ENGINEERING REPORT

CITY OF ESTACADA

STORM WATER MASTER PLANNING UPDATE

CLACKAMAS RIVER TMDL IMPLEMENTATION PLAN

STORM WATER SYSTEM DEVELOPMENT CHARGE UPDATE

Clackamas County, Oregon

Adopted February, 2010

July, 2009

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City of Estacada

STORM WATER MASTER PLAN

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Storm Drainage Master Plan, by ASCG, Inc.

City of Estacada
STORM WATER MASTER PLAN UPDATE
July 2009

PART A: STORM WATER MASTER PLANNING UPDATE

A1. INTRODUCTION & OBJECTIVE

In December of 1997, the City of Estacada published the Estacada Storm Drainage Master Plan prepared by ASCG Engineers, which identified needed system improvements and estimated costs for build-out of the storm water system throughout the Urban Growth Boundary. That document provided an effective planning tool that is still applicable to serve future growth.

The scope of this Master Plan Update is primarily to review the financial aspects of the adopted plan and to update the financial components to reflect the current economic climate. This update contains reproductions of the ASCG background information and planning maps to provide a single point reference for storm drainage information. The plates have not been updated, but are simply reproduced from the earlier ASCG study for reference.

This update does not model the storm system nor re-evaluate the list of needed improvements contained in the 1997 Master Plan except to address additional improvements identified following the 2009 New Years Day flooding. Integral to this effort, however, is an update of the population history and growth trends, which is used to confirm the need for listed projects.

In 2006 the Department of Environmental Quality (DEQ) adopted Total Maximum Daily Loads (TMDL) for the Clackamas River as a component of the Willamette River watershed study. The TMDLs identified bacteria, temperature and mercury as contaminants of concern. This mandates that the City prepare an implementation plan to minimize the potential for stormwater to contribute these contaminants. As a result, this Master Plan Update contains a TMDL Implementation Plan.

On January 1, 2009, the region experienced a substantial rainfall event which resulted in many areas of localized flooding causing extensive damage to many areas throughout town. The City Library and Wastewater Treatment Plant sustained extensive damage that was repaired with insurance proceeds. A natural drainage way adjacent to Hill Way sustained extensive erosion damage exposing a water distribution line and creating a safety hazard for the neighborhood.

As a result of the 2009 flooding, several capital improvements have been added to the Capital Improvement Plan (CIP) to better protect against future reoccurrence.

A2. STUDY AREA

The 1997 Master Plan identified the major drainage improvements for the entire Urban Growth Boundary and included the entire drainage basins as the study area. In the appendices bound at the end of this text is a reproduction of the figures originally bound in the ASCG Master Plan that show the Study Area (Figure 2-1), Existing and Projected Land Uses (Figure 2-2a, b and c), and Hydrologic Soil types (Figure 2-3).

The study area encompasses 4,441 acres, with approximately 2,257 acres within the Urban Growth Boundary (UGB) in 1997. Nearly 90% of the study area drains into Currin Creek (Basins 10 and 20) and Wade Creek (Basin 40) and contain essentially all of the developable area remaining within the UGB. The majority of the developed area within the City limits (Basins 50, 60, 70 and 99) contains 393 acres that drain primarily through pipelines directly to the Clackamas River.

Projects identified in the 1997 Plan apply to development of the entire Urban Growth Boundary, both inside and outside of the existing City Limits and in this update the costs are allocated through the SDC methodology to all users equally, both existing and future development.

The characteristics of the study area are well documented in the 1997 Master Plan.

A3. POPULATION PROJECTIONS

The Population Projections in the 1997 Storm Drainage Master Plan forecast three rates of annual population growth: 2.1%, 2.5% and 2.9%. Growth within the City of Estacada has varied from less than 1% (from 2000 to 2005) to greater than 3.5% (between 1980 and 1990). Average annual growth between 1990 and 2005 has been slightly over 1.3%. For the ten-year period 1997-2007, the average growth rate has been 2.5%.

The City of Estacada has observed a dramatic increase in the development of residential home sites in the past few years. Currently, the City has over 1,500 residential lots in the planning or construction stage throughout the area. Although the City has yet to see a substantial number of building permit requests, the City Council in 2006 adopted a projected growth rate of 3% per year for the City's planning documents, including this document.

With the current housing slowdown and slow economy of 2008, it is difficult to project future growth patterns. Fortunately, implementing the capital improvement program and the SDC cost allocation methodologies are not dependent upon the actual growth rate, but rather depend only on the amount of new development. If growth is accelerated, the SDC collection will increase and capital improvement projects can be undertaken sooner. Conversely, if growth slows, revenue collections will be reduced, however, the need for capital improvements is similarly reduced.

Based on the current economy, the growth rate is likely to be depressed over the next few years. As a result, the following table identifies existing and a range of projected City population based on 2.1% and 2.5%, similar to the original Master Plan, and a 3% growth for the high projection:

Table 1 - City of Estacada
POPULATION PROJECTIONS

Year	Projected Population At 2.1% Growth Rate	Projected Population At 2.5% Growth rate	Projected Population At 3.0% Growth rate
2005*	2,480	2,480	2,480
2006*	2,580	2,580	2,580
2007*	2,695	2,695	2,695
2008*	2,820	2,820	2,820
2010	2,940	2,963	2,992
2020	3,619	3,793	4,021
2030	4,455	4,855	5,403
2040	5,484	6,215	7,262
2050	6,750	7,955	9,760

* Population estimates Per Portland State University Population Research Center

A4. DESIGN STANDARDS & BEST MANAGEMENT PRACTICES

The Master Plan identified criteria for sizing the storm drainage system. Design storms have been identified as follows:

Table 2: City of Estacada
STORM WATER DESIGN STORM INTENSITY

Storm Return Probability	Design Rainfall
1 year	2.7 in/hr
2 year	3.0 in/hr
5 Year	3.4 in/hr
10 year	3.8 in/hr
25 year	4.4 in/hr
50 year	4.9 in/hr
100 year	5.5 in/hr

An overview of each improvement is important to determine the significance of the storm water improvements based on tributary area and potential for flood damages. The Master Plan quantified major storm drainage facilities as those with over 20 acres of tributary area, and critical for protecting transportation routes and regional flood protection. Major drainage facilities should be sized to convey a 25-year storm with adequate freeboard to contain the flow within the pipeline.

Minor storm drainage facilities were classified as those collecting less than 20 acres of tributary area and generally serve the local developed areas. Minor storm drainage facilities must be sized to convey the 25-year storm, but may allow interim surcharging in the collection system to the top of curb lines. The storm water piped system for minor facilities should be sized to convey a minimum of a 10-year return interval storm.

Private storm facilities are those on private property that collect site runoff and discharge to the public system. Private facilities fall under the requirements of the Uniform Plumbing Code as administered by Clackamas County. Generally, private facilities should be designed to convey a 10-year storm.

In all design cases, provisions must be made for the safe routing of the 100-year storm to avoid property damage.

In addition to hydraulic design standards, water quality Best Management Practices (BMPs) should be integrated into each project to improve water quality. There are two types of BMPs: Source Controls to prevent contaminants from entering the storm water runoff, and Treatment Controls to treat runoff already containing the contaminants. Examples of each as listed in the Master Plan include:

Source Control BMPs:

- Public Education
- Land Use Planning / Watershed Management
- Material Use Control
    a. Housekeeping Practices
    b. Safer Alternative Products
- Material Exposure Controls
    a. Material Storage Practices
    b. Vehicle Use Reduction
- Material Disposal & Recycling
    a. Storm Drainage System Signs
    b. Household Hazardous Waste Collection
    c. Used Oil Recycling
- Spill Prevention & Cleanup
    a. Vehicle Leak & Spill Control
    b. Tank Leak & Spill Control
- Illegal Dumping Control
- Illicit Connection Control
    a. Illicit Connection Prevention
    b. Illicit Connection Detection & Removal
    c. Leaking Sanitary Sewer Control
- Street / Storm Drain Maintenance
    a. Street Cleaning
    b. Catch Basin Cleaning
    c. Detention / Infiltration Device Maintenance
    d. Storm Drain Flushing
    e. Storm Channel / Creek Maintenance

Treatment Control BMPs:
- Infiltration
- Wet Ponds
- Constructed Wetlands
- Biofilters, bioswales
- Extended Detention Basins
- Media Filtration
- Oil / Water Separators & Water Quality Inlets
- Multiple Systems

Source Control BMPs should be the highest priority and included in all projects. The need for Treatment Control BMPs is secondary and needed when source controls are not effective.

A5. EXISTING STORM DRAINAGE SYSTEM

The following section provides a general overview of each of the seven drainage basins within the study area as well as general deficiencies noted in the 1997 Master Plan. Figure 2-1 in the appendices shows each basin boundary.

Basin 10: is a large 1,661 acre basin in the Currin Creek watershed. It drains nearly 700 acres of the northeast portion of the UGB through small perennial streams and open channels. No known drainage problems exist in this basin.

Basin 20: is a 917 acre drainage basin which is also part of the Currin Creek watershed. It drains the north-northeast portion of the City, and the western part of the UGB. The main stem of the drainage system is an open channel that crosses Cemetery Road just south of Hill Way and traverses the School property prior to discharging to overland sheet flows to Basin 30 and ultimately the Clackamas River. Flooding problems are attributed to culverts of insufficient size and the lack of maintenance of open channel reaches in the system. A realignment and improvement project was begun on this drainage way in 2002, however, it was not completed.

Basin 30: is 176 acres north and east of the City that discharges directly to the Clackamas River west of Highway 224. The area has no defined drainage courses. The main stream of Basin 20 flows along the northeast boundary of this basin, which creates occasional flooding in this area. In spite of the lack of drainage facilities, field observations did not indicate considerable standing water in the depressions of this area, indicating the presence of soils with good permeability rates.

Basin 40: is the Wade Creek watershed, which is the main stream flowing through the City of Estacada. The size of the drainage basin is 1,293 acres, of which 160 acres are within the existing boundaries of the City. The section of Wade Creek between the crossing of 6th Avenue east of the Estacada High School and the crossing of Wade Street north of 6th Avenue is an open channel paralleling N 6th Avenue and the Eagle Creek Highway. Frequent flooding occurs as the intersection of 6th Avenue and Wade Street, a problem attributed to the insufficient size and hydraulically inefficient configuration of the creek.

Street flooding due to storm drains of insufficient size in the streets south of 6th Avenue likely contribute to the flooding problems in this area.

Basin 50: is a typical urban watershed of 63 acres in size, entirely within City limits. It drains the western and central developed part of the City through existing storm drains, and discharges into an Oregon Department of Transportation (ODOT) storm drain in Highway 224. Most of the existing storm drains appear to be of only marginal capacity.

Basin 60: is also a typical urban watershed of 47 acres in size, entirely within City limits. It drains the southern developed part of the City through existing storm drains and discharges into the Clackamas River at Elm Road. Most of the existing drains in SW 2nd and 3rd Avenue appear to be of marginal capacity.

Basin 70: is a drainage basin of 178 acres in size, of which 99 acres is located within the existing City boundary. It drains the southeastern part of the City through a mix of existing open channels and underground storm drains, and discharges into the Clackamas River at Acacia Road. A large trunk sewer was installed in Basin 70 to eliminate many of the open channel flow areas.

There are also many minor drainage basins located along the Clackamas River, typically less than a dozen acres in size, which because of their relative position adjacent to the Clackamas River, will never have storm water limitations.

A6. STORM DRAINAGE CAPITAL IMPROVEMENT PLAN

The Capital Improvement Plan contained in the original Master Plan remains the guiding document for needed storm water improvements. The storm water collection system has only seen minimal improvement towards the listed CIP projects, including:

- In Basin 20, storm drainage improvements were initiated along Currin Creek and a portion of the creek was temporarily diverted through the creation of a new stream bed. This project is not complete and flow has been returned to the original channel along the High School property. This project was retained in the Capital Improvement Plan.

- In Basin 70, a portion of the lower project was completed in 2003-2004 which included installation of pipe from SE 4th and Shafford Street to Highway 211/224 excepting a short reach of open ditch that remains on Short Street. This work eliminated creek bank flooding along the base of the slopes and all but the remaining ditch section has been removed from the CIP and placed in a reimbursement project schedule.

- In 2007-2008 improvements were made to the Wade Creek pond adjacent to the new municipal library facility. This project provided improved capacity and safety improvements to this pond outlet and will be incorporated into the reimbursement schedule with this plan update.

- The last projects added to the reimbursement component account for the cost of master planning and SDC methodology maintenance.

The remaining projects listed in the 1997 Master Plan Capital Improvement Plan have been reincorporated in the SDC Improvements Fee with an update of the construction costs to reflect current 2009 pricing, and are listed in the following sections.

New projects have also been added to the CIP as a result of the 2009 flooding event. Damages were observed throughout the City, primarily as a result of debris created by wind damage blocking storm water inlets. As a result, extensive flood damage was incurred at the new library facility, the wastewater treatment plant and in several residential areas. New projects added to the CIP include:

- Hill Way Floodway Restoration - This project, estimated at $30,000, should be undertaken immediately to eliminate the safety hazards and protect the area from flooding that may occur in the 2009-10 wet weather months. The work should include placing native fill in all eroded area in the drainage way, and re-establishing surface protection with vegetation or rock materials. Additionally, special care is required to restore the waterline that was exposed and undermined. All debris should be removed from over the waterline and clean backfill installed. Additionally, a duplex, grated ditch inlet should be constructed at the culvert inlet above the cul-de-sac where drainage enters into the system to provide maximum inlet area to minimize the potential of plugging and diverting of the storm water.

- Wade Creek Pond Overflow - This project, estimated at $20,000, is intended to address flood conditions and provide an emergency overflow to protect the adjoining buildings in the event of a failure of the outfall system. Work should include exploring options to divert flood water away from the buildings, and improvements to the outfall structure to prevent debris from reducing the outfall capacity. This project is not as high a priority as Hill Way, but should be undertaken as early as the budgeting process will allow.

- Highway 211/224 Spillway - To protect the wastewater treatment facility from future flooding, the existing Highway 211/224 inlet and culvert system should be reviewed to determine how to minimize the impacts of debris plugging the storm system. An alternative approach would be to evaluate the elevations of the highway curbs to define a spillway that would divert flood waters directly to the Clackamas River before encroaching into the wastewater treatment plant site. This looks feasible immediately north of the Lakeshore Pump Stations at the highway low point, in an area that would not impact any buildable properties. An estimate of $20,000 is included in the CIP to address this issue which will also require ODOT involvement.

A7. COST ESTIMATE UPDATE

The updated cost estimate was calculated based on the information provided in the "City of Estacada Storm Drainage Master Plan December 1997."

As stated in the Master Plan, the cost estimates for each project are preliminary and on a planning level only. Storm water drainage rules and policy direction may evolve to include retention, detention, infiltration and best management practices to address specific issues. Individual projects will need to be closely examined during design and construction to assure they meet the current goals. At that time, a detailed cost estimate should be prepared to refine the estimates contained in this update.

The following table is a summary of all defined Capital Improvement Plan projects. The costs have been adjusted as per the Engineering News Record Construction Cost Index, published by McGraw Hill at ENR.Construction.Com. The annual ENR Index for 1997 was 5826. The July 2009 ENR CCI Index is 8566, resulting in an increase of 47% over the nearly 12-year period.

Reflecting the recent increases in property values, the cost to obtain right-of-ways was doubled from the estimated costs in the 1997 Master Plan.

Table 3: City of Estacada
STORM WATER CAPITAL IMPROVEMENT PLAN
JULY 2009

PROJ No.	MASTER PLAN IMPROVEMENT DESCRIPTION	RIGHT-OF-WAY COST	ESTIMATED CONSTRUCTION COST	ENGINEERING SERVICES 20%	PROJECT CONTING 20%	TOTAL ESTIMATED COST
20 B1 A	Improve Channel	-	$230,000	$45,000	$45,000	$320,000
20 B2	Ditch Restoration Culvert Replacement	$208,300	$172,700	$34,500	$34,500	$450,000
40 B1 A	Erosion Protection	-	$63,600	$12,700	$12,700	$89,000
40 B2 A	Improve Ditch+Culvert	$12,000	$276,000	$55,200	$55,200	$398,400
40 B2 B	Box Culvert	$2,200	$47,100	$9,400	$9,400	$68,100
40 B2 C	Improve Ditch	$1,400	$33,200	$6,600	$6,600	$47,800
40 B2 D	Box Culvert	$1,400	$27,700	$5,500	$5,500	$40,100
40 B2 E	Improve Ditch	$2,200	$35,800	$7,200	$7,200	$52,400
40 B2 F	Box Culvert	$1,400	$27,100	$5,400	$5,400	$39,300
40 B2 G	Improve Ditch	$5,000	$81,700	$16,300	$16,300	$119,300
40 B2 H	Box Culvert	$2,600	$81,100	$16,200	$16,200	$116,100
40 B2 I	Improve Ditch	$5,600	$168,600	$33,700	$33,700	$241,600
40 B2 J	Improve Culvert	$1,400	$31,000	$6,200	$6,200	$44,800
40 B2 K	Improve Ditch	$5,000	$76,700	$15,300	$15,300	$112,300
40 B3 A	Replace Culvert and Improve Ditch	$45,200	$82,000	$16,400	$16,400	$160,000
40 B3 B	Replace Culvert and Improve Ditch	$79,800	$105,400	$21,100	$21,100	$227,400
40 B4 F	Install Storm Drain	-	$42,800	$8,600	$8,600	$60,000
40 B4 G	Install Storm Drain	-	$28,700	$5,700	$5,700	$40,100

40 B5 A	Install Storm Drain	-	$15,400	$3,100	$3,100	$21,600
40 B5 B	Install Storm Drain	-	$55,600	$11,100	$11,100	$77,800
40 B5 C	Install Storm Drain	-	$54,800	$11,000	$11,000	$76,800
40 B6 A	Install Storm Drain	-	$22,100	$4,400	$4,400	$30,900
40 B6 B	Install Storm Drain	-	$38,600	$7,700	$7,700	$54,000
40 B6 C	Install Storm Drain	-	$37,700	$7,500	$7,500	$52,700
50 B1 A	Install Storm Drain	$8,400	$62,900	$12,600	$12,600	$96,500
50 B1 B	Install Storm Drain	-	$24,000	$4,800	$4,800	$33,600
50 B1 C	Install Storm Drain	-	$47,800	$9,600	$9,600	$67,000
50 B1 D	Install Storm Drain	-	$32,600	$6,500	$6,500	$45,600
50 B2 A	Install Storm Drain	-	$38,500	$7,700	$7,700	$53,900
50 B2 B	Install Storm Drain	-	$32,600	$6,500	$6,500	$45,600
50 B3	Install Storm Drain	-	$39,400	$7,900	$7,900	$55,200
60 B1 A	Install Storm Drain	-	$13,200	$2,600	$2,600	$18,400
60 B1 B	Install Storm Drain	-	$50,700	$10,100	$10,100	$70,900
60 B1 C	Install Storm Drain	-	$39,200	$7,800	$7,800	$54,800
60 B1 D	Install Storm Drain	-	$34,200	$6,800	$6,800	$47,800
60 B1 E	Install Storm Drain	-	$44,400	$8,900	$8,900	$62,200
60 B2	Install Storm Drain	-	$24,400	$4,900	$4,900	$34,200
60 B3 A	Install Storm Drain	-	$8,600	$1,700	$1,700	$12,000
60 B3 B	Install Storm Drain	-	$15,100	$3,000	$3,000	$21,100
60 B3 C	Install Storm Drain	-	$34,500	$6,900	$6,900	$48,300
70 B1 B	Replace Channel w/SD	$4,200	$24,600	$4,900	$4,900	$38,600
99B1	New Storm Drain	-	$23,800	$4,800	$4,800	$33,400
99B2	New Storm Drain	-	$18,900	$3,800	$3,800	$26,500
99B3	New Storm Drain	-	$26,600	$5,300	$5,300	$37,200
99B4	New Storm Drain	-	$33,400	$6,700	$6,700	$46,800
001	Hill Way Restoration	-	$22,000	$4,000	$4,000	$30,000
002	Wade Creek Pond Overflow	-	$15,000	$2,500	$2,500	$20,000
003	Hwy 211/224 Spillway	-	$15,000	$2,500	$2,500	$20,000
ENGR	Engr, Planning Mapping & SDC Compliance	-	-	$110,000	-	$110,000
Misc.	Miscellaneous Oversizing	-	$40,000	-	-	$40,000
	TOTALS	**$386,100**	**$2,596,800**	**$618,600**	**$508,600**	**$4,110,100**

A8. CAPITAL IMPROVEMENTS FUNDING

Primary funding for the Capital Improvement Plan is anticipated to be from System Development Charges (SDCs) assessed on new development. SDCs are based on the cost of providing service to each new development and are charged to recover the value of existing improvements as well as to accumulate revenues to construct the projects in the CIP.

In the SDC update contained in this text, the eligibility of each project is evaluated in light of providing regional benefits to existing and future users. The eligible project costs are then allocated over the projected number of users both existing and future. The SDC Methodology update and the calculated charges are presented at the end of this Master Plan Update.

A9. OPERATION & MAINTENANCE

As taken from the Master Plan text, the purpose of the storm drainage system is to provide for public safety by protecting life and property from flood-related damages; maintaining critical transportation routes during flooding events; and protecting public health by protecting storm water quality. The primary objective of a successful operation and maintenance program is to ensure that critical functions of the system are continuously operational.

Section 8 of the 1997 Master Plan provides an extensive discussion of system operation and maintenance that is important for the operators to understand and implement.

City of Estacada
PART B: STORMWATER SDC UPDATE

B1. OVERVIEW

The purpose of this Storm Water SDC Methodology is to provide the framework for a funding mechanism to address growth-related storm water system improvements. This document summarizes the prior investments, needed capital improvements and derives a method to allocate an equitable share of cost to future users.

The 1997 City of Estacada Storm Drainage Master Plan identified improvements for the entire Urban Growth Boundary, with the then-existing urban development accounting for approximately 638 acres of the total 4,441 acre basin (2,257 acres within the UGB and 2,184 acres outside the UGB).

Although in 1997 the total additional urban area to be served by the CIP was 1,619 acres, the previous SDC only assumed development of a projected 20-year planning period, which would increase the urban impervious area by 137 acres, east and north of the then-existing City Limits. This SDC update utilizes build-out of the UGB independent of time, and identified a total of 387 acres of impervious area at build-out.

This SDC update is intended to reevaluate the cost of each CIP project, as well as the cost allocation assumptions and calculations. Additionally, this update incorporates revisions mandated by current SDC statutes.

Adoption of this SDC Methodology incorporates the provisions of ORS 223.297 through 223.314 by reference. Per ORS 223.304(8), an annual adjustment of all scheduled values and resultant fees will be adopted by the City in accordance to the Engineering News Record Construction Cost Index. By reference, the current September 2009 ENR CCI Index of 8,585 is used to define current costs.

B2. SDC METHODOLOGY

In the Master Plan and in this update, the methodology for allocating eligible storm water improvements to benefiting users was based upon distributing the value of existing improvements and estimated costs of needed improvements over the total impervious area of each type of development. The Master Plan made assumptions as to the percent of impervious areas in each type of development, which is expanded in this update to include development of the entire UGB.

State statutes require the SDC methodology provide credits for on-site oversizing components of stormwater projects, and for 100% of off-site improvements. As a result, this update will incorporate these credit provisions and make a provision for an SDC Overlay to collect credits granted for any off-site base line costs, i.e., 12" diameter storm piping.

The SDC contained in the Master Plan had an Improvements Fee but no fee associated with the existing storm water collection system. In that the cost of needed improvements is allocated over all users, it is necessary and equitable to inventory the value of all existing improvements and to similarly allocate these costs over all users. This update will document the value of existing improvements and use these to support the Reimbursement Fee component of the SDC.

B3. SDC CREDIT FOR ELIGIBLE CONSTRUCTION

To comply with the provisions of ORS 223.304, this methodology provides a credit provision for construction of qualified public improvements that are "required as a condition of development approval, identified in the SDC Capital Improvement Plan, and is either:

(a) *Not located on or contiguous to property that is the subject of development approval; or*

(b) *Located in whole or in part on or contiguous to property that is the subject of development approval and required to be built larger or with greater capacity than is necessary for the particular development."*

The City of Estacada has identified SDC eligible storm sewers required to serve development throughout the UGB. In this SDC Update, eligible projects will receive a credit for the over-sizing to handle storm water from anticipated up-gradient future development or other off-site drainage that contributes to the collection system.

Eligible construction includes those projects listed in the CIP, including collection system on-site over-sizing. Over-sizing is defined as any pipeline greater than 12" diameter serving development. The on-site over-size component of development is eligible for an SDC credit. If an eligible project is mandated off-site, the entire pipeline cost is eligible for SDC credits in accordance with state statutes.

The following table identifies the current estimated construction cost for each line size including box culverts. Total costs include 25% engineering and 25% contingency for new storm sewer construction to establish the amount of available construction credits per foot installed:

Table 4: City of Estacada
STORM SEWER CONSTRUCTION CREDITS
September 2009

Line Size	Cost per Foot	Oversize Credit
12"	$70	$0
15"	$90	$20
18"	$110	$40
24"	$140	$70
30"	$170	$100
36"	$200	$130
42"	$230	$160
48"	$260	$190
60"	$300	$230
72"	$340	$270
Box Culverts	$500	$500

The credits in the above table apply only to new collection system construction and on-site oversizing, but not to replacement of off-site facilities. Where new lines are required off-site to replace existing, a credit for the full value of the new line is eligible for SDC credits.

B4. SDC OVERLAY METHODOLOGY

The current SDC Improvement Fee is based on qualified public improvements that are defined as that portion of an improvement that exceeds the local government's minimum standard facility size or capacity needed to serve the particular project or property. The cost of these qualified public improvements is shared equally over all future development based on a cost per square foot of impervious area.

ORS 223.304(4) requires that a credit be available for the construction of a "qualified public improvement" if it is required as a condition of development approval, identified in the Capital Improvement Plan and either located off the development site, or on-site and required to be built larger or with greater capacity than is necessary for the particular development.

It is clear that if the improvement is off-site, the "qualified public improvement" could also include that portion required to meet the agency's minimum standard because that is the only distinction in the statute between the on-site versus off-site improvements eligible for credit. The minimum standard improvement, such as a 12" storm line, would only benefit the adjoining users and would not have any regional benefit. As a result, the cost of these improvements should only be allocated to the directly benefited users.

This methodology update incorporates the ability to establish a specific SDC Overlay to allocate directly to benefited properties the costs of the Agency's minimum standard improvements that are:

1.) required as a condition of development approval;
2.) included in the CIP; and are
3.) not located on or contiguous to the property subject to development.

For the storm water collection system this would apply to the construction of the first 12" of any off-site pipeline. The benefited properties would include all future developable properties that abut the pipeline and the costs would be allocated on per square foot of impervious area of all abutting properties. The equitable basis for this allocation is that in the absence of the improvement, the benefited property owners would be mandated to construct equivalent level improvements at an inflated cost at the time of actual development.

The eligible portion of the SDC Overlay improvement cost is based on the incremental cost of the minimum standard improvement as published in the current adopted SDC Update. The overlay district should be identified in the SDC document with sufficient detail to estimate the magnitude of frontage benefited, excluding non-developable sites. Non-developable sites include abutting areas outside the UGB, unbuildable steep slopes or previously developed property.

The requirement to pay an SDC Overlay assessment would be in addition to the cost of the City-wide SDC charge for a new connection.

B5. STORM WATER SDC ELIGIBLE CAPITAL IMPROVEMENT PLAN

The following table summarizes the identified Capital Improvement Projects developed in the 2009 Master Plan Update and SDC eligible components:

Table 5: City of Estacada
STORM WATER SDC ELIGIBLE CAPITAL IMPROVEMENTS
September 2009

PROJ No.	MASTER PLAN IMPROVEMENT DESCRIPTION	TOTAL ESTIMATED COST	PERCENT SDC ELIGIBLE	TOTAL SDC COST	CONSTRUCTION PIORITY (YEARS)
20 B1 A	Improve Channel	$320,000	100	$320,000	1-20
20 B2	Ditch Restoration Culvert Replacement	$450,000	100	$450,000	1-20
40 B1 A	Erosion Protection	$89,000	100	$89,000	1-20
40 B2 A	Improve Ditch+Culvert	$398,400	100	$398,400	1-20
40 B2 B	Box Culvert	$68,100	100	$68,100	1-20
40 B2 C	Improve Ditch	$47,800	100	$47,800	1-20
40 B2 D	Box Culvert	$40,100	100	$40,100	1-20
40 B2 E	Improve Ditch	$52,400	100	$52,400	1-20
40 B2 F	Box Culvert	$39,300	100	$39,300	1-20
40 B2 G	Improve Ditch	$119,300	100	$119,300	1-20
40 B2 H	Box Culvert	$116,100	100	$116,100	1-20
40 B2 I	Improve Ditch	$241,600	100	$241,600	1-20
40 B2 J	Improve Culvert	$44,800	100	$44,800	1-20
40 B2 K	Improve Ditch	$112,300	100	$112,300	1-20
40 B3 A	Replace Culvert and Improve Ditch	$160,000	100	$160,000	1-20
40 B3 B	Replace Culvert and Improve Ditch	$227,400	100	$227,400	1-20
40 B4 F	Install Storm Drain	$60,000	100	$60,000	1-20
40 B4 G	Install Storm Drain	$40,100	100	$40,100	1-20
40 B5 A	Install Storm Drain	$21,600	100	$21,600	1-20
40 B5 B	Install Storm Drain	$77,800	100	$77,800	1-20
40 B5 C	Install Storm Drain	$76,800	100	$76,800	1-20
40 B6 A	Install Storm Drain	$30,900	100	$30,900	1-20
40 B6 B	Install Storm Drain	$54,000	100	$54,000	1-20
40 B6 C	Install Storm Drain	$52,700	100	$52,700	1-20
50 B1 A	Install Storm Drain	$96,500	100	$96,500	1-20
50 B1 B	Install Storm Drain	$33,600	100	$33,600	1-20
50 B1 C	Install Storm Drain	$67,000	100	$67,000	1-20
50 B1 D	Install Storm Drain	$45,600	100	$45,600	1-20

50 B2 A	Install Storm Drain	$53,900	100	$53,900	1-20
50 B2 B	Install Storm Drain	$45,600	100	$45,600	1-20
50 B3	Install Storm Drain	$55,200	100	$55,200	1-20
60 B1 A	Install Storm Drain	$18,400	100	$18,400	1-20
60 B1 B	Install Storm Drain	$70,900	100	$70,900	1-20
60 B1 C	Install Storm Drain	$54,800	100	$54,800	1-20
60 B1 D	Install Storm Drain	$47,800	100	$47,800	1-20
60 B1 E	Install Storm Drain	$62,200	100	$62,200	1-20
60 B2	Install Storm Drain	$34,200	100	$34,200	1-20
60 B3 A	Install Storm Drain	$12,000	100	$12,000	1-20
60 B3 B	Install Storm Drain	$21,100	100	$21,100	1-20
60 B3 C	Install Storm Drain	$48,300	100	$48,300	1-20
70 B1 B	Replace Channel w/SD	$38,600	100	$38,600	1-20
99 B1-4	Maple, Laurel, Ivy & Hawthorn	$143,900	100	143,900	1-20
0001	Hill Way Restoration	$30,000	100	$30,000	1-20
0002	Wade Creek Pond Overflow	$20,000	100	$20,000	1-20
0003	Hwy 211/224 Spillway	$20,000	100	$20,000	1-20
ENGR	Engr, Planning, Mapping & SDC Compliance	$110,000	100	$110,000	1-20
Misc	Miscellaneous Oversizing	$40,000	100	$40,000	1-20
	TOTALS	**$4,110,100**		**$4,110,100**	

B6. SDC IMPROVEMENT FEE CALCULATION

Improvement fees apply to all new development to fund improvements needed to support future growth.

Storm water costs are typically allocated based on the proportionate amounts of pervious area contained for each land use. Net private residential land uses are estimated to contain, on average, approximately 25% impervious area on each property. This would equate to 2,500 square feet on a 10,000 square foot lot. This rate would also apply to agricultural-zoned land upon their conversion to residential properties. Net residential land is estimated to be 65% of gross residential acreage after accounting for streets and other public uses.

Commercial zoning is anticipated to have a higher coverage rate than residential. It is estimated that net commercial areas are on average 60% impervious area, again with a 65% factor to convert from gross to net acreage. Industrial area is estimated at 15% impervious area, and again with 65% factor to convert from gross to net developable area.

Based on the inventory of land use contained in the Master Plan, the following table calculates the total impervious area contained within the built-out Urban Growth Boundary.

Table 6: City of Estacada
NET UGB IMPERVIOUS AREA
September 2009

DEVELOPMENT ZONE	GROSS ACRES	NET DEVELOPABLE ACRES (PERCENT)	NET IMPERVIOUS AREA (PERCENT)
Residential/Agricultural	2,065	1,342 (65%)	335.6 (25%)
Commercial	111	72.1 (65%)	43.3 (60%)
Industrial	81	53 (65%)	7.9 (15%)
Total	**2,257 Acres**	**1,467 Acres**	**387 Acres**

Assuming development costs of the storm system are allocated equally to existing and future users, the total cost of needed capital improvements is allocated over the total area of impervious area through build-out of the UGB. On a per square foot basis, the unit cost is as follows:

SDC Improvement Fee = (SDC CIP costs) / (Total Impervious area)
= ($4,110,100) / (387 acres)(43,560 SF/Ac)
= $0.244per Impervious SF

B7. SDC REIMBURSEMENT FEE CALCULATION

Over several decades, the City of Estacada has expended substantial public funds on storm drainage improvements that qualify for SDC reimbursement. The methodology for both the reimbursement and the improvement fee are based on an inventory of all facilities, divided by the entire build-out population. As a result, this methodology update has an inventory of all existing improvements with associated replacement cost, as listed on the attachment to this update at the end of this text.

The following table lists a summary of all system improvements to provide the basis for the Reimbursement Fee:

Table 7: City of Estacada
STORM DRAINAGE SYSTEM REIMBURSEMENT CHARGE
September 2009

	ORIGINAL COST (YR)	UPDATED COST 2009	SDC ELIGIBLE	SDC COSTS
Inventory of existing piping improvements	---	$997,370	100%	$997,370
Short Street Storm Sewer	$53,750 (2004)	$60,400	100%	$60,400
Wade Creek Park Outfall	$12,000 (2007)	$12,900	100%	$12,900
Engr, Planning, Mapping & SDC Compliance	$69,156 (1997)	$102,350	100%	$102,350
Engineering and SDC Update	$15,000 (2008)	$15,000	100%	$15,000
			TOTAL IMPROVEMENTS	$1,188,020

SDC Reimbursement Fee = (SDC Eligible Costs)/(Total Impervious area)
= ($1,188,020) / (387 acres)(43,560 SF/Ac)
= $ 0.070 per Impervious SF

B8. SDC FEE SUMMARY

The following table summarizes the proposed Storm Water SDC fee to be collected at the time of building permit issuance or change of land use:

Table 8: City of Estacada
STORM WATER SDC FEE SUMMARY
September 2009

DEVELOPMENT CLASS	IMPROVEMENT FEE / SF	REIMBURSEMENT FEE / SF	TOTAL FEE /SF	TOTAL SDC
Single Family Dwelling 2,500 SF Impervious	**$0.244**	**$0.070**	**$0.314**	**$784 per EDU**
Commercial/Industrial per 1,000 SF Impervious	**$0.244**	**$0.070**	**$0.314**	**$314 (per 1,000 SF)**

City of Estacada
PART C: TMDL IMPLEMENTATION PLAN

C1. INTRODUCTION

The City of Estacada rests along the Clackamas River east of the lake created by the River Mill Dam. The City is built on two terraces, the lower at between 420 and 450 feet above mean sea level (MSL) and the upper at between 460 and 520 feet above MSL. The downtown area is situated on the lower terrace and is largely built out. Large areas available for growth are to the north and east. Development has been planned for the upper terrace to the east and north of downtown.

A map of the city of Estacada can be found in Figure 1. The City owns, operates and maintains water and wastewater treatment facilities, a water distribution system, and wastewater and storm water collections systems.

Storm drainage originates in the easterly hills. Near ninety percent of the City is drained by Wade Creek and two branches of Currin Creek, in an east to west-northwest direction. The majority of the existing storm drainage piping system is built into and around the downtown streets, with ditches serving many roadways.

A City staff organizational chart can be found in Figure 2 and a brief description of the jobs in the organizational chart can be found in Figure 3.

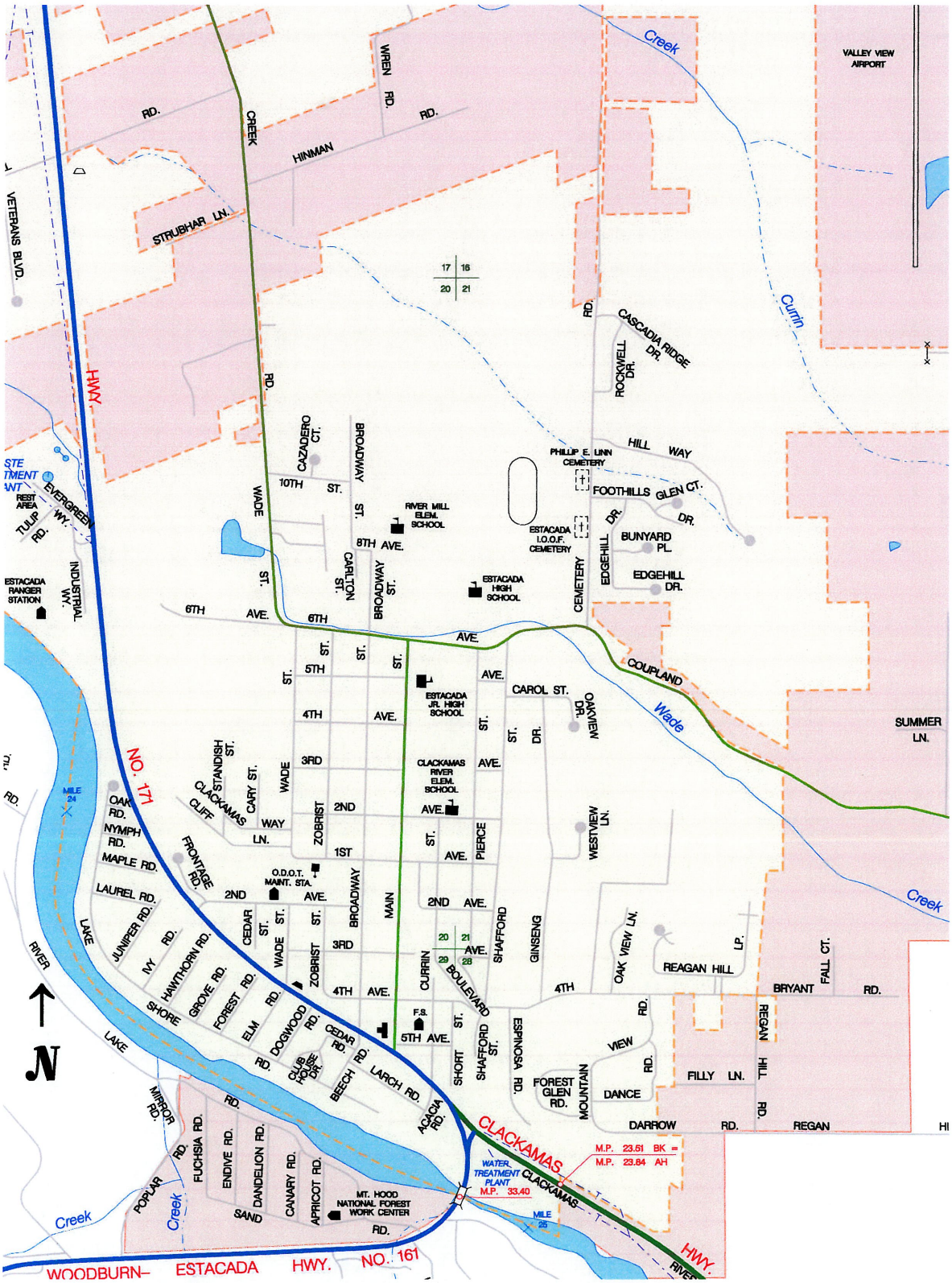


FIGURE 1: ESTACADA CITY MAP (courtesy Oregon DOT)

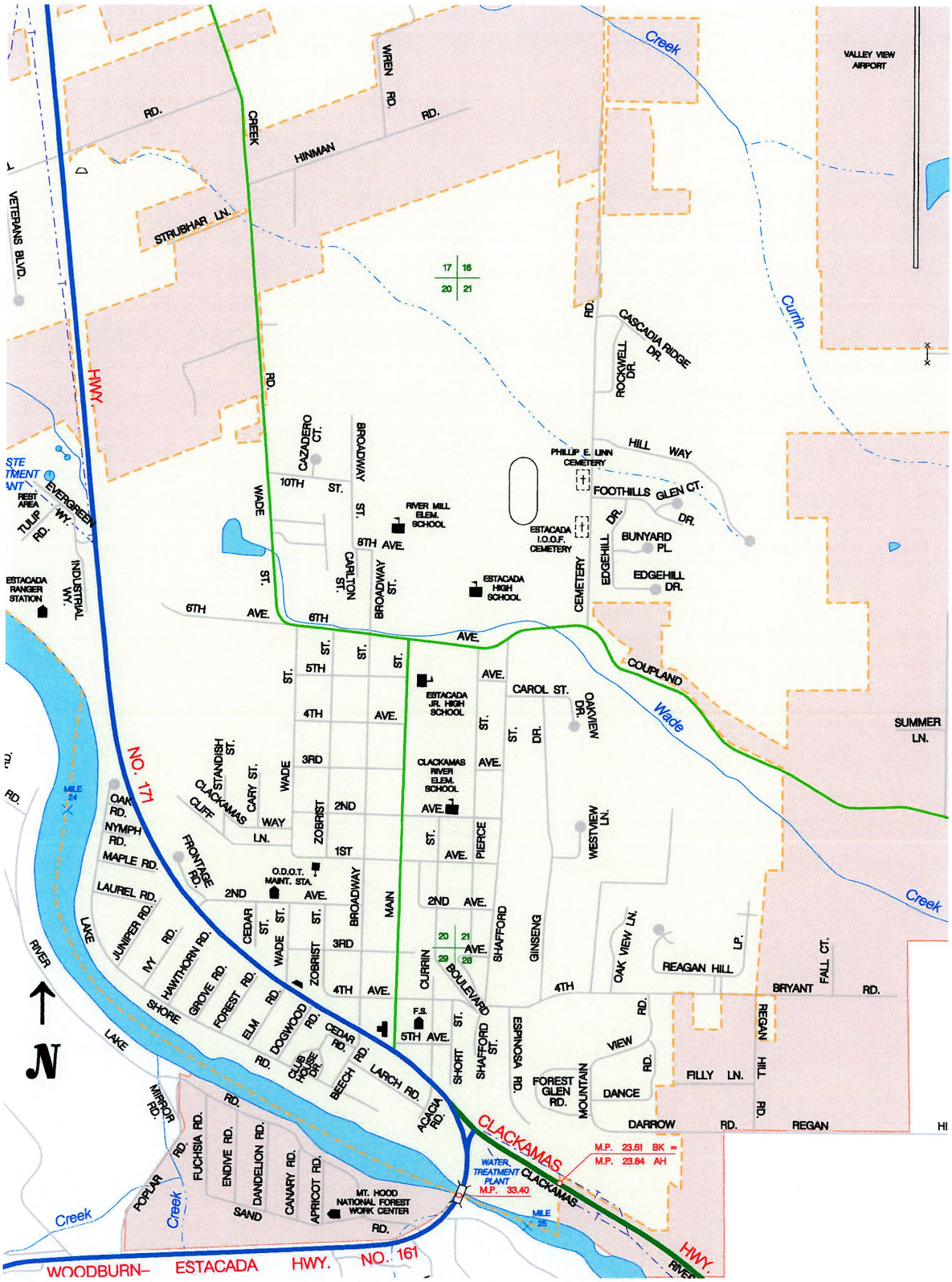


FIGURE 1: ESTACADA CITY MAP (courtesy Oregon DOT)

CITY OF ESTACADA
PUBLIC WORKS DEPARTMENT
ORGANIZATIONAL FLOWCHART

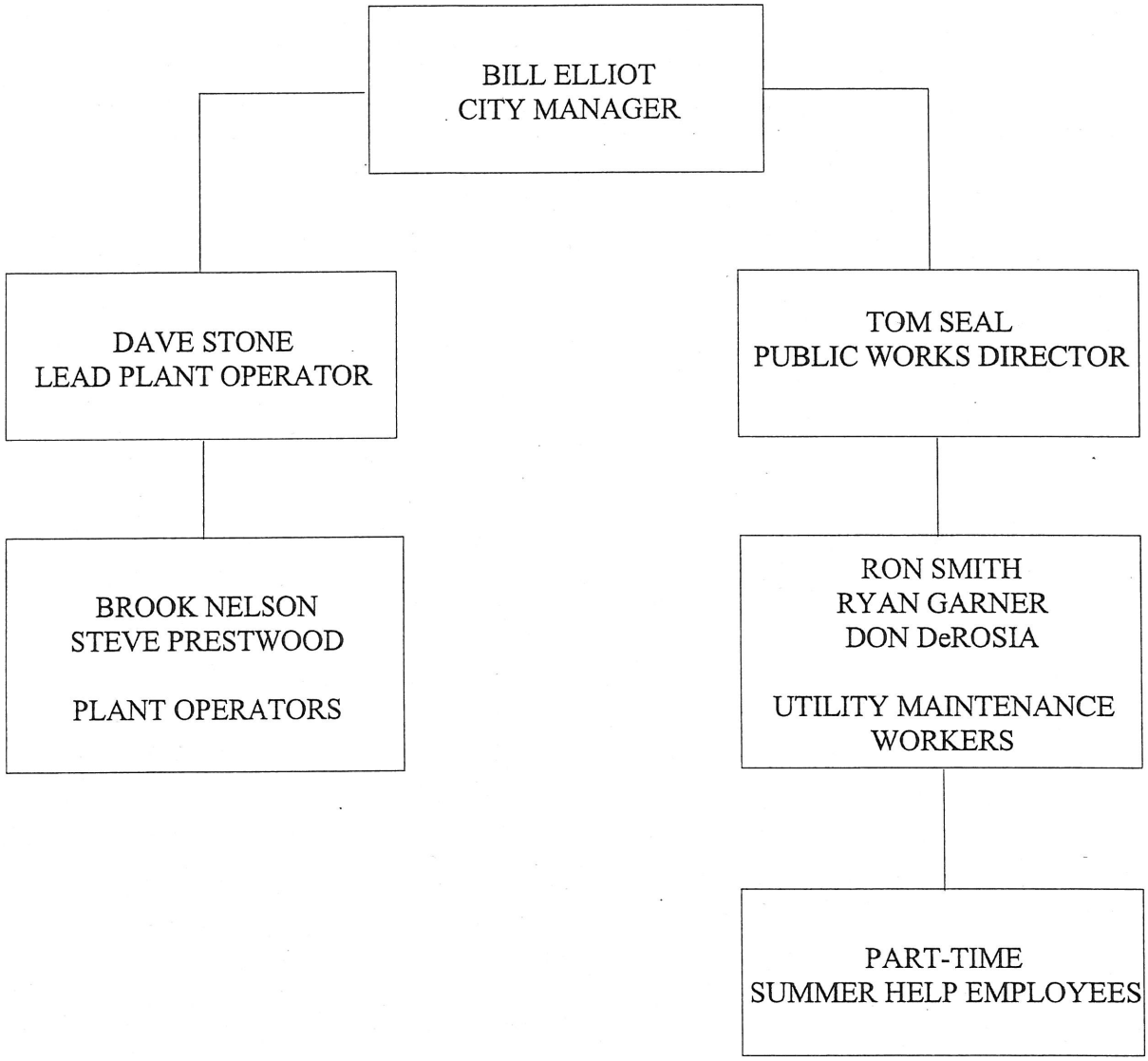


Figure 2: Estacada Public Works Organizational Flow Chart

Figure 3: Job Duties and Descriptions

City Manager – The City Manager controls and supervises all city employees and appointees, unless specifically excluded. The City Manager enforces all ordinances, provisions of franchises, leases, contracts, permits and privileges granted by, or running to the city. The City Manager acts as purchasing agent for the city and has a large duty preparing and submitting to the creation annual city budget. The City Manager supervises all public utilities owned and operated by the city.

Public Works Director – The Public Works Director administers, plans and directs the functions of the Public Works Department. The Public Works Director is responsible for assigning, directing, and inspecting work performed in the area of streets, parks, sewer collection system, storm drainage, water distribution system, and building and vehicle maintenance.

Utility Maintenance Worker – The Utility Maintenance Worker is responsible for the day-to-day operation, maintenance, and repair activities of the water distribution system, sewer and storm water collection system, street system and parks. The Utility Maintenance Workers also perform maintenance and repair work at the city's water and wastewater treatment plants. Utility Maintenance Workers takes direction form the Public Works Director.

Lead Plant Operator – The Lead Plant Operator oversees the operation of both the water and wastewater treatment plants including, but not limited to pump stations, lift stations, reservoirs and biosolids. The Lead Plant Operator oversees the work performed by the Plant Operators and is responsible for monthly reporting. The Lead Plant Operator is the certified operator of record.

Plant Operator - The Plant Operator performs duties necessary to the operation of both the water and wastewater treatment plants including, but not limited to pump stations, lift stations, reservoirs and biosolids. The Plant Operators work under the direction of the Lead Plant Operator.

Figure 3: Job Duties and Descriptions

C2. IMPLEMENTATION PLAN BACKGROUND

a. IMPLEMENTATION PLAN ORIGINS

The Department of Environmental Quality (DEQ) adopted Total Maximum Daily Loads (TMDL) for the Clackamas River in the Willamette Basin in 2006. The TMDLs address bacteria, mercury and temperature concerns for all the watersheds in the Willamette River Basin.

The TMDL identifies the City of Estacada as one of many jurisdictions with responsibility for improving water quality in the Willamette River Basin. The City has been identified as a Designated Management Agency (DMA). A DMA means a federal, state or local governmental agency that has legal authority over a sector or source contributing pollutants. The city has authorities in a number of areas including:

- Construction, operation, and maintenance of City roads and sanitary sewer and storm sewer system;
- Land use planning and permitting;
- Maintenance, construction, and operation of parks and other City-owned facilities and infrastructure; and,
- Riparian area management within the city limits.

The City of Estacada is responsible for developing an implementation plan for pollutants that enter streams within the City as a result of activities under the City's jurisdiction (OAR 340-042-0080). This plan is intended to meet this requirement. The plan draws upon and uses many of the recommendations made by the City in the City of Estacada Storm Drainage Master Plan (December 1997) for storm water control.

The DEQ has directed that the City of Estacada create a TMDL Implementation Plan for three pollutants: Temperature, Bacteria and Mercury.

b. IMPLEMENTATION PLAN SCOPE

This TMDL implementation plan addresses potential sources of pollutants that enter surface waters that may be affected by activities under the jurisdiction of the City of Estacada.

Oregon Administrative Rule (OAR 340-042-0080(3)(a)(A),(B),(C),(D)&(E))
The rule requires that designated management agencies submit a TMDL implementation plan to DEQ that does the following:

(A) Identifies the management strategies the DMA or other responsible person will use to achieve load allocations and reduce pollutant loading;

(B) Provides a timeline for implementing management strategies and a schedule for completing measurable milestones;

(C) Provides for performance monitoring with a plan for periodic review and revision of the implementation plan;

(D) To the extent required by ORS 197.180 and OAR chapter 340, division 18, provides evidence of compliance with applicable statewide land-use requirements; and,

(E) Provides any other analyses or information specified in the WQMP.

DMAs are required to implement the plan, modify it as needed, and report on the results.

THE CITY'S RESPONSE TO OAR 340-042-0080(3)(a)(A),(B),(C),(D)&(E)

1. REQUIREMENTS A, B, AND C:

Table 4 addresses requirements A, B, and C of OAR 340. A planning period of five years has been used, based on the recommendations of DEQ (2008 -2013). This planning period corresponds with a basin cycle used by DEQ.

2. REQUIREMENT D: EVIDENCE OF COMPLIANCE WITH LAND USE REQUIREMENTS

The City has a current DLCD-acknowledged comprehensive plan that addresses managed growth within the statutory guidelines, including public infrastructure. The TMDL implementation plan is in conformity with the comprehensive plan and assists to implement storm drainage master planning principles.

3. REQUIREMENT E: ADDITIONAL REQUIREMENTS AS INDICATED IN THE WQMP

Although the Clackamas River at Estacada does not exceed regulatory mercury action levels, DEQ has required the City of Estacada to submit a plan to minimize mercury introduction to the Clackamas River through implementation of sediment and storm water runoff control. The City currently has an erosion and sediment control plan that requires local permitting for all construction, in addition to the requirements of the state-administered 1200-C program.

c. REPORTING AND ADAPTIVE MANAGEMENT

The City of Estacada will track TMDL implementation activities and report to DEQ annually on progress and accomplishments using the matrix format in Tables 9 and 10. In addition, the City of Estacada will participate with DEQ and other entities in the basin in a 5-year review and will revise this Implementation Plan as needed. A reevaluation and revision may also be needed following DEQ's reevaluation of the TMDL.

Table 9 - The City of Estacada TMDL Program Implementation Measures

POLLUTANT	SOURCE	STRATEGY	HOW	MEASURE	TIMELINE	BENCHMARK	
What pollutant does TMDL address?	**What sources of pollution are under your jurisdiction?**	**What is being done, or what will you do to reduce and/or control pollution emitting from this source?**	**Specifically, how will this be done?**	**How will you demonstrate successful implementation or completion of this strategy?**	**Time line to implement the strategy?**	**What intermediate goals will be achieved, and by when, to know progress is being made?**	**STATUS**
Temperature	1. Solar Radiation Input	a. Maintain existing shading vegitation	Comprehensive Plan contains setback requirements	Enforce code requirements, track violations	Existing Program	Compare aerial photos at five-year intervals to determine state of changes to riparian areas	On-going
		b. Work with upstream landowners to initiate tree plantings	Contact landowners and discuss options	Monitor new growth in riparian areas by visiting plant sites annually	1-5 Years	At least one riparian tree planting project completed every two years	
			When requested, provide formal support (and resources as available) for watershed projects	Track the number of watershed projects	1-5 Years	Formal support for watershed projects	
	2. Wastewater Treatment Plant discharge	Maintain low effluent temperatures	Meet DEQ discharge permit requirements	Monitor effluent and river temperatures as a condition of discharge permit	Existing Program	Compliance means that wastewater effluent does not impact the river	On-going
Bacteria	1. Wastewater treatment plant (monitoring indicates meets requirements)	Upgrade and maintain existing Plant	Maintain Funding Program and Secure Grants as available	Monitor as project continues	Existing Program	Needed treament plant upgrades completed	On-going
	2. Pet and Animal waste from storm runoff	Install pet waste stations	Determine community need, type and location of stations	Documentation of community need, designate location	5-10 years	Define data requirements and prepare questionaire	
Mercury	1. Natural background in soil and rock is low	Limit erosion to maintain clear, clean water.	Land Development Code requires a geotechnical evaluation on new development on erosive areas	Building inspector will monitor complience with Land Development code requirements	Existing Program	Geotechnical evaluations completed, and all development in compliance with code requirements	On-going
			Inform developers and monitor 1200-C permits for new developments	Demonstrate that 100% of new developmets over one acre get 1200-C permits	Existing Program	Obtain materials explaining 1200-C requirements and make available with development applications	On-Going
	2. Erosion and sedimentation	Limit erosion to maintain clear, clean water.	City will add specific erosion control requirements (e.g. silt fences, mulching, seeding, avoiding excavation during wet periods) for all new construction/reconstruction	Once adopted, building inspector and planning department will monitor compliance	1-5 years	Small site Erosion Control requirements adopted by the City	

Table 10 - The City of Estacada TMDL Implementation Tracking Matrix

Best Management Practice (BMP)	Commitment	Performance Measure	Example Annual Report Information	Bacteria	Temperature	Mercury
Collection Systems Maintenance Program						
Videotape Collection System Pipelines	**Program Committment:** Identify all system deficienies	Linear Feet of pipes inspected	3,100 LF inspected in 2007			
	Year of Committment: Ongoing					
Respond to Identified Deficiencies	**Program Committment:** Repair, replace or clean deficient pipelines	Replacement or Sliplining dollars spent	$100,000 contracted for sliplining in 2007	X	X	X
		Number of service lines repaired	10 lines repaired in 2007	X	X	X
		Number of service lines replaced	6 lines replaced in 2007	X	X	X
		Number of service lines cleaned	2 lines cleaned in 2007	X		
	Year of Committment: Ongoing					
Catchbasin Cleaning	**Program Committment:** Clean all catch basins once a year	Percent Cleaned		X		X
	Year of Committment: Ongoing					
Prevent Illegal Discharge in to Storm or Sanitary Sewers	**Program Committment:** Identify current violators and prevent future violations	Inspection of storm and sanitary sewers		X	X	X
		Inspect new connections and test to verify proper connection		X	X	X
	Year of Committment: Ongoing					

Table 10 - The City of Estacada TMDL Implementation Tracking Matrix

Construction Site Management						
Erosion Prevention and Sediment Control	**Program Commitment:** Monitor construction activities to ensure ODOT sediment control standards are met	Compliance to ODOT standards at construction sites		X	X	X
	Ensure proper setbacks from wetlands and streambeds			X	X	X
	Year of Committment: Ongoing					
Stakeholder Involvement						
Public Education	**Program Commitment:** Educate the public on the importance of watershed protection through stormwater management	Education opportunities: Library Bioswale		X		X
	Year of Committment: Ongoing					
Wastewater Treatment Plant						
Prevent Overflows	**Program Commitment:** No overflows	Track number of overflows	None	X		
Effluent Limits	**Program Commitment:** Meet DEQ limits	Number of Violations	None	X		
	Year of Committment: Ongoing					

C3. TMDL ACTION: SOURCES

a. TEMPERATURE

Clackamas River temperatures are affected by industrial and municipal discharges. The City's sewage effluent discharge has only a small impact on Clackamas River water temperature, primarily due to the low effluent volume compared to the river flow. Nonetheless, the City is currently monitoring effluent and river temperatures as a condition of the NPDES permit to determine permit compliance.

There are no industries that add warmed water to the river at Estacada at this time.

In order to preserve river water temperature within the range required for salmonid spawning, the City can mandate the proper maintenance of existing shade trees over the river and encourage the planting of additional trees within the city's jurisdiction. Most of the river banks within City limits are lined with mature trees. The river in the City is the result of the water impoundment behind the River Mill Dam, and is very well shaded.

Relative to storm water, the Wade Creek watershed drains 1,293 acres, of which 160 is within the city limits. Currin Creek drains two watersheds totaling 2,578 acres. Both creeks traverse the City on the way to the Clackamas River. A great majority of the contribution of these streams on the Clackamas is made during winter months when solar radiation heating is not a factor. Although the City does not have jurisdiction in the areas outside the City limits, as they annex and develop, the City will implement storm water BMPs introducing trees and site appropriate vegetation in areas where they will contribute to erosion control and shading the two creeks where it is practicable. The results of these actions will not be measurable for some time, however.

b. BACTERIA

Sources for bacteria are sanitary wastewater and contaminated storm water runoff from wild and domestic animals.

The City is served by a municipal wastewater collection system. The City chlorinates its treated effluent and routine monitoring indicates this is successful in removing and deactivating bacteria to within statutory limits.

Bacteria measured as coliform species are ubiquitous in the environment and are reported in storm water sampling. Control may be affected by bioremediation techniques available as BMPs.

c. SOURCES OF MERCURY

Aside from direct industrial effluent, as in mine drainage or manufacturing, mercury generally comes from air-borne sources that are deposited on the local rock and soil that is in turn mobilized through erosion.

Although the most common referenced contributor, soil erosion is not likely to affect mercury levels in the Clackamas River. On steep slopes, the Estacada Municipal Code requires a geotechnical evaluation and mitigation efforts to prevent erosion in new development. Under DEQ rules, regardless of slope, a 1200-C storm water permit (with an approved storm water management plan) is required for any developments over one acre to prevent erosion and the discharge of contaminants to surface waters.

C4. TMDL ACTION: PREVENTION STRATIGIES

a. Maintenance of Existing Utilities

As part of the long-term maintenance strategy, the City of Estacada has an on-going program to video tape the interiors of all sewer pipes to identify existing deficiencies. The City also has a service line repair schedule in-place to systematically repair all old and damaged service lines.

Overall, the city budgeted about $125,000 this past year for maintenance and upkeep of the municipally owned pipelines. Together, the program will reduce infiltration and inflow to the wastewater treatment facility, and help to identify illegal connections. The program is limited by available manpower and money, but current levels of both are sustainable into the near future.

b. Public Outreach and Involvement

The City is a member of the Clackamas River Basin Council, a local voluntary Watershed Council, founded in 1997 with representatives elected from 21 diverse member groups in the basin. The Council meets and acts to foster partnerships for clean water, healthy streams and fisheries in the Clackamas watershed.

The council's five main action areas are: Council development, stream improvement, monitoring, assessments & research, and outreach & education. It is through the Clackamas River Basin Council that the City does much of its public outreach on the importance of maintaining the health of the Clackamas River and how citizens' actions or lack of action can affect it.

c. Illicit Discharge Detection and Elimination

Through the City's program of videotaping the city's sewers, illegal taps are discovered and subsequently eliminated. The small size of the City enables better oversight over the construction that occurs.

d. Construction Site Storm Water Control

The City faces a great deal of growth in the near future, all of which will drain to surface waters and is subject to the DEQ 1200C permitting program for construction storm water runoff. Currently, all contractors are advised that construction must abide by ODOT rules for erosion and sediment control. Although the 1200C and ODOT requirements provide guidelines for

erosion and sediment control, local control is the also an important component to assure adequate provisions are in-place regardless of site area or slopes.

e. Wastewater Treatment Plant

The City of Estacada Wastewater Treatment Plant was first constructed in 1962 and has undergone many modifications since. Flow measurement indicates there is significant infiltration and inflow during precipitation events. The City is working to identify and reduce infiltration and inflow through videotaping the collection system and repairing or replacing damaged sewers, although they are able, and continue, to meet the requirements of their NPDES permit.

C5. FUNDING

Table 9 and 10 are summaries of practices employed by the City of Estacada to meet TMDL requirements. The action items outlined in these tables are funded through two primary sources: system development fees and water, sewer and storm drain user fees. Development fees are assessed when a newly developed property connects to the existing water, sewer or storm drain system. Current utility users also contribute a monthly user fee.

Stormwater treatment is expensive and should be a last resort after working to reduce runoff and implementation of BMP to improve runoff quality. Programs to minimize runoff and improve the water quality should be aggressively implemented with development of the basin. Attention to riparian area restoration, promotion of low impact development, and incorporating BMP into design standards will provide the best long term, cost effective program to address water quality.

C6. PRIORITIES

Over the past year the City of Estacada has been heavily involved in the restoration of the flood damaged Wastewater Treatment Plant and public library as well as repairing to surface water drainageways damaged in the New Years Day 2009 flooding. In the future continued efforts need to be made to specifically address temperature, bacteria and mercury contaminants which currently contribute to the Willamette River Basin pollutant loading. These efforts should include implementing the capital improvements identified in this report as funding permits.

Additionally, the City should continue to reinforce the development ordinances to better educate residents and adopt prudent development standards that will improve runoff quality. This should include addressing development under one acre in size which currently fall outside of the 1200C permit program and mandates.

APPENDICES

Plates & Figures reproduced from the 1997 City of Estacada,
Storm Drainage Master Plan, by ASCG, Inc.

PLATE 1: EXISTING STORM DRAINAGE SYSTEM – UGB AREA

PLATE 2: EXISTING STORM DRAINAGE SYSTEM – CITY AREA

PLATE 3: CAPITAL IMPROVEMENT PROJECTS

PLATE 4: ENVIRONMENTAL SURVEY MAP

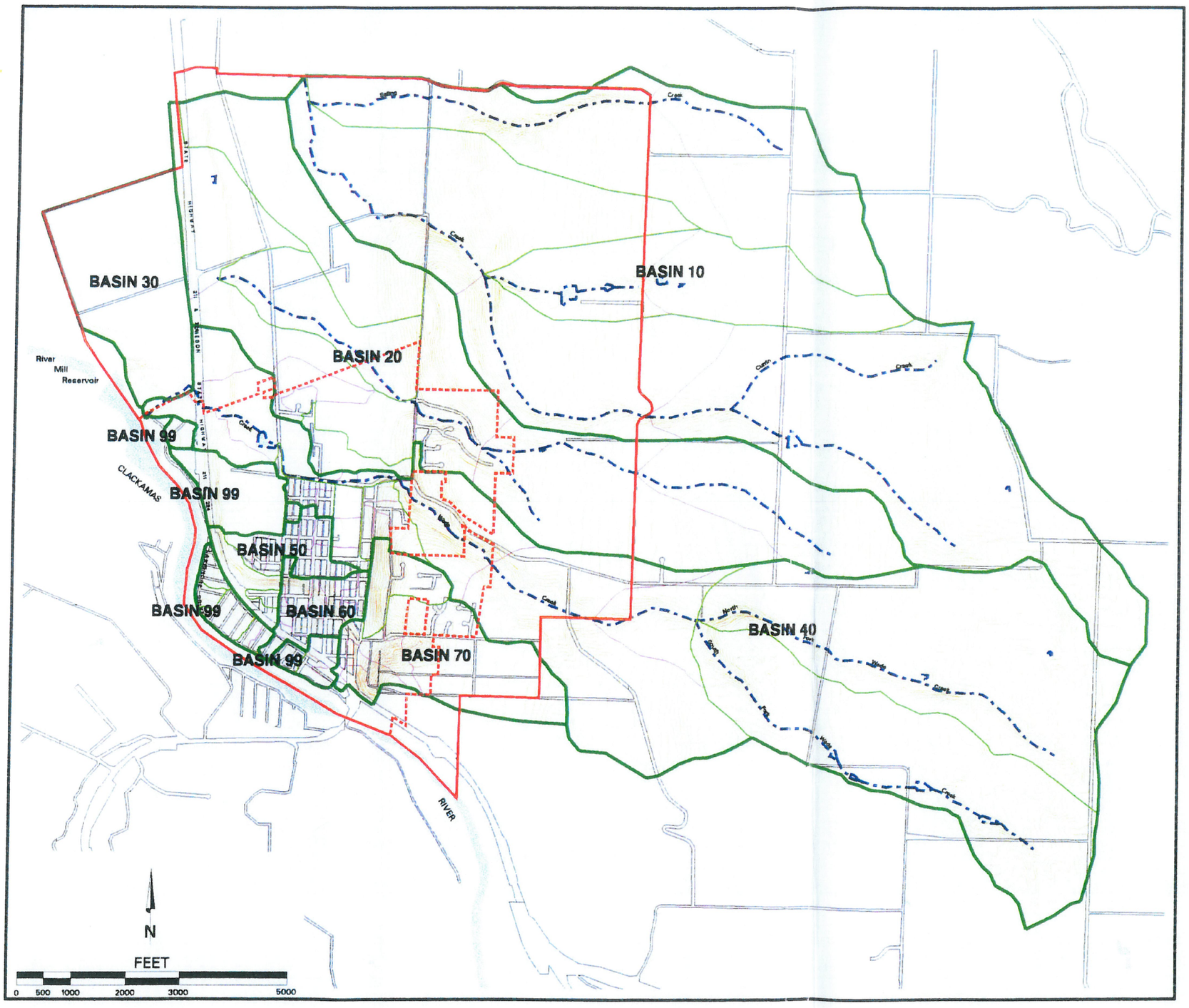
FIGURE 2-1: STUDY AREA

FIGURE 2-2A: CITY OF ESTACADA LAND USES

FIGURE 2-2B: CITY OF ESTACADA 20-YEAR LAND USES

FIGURE 2-2C: CITY OF ESTACADA ULTIMATE LAND USES

FIGURE 2-3: CITY OF ESTACADA HYDROLOGIC SOIL GROUPS



City of Estacada Study Area

Legend

- *Basin Boundary*
- *Subbasin Boundary*
- *Subarea Boundary*
- *Topographical Contour*
- *City Boundary*
- *Urban Growth Boundary*
- *Stream*
- *River/Pond*

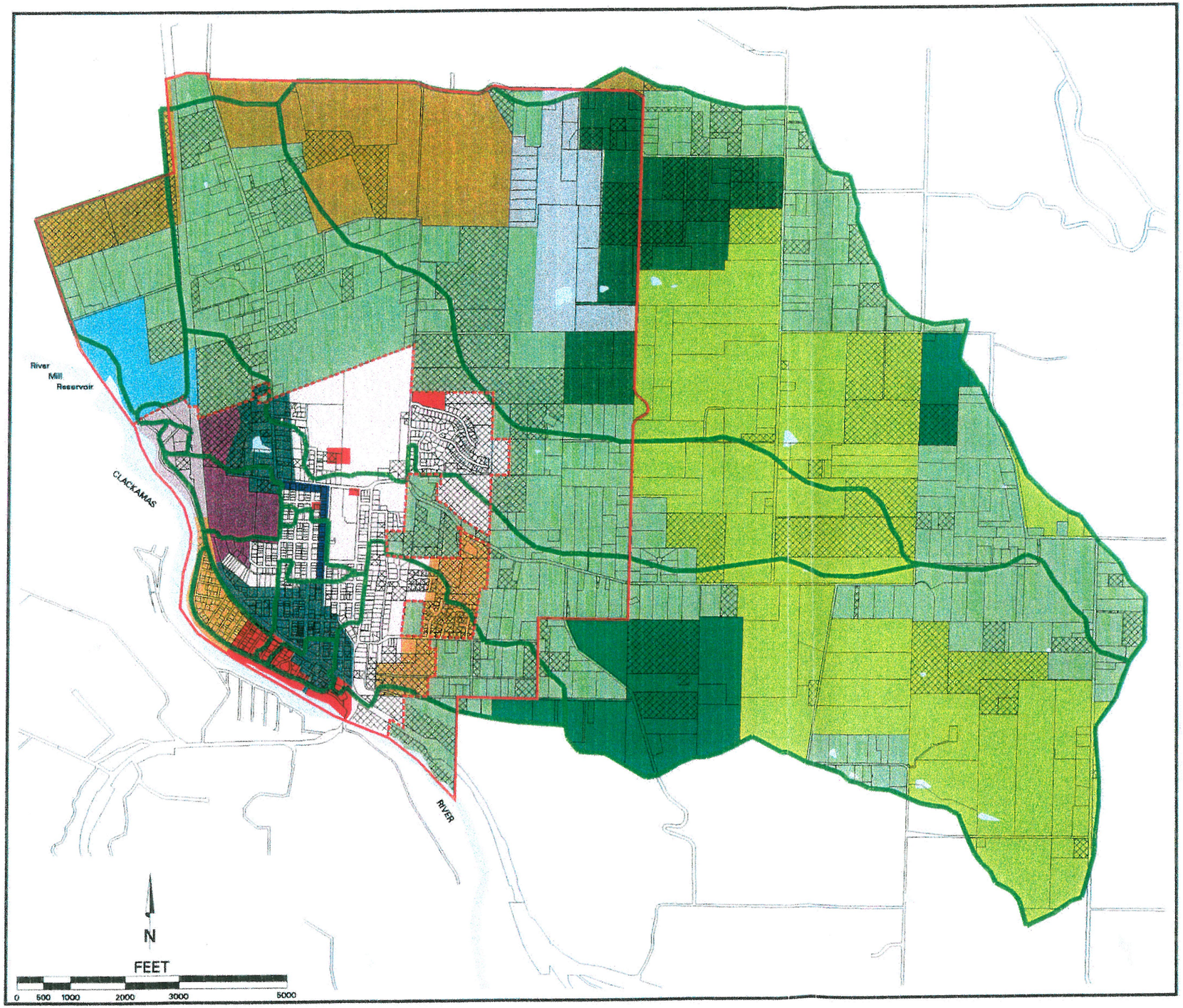
Fig. 2-1

Source: Clackamas County Geographic Information Systems

Date: August 28, 1997

Project Number: 3017

ASCG
INCORPORATED
ENGINEERS ARCHITECTS SURVEYORS INSPECTION SERVICES
9525 SW CASCADE BLVD., SUITE 310, BEAVERTON, OR 97008
(503)641-7800 FAX (503)641-2163



City of Estacada Existing Land Uses

Open Space

- *Open Space (OS) IMP = 0%*
- *Vacant Land (VAC) IMP = 0%*

Residential

- *Low Density Residential (R1) IMP = 35%*
- *Medium Density Residential (R2) IMP = 50%*
- *Multi-family Residential (R3) IMP = 65%*

Commercial

- *Airport (AP) IMP = 30%*
- *Commercial (C1) IMP = 85%*
- *Residential/Commercial (C2) IMP = 85%*

Industrial

- *Light Industrial (M1) IMP = 70%*
- *Heavy Industrial (M2) IMP = 85%*

Farm Use

- *Timber District (TBR) IMP = 5%*
- *Exclusive Farm Use (EFU) IMP = 5%*
- *Farm Forest (FF10) IMP = 5%*
- *Agriculture Forest (AGF) IMP = 5%*
- *Rural Residential Farm Forest (RRFF5) IMP = 20%*

City Boundary

Urban Growth Boundary

Basin Boundary

Fig. 2-2a

Source: Clackamas County Geographic Information Systems

Date: November 12, 1997

Project Number: 3017

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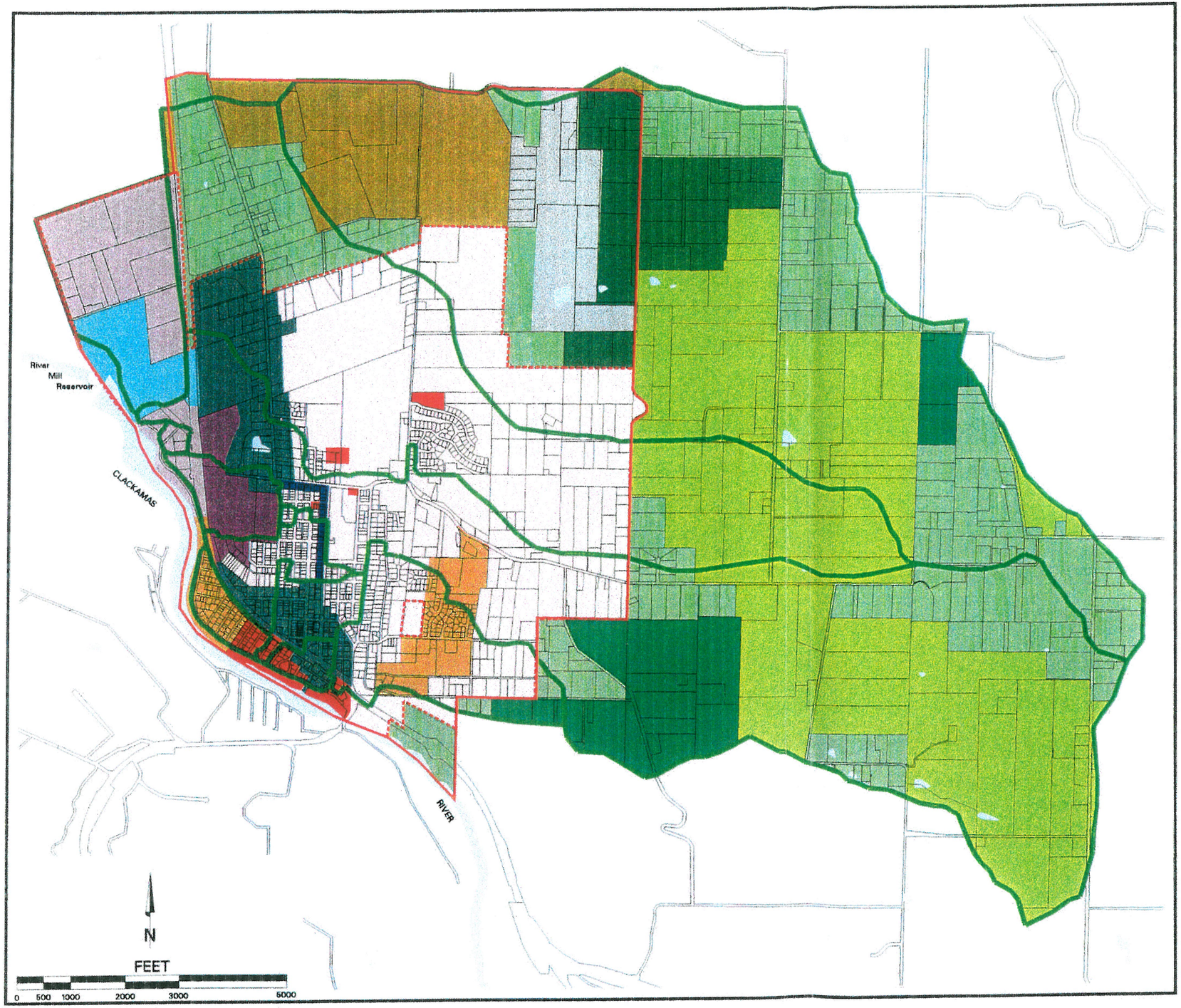

City of Estacada 20 Year Land Uses

Open Space

- *Open Space (OS) IMP = 0%*

Residential

- *Low Density Residential (R1) IMP = 35%*
- *Medium Density Residential (R2) IMP = 50%*
- *Multi-family Residential (R3) IMP = 65%*

Commercial

- *Airport (AP) IMP = 30%*
- *Commercial (C1) IMP = 85%*
- *Residential/Commercial (C2) IMP = 85%*

Industrial

- *Light Industrial (M1) IMP = 70%*
- *Heavy Industrial (M2) IMP = 85%*

Farm Use

- *Timber District (TBR) IMP = 5%*
- *Exclusive Farm Use (EFU) IMP = 5%*
- *Farm Forest (FF10) IMP = 5%*
- *Agriculture Forest (AGF) IMP = 5%*
- *Rural Residential Farm Forest (RRFF5) IMP = 20%*

- *City Boundary*
- *Urban Growth Boundary*
- *Basin Boundary*

Fig. 2-2b

Source: Clackamas County Geographic Information Systems

Date: November 12, 1997 Project Number: 3017

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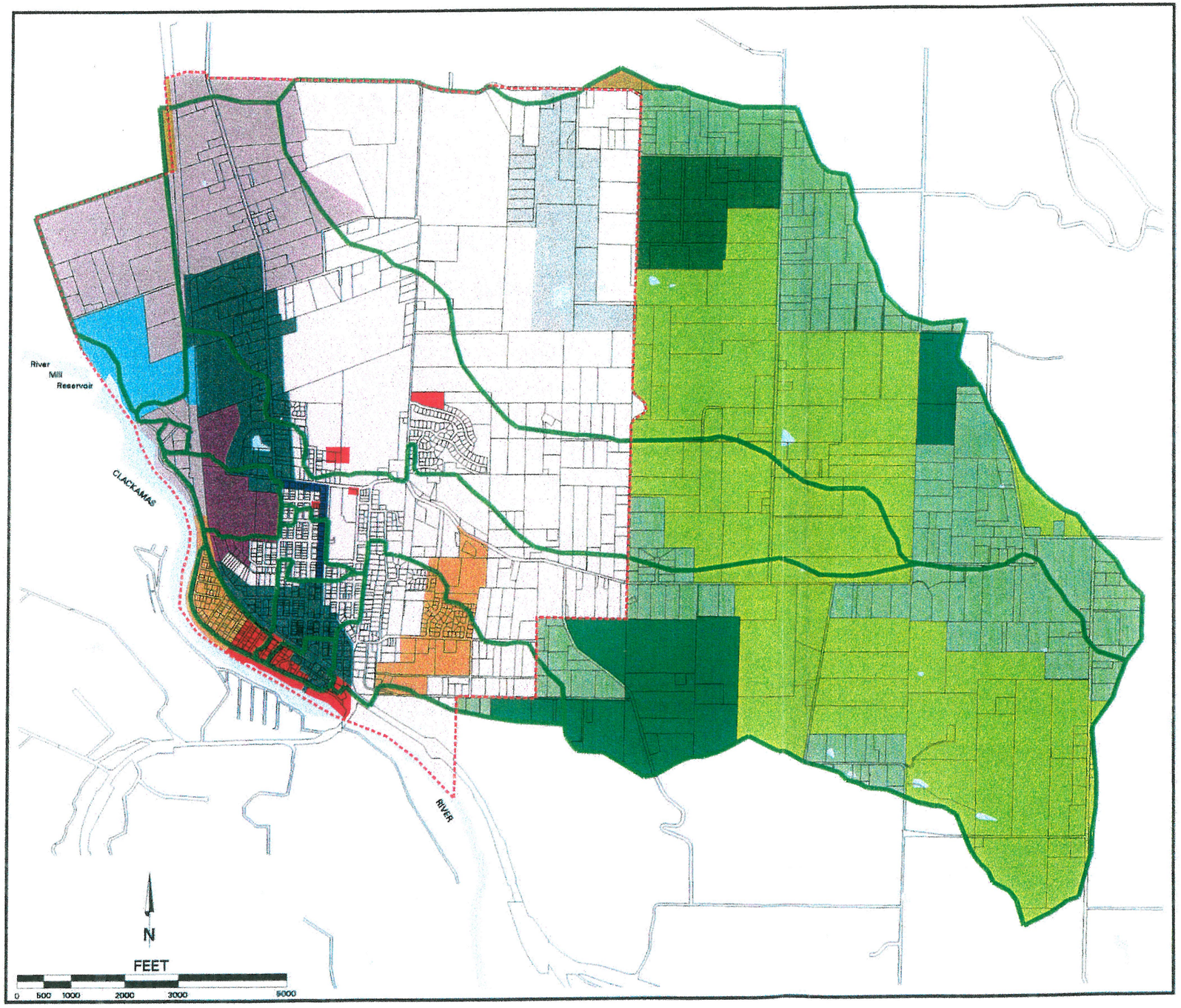

City of Estacada Ultimate Land Uses

Open Space

- *Open Space (OS) IMP = 0%*

Residential

- *Low Density Residential (R1) IMP = 35%*
- *Medium Density Residential (R2) IMP = 50%*
- *Multi-family Residential (R3) IMP = 65%*

Commercial

- *Airport (AP) IMP = 30%*
- *Commercial (C1) IMP = 85%*
- *Residential/Commercial (C2) IMP = 85%*

Industrial

- *Light Industrial (M1) IMP = 70%*
- *Heavy Industrial (M2) IMP = 85%*

Farm Use

- *Timber District (TBR) IMP = 5%*
- *Exclusive Farm Use (EFU) IMP = 5%*
- *Farm Forest (FF10) IMP = 5%*
- *Agriculture Forest (AGF) IMP = 5%*
- *Rural Residential Farm Forest (RRFF5) IMP = 20%*

City Boundary

Basin Boundary

Fig. 2-2c

Source: Clackamas County Geographic Information Systems

Date: November 12, 1997 Project Number: 3017

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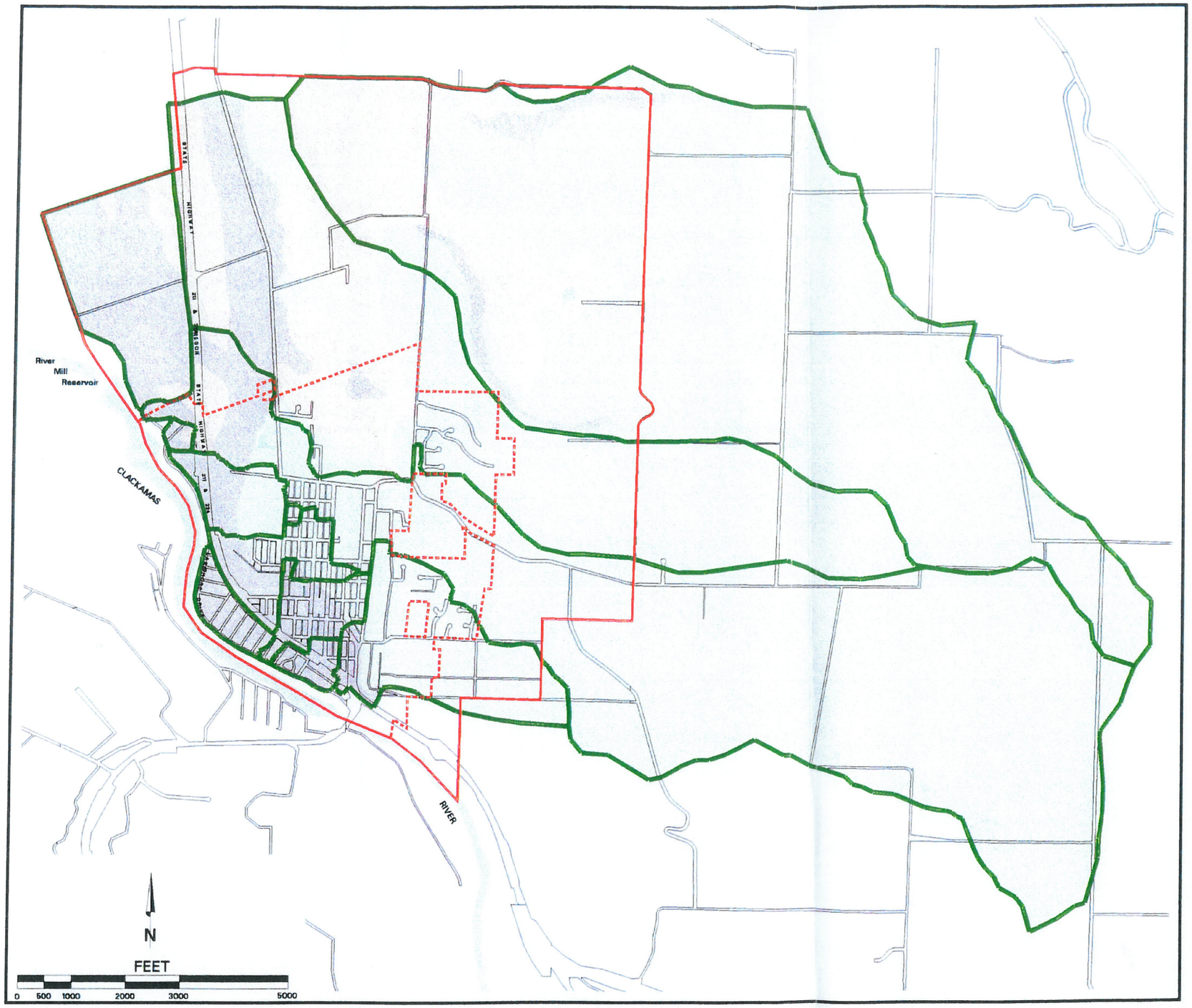

City of Estacada Hydrologic Soil Groups

Legend

- *Hyd. Group "B"*
- *Hyd. Group "C"*
- *Hyd. Group "D"*
- *River/Pond*
- *City Boundary*
- *Urban Growth Boundary*
- *Basin Boundary*

Fig. 2-3

Source: Clackamas County Geographic Information Systems

Date: August 28, 1997

Project Number: 3017

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Plate 1

City of Estacada Storm Drainage Master Plan

PLATE 1
Existing Storm Drainage System
UGB Area

LEGEND

- 99520 — SUBBASIN ID
- DRAINAGE BASIN BOUNDARY
- SUBBASIN BOUNDARY
- URBAN GROWTH BOUNDARY
- ESTACADA CITY LIMIT
- 12" — STORMDRAIN / MAJOR
- 12" — STORMDRAIN / MINOR
- STORMDRAIN LATERAL
- ODOT STORM DRAIN
- STREAM / MAJOR
- STREAM / MINOR
- OUTFALL
- STORAGE NODE

0 100' 200' 400' 600'
SCALE: IN FEET 1" = 400'

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Plate 2

City of Estacada Storm Drainage Master Plan

PLATE 2
Existing Storm Drainage System
City Area

LEGEND

- SUBBASIN ID
- DRAINAGE BASIN BOUNDARY
- SUBBASIN BOUNDARY
- URBAN GROWTH BOUNDARY
- ESTACADA CITY LIMIT
- STORMDRAIN / MAJOR
- STORMDRAIN / MINOR
- STORMDRAIN LATERAL
- ODOT STORM DRAIN
- STREAM / MAJOR
- STREAM / MINOR
- OUTFALL
- STORAGE NODE

SCALE: IN FEET 1" = 200'

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Plate 3

City of Estacada Storm Drainage Master Plan

PLATE 3
Capital Improvement Projects

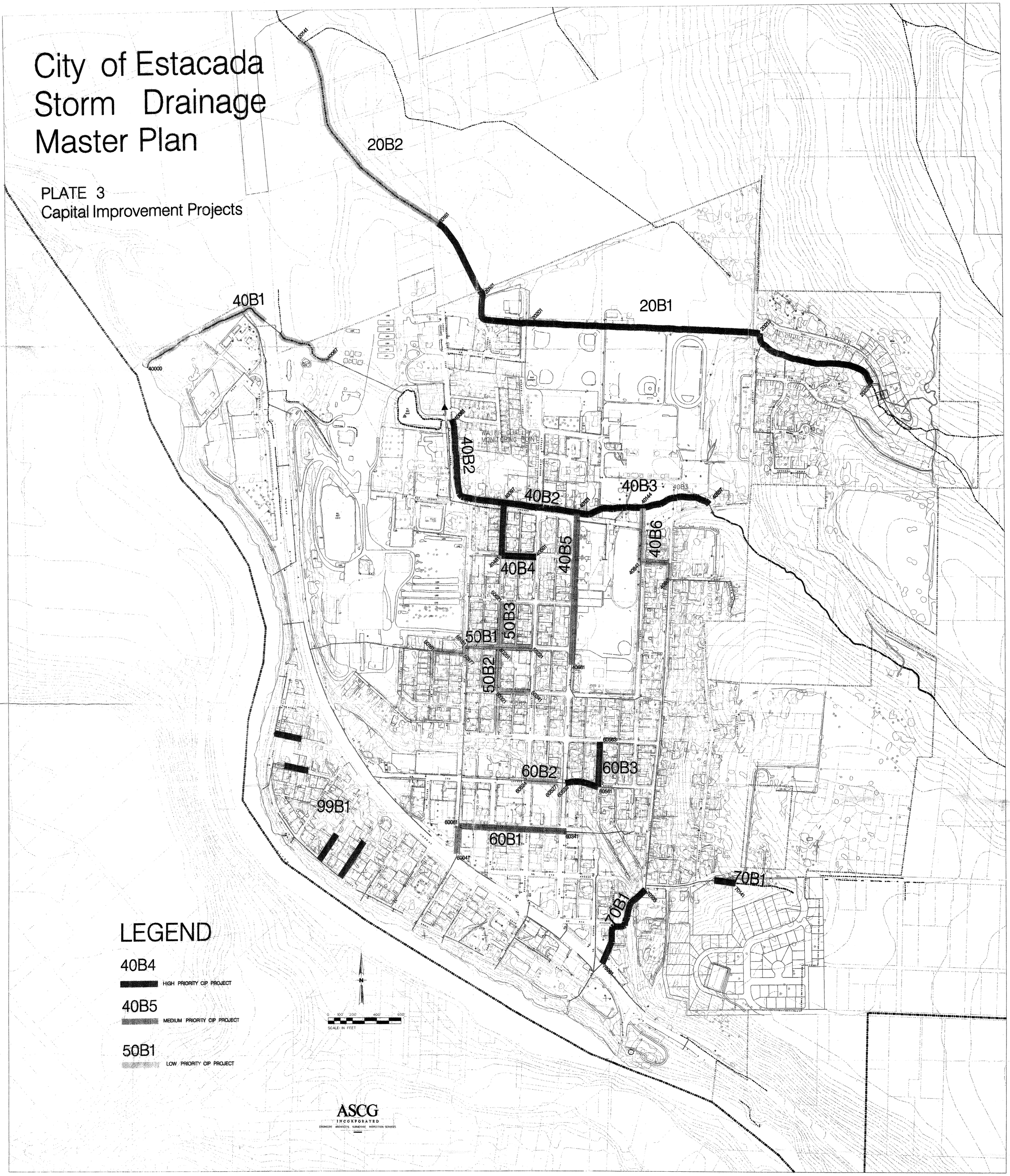

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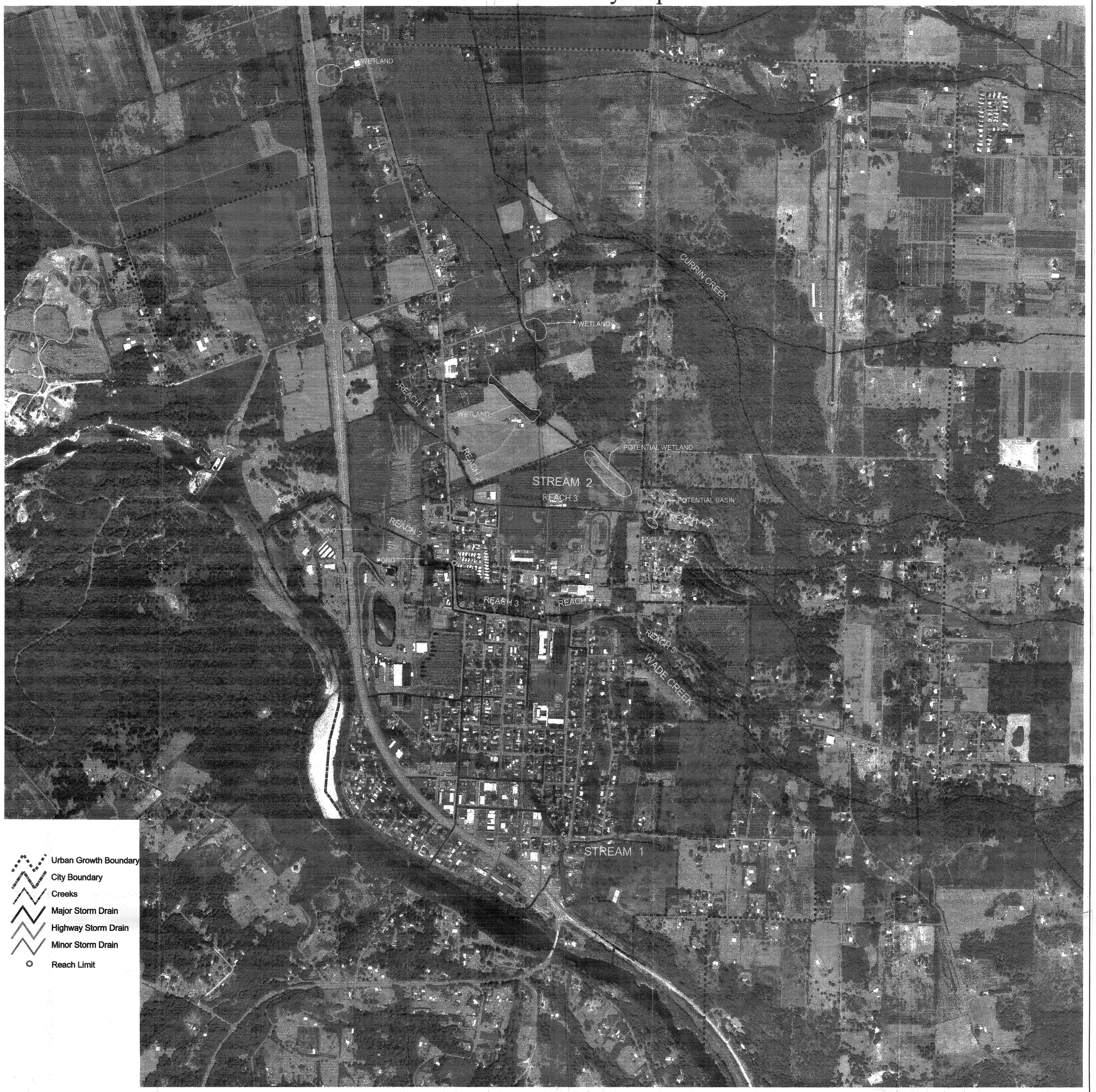
Plate 4

Environmental Survey Map



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N

450 0 450 900 Feet

Project Number: 3017
Plot Date: September 5, 1997

Plate 4