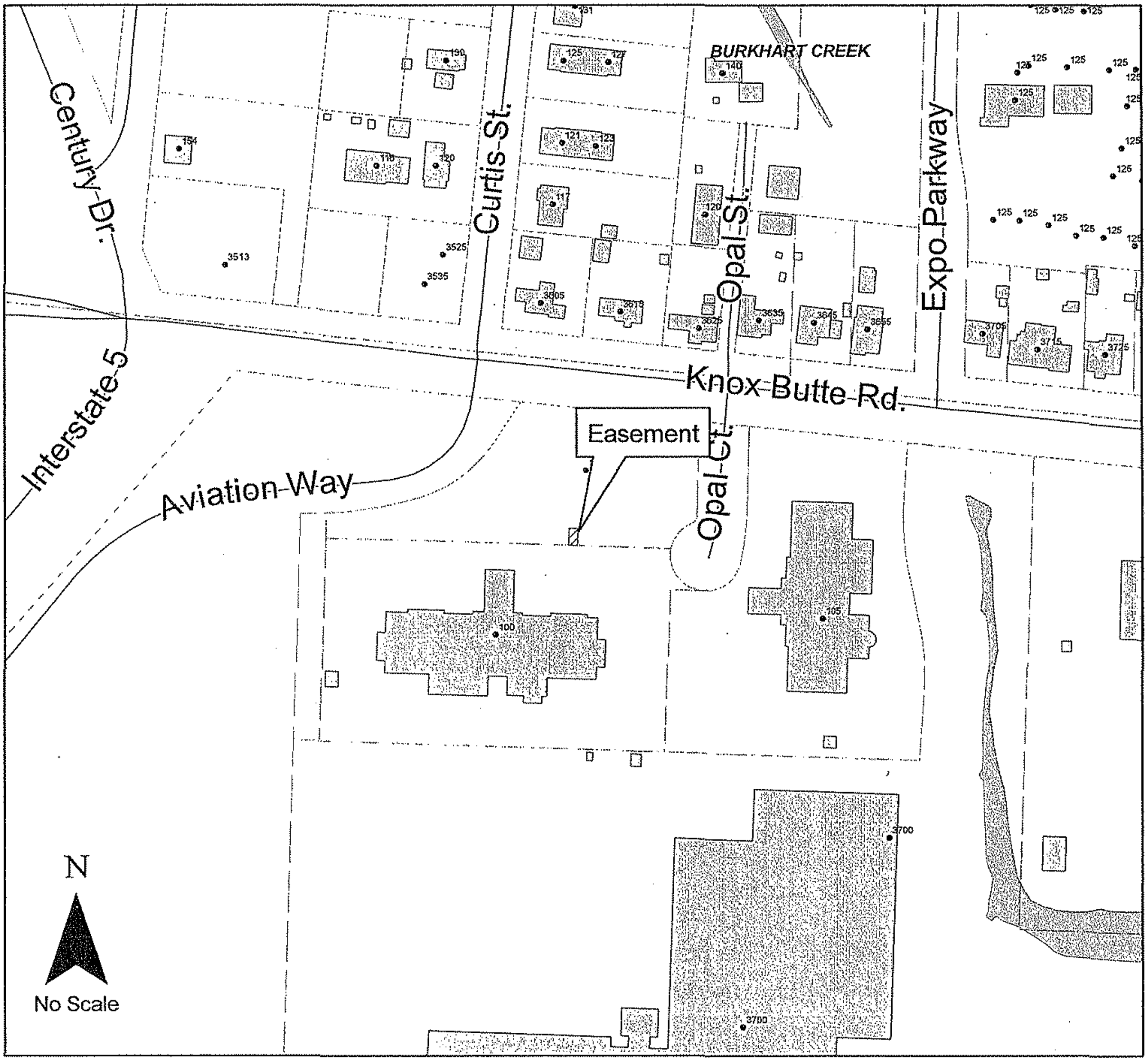
EXHIBIT C

11SO3W04DB00200

A 10-foot by 20-foot wide easement over a public fire hydrant water line for the Mitchell restaurant project.

City of Albany

Geographic Information Services



L:\Julieb\ArcMap Folder\Easement Exhibits\Easement Base Map.mxd

ALBANY POLICE DEPARTMENT

TO: Albany City Council

VIA: Wes Hare, City Manager

FROM: Edward Boyd, Chief of Police

Edward C Boyd

DATE: December 3, 2008, for December 8, 2008, City Council Meeting

SUBJECT: Limited On-Premises Sales, New Outlet Liquor License Application for Cinema Treasures, Inc., D/B/A Pix Theatre, 321 Second Avenue SE.

Action Requested:

I recommend the Limited On-Premises Sales, New Outlet Liquor License Application for Cinema Treasures, Inc., D/B/A Pix Theatre, be approved.

Discussion:

Jeffery and Robin Mexico, on behalf of Cinema Treasures, Inc., D/B/A Pix Theatre, have applied for a Limited On-Premises Sales, New Outlet liquor license. Based on a background and criminal history investigation through Albany Police Department records, I recommend approval of this request.

Budget Impact:

None.

MR

TO: Albany City Council

VIA: Wes Hare, City Manager
Diane Taniguchi-Dennis, P.E., Public Works Director FOR MWS

FROM: Mike Wolski, Assistant PW Director/Operations Manager
Herb Hoffer, Environmental Services Manager

DATE: December 2, 2008, for the December 8, 2008, City Council Meeting

SUBJECT: Overview of Albany's Pretreatment Program Plan to meet EPA Pretreatment Streamlining Regulations

RELATES TO STRATEGIC PLAN THEME:
- An Effective Government
- A Safe City

Action Requested:

None – information only. City Council approval will be needed for related revisions to the Albany Municipal Code Chapter 10.06 (Attachment A), and this approval will be requested at the City Council meeting of December 17, 2008.

Discussion:

This information is provided as an overview of the mandatory and optional changes to Albany's Industrial Pretreatment Program in response to the revised Federal Environmental Protection Agency (EPA) streamlining regulations. The revised EPA regulations require changes to the Albany Municipal Code Chapter 10.06 and these changes will need Council approval.

EPA made changes to the pretreatment regulations found in 40 CFR Part 403 effective November 14, 2005, and these revisions are termed the "Streamlining Regulations." The revisions were developed to align more closely with EPA's permitting regulations and provide pretreatment programs greater flexibility. The Oregon Department of Environmental Quality (DEQ) provided guidance throughout the State of Oregon allowing flexible schedules tailored to specific jurisdictions. Albany submitted a streamlining plan to DEQ that outlined revisions to our pretreatment program (proposed ordinance modifications, revisions to the enforcement response plan, and other procedural changes), and we followed this up with a submittal of our program revisions. Albany's program changes including the proposed AMC revisions were submitted to DEQ for review, and DEQ approval was obtained in a letter dated July 21, 2008.

Environmental Services staff invited potentially affected industrial sewer users, including all permit holders, to a public information meeting held on July 23, 2008. Along with the meeting notification, information on the regulation changes was provided. Several industrial representatives attended the meeting and there were no significant concerns expressed regarding the proposed program changes. In addition, the Albany Municipal Code Chapter 10.06 changes were reviewed by the City Attorney, and he approved the revisions in October 2008.

In general, the EPA regulatory revisions affect the way Cities monitor and regulate industrial sewer users that discharge wastewater to treatment systems, and DEQ has classified these changes as non-substantial. Included in this memorandum are staff proposals for adoption of specific required and optional changes allowed under the rule. We will seek Council review and adoption of the revisions to Albany Municipal Code Chapter 10.06 at the Council meeting of December 17, 2008. The Code changes include other minor revisions needed to comply with EPA's Model Ordinance.

The following pretreatment program documents have been revised to comply with the EPA streamlining regulations:

- Albany Municipal Code Chapter 10.06, *Wastewater Collection and Treatment System – Regulation of Industrial Wastes*
- Standard Operating Procedures (SOPs) used by the pretreatment program including SOPs for sampling, inspections, receipt of reports, and the City's Enforcement Response Plan
- Industrial Wastewater Discharge Permit template

Background

Albany's Pretreatment Program

The Environmental Services section of Public Works manages the Industrial Pretreatment Program as mandated by the Clean Water Act and promulgated in Federal Regulations 40 CFR Part 403. Our local authority to operate the pretreatment program is in Albany Municipal Code Chapter 10.06. Programs in the state of Oregon are subject to Oregon DEQ oversight under the authority of the EPA. Provisions of AMC Chapter 10.06 allow the City to:

- Identify Significant Industrial Users (SIUs) in the system.
- Deny or control pollutants entering the system.
- Require compliance with applicable pretreatment standards.
- Control through permit or other mechanism discharges into the system.
- Require compliance schedules and industry self-monitoring.
- Carry out inspections & sampling of SIUs.
- Carry out enforcement including assessment of civil penalties.

Albany's pretreatment streamlining revisions

The new rule contains twelve change categories; eight are optional and four are required. The following is a summary of the major elements of the rule. A brief description of each rule change and staff proposal/rationale is included below:

1. **Pollutants not Present** – Provides Publicly Owned Treatment Works (POTWs) the authority to grant monitoring waivers to certain facilities if they can document that specific pollutants are not present at the facility or anywhere in the wastestream.

   Required/Optional: **Optional**   Staff proposal: **Adopt**

   Discussion: Environmental Services staff proposes to allow industrial dischargers that meet qualifying requirements to take advantage of this streamlining rule. Facilities must follow EPA's procedure to demonstrate that a pollutant is not present and provide certification statements.

2. **General Control Mechanisms** – Authorizes POTWs to use general control mechanisms (e.g. special permits) to regulate multiple industrial dischargers that share common characteristics.

   Required/Optional: **Optional**   Staff proposal: **Do not adopt**

   Discussion: This streamlining rule has limited or no applicability to the Albany program. Specifically, this option was developed for use by very large cities with numerous permit holders that have very similar permitting requirements. Albany does not have groups of industrial dischargers that share common characteristics.

3. **Best Management Practices (BMPs) as Local Limits** – Clarifies that jurisdictions can use BMPs as an alternative to numeric limits that are developed to protect the treatment plant, water quality, and sewage sludge.

   Required/Optional: **Optional** Staff proposal: **Adopt**

   Discussion: Environmental Services proposes to allow industrial dischargers that meet qualifying requirements to take advantage of this streamlining rule. BMPs are management and operational procedures that are intended to prevent pollutants from entering a facility's wastestream. BMPs can be useful in instances where sampling and measurement of pollutants is difficult, where discharges are episodic in nature, and where other discharge control options are inappropriate.

4. **Slug Discharge Control Plans** – Clarifies certain requirements regarding the frequency of review including on-site industrial facility inspections to evaluate the adequacy of controls for slug discharges (exceptional high strength or uncontrolled overflows) into the sanitary sewer.

   Required/Optional: **Required** Staff proposal: **Adopt**

   Discussion: Currently Albany requires review and revision, if needed, of all slug discharge control plans every two years, as stated in SIU permits. This revision will allow review of slug discharge plans once per permit cycle if staff determines this is warranted. Permit cycles are generally four years.

5. **Use of Equivalent Concentration Limits** – Provides the City with the discretion to authorize the use of equivalent concentration limits in lieu of mass based discharge limits for certain industrial categories, and allows the conditional use of equivalent mass limits in lieu of concentration-based limits where appropriate to facilitate adoption of water-conserving technologies.

   Required/Optional: **Optional** Staff proposal: **Adopt**

   Discussion: Application of this revision is limited to specific Federal industrial categories, and one industry in Albany could be affected (Absorbent Technologies Inc). Concentration based limits would encourage water conservation at this industry and potentially simplify the regulatory burden on pretreatment staff and the industry.

6. **Grab vs. Composite Samples** – Clarifies and updates sampling requirements.

   Required/Optional: **Required** Staff proposal: **Adopt**

   Discussion: Provides additional flexibility to the City in certain sampling situations. Allows the City to reduce and/or modify sampling requirements in certain situations for industrial dischargers.

7. **Significant Noncompliance (SNC) Publication** – Allows DEQ-required publication of industrial dischargers which are found to be in SNC, in any paper of general circulation within the jurisdiction that provides meaningful public notice.

   Required/Optional: **Optional** Staff proposal: **Do not adopt**

Discussion: This rule does not affect Albany, since there is one paper of general circulation within the jurisdiction, the *Albany Democrat-Herald*, and we already publish the public notice in this newspaper.

8. **Changes to the SNC Definition** – Clarifies the definition of SNC as it applies to violations of instantaneous and narrative requirements, as well as late reports.

   Required/Optional: **Required** Staff proposal: **Adopt**

   Discussion: EPA amended applicability of SNC, limiting SNC applicability to SIUs, unless other non-domestic users cause pass through or interference, cause the City to exercise its emergency authority to halt or prevent a discharge; cause imminent endangerment to human health, welfare, or the environment; or adversely affect the pretreatment program. EPA expanded the SNC definition to include any numeric pretreatment standard or requirement, including instantaneous limits. EPA also changed the rule regarding SNC for late required reports, extended the 30-day deadline to 45 days for SNC.

9. **Removal Credits** – Provides updated references relating to requirements that POTWs must meet to adjust removal credits for Combined Sewer Overflows (CSOs).

   Required/Optional: **Optional** Staff proposal: **Do not adopt**

   Discussion: Currently Albany has not issued removal credits, and we do not anticipate any effects from this regulation change. This option does not pertain to our program since we do not have combined sewers.

10. **Miscellaneous Changes** – Updates or corrects provisions on signatory requirements, net/gross calculations, and requirement to report all monitoring data.

    Required/Optional: **Required** Staff proposal: **Adopt**

    Discussion: Albany must ensure that rule revisions regarding signatory requirements and duly authorized representatives are incorporated in legal authority and permits. Albany must ensure that applicable legal authority revisions are made to comply with the changed language for net/gross calculations. Albany must ensure that applicable legal authority revisions and any applicable permit revisions are made to require reporting of all monitoring data.

11. **Equivalent Mass Limits for Concentration Limits** – Allows the City to calculate an equivalent mass limit for industrial user permits for those pretreatment standards that are expressed in terms of concentration.

    Required/Optional: **Optional** Staff proposal: **Do not adopt**

    Discussion: The eligibility conditions for an industry to use equivalent mass units are complex, including requirement of a water conservation plan, wastewater flow measurement, records of production rates, and other conditions. Production and discharge levels are not allowed to fluctuate significantly. Staff believes that industries are better served by maintaining pretreatment equipment and meeting the applicable concentration limits.

12. **Classification Scheme for Certain Industries** – Allows greater flexibility in classification of federal categorical industries (industries that fall under specific federal standards), including options for POTWs to create Non-Significant Categorical Industrial Users (NSCIUs), and Middle Tier Categorical Industrial Users.

    Required/Optional: **Optional** Staff proposal: **Do not adopt**

    Discussion: This streamlining rule has limited applicability to Albany's program. Currently there are no industries in our area with discharges that meet EPA's designated criteria for categorization as Middle Tier Categorical Industrial Users (CIUs). We believe that our current requirements for inspection and monitoring of CIUs are appropriate. Also, Albany has several very complex Non Discharging Categorical Industrial Users (NDCIUs), and we do not want to open the door for selected wastestreams from these NDCIUs under the tiered program.

Summary

Environmental Services staff studied EPA's regulatory revisions to 40 CFR Part 403, and we conferred with DEQ and industrial sewer users on our plan for adoption of required and selected optional program changes. The changes are supported by revisions to AMC Chapter 10.06. A program revision package was submitted to DEQ for review and approval, and DEQ approval was obtained allowing us to proceed with the changes. Changes are considered minor or non-substantial by DEQ. Staff will return to Council with a request to adopt related revisions to AMC Chapter 10.06.

Budget Impact:

No significant budget impacts are expected. Additional staff time has been required to develop and incorporate the regulation changes into the pretreatment program permitting process.

HH:kw

ORDINANCE NO. _______

AN ORDINANCE AMENDING ALBANY MUNICIPAL CODE TITLE 10.06 TO COMPLY WITH FEDERAL REGULATIONS REGARDING THE INDUSTRIAL PRETREATMENT PROGRAM, AND DECLARING AN EMERGENCY.

WHEREAS, the Federal Environmental Protection Agency (EPA) has revised industrial pretreatment regulations affecting the City of Albany's pretreatment program; and

WHEREAS, the City of Albany desires industrial wastewater pretreatment regulations found in the Albany Municipal Code to be current and compliant with Federal and State regulations; and

WHEREAS, the City of Albany desires to amend the Municipal Code dedicated to industrial pretreatment regulations.

NOW, THEREFORE, THE PEOPLE OF THE CITY OF ALBANY DO ORDAIN AS FOLLOWS:

Title 10.06 of the Albany Municipal Code is hereby amended to incorporate the language herein:

Chapter 10.06
WASTEWATER COLLECTION AND TREATMENT SYSTEM – REGULATION OF INDUSTRIAL WASTES

Sections:
10.06.010 General provisions.
10.06.020 Abbreviations.
10.06.030 Definitions.
10.06.040 Regulations.
10.06.050 Hauled waste.
10.06.060 Administration.
10.06.070 **Reporting and Monitoring Requirements.**
10.06.0~~7~~**8**0 Pretreatment facilities.
10.06.0~~8~~**9**0 Enforcement.
10.06.~~090~~**100** Penalties.
10.06.~~100~~**110** Severability.

10.06.010 General provisions.

This chapter provides for the orderly and efficient functioning of the City of Albany publicly owned treatment works, through regulation of discharges into the wastewater treatment system by enforcement of administrative regulations.

(1) Purpose and Policy. This chapter sets forth uniform requirements for discharges into the wastewater treatment system and enables the City of Albany (City), to protect public health and the environment in conformity with all applicable State and Federal laws relating thereto.

The objectives of this chapter are:

(a) To protect the health of the City employees working in the City wastewater treatment system;

(b) To prevent the introduction of pollutants into the City wastewater treatment system that will interfere with the normal operation of the system, or contaminate the resulting sludge;

(c) To prevent the introduction of pollutants into the City wastewater treatment system that do not receive adequate treatment in the publicly owned treatment works (POTW) and that will pass through the system into receiving waters or the atmosphere or otherwise be incompatible with the system;

(d) To improve the opportunity to recycle and reclaim wastewater and sludge from the system; and

(e) To allow the use of fees and charges to recover the costs of operation, maintenance, and administration of the wastewater treatment system.

(2) Policy of Assistance. In achieving the objectives of this chapter, it shall be the policy of the City to actively support the community's commerce and industry through accommodation, assistance, and cooperation consistent with the City's responsibility to protect the waters of the State from pollution and to secure the health, safety, and welfare of the residents of the service area.

(3) Compliance with Standards. Pollutants shall be accepted into the City wastewater treatment system subject to regulations and requirements as may be promulgated by State and Federal regulatory agencies or the City of Albany for the protection of wastewater facilities and treatment processes, public health and safety, receiving water quality, and avoidance of nuisance. As a minimum, users of the City wastewater treatment system shall comply with the applicable pretreatment standards. Pretreatment standards shall be developed to ensure that at a minimum the City and users comply with Sections 307(b) and 307(c) of the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 and the regulations promulgated pursuant to these sections of the Act.

(4) Permit Conditions. Wastewater discharge permit conditions shall be predicated on federal, state, and local regulations and requirements and on the results of analysis of the type, concentration, quantity, and frequency of discharge including the geographical relationship of the point of discharge to the POTW. These permit conditions shall be reevaluated upon expiration of the permit and may be revised from time to time as required to remain consistent with local, state, or federal laws, regulations, and requirements or to meet any emergency. Wastewater discharge permits may include, but shall not be limited to, conditions pertaining to discharge standards, self-monitoring requirements, treatment methods, housekeeping practices, inventory storage, manufacturing methods, etc., that are intended to protect the waters of the State.

(5) This chapter shall apply to the City of Albany and to persons outside the City of Albany who are, by contract or agreement with the City of Albany, users of the City of Albany POTW. Except as otherwise provided herein, the Director of Public Works of the City of Albany shall administer, implement, and enforce the provisions of this chapter. (Ord. 5637, 2006).

10.06.020 Abbreviations.

The following abbreviations shall have the designated meanings:

ASPP – Accidental Spill Prevention Plan;

ASTM – American Society for Testing and Materials;

BOD – Biochemical Oxygen Demand;

BMP – Best Management Practice;

CFR – Code of Federal Regulations;
COD – Chemical Oxygen Demand;
CWA – Clean Water Act;
DEQ – Oregon Department of Environmental Quality;
EPA – U.S. Environmental Protection Agency;
L – Liter;
mg – Milligrams;
mg/L – Milligrams per liter;
NDCIU – Nondischarging Categorical Industrial User;
NPDES – National Pollutant Discharge Elimination System;
O & M – Operation and Maintenance;
POTW – Publicly Owned Treatment Works;
SIC – Standard Industrial Classification;
SWDA – Solid Waste Disposal Act, 42 U.S.C. 6901, et seq.;
TSS – Total Suspended Solids;
USC – United States Code. (Ord. 5637, 2006).

10.06.030 Definitions.

For the purposes of this section, the following words, phrases, abbreviations, terms and their derivatives shall be construed as specified in this section. Words used in the singular include the plural and the plural the singular. Words used in the masculine gender include the feminine, and the feminine the masculine:

(1) Act or "the Act." The Federal Water Pollution Control Act, also known as the Clean Water Act, as amended, 33 U.S.C. 1251, et seq.

(2) Applicable Pretreatment Standards. For any specified pollutant, City prohibitive discharge standards, City's specific limitations on discharge, State of Oregon Pretreatment Standards, or Categorical Pretreatment Standards (when effective), whichever standard is most stringent.

(3) Applicant. A person who applies for sewer service or a sewer connection.

(4) Approval Authority. The Oregon Department of Environmental Quality (DEQ).

(5) Authorized **or Duly Authorized** Representative of ~~Industrial~~ User. ~~An authorized representative of an industrial user shall be:~~

(a) **If the user is a corporation:**

(i) The president, secretary, treasurer, or a vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

(ii) The manager of one or more manufacturing, production, or operating facilities, provided the manager is authorized to make management decisions that govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiate and direct other comprehensive measures to assure long-term environmental compliance with environmental laws and regulation; can ensure that the necessary systems are established or actions taken to gather complete and accurate information for individual wastewater discharge permit requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.

(b) **If the user is a partnership or sole proprietorship: a general partner or proprietor, respectively.**

(c) **If the user is a Federal, State, or local governmental facility: a director or highest official appointed or designated to oversee the operation and performance of the activities of the government facility, or their designee.**

(d) **The individuals described in (a)-(c) above, may designate a Duly Authorized Representative if the authorization is in writing, the authorization specifies the individual or position responsible for the overall operation of the facility from which the discharge originates or having overall responsibility for the environmental matters for the company, and the written authorization is submitted to the Director.**

~~(a) A principal executive officer of at least the level of vice-president, if the industrial user is a corporation;~~

~~(b) A general partner or proprietor if the industrial user is a partnership or proprietorship, respectively; or~~

(c) ~~A duly authorized representative of the individual designated above if such representative is responsible for the overall operation of the facilities from which the indirect discharge originates.~~

(6) **Best Management Practices (BMPs). Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to implement the prohibitions listed in AMC 10.06.040(1). BMPs include but are not limited to treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage.**

(7) ~~(6)~~Biochemical Oxygen Demand (BOD). The quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure, five days at 20 degrees centigrade expressed in terms of weight and concentration (milligrams per liter (mg/L)).

(8) ~~(7)~~Building Sewer. A sewer conveying wastewater from the premises of a user to the POTW.

(9) ~~(8)~~Categorical Pretreatment Standard. Any regulation containing pollutant discharge limits promulgated by the EPA in accordance with Section 307(b) and (c) of the Act (33 U.S.C. 1317) that applies to a specific category of industrial users and that appears in 40 CFR Chapter 1, Subchapter N, Parts 405-471, incorporated herein by reference.

(10) ~~(9)~~City. The City of Albany, a municipal corporation of the State of Oregon.

(11) ~~(10)~~City Manager. The person designated by the Albany City Council to act as the administrative head of the City government and who is charged with certain duties and responsibilities by this chapter or the duly authorized representative.

(12) ~~(11)~~Commercial User. Any person who contributes, causes or permits the contribution of wastewater into the City's POTW that by nature of the services rendered is of a dissimilar volume or chemical makeup than that of a domestic user. Examples of commercial users may include but are not limited to restaurants, grocery stores, and car washes.

(13) ~~(12)~~Control Authority. The Director of Public Works for the City of Albany.

(14) ~~(13)~~Cooling Water. The water discharged from any use such as air conditioning, cooling, or refrigeration, to which the only pollutant added is heat.

(15) ~~(14)~~Direct Discharge. The discharge of treated or untreated wastewater directly to the waters of the State of Oregon.

(16) ~~(15)~~Director/Director of Public Works. The person designated by the City Manager to supervise the Public Works Department and who is charged with certain duties and responsibilities by this chapter or the duly authorized representative.

(17) ~~(16)~~Discharge. The discharge or introduction of pollutants into the municipal wastewater treatment system from any nondomestic user.

(18) ~~(17)~~Discharger/Industrial Discharger. Any nondomestic user who discharges an effluent into the wastewater treatment system by means of pipes, conduits, pumping stations, force mains, constructed drainage ditches, surface water intercepting ditches, and all constructed devices and appliances appurtenant thereto.

(19) ~~(18)~~Domestic Sewage or Domestic Waste. The liquid and waterborne wastes derived from the ordinary living processes, free from industrial wastes, and of such character as to permit satisfactory disposal, without special treatment, into the public sewer or by means of a private sewage disposal system.

(20) ~~(19)~~Domestic User. Any person who discharges only domestic waste.

(21) ~~(20)~~Domestic Water Supply. Any water supply system that serves potable water and may include for the purposes of this chapter, wells that supply potable water.

(22) ~~(21)~~Environmental Protection Agency (EPA). The U.S. Environmental Protection Agency, or where appropriate the term may also be used as a designation for the administrator or other duly authorized official of said agency.

(23) ~~(22)~~Garbage. The residue from the preparation and dispensing of food, and from the handling, storage, and sale of food products and produce.

(24) ~~(23)~~Grab Sample. A sample that is taken from a waste stream on a one-time basis with no regard to the flow in the waste stream and without consideration of time.

(25) ~~(24)~~Hauled Waste. Waste including septage, wastewater, or chemical toilet waste that is hauled for discharge into the City wastewater treatment system.

(26) ~~(25)~~Indirect Discharge. The discharge or the introduction of pollutants from an industrial user into a POTW.

(27) ~~(26)~~Industrial User. Any person, including a waste hauler, that discharges wastewater that is not domestic waste.

(28) ~~(27)~~Industrial Waste. Solid, liquid, or gaseous waste resulting from any industrial, manufacturing, trade, or business process or from the development, recovery, or processing of natural resources.

(29) **Instantaneous Limit. The maximum concentration of a pollutant allowed to be discharged at any time, determined from the analysis of any discrete or composited sample collected, independent of the industrial flow rate and the duration of the sampling event.**

(30) ~~(28)~~Interference. A discharge that, alone or in conjunction with a discharge or discharges from other sources:

   (a) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

   (b) Is a cause of a violation of any requirements of the NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SWDA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection Research and Sanctuaries Act.

(31) **Local Limit. Specific discharge limits developed and enforced by the City upon industrial or commercial facilities to implement the general and specific discharge prohibitions listed in 40 CFR Part 403.5.**
~~(29)National Pretreatment Standard. National pretreatment standard is defined in 40 CFR 403.3(j) as any regulation containing pollutant discharge limits promulgated by EPA under Section 307(b) and (c) of the Clean Water Act applicable to industrial users, including the general and specific prohibitions found in 40 CFR 403.5.~~

(32) ~~(30)~~Natural Outlet. Any outlet into a watercourse, pond, ditch, lake, or other body of surface or groundwater.

(33) ~~(31)~~New Source.

- (a) Any building, structure, facility, or installation from which there is or may be a discharge of pollutants, the construction of which commenced after the publication of proposed pretreatment standards under Section 307(c) of the Act that will be applicable to such sources if such standards are thereafter promulgated in accordance with that section, provided that:
  - (i) The building, structure, facility, or installation is constructed at a site at which no other source is located; or
  - (ii) The building, structure, facility, or installation totally replaces the process or production equipment that causes the discharge of pollutants at an existing source; or
  - (iii) The production of wastewater generating processes of the building, structure, facility, or installation are substantially independent of an existing source at the same site. In determining whether these are substantially independent, factors such as the extent to which the new facility is integrated with the existing plant and the extent to which the new facility is engaged in the same general type of activity as existing source should be considered.
- (b) Construction on a site at which an existing source is located results in a modification rather than a new source if the construction does not create a new building, structure, facility, or installation meeting the criteria of subsections (a)(ii) or (a)(iii) of this definition but otherwise alters, replaces, or adds to existing process or production equipment.
- (c) Construction of a new source as defined herein has commenced if the owner or operator has:
  - (i) Begun, or caused to begin as part of a continuous on-site construction program:
    - (1) Any placement, assembly, or installation of facilities or equipment; or
    - (2) Significant site preparation work including clearing, excavation, or removal of existing buildings, structures, or facilities that is necessary for placement, assembly, or installation of new source facilities or equipment; or
  - (ii) Entered into a binding contractual obligation for the purchase of facilities or equipment that is intended to be used in its operation within a reasonable time. Options to purchase or contracts that can be terminated or modified without substantial loss, and contracts for feasibility, engineering, and design studies do not constitute a contractual obligation.

(34) ~~(32)~~Nondischarging Categorical Industrial User (NDCIU). Any facility or industry having a connection to the City sewer system and having industrial processes that

would otherwise be subject to national categorical pretreatment standards, but having no process wastewater discharge.

(35) ~~(33)~~Other Wastes. Decayed wood, sawdust, shavings, bark, lime, refuse, ashes, garbage, offal, oil, tar, chemicals, and all other substances except sewage and industrial wastes.

(36) ~~(34)~~Pass Through. The occurrence of an indirect discharge that exits the POTW into waters of the United States in quantities or concentrations that, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

(37) ~~(35)~~Person. Any individual, partnership, copartnership, firm, company, corporation, association, joint stock company, trust, estate, governmental entity, or any other legal entity, or their legal representatives, agents, or assigns. The masculine gender shall include the feminine; the singular shall include the plural where indicated by the context.

(38) ~~(36)~~pH. The logarithm (base 10) of the reciprocal of the concentration of hydrogen ions expressed in grams per liter of solution.

(39) ~~(37)~~Plumbing Fixture. Approved receptacle or devices intended to receive water, liquids or other permissible wastes, and that discharge the same into the soil pipe, waste pipe or special waste pipe with which they are connected and shall include all floor drains.

(40) ~~(38)~~Pollutant. Any dredged spoil, solid waste, incinerator residue, wastewater, garbage, wastewater sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discharged equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.

(41) ~~(39)~~Pretreatment. The reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater to a less harmful state prior to, or in lieu of, discharging or otherwise introducing such pollutants into a POTW.

(42) ~~(40)~~Pretreatment Requirement. Any substantive or procedural requirement **related to pretreatment imposed on a User, other than a Pretreatment Standard.** ~~, other than a national pretreatment standard, imposed on an industrial user.~~

(43) **Pretreatment Standards or Standards. Prohibited discharge standards, categorical Pretreatment Standards, and Local Limits.**

(44) ~~(41)~~Prohibited Discharge~~s~~ **Standards or Prohibited Discharges**. Absolute prohibitions against the discharge of certain ~~types or characteristics of wastewater as established by EPA, DEQ and/or the Director~~. **substances; these prohibitions appear in AMC 10.06.040(1).**

(45) ~~(42)~~Publicly Owned Treatment Works (POTW). Any wastewater treatment works and the sewers, conveyances, and appurtenances discharging thereto, owned and operated by the City.

(46) ~~(43)~~Septage. Either liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar treatment works that receives only domestic sewage. Septage does not include liquid or solid material removed from a septic tank, cesspool, or similar holding tank that receives industrial waste and does not include grease removed from a grease trap at a restaurant.

(47) ~~(44)~~Service Lateral. Any pipe between the main sewer lines of the City and the user's plumbing facilities.

(48) ~~(45)~~Sewage. Water-carried human wastes or a combination of water-carried wastes from residences, business buildings, institutions, and industrial

establishments, together with such ground, surface, storm, or other waters as may be present.

(49) ~~(46)~~Sewer. Any pipe, conduit, ditch, or other device used to collect and transport wastewater from the generating source.

(50) ~~(47)~~Sewerage. The system of sewers and appurtenances for the collection, transportation, and pumping of wastewater.

(51) ~~(48)~~Sewer Connection Permit. A permit issued to connect buildings or structures to a public sewer.

(52) ~~(49)~~Sewer, Public. A sewer provided by or subject to the jurisdiction of the City. It also includes sewers within or outside the City boundaries that serve one or more persons and ultimately discharge into the City sanitary sewer system, even though those sewers may not have been constructed with City funds.

(53) ~~(50)~~Sewer, Sanitary. A sewer that conveys only wastewater and into which storm, surface, and groundwaters are not intentionally admitted.

(54) ~~(51)~~Sewer, Storm. A sewer that conveys storm, surface, and groundwaters and into which wastewaters are not intentionally admitted.

(55) ~~(52)~~Sewer System Facility Plan. The current version of the facility plan for the development of the wastewater treatment plant and sanitary sewer system as amended or updated.

(56) ~~(53)~~Sewer Use Charge. The assessment levied on all users of the public sewer system.

(57) ~~(54)~~Shall, May. "Shall" is mandatory; "may" is permissive.

(58) ~~(55)~~Significant Industrial User. Except as provided in subdivision (c) of this subsection, the term "significant industrial user" shall mean:

(a) All industrial users subject to categorical pretreatment standards under 40 CFR 403.6 and 40 CFR I, Subchapter N; ~~and~~ **or**

(b) Any other industrial user that:

(i) Discharges a process waste stream that makes up five percent of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or

(ii) Discharges to the POTW a process wastewater flow of 25,000 gallons or more per average work day (excluding sanitary, noncontact cooling, and boiler blowdown wastewater); or

(iii) Is designated as significant by the City on the basis that the industrial user has a reasonable potential for ~~causing pass through or interference.~~ **adversely affecting the POTW's operation or for violating any Pretreatment Standard or Requirement.**

(c) Upon finding that an industrial user meeting the criteria in subdivision (b) of this definition has no reasonable potential for adversely affecting the POTW's operation or for violating any Pretreatment Standard or Requirement, the City may at any time, on its own initiative or in response to a petition received from an industrial user, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

(59) ~~(56)~~Significant Noncompliance. A~~n~~ **Significant** Industrial User **(or any other Industrial User that violates paragraph (c), (d), or (h) below)** is determined to be in significant noncompliance if its violation meets one or more of the following criteria:

(a) Chronic violations of wastewater discharge limits, defined here as those in which 66 percent or more of all the measurements taken **for the same pollutant parameter** during **a** six-month period exceeded (by any magnitude) ~~the daily maximum limit or the average limit for the same pollutant parameter;~~

a numeric Pretreatment Standard or Requirement, including Instantaneous Limits as defined in AMC 10.06.030(29).

(b) Technical review criteria (TRC) violations, defined here as those in which 33 percent or more of all of the measurements for each pollutant parameter taken during a six-month period equaled or exceeded the product of the **numeric Pretreatment Standard or Requirement including Instantaneous Limits as defined by AMC 10.06.030(29)** ~~daily maximum limit or the average limit~~ multiplied by the applicable criteria ~~TRC~~ (~~TRC =~~ 1.4 for BOD, TSS, fats, oil, and grease, and 1.2 for all other pollutants except pH);

(c) Any other violation of a ~~p~~Pretreatment **Standard or Requirement as defined by AMC 10.06.030(42) and 10.06.030(43)** ~~effluent limit~~ (daily maximum, ~~or~~ long~~er~~-term~~ed~~ average**, Instantaneous Limit, or narrative standard**) that the ~~City~~ **Director** determines has caused, alone or in combination with other discharges, interference or pass through**,** ~~(~~including endangering the health of City personnel or the general public~~)~~;

(d) Any discharge of a pollutant that has caused imminent endangerment to human health, welfare, or to the environment or has resulted in the ~~City~~**Director**'s exercise of its emergency authority to halt or prevent such a discharge;

(e) Failure to meet, within 90 days after the scheduled date, a compliance schedule milestone contained in a local control mechanism or enforcement order for starting construction, completing construction, or attaining final compliance;

(f) Failure to provide within ~~30~~ **forty-five (45)** days after the due date, required reports such as baseline monitoring reports, ~~90-day compliance~~ reports **on compliance with categorical Pretreatment Standard deadlines**, periodic self-monitoring reports, and reports on compliance with compliance schedules;

(g) Failure to accurately report noncompliance; **or**

(h) Any other violation or group of violations**, which may include a violation of Best Management Practices,** that the ~~City~~ **Director** determines will adversely affect the operation or implementation of the City's pretreatment program.

(60) ~~(57)~~Slug Load **or Slug Discharge**. Any pollutant (including BOD) released in a nonroutine, episodic, or noncustomary batch discharge at a flow rate or concentration that has the potential to cause **interference or pass through, cause** a violation of the specific discharge prohibitions in AMC 10.06.040, **or in any other way violate the POTW's regulations, Local Limits, or permit conditions**.

(61) ~~(58)~~Storm Water. Any flow occurring during or following any form of natural precipitation and resulting therefrom.

(62) ~~(59)~~Total Suspended Solids. The total suspended matter that floats on the surface of, or is suspended in, water, wastewater, or other liquids and that is removable by laboratory filtering.

(63) ~~(60)~~Toxic Pollutant. One of the pollutants or combination of those pollutants listed as toxic in regulations promulgated by the Environmental Protection Agency under the provision of Section 307 (33 U.S.C. 1317) of the Act.

(64) ~~(61)~~Treatment Plant. That portion of the municipal wastewater treatment system designed to provide treatment to wastewater.

(65) ~~(62)~~Upset. An exceptional incident in which an industrial user unintentionally and temporarily is in a state of noncompliance with the standards set forth in AMC 10.06.0980(6)(a) due to factors beyond the reasonable control of the industrial user, and excluding noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation thereof.
(66) ~~(63)~~User. Any person who contributes, causes, or permits the contribution of wastewater into the City's POTW.
(67) ~~(64)~~Utility. The City of Albany, a municipal corporation of the State of Oregon.
(68) ~~(65)~~Wastewater. The liquid and water-carried industrial or domestic wastes from dwellings, commercial buildings, industrial facilities, and institutions, whether treated or untreated, that is contributed into or permitted to enter the POTW.
(69) ~~(66)~~Wastewater Discharge Permit. As set forth in AMC 10.06.060.
(70) ~~(67)~~Wastewater Treatment System. Any wastewater treatment works and the sewers, conveyances, and appurtenances discharging thereto, owned and operated by the City. Same as publicly owned treatment works (POTW).
(71) ~~(68)~~Waters of the State. All streams, lakes, ponds, marshes, watercourses, waterways, wells, springs, reservoirs, aquifers, irrigation systems, drainage systems and all other bodies or accumulations of water, surface or underground, natural or artificial, public or private, that are contained within, flow through, or border upon the State, or any portion thereof. (Ord. 5637, 2006).

10.06.040 Regulations.

(1) Discharge Prohibitions. No user shall contribute or cause to be discharged, directly or indirectly, any pollutant or wastewater that will cause interference or pass through. These general prohibitions apply to all users of the publicly owned treatment works (POTW) whether or not the use is subject to categorical Pretreatment Standards or any other National, State, or local Pretreatment Standards or Requirements. Furthermore, no user may contribute the following substances to the **POTW**~~ wastewater treatment system~~:

(a) Any liquids, solids, or gases that by reason of their nature or quantity are, or may be, sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious in any other way to the POTW or to the operation of the POTW. Wastewater discharges with a closed cup flashpoint of less than 140 degrees Fahrenheit or 60 degrees Celsius using the test methods specified in 40 CFR 261.21 are prohibited.

(b) Any solid or viscous substances that may cause obstruction to the flow in a sewer or other interferences with the operation of the wastewater treatment system facilities, such as, but not limited to: grease, garbage with particles greater than one-half inch in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dusts, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas, tar asphalt residues, residues from refining or processing of fuel or lubricating oil, mud, or glass grinding or polishing wastes.

(c) Any wastewater having a pH less than six or greater than 10, except under conditions of continuous pH monitoring as specified in the City's enforcement response plan. In no case shall a user be permitted to discharge wastewater having a pH of less than five, or wastewater having any corrosive property capable of causing damage or hazard to structures, equipment, and/or personnel of the City.

(d) Any wastewater containing toxic pollutants in sufficient quantity, either singly or by interaction, to injure or interfere with any wastewater treatment system process, create a toxic effect on the receiving waters of the POTW, constitute a hazard to humans or animals, or to exceed the limitation set forth in categorical pretreatment standards.

(e) Pollutants that result in the presence of toxic gases, vapors, or fumes within the POTW in a quantity that may cause acute worker health or safety problems.

(f) Any substance that may cause the POTW's effluent or treatment residues, sludges, or scums to be unsuitable for reclamation and reuse or to interfere with the reclamation process. (In no case shall a substance discharged to the POTW cause the POTW to be in noncompliance with sludge use or disposal criteria, guidelines, or regulations developed under Section 405 of the Act, any criteria, guidelines, or regulations affecting sludge use or disposal developed pursuant to the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substance Control Act, or State standards applicable to the sludge management method being used.)

(g) Any substance that will cause the POTW to violate its NPDES and/or other disposal system permits.

(h) Any substance with objectionable color not removed in the treatment process, such as, but not limited to, dye wastes and vegetable tanning solutions.

(i) Any wastewater having a temperature that will inhibit biological activity in the POTW treatment plant resulting in interference but, in no case, wastewater that causes the temperature at the introduction into the treatment plant to exceed 40 degrees Celsius (104 degrees Fahrenheit). If, in the opinion of the City, lower temperatures of such wastes could harm either the sewers, wastewater treatment processes, or equipment; have an adverse effect on the receiving streams; or otherwise endanger life, health, or property or constitute a nuisance, the City may prohibit such discharges.

(j) Any unpolluted water including, but not limited to, storm water, surface water, groundwater, roof runoff, parking lot and subsurface drainage, noncontact cooling water, and unpolluted wastewater, unless specifically authorized by the Public Works Director.

(k) Any wastewater containing any radioactive wastes or isotopes of such half life or concentration as exceed limits established by the Director in compliance with applicable State or Federal regulations.

(l) Any wastewater containing pollutants**, including oxygen demanding pollutants,** in sufficient quantity (flow or concentration), either singly or by interaction with other pollutants, to pass through or interfere with the POTW, any wastewater treatment or sludge process, or constitute a hazard to humans or animals.

(m) Wastewater containing substances not amenable to treatment or reduction by the wastewater treatment system processes employed, or are amenable to treatment only to such degree that the wastewater treatment plant effluent cannot meet the requirements of other agencies having jurisdiction over discharge to the receiving waters.

(n) Fats, wax, grease, or oils whether emulsified or not, containing substances that may solidify or become viscous at temperatures between 32 degrees Fahrenheit and 150 degrees Fahrenheit (zero degrees Celsius and 65 degrees Celsius).

(o) Any sludges, screenings, or other residues from the pretreatment of industrial waste.

(p) Any hauled waste or septage, except at discharge points designated by the City and authorized in writing by the Director.

(q) Any wastewater causing the treatment plant effluent to demonstrate toxicity to test species during a biomonitoring evaluation.

(r) Any wastewater, residual solvents, or solvent-contaminated waste from dry cleaning machines, as well as solvent-contaminated wastewater from any auxiliary operation at dry cleaning facilities.

(s) Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin, in amounts that will cause Interference or Pass Through.

(2) Limitations on Wastewater Strength.

(a) Federal Categorical Pretreatment Standards. Users subject to categorical pretreatment standards are required to comply with applicable standards as set out in 40 CFR Chapter 1, Subchapter N, Parts 405-471 and incorporated herein.

(i) When the limits in a categorical Pretreatment Standard are expressed only in terms of mass of pollutant per unit of production, the Director may convert the limits to equivalent limitations expressed either as mass of pollutant discharged per day or effluent concentration for purposes of calculating effluent limitations applicable to individual industrial users, in accordance with AMC 10.06.040(2)(a)(ii).

(ii) The Director may convert the mass limits of the categorical Pretreatment Standards of 40 CFR Parts 414, 419, and 455 to concentration limits for purposes of calculating limitations applicable to individual industrial users. The conversion is at the discretion of the Director. When converting any mass limits to concentration limits, documentation will be made that dilution is not being substituted for treatment as prohibited by AMC Chapter 10.06.040(2)(d). The Director will document how the equivalent limits were derived for any changes from mass limits to concentration and make this information publicly available upon request.

(iii) Once included in its permit, the industrial user must comply with the equivalent limitations developed in this section in lieu of the promulgated categorical standards from which the equivalent limitations were derived.

(iv) Many categorical Pretreatment Standards specify one limit for calculating maximum daily discharge limitations and a second limit for calculating maximum Monthly Average, or 4-day average, limitations. Where such Standards are being applied, the same production or flow figure shall be used in calculating both the average and the maximum equivalent limitation.

(v) Any industrial user operating under a permit incorporating equivalent mass or concentration limits calculated from a production-based Standard shall notify the Director within two (2) business days after the user has a reasonable basis to know that the production level will significantly change within the next calendar month. Ay user not notifying the Director of such anticipated change will be required to meet the mass or concentration limits in its permit that were based on the original estimate of the long-term average production rate.

(b) State Requirements. State requirements and limitations on users of the POTW shall be met by all users that are subject to such standards in any instance in which they are more stringent than Federal requirements and limitations, or those in this chapter or any other applicable ordinance.

(c) Right of Revision. The City reserves the right to amend this chapter to provide for more stringent limitations or requirements on discharges to the POTW where deemed necessary to comply with the objectives set forth in AMC 10.06.010.

(d) Dilution. No user shall increase the use of potable or process water in any way for the purpose of diluting a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the applicable standards set forth in this chapter. The City may impose mass limitations on users that are using dilutions to meet the applicable pretreatment standards or requirements of this chapter.

(e) Specific Pollutant Limitations.

(i) No nondomestic user shall discharge wastewater containing restricted substances into the **POTW**~~publicly owned treatment works~~ in excess of limitations specified in its wastewater discharge permit or published by the Director. The Director shall publish and revise from time to time standards for specific restricted substances, **termed Local Limits, including designation of affected nondomestic users.** These standards shall be developed in accordance with 40 CFR 403.5 and shall implement the objectives of this chapter. Standards published in accordance with this section will be deemed pretreatment standards for the purposes of Section 307(d) of the Act.

(ii) The Director may develop Best Management Practices (BMPs), by ordinance or in individual wastewater discharge permits, to implement Local Limits and the requirements of AMC 10.06.040(1).

(~~ii~~**iii**) The Director may impose mass limitations in addition to or in place of the concentration limits referenced above.

(3) Accidental Discharges. As appropriate, industrial users shall provide protection from accidental discharge of prohibited or regulated materials or substances established by this chapter. Where deemed necessary by the City, facilities to prevent accidental discharge of prohibited materials shall be provided and maintained at the industrial user's cost and expense. An accidental spill prevention plan (ASPP) **or slug discharge control plan** showing facilities and operating procedures to provide this protection shall be submitted to the City for review and approval before implementation. The City shall determine which industrial users are required to develop an ASPP and require said industrial users to submit the ASPP within 60 days after notification by the City. Each industrial user shall implement its ASPP as submitted after such ASPP has been reviewed and approved by the City. Review and approval of such plans and operating procedures by the City shall not relieve the industrial user from the responsibility to modify its facility as necessary to meet the requirements of this chapter.

(a) Any user required to develop and implement an accidental spill prevention plan shall submit a plan that addresses, at a minimum, the following:

(i) Description of discharge practices, including nonroutine batch discharges;

(ii) Description of stored chemicals;

(iii) Procedures for immediately notifying the POTW of any accidental or slug discharge. Such notification must also be given for any discharge that would violate any of the standards in AMC 10.06.040(1);

(iv) If necessary and applicable, procedures to prevent adverse impact from any accidental or slug discharge. Such procedures include, but are not limited to, inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site runoff, worker training, building of containment structures or equipment, measures for containing toxic organic chemicals (including solvents), and/or measures and equipment for emergency response.

(b) Industrial users shall notify the City (wastewater treatment plant) immediately upon the occurrence of an accidental or other discharge that may cause potential problems for the POTW. The notification shall include location of discharge, date and time thereof, type of waste, concentration and volume, and corrective actions. Any industrial user that discharges prohibited materials shall be liable for any incurred expense, loss, or damage to the POTW, in addition to the amount of any fines imposed on the City on account thereof under State or Federal law.

(c) Written Notice. Within five days following an accidental discharge, the user shall submit to the Director a detailed written report describing the cause of the discharge and the measures to be taken by the user to prevent similar future occurrences. Such notification shall not relieve the user of any expense, loss, damage, or other liability that may be incurred as a result of damage to the POTW, fish kills, or any other damage to person or property; nor shall such notification relieve the user of any fines, civil penalties, or other liability that may be imposed by this chapter or other applicable law.

(d) Signs shall be permanently posted in conspicuous places on industrial user's premises, advising employees who to call in the event of a discharge described in subdivision (a) of this subsection. Employers shall instruct all employees who may cause or discover such a discharge with respect to emergency notification procedure.

(e) Industrial users required to develop an ASPP or slug discharge control plan including significant industrial users are required to notify the City immediately of any changes at the industrial facility affecting the potential for a slug discharge.

(4) Special Agreements. The City reserves the right to enter into special agreements with users setting out special terms under which the industrial user may discharge to the wastewater treatment system. In no case will a special agreement waive compliance with a pretreatment standard. However, the industrial user may request a net gross adjustment to a categorical standard in accordance with 40 CFR 403.15. Industrial users may also request a variance from the categorical pretreatment standard from U.S. EPA. Such a request will be approved only if the user can prove that factors relating to its discharge are fundamentally different from the factors considered by U.S. EPA when establishing that pretreatment standard. An industrial user requesting a fundamentally different factor variance must comply with the procedural and substantive provisions in 40 CFR 403.13. (Ord. 5637, 2006).

10.06.050 Hauled waste.

All hauled waste including septage must be discharged at the City of Albany wastewater treatment plant. All discharges at any other point within the wastewater treatment system, including sanitary sewer manholes, are hereby prohibited. Administration and enforcement of hauled waste permits shall be the same as industrial permits, AMC 10.06.060**, 10.06.070, and 10.06.090**~~and 10.06.080~~.

(1) Permit Required. Any waste hauler must apply for and be issued a hauled waste discharge permit prior to discharge and/or use of treatment plant services.

(2) In addition to the following administration and enforcement requirements, hauled waste dischargers must have the following to obtain a permit:

(a) A valid Oregon Department of Environmental Quality septage hauling permit if applicable; and

(b) Proof of liability insurance with coverage limits as required by the City of Albany Finance Director; and

(c) Indemnity bond, deposit or other payment guarantee sufficient to guarantee payment of treatment fees as determined by the Finance Director.

(3) Permit fees and treatment rates for hauled waste shall be established by Council resolution. (Ord. 5637, 2006).

10.06.060 Administration.

(1) Wastewater Discharges. It shall be unlawful to discharge industrial wastes to the POTW without having first complied with the terms of this chapter, or without having first obtained the City's approval of a compliance schedule submitted by the industrial user.

(2) General Disclosure. All industrial users proposing to connect to or to discharge sewage, industrial wastes, and other wastes to the POTW shall comply with all terms of this chapter within 30 days after the effective date of this chapter.

(3) Wastewater Discharge Permit Requirement. No significant industrial user shall discharge wastewater into the POTW without first obtaining a wastewater discharge permit from the Director. Any violation of the terms and conditions of a wastewater discharge permit shall be deemed a violation of this chapter and subjects the wastewater

discharge permittee to the sanctions set forth in this chapter. Obtaining a wastewater discharge permit does not relieve a permittee of its obligation to comply with all Federal and State pretreatment standards or requirements or with other requirements of Federal, State, and local law.

The Director may require other users, including liquid waste haulers and nondischarging categorical industrial users (NDCIUs) to obtain wastewater discharge permits (as necessary) to carry out the purposes of this chapter.

(4) ~~Disclosure Forms~~ **Wastewater Discharge Permit Application.** ~~Significant industrial~~ **All** users **required to obtain a wastewater discharge permit must submit a permit application** ~~shall complete and file with the City a data disclosure declaration in the form prescribed by the City, and~~ **accompanied by the appropriate fee**. Existing significant industrial users shall file a ~~disclosure form~~ **permit application** within 60 days after the notification by the City and any proposed industrial user that is a new source shall file a ~~disclosure form~~ **permit application** a minimum of 90 days prior to connecting to the POTW. This ~~data disclosure form~~ **permit application shall** satisfi~~es~~**y** the requirements of the baseline monitoring report as described in 40 CFR 403.12(b). The ~~disclosure to be made by the industrial user~~ **permit application** shall be made on ~~written~~ forms provided by the City and shall include the following information:

(a) Name, address, and location of the industrial user**, and name of the operator and owner**.

(b) Standard industrial classification (SIC) number according to the Standard Industrial Classification Manual, Bureau of the Budget, 1972, as amended.

(c) Wastewater constituents and characteristics including but not limited to those mentioned in this chapter, including standards contained in AMC 10.06.040(1) and (2) as appropriate, as determined by bona fide chemical and biological analyses. Sampling and analysis shall be performed in accordance with procedures established by the EPA and contained in 40 CFR, Part 136, as amended.

(d) Time and duration of discharges.

(e) Average daily and instantaneous peak wastewater flow rates, in gallons per day, including daily, monthly, and seasonal variations, if any. All flows shall be measured unless other verifiable techniques are approved by the City due to cost or nonfeasibility.

(f) Site plans, floor plans, plumbing plans, and details to show all sewers, sewer connections, inspection manholes, sampling chambers, and appurtenances by size and location.

(g) Activities, facilities, and plant processes on the premises, including all materials that are or may be discharged to the sewers or works of the City, and a brief description of the nature, average rate of production, and standard industrial classification of the operation.

(h) A statement regarding whether or not compliance is being achieved with this chapter on a consistent basis and, if not, whether additional operation and maintenance activities and/or additional pretreatment is required for the industrial user to comply with this chapter.

(i) Where additional pretreatment and/or operation and maintenance activities will be required to comply with this chapter, the industrial user shall provide a compliance schedule consisting of a declaration of the shortest schedule by which the industrial user will provide such additional pretreatment and/or implementation of additional operational and maintenance activities.

(i) The schedule shall contain milestone dates for the commencement and completion of major events leading to the construction and operation of additional pretreatment required for the industrial user to comply with the requirements of this chapter including, but not limited to, dates relating to hiring an engineer, completing preliminary plans, completing final plans, executing contracts for major components, commencing construction, completing construction, and all other acts necessary to achieve compliance with this chapter.

(ii) Under no circumstance shall the City permit a time increment for any single step directed toward compliance that exceeds nine months.

(iii) Not later than 14 days following each milestone date in the schedule and the final date for compliance, the industrial user shall submit a progress report to the City, including no less than a statement as to whether or not it complied with the increment of progress represented by that milestone date and, if not, the date on which it expects to comply with this increment of progress, the reason for delay, and the steps being taken by the industrial user to return the construction to the approved schedule. In no event shall more than nine months elapse between such progress reports to the City.

(j) Each product produced by type, amount, process or processes, and rate of production.

(k) Type and amount of raw materials utilized including chemicals used in process that may be discharged to the sanitary sewer system (average and maximum per day).

~~(l) A statement signed by an authorized representative of the user and certified by a qualified professional, indicating whether pretreatment standards are being met on a consistent basis, and if not, whether additional operations and maintenance (O&M) and/or additional pretreatment is required in order to meet the pretreatment standards and requirements.~~

(l) ~~(m)~~List of environmental control permits held by or for the facility.

(m) Any requests for a monitoring waiver (or a renewal of an approved monitoring waiver) for a pollutant neither present nor expected to be present in the discharge based on AMC 10.06.070(1)(b)(iii).

(5) Evaluation of ~~Disclosure~~ **Permit Application**. The City will evaluate the complete ~~disclosure form~~ **permit application** and data furnished by the industrial user and may require additional information. Within 60 days of receipt of a complete permit application, the Director will determine whether or not to issue a wastewater permit. If no determination is made within this time period, the application will be deemed denied. If any waters or wastes are discharged, or are proposed to be discharged to the public sewers, which waters contain the substances or possess the characteristics enumerated in AMC 10.06.040, and that in the judgment of the Director may have a deleterious effect upon the POTW, processes, equipment, or receiving waters, or which otherwise create a hazard to life or constitute a public nuisance, the Director may take any of the following actions:

(a) Reject the wastes;

(b) Require pretreatment to an acceptable condition for discharge to the public sewers;

(c) Require control over the quantities and rates of discharge; and/or

(d) Require payment to cover the added cost of handling and treating the wastes not covered by existing taxes or sewer charges under the provision of AMC 10.01.070.

(6) Standards Modification. The City reserves the right to amend this chapter and the terms and conditions hereof in order to assure compliance by the City with applicable laws and regulations. All categorical pretreatment standards adopted by the EPA after the promulgation of this chapter shall be enforceable by the City through this chapter.

(7) Categorical Standards Promulgation. Where an industrial user, subject to a categorical pretreatment standard, has not previously submitted a ~~data disclosure form~~ **permit application** as required by subsection (4) of this section, the industrial user shall file a ~~disclosure form~~ **permit application** with the City within 180 days after the promulgation of the applicable categorical pretreatment standard by the EPA. In addition, any industrial user operating on the basis of a previous filing of a ~~data disclosure form~~ **permit application** shall submit to the City within 180 days after the promulgation of an applicable categorical pretreatment standard **a permit application, and** the additional information required by subsections (4)(h) and (i) of this section. If deemed necessary by the City, where categorical pretreatment standards are more stringent, the wastewater discharge permit will be modified. ~~The industrial user shall be informed of any proposed changes in the chapter at least 30 days prior to the effective date of change. Any changes or new conditions in the chapter shall include a reasonable time schedule for compliance.~~

(8) ~~(7)~~Wastewater Discharge Permit. Wastewater permits shall include such conditions as are deemed reasonably necessary by the Director to prevent pass through or interference**, protect the quality of the receiving water body, protect worker health and safety, facilitate sludge management and disposal, protect against damage to the POTW,** and to implement the objectives of this code.

(a) Wastewater permits must contain the following conditions:

(i) A statement that indicates permit duration, which in no event shall exceed five years.

(ii) A statement that the permit is nontransferable without prior notification to and approval from the City and provisions for furnishing the new owner or operator with a copy of the existing permit.

(iii) Effluent limits**, including Best Management Practices**, ~~applicable to the user~~ based on applicable **Pretreatment S**~~s~~tandards ~~in Federal, State, and local law~~.

(iv) Self-monitoring, sampling, reporting, notification, and record keeping requirements. These requirements shall include an identification of pollutants **(or Best Management Practice(s))** to be monitored, sampling location, sampling frequency, and sample type based on Federal, State, and local law.

(v) Statement of applicable penalties for violation of Pretreatment Standards and Requirements, and compliance schedules.

(vi) The process for seeking a waiver from monitoring for a pollutant neither present nor expected to be present in the discharge in accordance with AMC 10.06.070(1)(b)(3). Any grant of the monitoring waiver by the Director must be included as a condition in the user's permit.

(vii) Requirements to control slug discharge, if determined by the Director to be necessary.

(b) Permits may contain, but need not be limited to, the following:

(i) Limits on the average and/or maximum rate of discharge, time of discharge, and/or requirements for flow regulation and equalization.

(ii) Limits on the instantaneous, daily and monthly average and/or maximum concentration, mass, or other measure of identified wastewater pollutants or properties.

(iii) Requirements for the installation of pretreatment technology or construction of appropriate containment devices, etc., designed to reduce, eliminate, or prevent the introduction of pollutants into the POTW.

~~(iv) Development and implementation of spill control plans or other special conditions including management practices necessary to adequately prevent accidental or unanticipated discharges.~~

(iv)~~(v)~~ Development and implementation of waste minimization plans to reduce the amount of pollutants discharged to the POTW.

(v)~~(vi)~~ The unit charge or schedule of user charges and fees for the management of the wastewater discharged to the wastewater treatment system.

(vi)~~(vii)~~ Requirements for installation and maintenance of inspection and sampling facilities and equipment.

(vii)~~(viii)~~ Specifications for monitoring programs that may include sampling locations, frequency of sampling, number, types, and standards for tests, and reporting schedules.

(viii)~~(ix)~~ Requirements for immediate reporting of any instance of noncompliance and for automatic resampling and reporting within 30 days where self-monitoring indicates a violation(s).

(ix)~~(x)~~ Compliance schedules for meeting pretreatment standards and requirements.

(x)~~(xi)~~ Requirements for submission of periodic self-monitoring or special notification reports.

(xi)~~(xii)~~ Requirements for maintaining and retaining plant records relating to wastewater discharge as specified in ~~subsection (14)~~**AMC 10.06.070(6)** ~~of this section~~ and affording the Director, or his representatives, access thereto.

~~*(xiii) Requirements for prior notification and approval by the Director of any new introduction of wastewater pollutants or of any change in the volume or character of the wastewater prior to introduction in the system.*~~

(xii)~~(xiv)~~ Requirements for the prior notification and approval by the Director of any change in the manufacturing and/or pretreatment process used by the permittee.

~~(xv) Requirements for the immediate notification of excessive, accidental, or slug loads, or any discharge that could cause any problems to the wastewater treatment system.~~

(xiii)~~(xvi)~~ A statement that compliance with the permit does not relieve the permittee of responsibility for compliance with all applicable Federal and State pretreatment standards, including those that become effective during the term of the permit.

(xiv)~~(xvi)~~ Other conditions as deemed appropriate by the Director to ensure compliance with this chapter, and State and Federal laws, rules, and regulations; the term of the permit.

(9)~~(8)~~ Wastewater Permit Modifications. The Director may modify the permit for good cause including, but not limited to, the following:

(a) To incorporate any new or revised Federal, State, or local pretreatment standards or requirements.

(b) To address significant alterations or additions to the industrial user's operation, processes, or wastewater volume or character since the time of permit issuance.

(c) A change in the **POTW**~~municipal wastewater treatment system~~ that requires either a temporary or permanent reduction or elimination of the authorized discharge.

(d) Information indicating that the permitted discharge poses a threat to the City's **POTW** ~~municipal wastewater treatment system~~, City personnel, or the receiving waters.

(e) Violation of any terms or conditions of the wastewater permit.

(f) Misrepresentation or failure to disclose fully all relevant facts in the permit application or in any required reporting.

(g) Revision of or a grant of variance from categorical Pretreatment Standards pursuant to 40 CFR 403.13.

(h) To correct typographical or other errors in the permit.

(i) To reflect a transfer of the facility ownership and/or operation to a new owner/operator.

The filing of a request by the permittee for a permit modification does not stay any permit condition.

(10)~~(9)~~ Permit Reissue. Industrial users issued permits are required to reapply to the City a minimum of 90 days prior to the expiration date of their existing permit. Reapplication shall be made on a form provided by the City.

10.06.070 Reporting and Monitoring Requirements.

(1)~~(10)~~ Reporting Requirements for Industrial Users.

(a) Final Compliance Report. Within 90 days following the date for final compliance by the industrial user with applicable categorical pretreatment standards and requirements set forth in this chapter or a wastewater discharge permit, or within 30 days following commencement of the introduction of wastewater into the POTW by a new source, any industrial user subject to this chapter shall submit to the City a report indicating the nature and concentration of all prohibited or regulated substances contained in its discharge, and the average and maximum daily flow in gallons. The report shall include a statement, signed by an authorized representative of the industrial user and certified by a qualified professional, indicating whether pretreatment standards are being met on a consistent basis and, if not, whether additional operations and maintenance (O&M) and/or additional pretreatment is required in order to meet the pretreatment standards and requirements.

(b) Periodic Compliance Reports.

(i) Any significant industrial users subject to a pretreatment standard shall, at a frequency determined by the Director, but in no case less than twice per year, submit a report indicating the nature and concentration of pollutants in the discharge that are limited to such pretreatment standards and the measured or estimated average and maximum daily flows for the reporting period. **In cases where the pretreatment standard requires compliance with a Best Management Practice (BMP), the user must submit documentation required by the Director or the pretreatment standard necessary to determine the compliance status of the user.** All periodic compliance reports must be signed and certified in accordance with **AMC 10.06.070(11)** ~~subsection (11) of this section~~.

(ii) Reports of industrial users shall contain all results of sampling and analysis of the discharge, including the flow and the nature and concentration, or production and mass where required by the City. The frequency of monitoring by the industrial user shall be as prescribed within the wastewater discharge permit. If an industrial user monitors any pollutant more frequently than required by the wastewater discharge permit, using the procedures prescribed in this section, the results of this monitoring shall be included in the report.

(iii) The City may authorize an Industrial User subject to a categorical Pretreatment Standard to forego sampling of a pollutant regulated by a categorical Pretreatment Standard if the industrial user has demonstrated through sampling and other technical factors that the pollutant is neither present nor expected to be present in the discharge, or is present only at background levels from intake water and without any increase in the pollutant due to activities of the industrial user. Any grant of the monitoring waiver by the Director shall be included as a condition in the user's permit. This authorization is subject to the industrial user meeting the conditions specified in 40 CFR Part 403.12(e)(2) as amended.

(iv) All wastewater samples must be representative of the user's discharge. Wastewater monitoring and flow measurement facilities shall be properly operated, kept clean, and maintained in good working order at all times. The failure of a user to keep its monitoring facility in good working order shall not be grounds for the user to claim that sample results are unrepresentative of its discharge.

(2)~~(11)~~ Analytical Requirements. All pollutant analyses, including sampling techniques, to be submitted as part of a permit application or report shall be performed in accordance with the techniques prescribed in 40 CFR Part 136 **and amendments** or, if 40 CFR 136 does not contain sampling or analytical techniques for the pollutant in question, in accordance with procedures approved by the EPA administrator.

(3) Sample Collection. Data collected to satisfy reporting requirements must be based on appropriate sampling and analysis performed during the period covered by the report, and must be representative of conditions occurring during the reporting period.

(a) Except as indicated in (b) and (c) below, the user must collect wastewater samples using 24-hour flow-proportional composite sampling techniques, unless time-proportional composite sampling or grab sampling is authorized by the Director. Where time-proportional composite sampling or grab sampling is authorized by the City, the samples must be representative of the discharge. Using protocols (including appropriate preservation) specified in 40 CFR Part 136 and appropriate EPA guidance, multiple grab samples collected during a 24-hour period may be composited prior to the analysis as follows: for cyanide, total phenols, and sulfides the samples may be composited in the laboratory or in the field; for volatile organics and oil and grease, the samples may be composited in the laboratory. Composite samples for other parameters unaffected by the compositing procedures as documented in approved EPA methodologies may be authorized by the City, as appropriate. In addition, grab samples may be required to show compliance with Instantaneous Limits.

(b) Samples for oil and grease, temperature, pH, cyanide, total phenols, sulfides, and volatile organic compounds must be obtained using grab collection techniques.

(c) For sampling required in support of baseline monitoring and 90-day compliance reports required in AMC 10.06.060(4) and AMC 10.06.070(1)(a), a minimum of four (4) grab samples must be used for pH, cyanide, total phenols, oil and grease, sulfide and volatile organic compounds for facilities for which historical sampling data do not exist; for facilities for which historical sampling data are available, the Director may authorize a lower minimum. For the reports required by AMC 10.06.070(1)(b), the Industrial User is required to collect the number of grab samples necessary to assess and assure compliance with applicable Pretreatment Standards and Requirements.

(4)~~(12)~~ Notification and Resampling. In the event an industrial user's monitoring results indicate a violation has occurred, the industrial user must immediately (within 24 hours of becoming aware of the violation) notify the City and resample its discharge. The industrial user must report the results of the repeated sampling within 30 days of discovering the first violation. **Resampling by the industrial user is not required if the City performs sampling at the user's facility at least once a month, or if the City performs sampling at the user between the time when the initial sampling was conducted and the time when the user or the City receives the results of this sampling, or if the City has performed the sampling and analysis in lieu of the industrial user. If the City performed the sampling and analysis in lieu of the industrial user, the City will perform the repeat sampling and analysis unless it notifies the user of the violation and requires the user to perform the repeat sampling and analysis.**

(5)~~(13)~~ Inspection and Sampling. ~~The City may inspect the monitoring facilities, and all parts of the premises of any industrial user to determine compliance with the requirements of this chapter. The industrial user shall allow the City or its representatives to enter upon the premises of the industrial user at all reasonable hours for the purposes of inspection, sampling, or records examination or copying.~~ **The Director shall have the right to enter the premises of any user to determine**

whether the user is complying with all requirements of this ordinance and any individual wastewater discharge permit or order issued hereunder. Users shall allow the Director ready access to all parts of the premises for the purposes of inspection, sampling, records examination and copying, and the performance of any additional duties. ~~The City shall have the right to set up on the industrial user's property such devices as are necessary to conduct sampling, inspection compliance, monitoring, and/or metering operations.~~

(a) The Director shall have the right to set up on the industrial user's property, or require installation of, such devices as are necessary to conduct sampling, inspection compliance, monitoring, and/or metering operations.

(b) Where a user has security measures in force which require proper identification and clearance before entry into its premises, the user shall make necessary arrangements with its security guards so that, upon presentation of suitable identification, the Director or authorized representatives shall be permitted to enter without delay for the purposes of performing specific responsibilities.

(c) Any temporary or permanent obstruction to safe and easy access to the facility to be inspected and/or sampled shall be promptly removed by the user at the written or verbal request of the Director and shall not be replaced. The costs of clearing such access shall be born by the user.

(d) Unreasonable delays in allowing the Director access to the user's premises shall be a violation of this ordinance.

(6)~~(14)~~ Record Keeping. Industrial users shall retain, and make available for inspection and copying, all records ~~and information required to be retained under 40 CFR 403.12(o).~~ **of information obtained pursuant to any monitoring activities required by the ordinance, any additional records of information obtained pursuant to monitoring activities undertaken by the user independent of such requirements, documentation supporting any monitoring waiver for pollutants not present established under AMC 10.06.070(1)(b)(iii), and documentation associated with Best Management Practices established under AMC 10.06.040(2)(e)(ii). Records shall include the date, exact place, method, and time of sampling, and the name of the person(s) taking the samples; the dates analyses were performed; who performed the analyses; the analytical techniques or methods used; and the results of such analyses.** These records shall remain available for a period of at least three years. This period shall be automatically extended for the duration of any litigation concerning compliance with the Albany Municipal Code, or where the industrial user has been specifically notified of a longer retention period by the Director.

(7)~~(15)~~ Report of Changed Conditions. Each industrial user is required to notify the City of any planned significant changes to the industrial user's operations or pretreatment systems that might alter the nature, quality, or volume of its wastewater.

(a) The Director may require the industrial user to submit such information as may be deemed necessary to evaluate the changed condition, including the submission of a wastewater permit application under **AMC 10.06.060(4)** ~~subsection (4) of this section~~, if necessary.

(b) The City may issue a wastewater permit under **AMC 10.06.060(7)** ~~subsection (7) of this section~~ or modify an existing wastewater permit under **AMC 10.06.060(8)** ~~subsection (8) of this section~~.

(c) No industrial user shall implement the planned changed condition(s) until and unless the Director has responded to the industrial user's notice.

(d) For purposes of this requirement, flow increases or loading increases of 20 percent or greater and/or the discharge of any previously unreported pollutant shall be deemed significant.

(8)~~(16)~~ Notification of Significant Production Change. An industry operating under a wastewater discharge permit incorporating equivalent mass or concentration limits calculated from a production-based standard shall notify the City within two business days after the user has a reasonable basis to know that the production level will significantly change within the next calendar month. Any user not notifying the City of such anticipated change will be required to meet the mass or concentration limits in its permit that were based on the original estimate of the long-term average production rate.

(9)~~(17)~~ Confidential Information. Information and data on an industrial user obtained from reports, questionnaires, permit applications, permits, and monitoring programs, and from City inspection and sampling activities shall be available to the public without restriction unless the industrial user specifically requests and is able to demonstrate to the satisfaction of the City that the release of such information would divulge information, processes or methods of production entitled to protection as trade secrets under applicable State laws.

(a) Wastewater constituents and characteristics and other "effluent data" as defined by 40 CFR 2.302 will not be recognized as confidential information and will be available to the public without restriction.

(b) When requested and demonstrated by the industrial user furnishing a report that such information should be held confidential, the portions of a report that might disclose trade secrets or secret processes shall not be made available for inspection by the public, but shall be made available immediately upon request to governmental agencies for uses related to the Albany Municipal Code, the National Pollutant Discharge Elimination System (NPDES) program, and in enforcement proceedings involving the person furnishing the report.

(10)~~(18)~~ Notification by Industrial Users Discharging Hazardous Waste. In compliance with 40 CFR 403.12(p), industrial users shall notify the Director, EPA, and DEQ in writing of any discharge into the municipal wastewater system of a substance that, if otherwise disposed of, would be a hazardous waste under 40 CFR part 261.The City may request additional information on the nature and concentration of the discharge, and may prohibit such discharge of wastewater containing hazardous waste.

(11)(~~19~~) ~~Signatory Requirements~~ **Certification Statements**. All applications, reports,or information to the City shall be signed and certified in accordance with 40 CFR 403.12(l)

(a) Certification of Permit Applications, User Reports and Initial Monitoring Waiver. The following certification statement is required to be signed and submitted by users submitting permit applications including baseline monitoring reports in accordance with AMC 10.06.060(4); users submitting final compliance reports under AMC 10.06.070(1)(a); users submitting reports on compliance with the categorical Pretreatment Standard deadlines under AMC 10.06.070(1)(b); users submitting compliance reports required by AMC 10.06.070(1); and users submitting an initial request to forego sampling of a pollutant on the basis of AMC 10.06.070(1)(b)(iii). The following certification statement must be signed by an authorized representative as defined in AMC 10.06.030:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the

information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

(b) Certification of Pollutants Not Present. Users that have an approved monitoring waiver based on AMC 10.06.070(1)(b)(iii) must certify on each report with the following statement that there has been no increase in the pollutant in its wastestream due to activities of the user.

Based on my inquiry of the person or persons directly responsible for managing compliance with the Pretreatment Standard for 40 CFR _____ [specify applicable National Pretreatment Standard part(s)], I certify that, to the best of my knowledge and belief, there has been no increase in the level of _____ [list pollutant(s)] in the wastewaters due to the activities at the facility since filing of the last periodic report under AMC 10.06.0.070(1)(b). (Ord. 5637, 2006).

10.06.~~070~~080 Pretreatment facilities.

(1) Pretreatment Plans Required. Industrial users shall provide necessary wastewater pretreatment as required to comply with this chapter and shall achieve compliance with all applicable pretreatment standards within the time limitations as specified by appropriate statutes, regulation, and ordinance. Any facilities required to pretreat wastewater to a level acceptable to the City shall be provided, properly operated, and maintained at the industrial user's expense. Detailed plans showing the pretreatment facilities shall be submitted to the City for review and must be acceptable to the City before construction of the facility. The review of such plans shall in no way relieve the industrial user from the responsibility of modifying its facility or operations as necessary to produce an effluent acceptable to the City under the provisions of this chapter. Within a reasonable time after the completion of the wastewater pretreatment facility, the industrial user shall furnish its operations and maintenance procedures for the City to review.

(2) Monitoring Facilities. Each industrial user required to do so by the City shall provide and operate at the industrial user's own expense a monitoring facility to allow inspection, sampling, and flow measurement of each sewer discharge to the City. Each monitoring facility shall be situated on the industrial user's premises, except where such a location would be impractical or cause undue hardship on the industrial user, the City may concur with the facility being constructed in the public street or sidewalk area, providing that the facility is located so that it will not be obstructed by landscaping or parked vehicles.

There shall be ample room in or near such sampling facility to allow accurate sampling and preparation of samples for analysis. The facility, sampling, and measuring equipment shall be maintained at all times in a safe and proper operating condition at the expense of the industrial user.

All monitoring facilities shall be constructed and maintained in accordance with all applicable local construction standards and specifications. Construction shall be completed within 120 days of receipt of wastewater discharge permit by the industrial user.

(3) Grease Interceptor Requirements.

(a) The owner of every newly constructed, remodeled, or converted commercial or industrial facility with one or more grease-generating activities, including food service facilities with new or remodeled kitchens, shall install or cause to be installed a grease interceptor for each grease-generating activity. Grease interceptors shall be sized, designed, constructed, and installed in accordance with the Uniform Plumbing Code (UPC) standards, and any other requirements set by the Director through the City plan review and permit process.

(b) The owner of every commercial or industrial facility with one or more grease-generating activities including food service facilities, serviced by a sewer connection line found to have a grease blockage, a history of grease blockage, or accelerated line maintenance resulting from grease disposal shall install or cause to be installed, upon notification by the Director, an approved grease interceptor.

(c) Grease interceptors shall be located outside the building in order to facilitate cleaning, inspection, and maintenance. Installation of smaller grease traps or grease interceptors located inside any building will be allowed only under circumstances where exterior installation is not effective or not practicable, and shall be approved only on a case-by-case basis.

(d) The owner of any facility with a grease interceptor installation shall maintain the grease interceptor at all times in a manner that shall prevent fat waste, oil, or grease from being carried into the sewer system. Authorized City employees shall be allowed access to grease interceptors for the purpose of inspection and/or to verify compliance with this chapter. Fat waste, oil, or grease removed from such a facility shall not be disposed of in the sanitary sewer or the storm drain system, and recovered grease shall be stored in a manner to prevent spillage or runoff to the sanitary sewer or storm drain system. A record of disposal shall be maintained for review upon request by the City. (Ord. 5637, 2006).

10.06.~~080~~090 Enforcement.

(1) Emergency Suspension of Service and Wastewater Discharge Permit. The City may, after informal notice to the industrial user (in writing, in person, or by telephone), order the suspension of the wastewater treatment service and revoke the wastewater discharge permit to an industrial user when it appears to the City that an actual or threatened discharge:

(a) Presents or threatens an imminent or substantial danger to the health or welfare of persons or substantial danger to the environment; or

(b) Threatens to interfere with the operation of the POTW, or to violate any pretreatment limits imposed by this chapter.

Any industrial user notified of the City's suspension order shall immediately cease all discharges. In the event of failure of the industrial user to comply with the suspension order, the City may immediately take all necessary steps to halt or prevent any further discharge by such industrial user into the POTW. The City shall have authority to physically cap, block, or seal the industrial user's sewer line (whether on public or private property) in order to terminate service under this section. The City shall have the right to enter upon the industrial user's property to accomplish the capping, blocking, or sealing of the industrial user's sewer line. The City may also commence judicial proceedings immediately thereafter to compel the industrial user's specific compliance with such order and/or to recover civil penalties. The City shall reinstate the wastewater discharge permit and/or wastewater treatment service upon clear and convincing proof by the industrial user of the elimination of the noncomplying discharge or conditions creating the threat as set forth above.

(2) Industrial User Prohibited Conduct. An industrial user shall not:

(a) Fail to accurately report the wastewater constituents and characteristics of its discharge;

(b) Fail to report significant changes in wastewater constituents or characteristics;

(c) Refuse reasonable access to the industrial user's premises by representatives of the City for the purpose of inspection or monitoring; or

(d) Violate the provisions of the wastewater discharge permit or the provisions of this chapter.

The City may seek any and all of the remedies or penalties provided in this chapter (including termination of wastewater services and/or revocation of wastewater discharge permit) against any industrial user who violates any of the foregoing prohibitions.

(3) Procedure. The procedures set forth below apply in those situations where emergency suspension of service pursuant to subsection (1) of this section is not needed. Ordinarily, the enforcement procedure outlined below will be followed in the order hereinafter set forth**, and enforcement will generally be in accordance with the City's enforcement response plan**. Notwithstanding the foregoing, the City reserves the right and discretion to impose any of the sanctions listed below for any violation should the City deem such action appropriate or necessary in the individual circumstances.

(a) Notification of Violation. Whenever the City determines that any industrial user has violated or is violating the provisions of subsection (2) of this section, the City may serve upon such industrial user a written **N**~~n~~otice **of Violation** stating the nature of the violation(s). Where directed to do so by the notice, a plan for the satisfactory correction of the violation(s) will be submitted to the City by the industrial user, within a time frame as specified in the **N**~~n~~otice **of Violation. Submission of such a plan in no way relieves the user of liability for any violations occurring before or after receipt of the Notice of Violation. Nothing in this Section shall limit the authority of the Director to take any action, including emergency actions or any other enforcement action, without first issuing a Notice of Violation.**

(b) Administrative Order. Whenever the City determines that any industrial user has violated or is violating any provision of this chapter of the Albany Municipal Code or an industrial wastewater discharge permit issued and approved hereunder, or has violated any directives or orders issued and approved hereunder, the City may serve upon such industrial user a written administrative order stating the nature of the violation(s) and imposing sanctions. This notice shall be served upon the industrial user either by personal service to any owner, operator, authorized agent, or any employee of the industrial user at any office maintained by the industrial user either within or outside of the City of Albany. Service of the notice may also be accomplished by mailing the notice, via registered or certified mail, return receipt requested, to the industrial user at any office maintained by the industrial user either within or outside of the City of Albany.

These sanctions may include:

(i) An order requiring corrective action.

(ii) An order setting civil penalties **as described in AMC 10.06.100** in the event corrective action is not undertaken as ordered in subsection (3)(b)(i) of this section.

(iii) An order imposing civil penalties **as described in AMC 10.06.100** in lieu of, or in addition to, an order of corrective action.

(iv) An order requiring payment of City costs incurred as a result of a violation.

(v) An order requiring a compliance schedule containing milestones and applicable reporting requirements, or requiring an industrial user to submit a compliance schedule for approval by the City.

(vi) Revocation of the industrial user's wastewater discharge permit.

(vii) Disconnection from the wastewater discharge system pursuant to the rights and procedures set forth concerning emergency suspension of service in subsection (1) of this section.

(c) Appeal of Administrative Order. An industrial user served by an administrative order may within seven days of the receipt of the order request in writing that the Director review the enforcement action. The request (letter of appeal) will state all points of disagreement and objection to the order. Upon receipt of the letter of appeal, the City shall cause a hearing to be held before the Public Works Director of the City of Albany, or his authorized representative. The Public Works Director, or his authorized representative, shall conduct the hearing with the advice and counsel of the City Attorney and shall establish such rules and procedures as may be determined by the City in order to meet due process minimums. Following the close of the hearing, the Public Works Director, or his authorized representative, shall enter appropriate findings of fact, conclusions of law, and an administrative order with respect to the alleged violations and under the terms of the order, may impose any or all of these sanctions referred to in subsection (3)(b) of this section. Said sanction may exceed those originally purposed in the notice of proposed administrative order. The findings, conclusions, and order shall be served upon the industrial user in the manner provided above for the service of the notification of an administrative order.

(d) Within seven days of its receipt of the determination as outlined above, the industrial user may appeal the findings, conclusions, and order of the Public Works Director or his authorized representative by serving a written notice of such appeal in the same manner as provided above for the service of the initial appeal. Thereafter, a hearing on the appeal shall be scheduled before the City Council of the City of Albany, or such Appeal Hearings Officer as the City may appoint for such purpose. The City Manager of the City of Albany shall have the authority and discretion to appoint an Appeal Hearings Officer or direct the appeal to the City Council. Thereafter, the City Council or the Appeal Hearings Officer may render its decision based upon the record of the hearing on the administrative order, grant an additional hearing to take additional evidence, or conduct a de novo hearing. The City Council, or Appeal Hearings Officer, in consultation with the City Attorney, shall establish rules and procedures for the conduct of the appeal in order to accord the industrial user minimum due process. The City Council or Appeal Hearings Officer shall affirm, reverse, or modify the findings, conclusions, and administrative order and shall serve its decision, in writing, upon the industrial user in the manner provided for the service of the original administrative order. The decision of the City Council or Appeal Hearings Officer shall be final.

(4) Judicial Proceedings. Following the entry of any final administrative order by the City with respect to the violation by an industrial user of subsection (2) of this section, the City may commence an action for appropriate legal and/or equitable relief in the appropriate local court to enforce the penalty or remedy imposed by the City hereunder.

(5) Enforcement Actions – Annual Publication. A list of all industrial users in significant noncompliance during the 12 previous months shall be annually published by the City in the largest daily newspaper circulated in the area of the municipality **or a newspaper of general circulation**, summarizing the violations and enforcement action undertaken by the City. For the purpose of this subsection, an industrial user is in significant noncompliance if its violation meets one or more of the criteria stated under the definition of significant noncompliance in AMC 10.06.030(56).

(6) Affirmative Defense – Upset.

(a) For the purposes of this section, "upset" means an exceptional incident in which there is unintentional and temporary noncompliance with categorical Pretreatment Standards and Requirements because of factors beyond the reasonable control of the industrial user. An upset does not include noncompliance caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

(b) An upset shall constitute an affirmative defense to an action brought for noncompliance with applicable Pretreatment Standards if the requirements of subsection (6)(c) of this section are met.

(c) An industrial user who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(i) An upset occurred and the industrial user can identify the cause of the upset;

(ii) The facility was at the time of the upset being operated in a prudent and workmanlike manner and was in compliance with applicable operation and maintenance procedures; and

(iii) The industrial user has submitted the following information to the City within 24 hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days):

(A) A description of the discharge and cause of noncompliance;

(B) The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and

(C) Steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

(d) In any enforcement proceeding, the industrial user seeking to establish the occurrence of an upset shall have the burden of proof.

(e) Industrial users will have the opportunity for a judicial determination on any claim of upset only in an enforcement action brought for noncompliance with applicable pretreatment standards.

(f) Industrial users shall control production of all discharges to the extent necessary to maintain compliance with applicable pretreatment standards upon reduction, loss, or failure of their treatment facility until the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power of the treatment facility is reduced, lost, or fails.

(7) General/Specific Prohibitions. An industrial user shall have an affirmative defense to an enforcement action brought against it for noncompliance with the general and specific prohibitions in AMC 10.06.040 if it can prove that it did not know or have reason to know that its discharge, alone or in conjunction with a discharge or discharges from other sources, would cause pass through or interference and that either:

(a) A local limit exists for each pollutant discharged and the industrial user was in compliance with each limit directly prior to and during the pass through or interference; or

(b) No local limit exists, but the discharge did not change substantially in nature or constituents from the industrial user's prior discharge when the City was regularly in compliance with its NPDES permit, and in the case of interference, in compliance with applicable sludge use or disposal requirements.

(8) Affirmative Defense – Bypass. The intentional diversion of waste streams from any portion of an individual user's treatment facility shall be an affirmative defense to an enforcement action brought against the industrial user if the user can demonstrate that such a bypass was unavoidable to prevent loss of life, personal injury, or severe property damage**, and there were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance.** In order to be eligible for the affirmative defense, the industrial user must demonstrate that

there was no feasible alternative to the bypass, and **meet all required conditions of 40 CFR 403.17, including notification** ~~submit notice~~ of the bypass. ~~as required by 40 CFR 403.17.~~

(9) Remedies Nonexclusive. The remedies provided for in this ordinance are not exclusive. The Director may take any, all, or any combination of these actions against a noncompliant user. Enforcement of pretreatment violations will generally be in accordance with the City's enforcement response plan. However, the Director may take other action against any user when the circumstances warrant. Further, the Director is empowered to take more than one enforcement action against any noncompliant user. (Ord. 5637, 2006).

10.06.~~090~~100 Penalties.

(1) Civil Penalties. Any industrial user who violates an administrative order of the City, or who fails to comply with: (a) any provision of this chapter, or (b) any regulation, rule, or permit of the City, issued pursuant to this chapter, shall be liable to the City for a civil penalty. The amount of such civil penalty shall be not less than $250.00 per violation nor more than $2,500 per violation. Each day upon which a violation occurs or continues shall constitute a separate violation. Such penalties may be collected by judicial actions commenced by the City as provided in AMC 10.06.090(4). In addition, the City may issue an administrative order terminating the industrial user's wastewater service if a civil penalty is not paid when due.

(2) Administrative Fines. When the Director finds that a user has violated, or continues to violate, any provision of this chapter, a wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or pretreatment requirement, the Director may fine such user. The amount of such administrative fine shall be not less than $250.00 per violation nor more than $2,500 per violation. Each day upon which a violation occurs or continues shall constitute a separate violation.

(3) Recovery of Cost Incurred by the City. Any user violating any of the provisions of this chapter who discharges or causes a discharge producing a deposit or obstruction or causes damage to or impairs the City's wastewater treatment system shall be liable to the City for any expense, loss, or damage caused by such violation or discharge. The City may require the user to pay for the cost incurred by the City for any cleaning, repair, or replacement work caused by the violation or discharge and for cost incurred by the City in investigating the violation and in enforcing this chapter against the user, including reasonable administrative costs, fees for testing, attorney fees, court costs, and all expenses of litigation. Refusal to pay the ordered costs shall constitute a violation of this chapter, enforceable under the provisions of AMC 10.06.090. The user shall also reimburse the City for any and all fines or penalties levied against the City as a result of a discharge by the user.

(4) Falsifying Information. Any person who knowingly makes any false statement, representation, or certification in any application, record, report and plan, or other document filed or required to be maintained pursuant to this chapter, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under AMC 10.06.070, shall (in addition to civil and/or criminal penalties provided by state law) be subject to general criminal penalties under **AMC 10.06.100(6).** ~~subsection (6) of this section.~~

(5) Fraud and False Statements. Any reports required in this code and any other documents required to be submitted by the City or maintained by the industrial user shall be subject to enforcement provision of the Albany Municipal Code, municipal, State, and Federal law relating to fraud and false statements. In addition, the industrial user shall be

subject to general criminal penalties under **AMC 10.06.100(6).** ~~subsection (6) of this section.~~

(6) General Criminal Penalties. Any user who willfully or negligently violates any provision of this chapter, a wastewater discharge permit, or order issued hereunder, or any other pretreatment standard or requirement shall, upon conviction, be guilty of a crime and subject to penalties under a misdemeanor or felony as determined by the court. (Ord. 5637, 2006).

10.06.~~100~~110 Severability.

If any provision, paragraph, word, section, or article of this chapter is invalidated by any court of competent jurisdiction, the remaining provisions, paragraphs, words, sections, and chapters shall not be affected and shall continue in full force and effect. (Ord. 5637, 2006).