City of McCleary Staff Report for Port Blakely Annexation 2021-01

Proposal: The proposed application is for annexation of 42.65 acres by 60 percent petition. The annexation area would be zoned as Single-Family Residential (R-1) per McCleary Municipal Code 17.16.070, provided on page 8 of this report .

Location: The 42.65-acre annexation area consists of a triangular shape parcel. The western boarder is the Summit Place 2 Plat and the eastern border is Puget Sound and Pacific Railroad and SR 108.

Property Identification Number: A portion of Parcel 180501110000.

Legal Description: THE NORTH HALF OF THE SOUTHWEST QUARTER LYING WESTERLY OF STATE HIGHWAY 108 IN SECTION 1, TOWNSHIP 18 NORTH, RANGE 5 WEST OF THE WILLAMETTE MERIDIAN; EXCEPT THAT PORTION CONVEYED TO PUGET SOUND AND GRAYS HARBOR RAILROAD AND TRANSPORTATION COMPANY BY RIGHT-OF-WAY DEED RECORDED OCTOBER 14, 1890, IN VOLUME 22, PAGE 496, RECORDS OF GRAYS HARBOR COUNTY;SITUATE IN THE COUNTY OF GRAYS HARBOR, STATE OF WASHINGTON.

Applicable Standards: RCW 35A.14, McCleary Municipal Code (MMC) Title 17.

SEPA: Annexations are not subject to review under the Washington State Environmental Policy Act (SEPA).

Hearing: The McCleary City Council will conduct a public hearing on Wednesday, August 11th, 2021, beginning at 6:30 PM. The meeting will be conducted in person and virtually using the City's WebEx platform. A public hearing notice issued separately provides meeting connection information.

Exhibits

Exhibit A: Application Materials including GHC letter of Sufficiency

Exhibit B: Public Comments

Exhibit C: Engineering Reports

Exhibit D: Wildcat Creek Aquifer Final Report

Exhibit E: City of McCleary Comprehensive Land Use Plan

Exhibit F: Horsley Witten Report

Exhibit G: Hart Crowser Report

Exhibit H: Wildcat Aquifer Zoning Map, GHC Wetland Map, USFW Nation Wetlands Inventory

The applicant is proposing to annex approximately 42.65 acres into the city of McCleary. The annexation area does not include any right-of-way. All application materials are provided as Exhibit A and public comments are provided as Exhibit B. No development is proposed at this time.

The applicant previously submitted a 10% Notice of Intent to Annex (#2021-01), which was accepted by the City Council on July 14th, 2021 without modification.

Zoning and Comprehensive Plan Designation:

The property borders city limits to the west and south, which are currently in development as the Summit Place 1 subdivision and Summit Place 2 subdivision (annexed May 14th, 2003, Ord. 702). Land to the north is in Grays Harbor County and is currently zoned Rural Residential (RR) and G5 General. Land to the east is Puget Sound and Pacific Railroad and SR 108. See Figure 1.

All of the property is undeveloped and , See Figure 2.

Figure 1 – Project Location

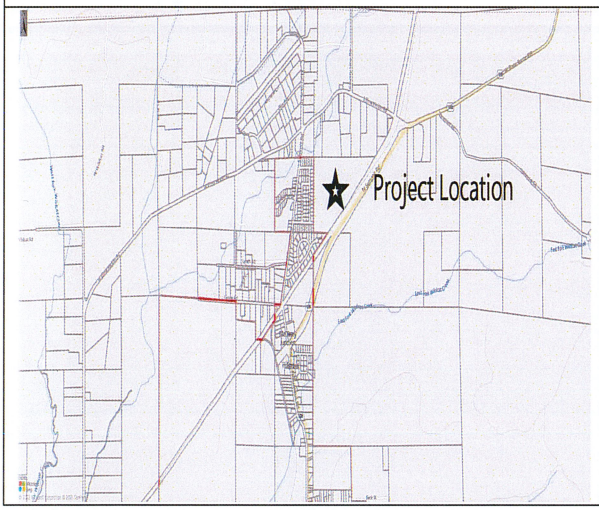
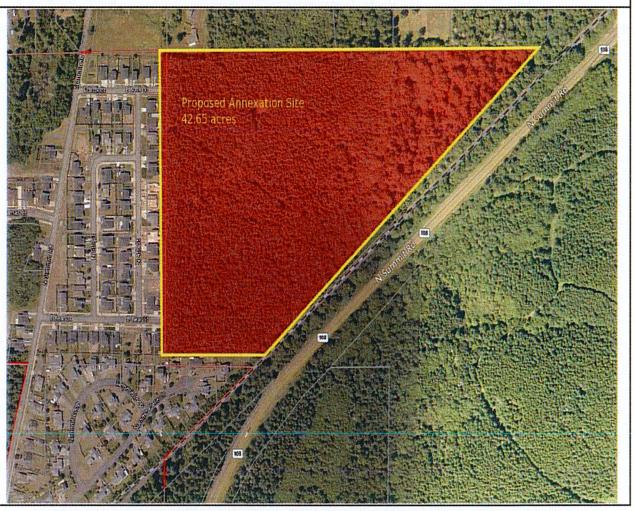


Figure 2- Aerial



Utilities:

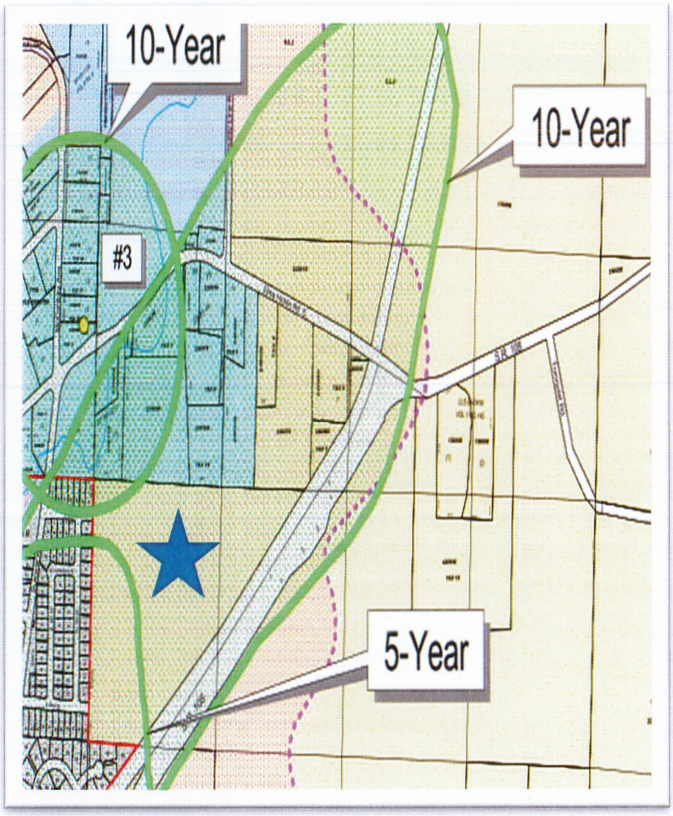
The City of McCleary Comprehensive Land Use Plan recommends requiring annexation as a precondition to extending sewer and water utilities. There is currently water, sewer, and power services available in Summit Place 2 plat that is adjacent to the parcel. Stormwater facilities will be provided by the applicant at the time of subdivision development. The city engineer, Gray and Osborne has a report attached to this document that has more details about the water and sewer utilities. BKI will have a report attached to this report for our power utility.

Critical Areas:

The annexation area does not contain any mapped wetlands or streams. An unnamed, non-fish-bearing intermittent stream (USFW Classification code: R4SBC) is located on the eastern border along the Puget Sound and Pacific rail line, see Figures 3. The one feature for critical areas within the annexation area is the critical aquifer recharge area. The property and general vicinity are located in a Zone 2 (5 year) and Zone 3 (10 year) of the wellhead protection area, see Figure 4.

Figure 3- National Wetland Inventory

Figure 4- Wildcat Creek Aquifer Map



Wildcat Creek Aquifer

Wildcat Creek Aquifer Final Report (Exhibit D)

The Wildcat Creek Aquifer is a naturally occurring, cost-free reservoir that provides clean, safe drinking water to several hundred individual domestic wells, three Group B public water system wells, and three Group A public water system wells, one of which is the City of McCleary's water system. As the only practical, abundant source of water in the vicinity, the Wildcat Creek Aquifer is a significant natural resource supporting the economy, health, and safety of residents of the City of McCleary and the surrounding unincorporated land under Grays Harbor County jurisdiction.

The City's Comprehensive Plan, adopted in 2002, has two objectives that are relevant for managing and protecting the aquifer:

- LU 2.1 Protect critical areas within the city: wetlands; areas with critical recharging effect on aquifers; fish and wildlife conservation areas; frequently flooded areas; and geologically hazardous areas.
- LU 2.3 Manage development so growth does not negatively affect the quality and quantity of groundwater and surface water.

These objectives are followed by Implementation Steps:

- Manage areas with development constraints by:
  - Enforcing the city's critical areas ordinance.
  - Protecting Wildcat Creek as a Critical Area.

- Maintain water quality and quantity by:
  - Keeping the city's wellhead protection program current to protect the public water supply;
  - Developing and enforcing that protect the city's aquifer recharge areas;
  - Requiring new development in all zoning districts to be on the city sewer system to protect ground water quality;
  - Requiring new development to provide adequate stormwater management as specified and adopted by the City;
  - Adopting requirements for minimum removal of vegetative cover for reducing storm water runoff.

With the City's approval of Summit Place 1, Summit Place 2, and the Grange Plats in the City's recharge area not long after the Comprehensive Plan was adopted, the City's emphasis for aquifer management and protection is now focusing on the second set of implementation steps, those for maintaining water quality and quantity. Because the new homes in these developments are served by City water and sewer, the approach now is on maximizing recharge given the additional impervious surfaces and educating residents about proper use of pesticides and fertilizers.

Although the 2002 Comprehensive Plan did not anticipate the new growth along Summit Road, it did project that the City would encompass the developed area along Lynch and Larson Roads, presently zoned R2 - General Residential by Grays Harbor County. Both the Hart Crowser and Horsley Witten reports cite this area as one of concern because of the proximity of private on-site sewage systems to City wells, some of which are within the wells' one-year travel time capture zone.

Land Use Analysis:

City of McCleary Comprehensive Land Use Plan (Exhibit E)

The City of McCleary comprehensive land use plan contains policies related to annexation, and a copy of the plan is provided as Exhibit E.

In general, the policies encourage the City to ensure that development occurs in an orderly fashion and that adequate public facilities can be provided to annexation sites, and to coordinate annexations with other agencies. The annexation area is located adjacent to city limits and development (e.g., the Summit Place 2 and Summit Place 1 subdivisions).

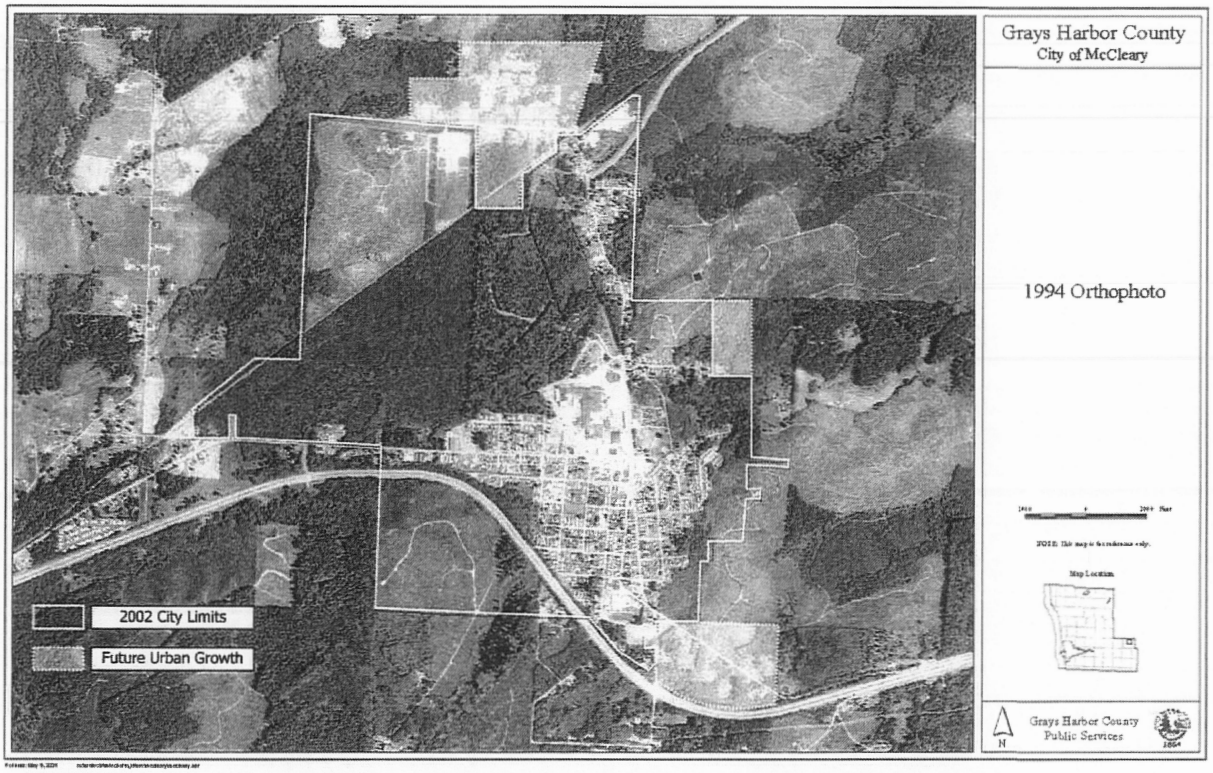
The Comprehensive Land Use Plan states the following:

- Annexation should be consistent with objectives stated in this plan:

► Figure 2 (below) shows those areas that the City will encourage annexation over the next 20 years. The City will consider other annexation requests on a case-by-case basis.

► All utilities for newly annexed areas should meet City standards.

Figure 2: Urban Growth Area



Therefore, the proposed annexation generally complies with the annexation objectives of the City's comprehensive land use plan.

PROCEDURES:

Annexations are subject to legislative review with final approval by the City Council. The applicant submitted an application for annexation by 60 percent petition on May 28th, 2021, and the application was certified as sufficient and was deemed complete on June 14th, 2021. The following schedule is from the Annexation by Washington Cities and Towns, June 2020, provided by MRSC.

THE SIXTY PERCENT PETITION ANNEXATION METHOD

The most frequently used method of annexing unincorporated territory is by petition of the owners of at least 60 percent of the property value in the area, computed according to the assessed valuation of the property for general taxation purposes.

Initiation of the 60 Percent Petition Annexation (RCW 35A.14.120)

Prior to circulating a petition for annexation, the initiating party or parties (the owners of property representing not less than 10 percent of the assessed value of the property for which annexation is

sought) must give written notice to the city council of their intention to commence annexation proceedings.

Meeting with Initiators on the Annexation Proposal (RCW 35A.14.120)

The city council is to set a date (not later than 60 days after the filing of the notice) for a meeting with the initiating parties to determine:

- Whether the city will accept, reject, or geographically modify the proposed annexation;
- Whether it will require the simultaneous adoption of a proposed zoning regulation, if such a proposal has been prepared and filed (as provided for in RCW 35A.14.330 and 35A.14.340); and
- Whether it will require the assumption of all or any portion of existing city indebtedness by the area to be annexed.

If the legislative body requires the adoption of a proposed zoning regulation and/or the assumption of all or any portion of indebtedness as conditions to annexation, it is to record this action in its minutes. Council acceptance of the proposed annexation is a condition precedent to circulation of the petition. There is no appeal from the council decision.

Contents of Petition (RCW 35A.14.120)

If the city council accepts the initial annexation proposal, the petition may be drafted and circulated. The petition must:

- Describe the property according to government legal subdivisions or legal plats.
- Be accompanied by a map that outlines the boundaries of the property sought to be annexed.
- If the council has required the assumption of all or any portion of city indebtedness and/or the adoption of a proposed zoning regulation for the area to be annexed, set forth these facts clearly, together with a quotation of the minute entry of that requirement.

Be signed by the owners of not less than 60 percent of the assessed value of the property for which annexation is petitioned. "Owners" eligible to sign are defined in RCW 35A.01.040(9)(a) through (e). (Although the statute refers to subsections "(a)-(d)", it is assumed that reference was intended to be made to subsections "(a)-(e).")

- Comply with the rules for petitions in RCW 35A.01.040 (RCW 35A.14.130).

Filing of Petition; Determination of Sufficiency

The petition is to be filed with the city council (RCW 35A.14.120). Although there is no time limit specified in the annexation statutes as to when a petition need be filed with the council after it has begun circulating for signatures, the signatures on a petition are valid only if signed no later than six months prior to the filing date. Any signatures older than six months are to be stricken from the petition by the officer certifying petition sufficiency (RCW 35A.01.040(8)).

The petition must be certified as sufficient (i.e., as having valid signatures representing the required 60 percent of property value). Within three working days of the filing of the petition, the officer with whom the petition is filed must transmit the petition to the county assessor, who makes the determination of the sufficiency of the petition. The county officer whose duty it is to determine petition sufficiency must file with the officer receiving the petition for filing a certificate stating the date the determination of

sufficiency was begun. The officer determining petition sufficiency must do so "with reasonable promptness" (RCW 35A.01.040(4)).

Hearing on Petition (RCW 35A.14.130)

When a legally sufficient petition is filed, the city council may consider it and:

- Fix a date for a public hearing, and
- Provide notice specifying the time and place of the hearing and inviting interested persons to appear and voice approval or disapproval of the annexation. The notice is to be:
  - Published in one or more issues of a newspaper of general circulation in the city; and
  - Posted in three public places within the territory proposed for annexation.

There are no statutory requirements concerning the actual hearing, other than to give proponents and opponents an opportunity to speak.

Decision (RCW 35A.14.140)

- **Cities in Counties Having Boundary Review Boards.** Since a code city in a county with a boundary review board may not annex territory without prior board approval (unless the board determines, for certain proposals, that review is not necessary, or the board's jurisdiction is not invoked), an annexation ordinance passed following a hearing but before board review cannot yet be effective. Consequently, cities in counties requiring action by a boundary review board, when they have not previously received review board approval, often first pass a motion or resolution of intent to annex. After review board approval, the formal ordinance is adopted.

- **County Annexation Review Board for Code Cities** (RCW 35A.14.220). The county annexation review board for code cities does not review annexations under the 60 percent petition method.

Effective Date of Annexation (RCW 35A.14.150)

The annexation, together with any provision relating to application of a proposed zoning regulation, is effective on the date fixed in the annexation ordinance. The relevant statute, RCW 35A.14.150, does not specify any date by which the annexation must be made effective. Note, however, that there are important timing issues as to when an annexation occurs with respect to when the city's property tax levy can be effective in the newly annexed area and with respect to receipt of state-shared revenues, sales tax, and, if applicable, sales tax equalization payments (see Financial Impacts).

McCleary Municipal Code Title 17- Zoning

17.08.010 - General purpose.

The provisions of this chapter are the minimum requirements adopted to promote the health, safety, and general welfare of the city of McCleary. Such requirements are necessary to achieve the following specific purposes:

A. Encourage land use decision-making in accordance with the public interest, protection of private property rights, and the public good, and applicable laws of the state of Washington;
B. Protect the general public health, safety, and welfare and encourage orderly economic development;

C. Implement the city of McCleary comprehensive land use plan goals and policies through land-use and other regulations;
D. Provide for the economic, social, and aesthetic advantages of orderly development through harmonious groupings of compatible and complementary land uses and the application of appropriate development standards;
E. Provide for adequate public facilities and services in conjunction with development; and
F. Promote general public safety by regulating development of lands containing physical hazards and to minimize the adverse environmental impacts of development.

17.16.040 - Purposes of zoning districts.

A. The single-family residential (R-1) district provides for uses, structures, and activities compatible with neighborhoods consisting predominately of single-family dwelling units and designated manufactured homes.

17.16.070 - Annexed property.

A. Unless a different zoning classification is established pursuant to the provisions of subsection B of this section, all newly annexed territories shall assume the zoning district designation as shown in the future land use map of the comprehensive land use plan, or if not designated on that map, the R-1 district.

B. If the either the applicant for annexation or the city council proposes that the zoning after annexation is to be other than the classification which would be established by subsection A of this section, the public notice for the hearing on annexation shall include the requested or suggested zoning district. In the event that the council proposes a classification pursuant to this section, it shall notify the applicant in writing of that proposed classification. In that event, the applicant shall have until the commencement of the public hearing on the petition to withdraw the petition.

C. In the event that the alternative processes authorized by subsection B of this section are utilized, the zoning district specified in the annexation ordinance shall be the zoning classification of the property. That classification may be the specific zone indicated in the public notice or the presumptive zoning classification set out in subsection A of this section.

Chapter 17.24 - DENSITY AND DIMENSIONAL REQUIREMENTS

17.24.010 - Purpose.

The purpose of this chapter is to establish requirements for development relative to residential density and basic dimensional standards, as well as specific rules for general application. The standards and rules are established to provide flexibility in project design and maintain privacy between adjacent uses.

17.24.020 - Interpretation of tables.

A. Section 17.24.030 contains the maximum density and minimum dimension standards for zoning districts.
B. The table is arranged as a matrix format showing the required standard by zoning districts. Development standards are listed down the left side of the table and the zones are delineated across the top. The matrix cells contain the maximum density or minimum dimensional requirements for each zoning district. A blank box indicates that there are no specific

requirements. The presence of a letter accompanying a number means there are special development limitations or conditions. The development limitation with the corresponding letter immediately follows the table.

17.24.030 - Table of density and dimensional requirements.

Requirement	R-1
Maximum Net Density (Dwelling Units Per Acre)	
1. Single-family dwelling	6
2. Manufactured homes	
3. Designated manufactured homes	6
4. Multi-family dwellings	
Minimum lot area in square feet	7,200
Minimum lot width in feet	60
Minimum yard requirements in feet:	
1. Front yard	20
2. Rear yard	10
3. Side yard	5
4. Side yard abutting a street	15
Maximum building height in feet	35

PUBLIC COMMENTS

Prior to the public hearing, scheduled on August 11th, 2021, at 6:30 PM, City staff will be receiving both written and email public comments on the Notice of Application for the proposed annexation (Exhibit B). The written and email public comments will be included and made available to Council at the public hearing. Public comments will also be heard in person at the scheduled public hearing.

CONCLUSIONS

The review authority finds the applicant has sustained the burden of proving the application complies with the applicable provisions of the McCleary Municipal Code (MMC) and RCW 35A.14. Therefore, the subject application is recommended to be **APPROVED, SUBJECT TO THE FOLLOWING CONDITIONS.**

Land Use Conditions

1. Upon annexation, the annexation area shall be zoned R-1, in accordance with MMC 17.16.070(A).
2. Unless an agreement is made prior with the land owner, once annexed, the property shall be assessed and taxed by the City in the same manner as other similarly situated and zoned property within the city as of the effective date of the annexation ordinance.

Public Works and Engineering Conditions

There are no conditions of approval for Public Works and Engineering at this time. Conditions of approval related to access and utilities will be evaluated in the future when development is proposed.

Police, Fire and Rescue Conditions

There are no conditions of approval for police, fire, and rescue at this time, as development is not proposed. Conditions of approval for police, fire, and rescue, including emergency access, will be identified in the future when development is proposed.

RECOMMENDATION/MOTION

Staff recommends that the City Council approve the Port Blakely Annexation 2021-01 Annexation.

APPEALS

Annexation decisions of the legislative body are not subject to appeal (RCW 35A.14.130) The public record for this file is available at the McCleary City Hall, located at 100 S. 3rd Street, McCleary, WA 98557, between the hours of 8:00 a.m. and 4:00p.m., Monday through Friday.

HATTON GODAT PANTIER

3910 Martin Way E, Suite B
Olympia, WA 98506
Phone 360.943.1599
Fax 360.357.6299
hattonpantier.com

TRANSMITTAL LETTER

TO:	Josh Cooper	**DATE:**	May 28, 2021
BUSINESS/AGENCY:	City of McCleary	**PROJECT NAME:**	McCleary-Port Blakely Subdivision
ADDRESS:	100 South 3rd Street	**AGENCY#:**	
CITY, ST ZIP:	McCleary, WA 98557	**HGP PROJECT#:**	21-028

WE ARE SENDING YOU: ☒ Prints ☐ Mylars ☐ Specifications ☒ Other

COPIES	DATE	DESCRIPTION
1	5/25/2021	**HGP Check for $416.00**
1	5/27/2021	**Notice of Intention to Commence Annexation Proceedings**
1	5/25/2021	**Legal Description prepared for Brogan Companies**
1	5/25/2021	**11X17 Annexation Exhibit Map**

ITEMS TRANSMITTED FOR: ☐ As Requested ☒ Your Use & Information ☒ Approval ☐ Signature ☒ Review & Comment ☐

REMARKS:

Please process the enclosed Annexation Request submittal. If you have any questions, please contact Chris Carlson at (360) 943-1599 or via email to chrisc@hattonpantier.com.

Thank you

FROM: Michelle Brown
Michelle Brown for Chris Carlson, PM

CC: Correspondence File 21-028
Brogan Companies

☒ Regular Mail mlb
☐ Overnight
☐ Courier
☐ HGP Delivery via
☐ Client pickup

NOTICE OF INTENTION TO COMMENCE ANNEXATION PROCEEDINGS

TO THE CITY COUNCIL OF THE CITY OF McCLEARY

100 South 3rd Street., McCleary, WA 98557:

*Requires **10%** participation based on assessed value of all properties within proposed annexation area.*

We, the undersigned, being owners of not less than ten percent in value of the real property herein described for which annexation is sought, hereby advise the City Council of the City of McCleary that it is our desire to commence annexation proceedings.

The property herein referred to is described on Exhibit "A" attached hereto and is depicted on Exhibit "B" further attached hereto.

It is requested that the City Council of the City of McCleary set a date not later than sixty (60) days after the filing of this request for a meeting with the undersigned to determine:

1. Whether the City Council will accept, reject, or geographically modify the proposed annexation; and,

2. Whether the City Council will require the simultaneous adoption of a proposed zoning regulation, if such a proposal has been prepared and filed for the area to be annexed as provided for in RCW 35A.14.330 and 35A.14.340; and,

3. Whether the City Council will require the assumption of existing City indebtedness by the area to be annexed.

Said property is now in Grays Harbor County. We wish to have this property annexed into the City of McCleary and are willing to assume our fair share of the City's indebtedness and are willing to accept the City's Comprehensive Plan.

(Names of petitioners should be in identical form as the same appear of record in the chain of title to the real estate.)

DocuSigned by:
Mike Warjone
7F38A353D3704E2...
OWNER'S SIGNATURE
Port Blakely Tree Farms (Limited Partnership), a
Washington limited partnership
By The Port Blakely Company, its General Partner
Mike Warjone, President, Forestry Division
PRINTED NAME

Land only knowns as SUMMIT 40, Montesano WA 98563
SITE ADDRESS

5/27/2021
DATE

Assessor's Parcel#: 180501110000

Approximate # of acres: 40

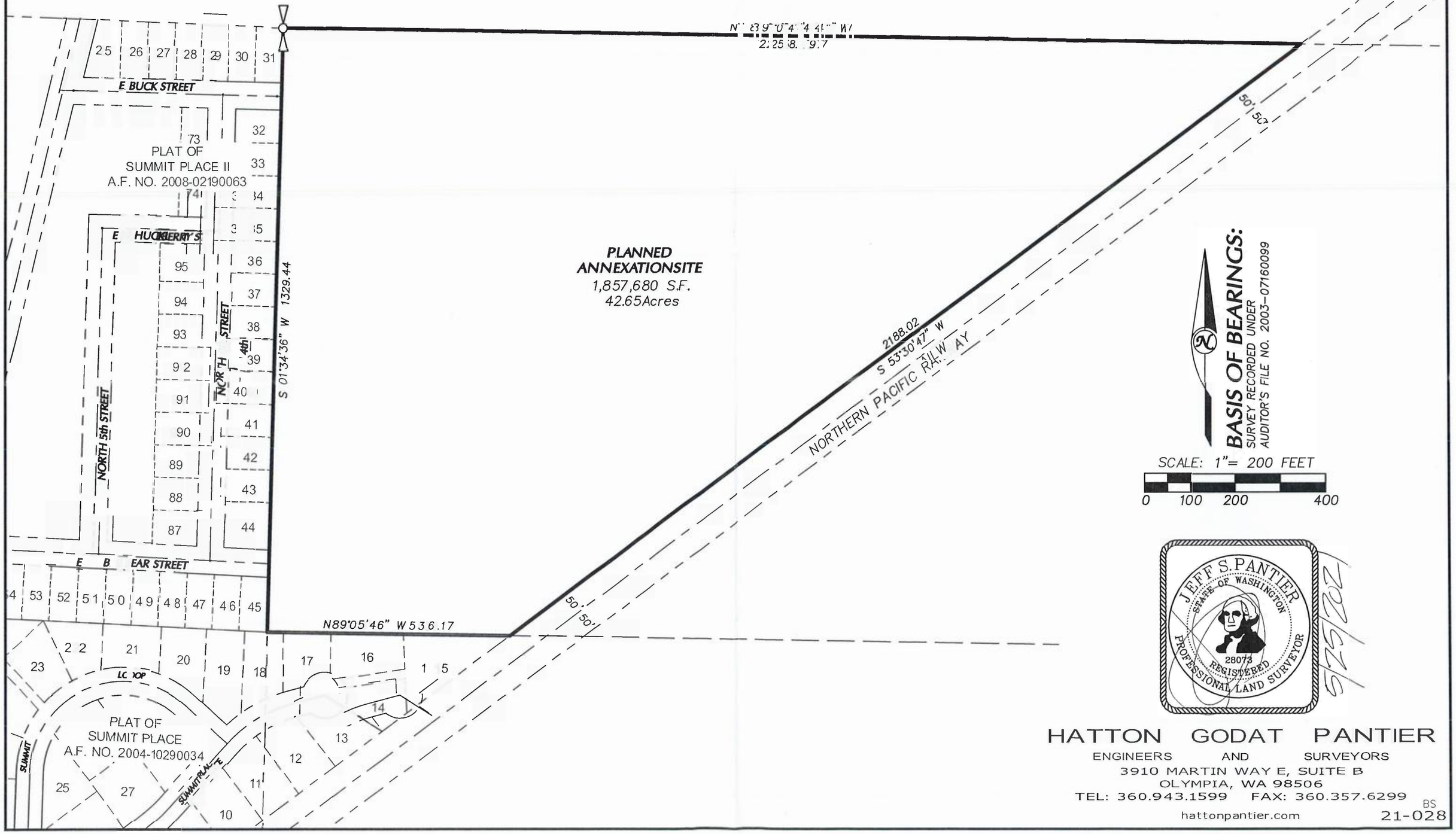
DESCRIPTION PREPARED
FOR BROGAN COMPANIES
(ANNEXATION CITY OF MCCLEARY)
HGP #21-028

THE NORTH HALF OF THE SOUTHWEST QUARTER LYING WESTERLY OF STATE HIGHWAY108 IN SECTION 1, TOWNSHIP 18 NORTH, RANGE 5 WEST OF THE WILLAMETTE MERIDIAN; EXCEPT THAT PORTION CONVEYED TO PUGET SOUND AND GRAYS HARBOR RAILROAD AND TRANSPORTATION COMPANY BY RIGHT-OF-WAY DEED RECORDED OCTOBER 14, 1890 IN VOLUME 22, PAGE 496, RECORDS OF GRAYS HARBOR COUNTY; SITUATE IN THE COUNTY OF GRAYS HARBOR, STATE OF WASHINGTON.

5/25/2021

ANNEXATION EXHIBIT

A PORTION OF THE NORTHEAST AND NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 1, TOWNSHIP 18 NORTH, RANGE 5 WEST, W.M.
GRAYS HARBOR COUNTY, WASHINGTON



BASIS OF BEARINGS:
SURVEY RECORDED UNDER
AUDITOR'S FILE NO. 2003-07160099

SCALE: 1"= 200 FEET

0 100 200 400

JEFF S. PANTIER
STATE OF WASHINGTON
28073
REGISTERED
PROFESSIONAL LAND SURVEYOR

12/15/21

HATTON GODAT PANTIER
ENGINEERS AND SURVEYORS
3910 MARTIN WAY E, SUITE B
OLYMPIA, WA 98506
TEL: 360.943.1599 FAX: 360.357.6299
hattonpantier.com

BS
21-028

OFFICE OF ASSESSOR

100 West Broadway, Suite 21
Montesano, Washington 98563

DAN LINDGREN
ASSESSOR
Phone(360)249-4121
www.co.grays-harbor.wa.us

1854

GRAYS HARBOR COUNTY

STATE OF WASHINGTON

I affirm that I ran the legal description and the signatures of the owner of the area to annex by the City of McCleary. This includes the below parcel and legal description located in Section 1, Township 18 North, Range 5 West, w.m.

Parcel#
180501110000

Legal Description
The North Half of the Southwest Quarter Lying Westerly of the State Highway 108 in section 1, Township 18 North Range 5 West of the Willamette Meridian

The ownership on this parcel is Port Blakely Tree Farms. The signatures on the annexation petition represent at least 60% of the area of land included in the annexation petition as required by RCW 52.04.031.

6-9-21

Dan Lindgren
Grays Harbor County Assessor's Office
Assessor
(360) 249-4121

McCleary Annexation 2021—01 – Comments for public hearing

-These comments are intended to help the City of McCleary understand the recently approved Streamflow Restoration plan in the context of the city's future water use

-Chehalis Basin Partnership is a coalition of interests in water in the Chehalis River Basin. City of McCleary is a member who participated in this process

-Our work between 2018 and 2020 was to come up with and then adopt a Streamflow Restoration Plan in accordance with RCW 90.94

-The Plan identifies ways to offset the impacts to streams from drilling "permit exempt wells," which are rural residential wells that are hydrologically connected to adjacent streams.

-While the new annexation and potential subdivision may connect into City water, assuming both sources tap into the same aquifer, it will still have an impact on the aquifer and connected systems

-Wildcat Creek and the Cloquallum system:

> -Low flows in the summer are already a problem for fish – Our salmon restoration and preservation plan (2011) identified low flow as one of the top concerns limiting fish productivity
>
> -Groundwater aquifers and streams are connected. More groundwater pumping contributes to lower amounts of water in streams for fish

-The City of McCleary identified some project ideas for "offset" projects. There may be extra incentive to implement these given the expected impact on this aquifer if the annexation goes through – whether by "exempt" wells or city water.

-Some relevant projects include a proposed channel remeander in a near-by area, and stormwater management to increase groundwater infiltration/recharge.

-Additional water conservation measures possible for this area are "low impact development," Stormwater infiltration and xeriscaped landscaping.

-A statewide funding source through Ecology's Streamflow Restoration program would provide the City or other interested sponsor with funding to plan for these projects.

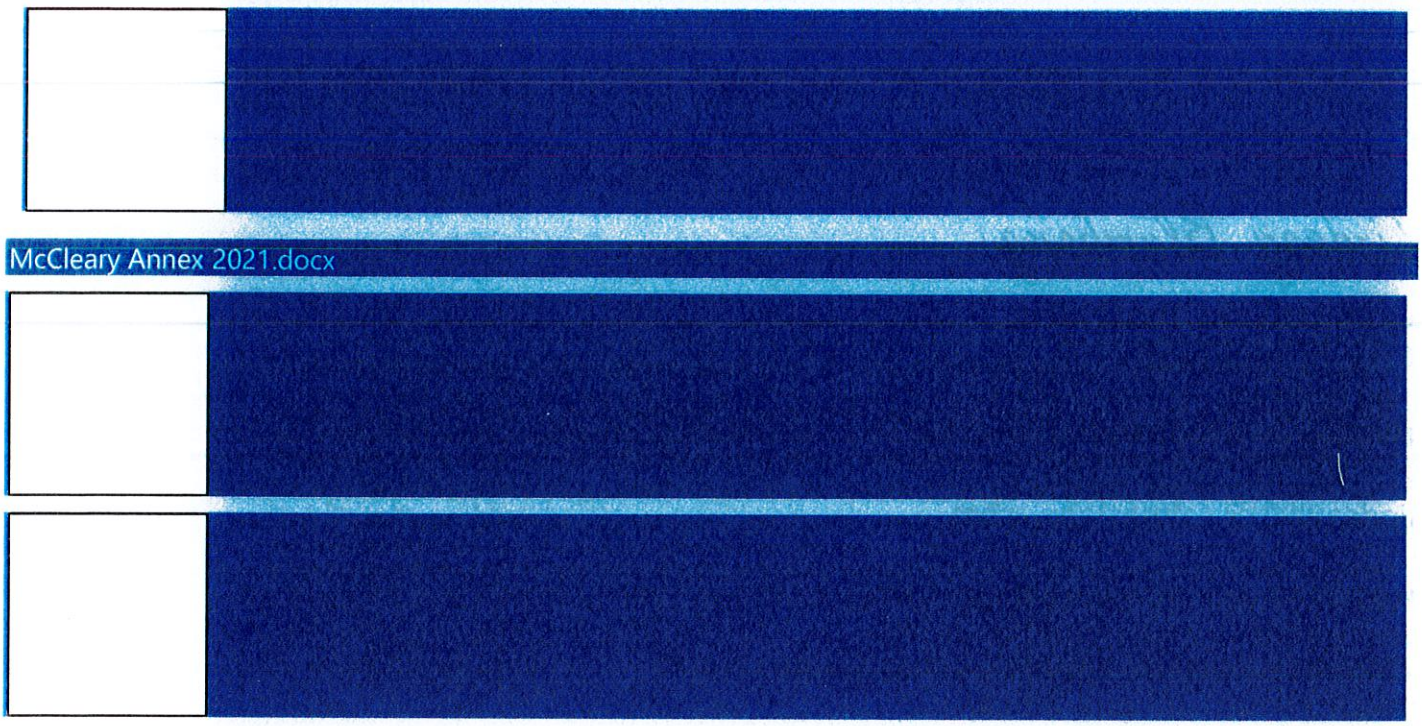
-In summary, development, water use, and streamflow in adjacent streams are connected. This area is growing. Now is a good time to proactively think about how to recharge the aquifer and protect the ecological and community values of local streams.

Kirsten Harma

Watershed Coordinator

Chehalis Basin Partnership & Chehalis Basin Lead Entity

From: Melissa Pascal <teeliner1990@icloud.com>
Sent: Wednesday, August 11, 2021 11:04 AM
To: Josh Cooper <joshc@cityofmccleary.com>
Subject: Fwd: McCleary Annex 2021.docx



8/11/2021

Annex Meeting of the tree farm

Dear Honorable City Council & the City of McCleary,

5 months ago, my family purchased the property at 1554 N. 4th Street, McCleary WA. We chose this property because of the community in McCleary and the peaceful location with the understanding that the tree farm would not be annexed behind our home. We have enjoyed all the wildlife that visit our backyard such as birds, chipmucks, rabbits, coyotes, frogs and raccoons that we have seen so far. We respect the nature and appreciate the serenity that is behind our home.

We saved and planned for 3 years to be able to afford to move to McCleary and to be in this neighborhood area. We have worked very hard to become homeowners and our family was blessed that our current home was available. We love our neighborhood and our neighbors. We are proud to say that we live in the community of McCleary.

My family and our neighbor that border the current annex proposal were stunned and upset that this would even be a thought to do such a large development. Our roads in our small community will not sustain the traffic that this proposal is trying to pass by you, our City Council. The

construction companies traffic alone will tear up our road, bring loud and disturbing noise to our quiet community and much more. After our home was built, the garbage and drug paraphernalia alone were disturbing and unsettling. These contracting companies do not care how they leave the land. If we were not checking on the progress of our property the garbage would have been much larger such as poured piles of cement that they tried to cover with soil, marijuana joint containers, tin cans, plastic bottles to name a few. There seems to be no one held responsible for who is allowed to build and making sure that your community members are not taken advantage of. Our home and the next-door neighbor are still in a fight for the work that was done, we are losing our front porch because of the poor workmanship with the cement, the back steps are doing the same. If you allow these companies to come in and sell homes, there should be a partial responsibility set upon your shoulders that you allowed these companies to come into our community to take advantage the working-class families that can afford these homes. Will you take on this responsibility if you move this annex forward. Will you protect the community and let us not forget the environment that we come to love? Will we be able to come to you to uphold the common decency and respect of our neighborhood when you allow these companies to come into our community?

Here are our concerns:

- 1. How will you upgrade the road system out in our community if you are allowing this annex to go through?
- 2. How will you upgrade the infrastructure for possibly 500 more people int his tiny community?
- 3. How will you upgrade and expand the schools?
- 4. How will you expand the police and fire department for 500+ more citizens?
- 5. How will you upgrade the utility department?

- 6. How will you reroute the entrance to this new annexed area so that it is not just through our little community?
- 7. How will you bring in more services to McCleary for this housing boom that you are proposing?
- 8. Will this annex stay residential or you going to allow for commercial building?
- 9. How will you protect the wildlife that is living in this proposed annexed area?

Here are our proposals:

- 1. Greenbelts separating the current citizens from the proposed annex.
    - a. Greenbelts held (plot size) in protection for 10+ years then revisit this.
    - b. If you are not allowing for greenbelts, then allowing the homeowners to buy a plot or partial plot that is connected to their property at a fare and market price before allowing it to be sold to contractors.

- 2. Park/s must be part of the planning for this area.
- 3. Rerouting all in and out traffic & construction of this community to come from E Elma Hicklin Road and N Summit Road/hwy 108.
- 4. Due to more traffic true stop lights in all major crossing with crosswalks for the safety of all communities, round abouts.
- 5. ADA Sidewalks installed on all streets (neighborhoods & in the city of McCleary) for the safety of our communities.

Thank you for considering our proposals and your diligence in keeping our community special and safe for your citizens and children.

Melissa Pascal & Brad Beadle

1554 N. 4th Street, McCleary WA 98557

cc. All Neighbors effected by this proposal

Begin forwarded message:

From: Melissa Pascal <teeliner1990@icloud.com>
Date: August 11, 2021 at 11:00:04 AM PDT
To: Melissa Pascal <teeliner1990@icloud.com>
Subject: McCleary Annex 2021.docx

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Lindsay Blumberg

From: Josh Cooper
Sent: Wednesday, August 11, 2021 4:18 PM
To: Lindsay Blumberg
Subject: Fw: Comments re Port Blakely Annexation August 11 2021

From: Marina K <makai32@outlook.com>
Sent: Wednesday, August 11, 2021 4:12 PM
To: Josh Cooper <joshc@cityofmccleary.com>
Subject: Comments re Port Blakely Annexation August 11 2021

Hi Josh.

Just in case technical difficulties prevent me from speaking at tonight's hearing....Thanks much, Marina Kuran on the Elma Hicklin Rd

Warmly,
Marina

I have no problem with the City annexing the proposed parcel ...or the one behind the park. My concern is how all this development will be handled. We're talking 126 homes with this proposal and another 160-206 behind the park. That's about 300 or more homes. Is it sustainable? Will the developer do it responsibly? How will this be determined? For example, who does Kevin Trewhella consult with regarding best practices for the aquifer and how often? Any local hydrogeologists? Many new homes are popping up not just within the City but just outside of it. Development, water use and streamflow are interconnected. We need to proactively plan for the future...how we're going to protect the aquifer and other natural resources, including our streams and the fish that live in them. It's a package deal that ensures the overall quality of life for all. I assume that's why most of us are here...we prefer the rural life to the city life. I for one don't want to see this area become another Olympia. We also need to think about the impact of all this growth on the infrastructure. For example, for every 300 new homes, we're looking at least 600-800 more vehicles.

For those of us who live in the Cloquallum basin, The Wildcat Creek Aquifer is our only source of water. We don't have multiple sources like Olympia. Our aquifer is also a contained one which means it's a lot more vulnerable to contamination. Whatever contaminants get on the ground eventually get into the aquifer. Then there's supply. The aquifer can't recharge if we keep paving over it..especially the critical recharge areas. This is even more urgent in the summer months when the water table plummets yet the demand for water goes way up. Lawns for example suck up a lot of water. If we're not careful, we end up with a net deficit, especially considering how much longer, drier and hotter our summers are getting. It also puts a huge stress on fish. More demand on the ground water means less water in the streams means trouble for fish. My husband and I walk beside the Chehalis River in Elma at least twice a week and the level now compared with just 3 or so months ago is beyond scary....I'm

talking about a 10' or so drop. According to the Chehalis Watershed Mgmt Plan updated just last February, our area is projected to have the most development in the entire county in the next 20 years. Yet we currently have no projects planned to offset our water consumption.

Bottom line is that even though this is a City of McCleary hearing, the Aquifer doesn't give a fig whether you live within the City's boundaries or just outside of it on the Prairie. What each of us does or doesn't do affects everyone else. Yet when it comes to protecting this precious resource, the City of McCleary and Grays Harbor County haven't been on the same page. There needs to be collaboration starting now so the future will be sustainable not just for us but for the ecosystem that sustains us. If we don't act responsibly now, we may end up with devastating, irreversible and pricey consequences down the road. We can start by moving forward with low impact development practices such as stormwater infiltration and storm ponds, ensuring that new homes are built with low water landscaping, allowing existing lawns to brown out in the summer months, and in general conserving water and being mindful of what chemicals we use in our homes and yards. It also includes designating good size protected areas. Funding for water offset projects is still available through the Dept of Ecology's Streamflow Restoration program.

Todd Baun

From: Christine Belcher <cbelcher84@comcast.net>
Sent: Wednesday, August 11, 2021 5:42 PM
To: Todd Baun
Subject: Public Comment For Annexation Hrg 8/11

I am hereby submitting my comment against the proposed Port Blakely annexation set for hearing today. I live near the property in question. The annexation would be totally inappropriate. We have a sole source aquifer that supplies everyone in mccleary and surrounding properties. This aquifer was determined to be at risk in several ways by the Hart Croser and Author reports. Neither the city nor the county has taken any steps toward protection of our water as evidenced by the failure to follow through on the recommendations of those reports. We need testing done on our water sources to see if they are reducing. We can't keep allowing irresponsible development or we're all going to end up with worthless properties that have no water.

The proposal is for 6 houses per acre. Allowing that level of development is not only irresponsible but completely negligent since no testing has been done on the effects of all the new developments that have already been put in. If the city approves this, all they are doing is showing they dont care about our water supply. We have to stop new developments like this until the city can prove our water isn't already at risk. For all we know we might already not have enough water to go around. All recommendations of prior water studies should be completed and testing maintained before something like this is allowed. We should not be developing at the detriment of people who live here. If our water isn't protected, our town and the land around will be worth nothing. Just ask Flint Michigan.

We should not allow this annexation.

Christine Townsend

Gray & Osborne, Inc.
CONSULTING ENGINEERS

August 10, 2021

Mr. Todd Baun
Director of Public Works
City of McCleary
100 South 3rd Street
P.O. Box 777
McCleary, Washington 98557

SUBJECT: REVIEW OF PORT BLAKELY ANNEXATION
CITY OF MCCLEARY, GRAYS HARBOR COUNTY, WASHINGTON
G&O #21249.00

Dear Mr. Baun:

We have reviewed the Port Blakely Annexation information provided by your email dated July 15, 2021 and provide the following information regarding the determination of direct impact as outlined in MMC Section 3.36.020 below.

A. Before any development is given the required approval or is permitted to proceed, the official, board or body charged with deciding whether such approval should be given shall determine all impacts, if any, that are a direct consequence of the proposed development and which require mitigation, considering, but not limited to, the following factors:

1. Predevelopment versus post development demands upon city streets, sewers, water supplies, drainage facilities, parks, playgrounds, recreational facilities, schools, police services, fire services, and other municipal facilities or services;

Post development demands from The Port Blakely Annexation are not anticipated to negatively impact the City's current street, water, or wastewater capacities.

2. Likelihood that a direct impact of a proposed development would require mitigation due to the cumulative effect of such impact when aggregated with the similar impacts of future development in the immediate vicinity of the proposed development;

2102 Carriage Drive SW, Building I Olympia, Washington 98502 (360) 292-7481 Fax (360) 292-7517

Significant sized future developments will require the evaluation of sewer pipe capacity along Summit Road.

3. Size, number, condition and proximity of existing facilities to be affected by the proposed development;

   None anticipated.

4. Nature and quantity of capital improvements reasonably necessary to mitigate specific direct impacts identified as a consequence of the proposed development;

   No direct impacts to existing facilities are anticipated.

5. Likelihood that the users of the proposed development will benefit from any mitigating capital improvements;

   Not applicable.

6. Any significant adverse environmental impacts of the proposed development;

   None anticipated. Serving this property with stormwater facilities and City wastewater collection and treatment facilities will reduce the potential of impacting the water quality of the Wildcat Creek Aquifer.

7. Consistency with each of the city's comprehensive plans and subparts;

   This annexation will require a change to the City's water and wastewater service area boundaries.

8. Likelihood of city growth by annexation into areas immediately adjacent to the proposed development;

   There is undeveloped land adjacent to this property that may desire annexation into the City at some future date.

9. Appropriateness of financing necessary capital improvements by means of local improvement districts;

   Not applicable.

10. Whether the designated capital improvement furthers the public health, safety or general welfare;

As stated in item 6 above, serving this property with stormwater facilities and City wastewater collection and treatment facilities will reduce the potential of impacting the water quality of the Wildcat Creek Aquifer.

11. Any other facts deemed by the city to be relevant.

Not at this time. Further evaluation of utility extensions and roadway connections will be performed if/when development proposal documents are submitted to the City for review.

B. The cost of any investigations, analyses or reports necessary shall be borne by the Applicant.

Thank you for the opportunity to provide these comments. Please contact me if you have any questions or comments regarding this matter.

Sincerely,

GRAY & OSBORNE, INC.

Jon Hinton, P.E.

JH/sp

BKI ENGINEERING SERVICES

Power in Partnership

MEMORANDUM

Project No.:	MC21-000
Date:	08/11/2021
To:	Todd Baun
From:	Matthew Springer
Cc:	Eddie Jackson, Guy Colpron
Subject:	City of McCleary Impact Report

City of McCleary has requested BKI Engineering Services to create a system direct impact report for the annexation of a 150-200 home subdivision and the potential development project of the Sunset subdivision. These two projects will be a load addition to the McCleary Substation on the 12-2 North feeder. Using a pre-existing Windmil model of the McCleary system, it indicates that there are existing under-voltage issues in the loads North of and on Elma Hicklin Rd W.

The Port Blakely annexation subdivision load was added to the system. We have estimated that each home would add 1 ampere (A) for the average load and 2A for the peak load to the McCleary system. Using the 1A load per home, the model indicates that there will be an increase in under voltage issues in the Northern load and it will create issues in the Southern load. The new load will cause the power factor to drop below optimal values on the main feeder line. The new subdivision addition will increase the main feeder lines current to be above the recommended 70% current carrying capacity for the existing line sizes. The addition of this annexation will create the need to upgrade the main feeder line and the need to purchase new equipment to correct the power factor on the system.

The Sunset subdivision load was added to the system with the Port Blakely annexation load. With the addition of both loads with the 1A load per home, the model indicates there will be an undervoltage throughout the whole system. The Sunset subdivision addition will overload the main feeder line and increase the current on the line down to the Sunset subdivision to be above the 70% current carrying capacity for that line size. The power factor on the main line and down to the subdivision will decrease below optimal values. The upgrades that will be needed for the addition of both loads will be an increase in the main feeder line size and the lines going to both loads, purchase new capacitor banks to address the power factor and voltage regulators for the undervoltage problems, and possibly an upgrade in the substation main transformer depending on the existing load for all three feeders.

WILDCAT CREEK AQUIFER
HYDROLOGY, REGULATORY ALTERNATIVE, AND RECOMMENDATIONS - FINAL REPORT

Prepared for:

Grays Harbor County
and
The City of McCleary

Prepared by:

Jim Arthur
1825 Lenox Court NW
Olympia, WA 98502
360.357-7044

and

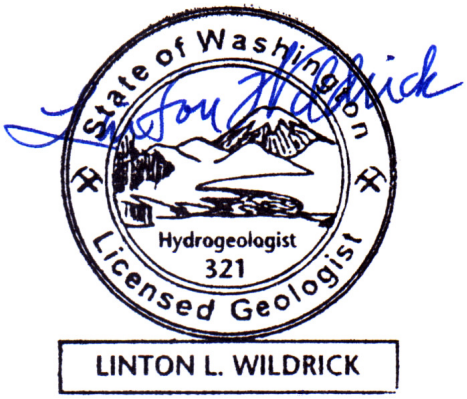
Pacific Groundwater Group
1627 Linwood Ave SW
Tumwater, Washington 98512
360.570.8244
www.pgwg.com

June 13, 2008

SIGNATURE

This report was reviewed by the undersigned and approved for release.

Jim Arthur
Consultant



Linton Wildrick
Associate Hydrogeologist
Pacific Groundwater Group

Contents

Part 1 – Hydrogeology and Existing Development

Introduction

The Wildcat Creek Aquifer is a naturally occurring, cost-free reservoir that provides clean, safe drinking water to several hundred individual domestic wells, three Group B public water system wells, and three Group A public water system wells, one of which is the City of McCleary's water system. As the only practical, abundant source of water in the vicinity, the Wildcat Creek Aquifer is a significant natural resource supporting the economy, health, and safety of residents of the City of McCleary and the surrounding unincorporated land under Grays Harbor County jurisdiction.

Because of uncertainty about how future development could affect this indispensable water supply, on February 12, 2007, the Grays Harbor County Board of County Commissioners declared a moratorium on development of land above the Wildcat Creek Aquifer and extended it twice. The current extension expires on August 12, 2008.

While the moratorium has been in effect, County and City officials have been working together to learn more about the aquifer and how to protect it. In 2007 they were assisted by Dan Cappellini of Evergreen Rural Water, which is headquartered in Shelton, and Scott Horsley and his associates at the Horsley Witten Group, a ground water and planning consulting firm from Massachusetts. The Washington State Department of Health paid for Horsley Witten's assistance through a contract with Evergreen Rural Water.

The County and City hired consultant Jim Arthur from Olympia to coordinate their partnership and to prepare this report. The report describes what is now known about the Wildcat Creek Aquifer and recommends actions for its protection and management. The Washington State Department of Community, Trade, and Economic Development funded the report through an Emerging Issues Grant, with matching funds from the County and City. Linton Wildrick, a licensed hydrogeologist with Pacific Groundwater Group, Tumwater, assisted Mr. Arthur in the preparation of this report.

Hydrogeology of the Wildcat Creek Aquifer

How the Aquifer Was Formed

Wildcat Creek Aquifer is a semi-confined aquifer located within sedimentary deposits that partly fill a northeast-to-southwest oriented valley. The nearby hills are composed of basaltic and sedimentary bedrock. The aquifer material consists mostly of sand and gravel that are fragments of rocks from the southeastern Olympic Mountains and the northern Cascades.

The aquifer-containing sediments were carried to the Wildcat Creek Valley by an advancing glacier of the Double Bluff glaciation period. As the glacier moved toward the valley, streams flowing out of the glacier's melting end deposited these "advance outwash" sediments at least 100,000 years ago. As the glacier then advanced into the valley, it over-rode the advance outwash materials and deposited glacial till beneath the ice. Commonly called hardpan, till is a mixture of clay, silt, and gravel, with some sand. Though saturated with water like the outwash below, till is far less permeable and usually does not yield water readily to wells.

The Double Bluff glacier stopped at the southwestern end of the valley, pushing up a terminal moraine of sand and gravel. That is partly why the three branches of Wildcat Creek converge where they do. More than 100,000 years later, the final Ice Age glaciation, called the Vashon stade of the Frasier glaciation, advanced again toward the southwest. It stopped in the upper reaches of the Skookum Creek watershed and deposited only a thin veneer of advance and recessional outwash over the old till in the Wildcat Creek Valley. Since then, modern streams have eroded channels through the glacial materials and deposited minor pockets of sediments along the channels. So, looking at the valley in cross-section:

- At the bottom is bedrock – basalt to the east and south, sandstone to the west and north.
- Above that is the advance outwash, up to 75 feet thick – the aquifer layer that contains the productive water supplies.
- Above that is the till, an aquitard, which varies from as little as 10 feet to as much as 40 feet.
- Above the till is a thin (5 feet or less) discontinuous veneer of Vashon outwash.
- On top are recent alluvial sediments, deposited by running water along Wildcat Creek and its tributaries during the 13,000 years since the last Ice Age.

Only One Aquifer

Previous reports written about Wildcat Creek Aquifer are correct in assuming the presence of a confining layer in the northeast portion of the aquifer. Pacific Groundwater Group's analysis has concluded that the confining layer is till and that it extends throughout the aquifer. The only significant aquifer resides within advance outwash material beneath the till, not in thin or absent outwash material at the surface or deeper in the main aquifer.

- There is only one aquifer.
- Both shallow domestic wells and slightly deeper City wells are drilled through the overlying till into this aquifer.
- The semi-confining effect of the till accounts for the upward pressure in the City wells.
- While some recharge comes from the surrounding hillsides, most recharge percolates down from precipitation falling directly on the land surface overlying the aquifer. There is little contribution via fractures in basalt.

- Because of its silty or clayey matrix, the till delays the percolation of rainwater down to the aquifer. That delay provides some protection against aquifer contamination but also lowers the recharge rate.

To develop this understanding of the aquifer as a whole, Mr. Wildrick examined all 200-plus well logs for the area. By contrast, Hart Crowser interpreted 67 logs, most of them located in the northeastern part of the valley, the more relevant area to analyze for a study that focused on the City's wellfield. Mr. Wildrick also spoke with Robert L. Logan, the geologist who most recently mapped the local geology for the Department of Natural Resources (Logan, R. L. 1987.)

In analyzing these well logs, what puzzled Mr. Wildrick was that the drillers all noted the presence of yellow clay, gravel, and "hardpan," the driller's term that usually means glacial till. Till is formed by the weight of ice, and the yellowish color, a sign of iron oxide, means that a deposit has weathered for a long time. Mr. Logan explained that the outwash that makes up the aquifer came not from last Ice Age advance, as had been assumed, but from the next-to-last advance. Because it has been more than 100,000 years since the Double Bluff advance deposited the till, ample time has passed for deep weathering to have occurred in the area's wet, maritime climate.

Though precipitation percolates through the till to recharge the aquifer in the advance outwash layer, the till does act as a semi-confining layer. Mr. Wildrick determined that the confined water level (the piezometric head) usually occurs above the top of the confined aquifer and about 5 to 20 feet below land surface, but never above land surface, which would make it artesian. He also noted that a water table occurs within the surficial Vashon outwash or Double Bluff till at a slightly higher level than in the Wildcat aquifer and may reach the surface during winter, forming seasonal wetlands.

The water table and piezometric water levels can be readily explained by the hydrodynamic balance of local recharge from precipitation as it percolates downward through the less permeable till into the much more permeable outwash, where it then flows down the valley or toward the creeks. Additional recharge by surface water from the surrounding hills is not required to explain the head distribution. The computer model used by Hart Crowser confirmed this conceptual interpretation by reproducing the head distribution and flow pattern in the northeastern part of the valley.

Finally, the very thin outwash and uppermost weathered till do not constitute an aquifer; no known wells tap these deposits. A few wells appear to tap thin, discontinuous, permeable lenses of sand and gravel within the till. These lenses could be called aquifers in the strict sense of the scientific term, but are insignificant in volume compared to the Wildcat Creek Aquifer and so do not constitute a second, independent aquifer of importance to our considerations.

Learning More about the Aquifer and Safe Yield

Fieldwork by the Horsley Witten Group in 2007 indicated that groundwater from the Wildcat Creek aquifer is discharging to the branches of Wildcat Creek. Groundwater

discharge to streams, called baseflow, is the natural source of streamflow during the dry months in western Washington. Monitoring streamflow below the confluence of the three branches would make it possible to estimate the average annual recharge of the aquifer. In other words, each year there is an approximate balance between the amount of water that is recharged and the amount that drains away to the streams; otherwise the groundwater level would rise or fall in the long-term.

Streamflow monitoring could be accomplished with a simple staff gauge that would be observed weekly or even monthly, coupled with several flow measurements each year, using a current meter on a wading staff. Monitoring need only be done during the dry season (June through October), since most water in the creeks would then be baseflow from groundwater. Several years of streamflow monitoring would improve the estimate of groundwater recharge, because recharge varies with the weather.

It would also be useful to monitor water elevations in various locations in the aquifer. Monitoring levels in two or three wells would be sufficient. For example, one of the un-pumped City could be monitored along with one or two newer, private wells. One should only monitor wells for which a driller's construction log is available, because the depth and geology must be known for the results to be meaningful. Depth-to-water measurements in wells usually are done with an "electrical tape" (e-tape), consisting of a coaxial cable on a reel, with depth markings on the cable and an indicator needle. Initially monitoring should be done monthly, but once the typical seasonal pattern is known, the monitoring can be cut back to quarterly or half-yearly.

In especially dry years, well owners may be concerned about whether their water supply will be depleted. Historic data on water levels compared to annual rainfall could then help water managers and governments compare current conditions to the past.

Another long-term benefit of combined streamflow and groundwater level monitoring would be improved understanding of the specific dependency of Wildcat Creek on baseflow from the aquifer. Pumping groundwater always reduces baseflow to some extent. The tough questions one must answer to define "safe yield" for an aquifer are how much effect on streamflow and other wells is acceptable to the community and to regulatory agencies. Also, if the City needs additional water rights, the monitoring results would permit more accurate estimates of the effects of new pumping, as is routinely required by Department of Ecology.

Development in the Valley

Unincorporated Area

Approximately 250 parcels in the unincorporated part of the valley have houses on them. Forty-five houses do not have on-site sewage disposal permits but are assumed to have on-site sewage systems. The County issued 171 permits for on-site systems before 1995, and has issued 74 permits since then. The new standards that took effect in 1995 have resulted in the construction of a greater number of pressure distribution systems, and there are now about 50 such systems in the valley. County records show that 13 on-site

systems have been repaired in the valley, a number that may be low since repairs before 1980 may not have been recorded.

There are fewer individual wells than on-site sewage systems because of homes served by the six public water system wells: Two Group B wells (Olin 330 & Sky Acres) and one Group A well (Pit Co 328) in the northeastern portion of the valley; one Group B well (Wintercreek MHP) and one Group A well (Forrestview Senior 55+ community) in the southwestern portion of the valley; and the City of McCleary's water utility, which serves four homes located outside City boundaries on Larson Road.

Approximately two-thirds of the unincorporated area is presently zoned for 5 acre or larger lot sizes. The remaining one-third is R2 – General Residential and RR – Rural Residential.

The minimum lot size in the RR zone is one acre, provided that various conditions are met. As a practical matter, however, County requirements for distances between on-site sewage systems and wells suggest that the actual minimum lot size would be between one and two acres. (The County requires a setback of 100 feet from the edge of an on-site system's soil dispersal component and a set-aside area for a reserve drainfield. Also, wells must be 50 feet from any sewage tank and distribution box, sewer line, and non-perforated distribution pipe.)

In the R2 zone, the minimum lot size is 10,000 square feet for a single family home, or 11,500 square feet for a duplex, provided that (1) the area is within the designated urban service area of a city, town, water, or sewer district or (2) the area is adjacent to a city or developed area and has an adequate public water system and either an adequate public sewer system or is suitable for the long-term use of on-site septic systems at the permitted density.

Under current zoning, the build-out potential above the aquifer and within County jurisdiction is an additional 400 to 500 homes on individual, on-site sewage systems, for a total of approximately 650 to 750 residences.

City of McCleary

Approximately one-third of the aquifer lies within the City of McCleary, including the downtown commercial district and the Simpson mill. The land in the very center of the aquifer is zoned industrial but, except for the 14-acre site of a former pole yard, is undeveloped. Port Blakely operated the pole yard for several years but only to peel poles, which were then shipped to another company for treatment.

In recent years the City has annexed northward along Summit Road and approved subdivisions for the construction of approximately 125 homes, all of which will be located within this report's recommended City wellhead protection area. The 2007 estimated City population is 1,550.

Risks to Wells

On-Site Sewage Disposal

The primary source of potential contamination in the Wildcat Creek Aquifer is on-site sewage systems. In much of the portion of the aquifer under County jurisdiction, the risk to wells is low because of the current low density of development. The more significant risks to manage for are those associated with wells of the group public water systems, including the City of McCleary, and individual wells in the R2 and RR zones that may be located too close to improperly functioning, on-site sewage systems.

Hazardous Chemicals

The Hart Crowser report listed potential contamination sites for hazardous materials upgradient to the City wells. That list was updated in the City of McCleary's *Wellhead Protection Plan* (Cleveland, 1999.)

Monitoring Private Wells

One unknown about the aquifer is the quality of water in the several hundred private wells. The risk presumably would be for wells receiving water from failed on-site sewage systems. A program to check the quality of private well water should test for nitrate, at a minimum. Caffeine and methylene blue substances (used in detergents) also are relatively inexpensive to detect and their presence can indicate an impending problem.

An initial round of tests would establish the background concentration of these substances. There is always some nitrate from natural sources, but caffeine and methylene blue substances should not be detectable. Subsequent testing could then focus on areas downgradient from and close to housing developments having a relatively dense concentration of septic systems. Retesting once every few years likely would be adequate.

Previous reports (Hart Crowser and Horsley Witten) have recommended extending public water and sewer to houses on Lynch and Larson Roads, immediately north of the City wells. Monitoring private wells in this area could reveal whether, in fact, on-site sewage systems there are causing a problem.

Wellhead Protection Areas

The City of McCleary's Time-Related Capture Zone

Hart Crowser conducted a capture zone analysis to determine areas where the McCleary wellfield is most vulnerable to land use impacts. The analysis used a numerical modeling method, with input from the aquifer pumping test that the firm conducted on a City well from July 27 to July 30, 1993. (For more about the Hart Crowser analysis, please see pages 5, 8-10, and Appendices A and B in the Hart Crowser report, 1994.)

Hart Crowser's method and test procedures were state-of-the-art and equivalent to those currently recommended by EPA and the Department of Ecology. As noted in their report, however,

> It is important to recognize that these modeled capture zones are subject to uncertainty…. The uncertainty is unavoidable because it is not possible to have perfect knowledge of the aquifer and its hydraulic properties. [p. 10]

Because of this uncertainty and to provide a margin of safety, Pacific Groundwater Group has recommended that Hart Crowser's original 10-year time-of-travel capture zone be enlarged (see Wildcat Creek Aquifer Map). This enlargement increases the width by about 50 percent to the west; to the east it extends the zone to the railroad and highway to draw attention to the potential for spills from road vehicles or trains.

While this larger capture zone does not cover the entire area from which water may be influencing City wells, the so-called "beneficial recharge area," it is believed to sufficiently encompass the area that could contribute contaminants to the wells for the foreseeable future. The distinction between "capture zone" and "beneficial recharge area" refers to the way that water in an area beyond a capture zone can reduce drawdown around a well without actually getting pumped up a well. Beneficial recharge helps to maintain the groundwater level at a well (by causing less drawdown) even though most if not all of the water in the "beneficial recharge area" never shows up at the well and, in fact, bypasses the well field.

In addition to the added protection of the expanded capture zone, we now recognize that older glacier till covers the entire Wildcat Creek aquifer. This layer provides additional filtration for septic effluent and delays the vertical movement of contaminants down to the aquifer, thereby allowing more time for cleanup of accidental spills.

Wellhead Protection Areas for Other Group Water Systems

At present the wellhead protection areas for other group public water system wells using the Wildcat Creek Aquifer are defined by the simple "fixed-radius" method, which does not incorporate the effect of recharge. Time-related capture zones for these wellhead protection areas could be estimated reliably by EPA's "WhAEM 2000" model (Kraemer and others, 2007), which would use the same hydraulic inputs as Hart Crowser's model but is much simpler to construct and execute.

Part 2 – Regulatory Alternatives

Introduction

Several state and federal statutes address the protection and management of groundwater resources, especially for communities without a practical alternative drinking water source. All such programs require detailed applications, considerable funding, and appear to be more complicated than needed for present management of the Wildcat Creek Aquifer.

Sole Source Aquifer Protection Program

The federal Safe Drinking Water Act authorizes the U. S. Environmental Protection Agency to designate aquifers that are the sole or principal source of drinking water for an area. To meet the criteria for designation, a sole source aquifer must supply at least 50 percent of the drinking water to persons living over the aquifer, and there can be no feasible alternate source of drinking water. Once designated, EPA can review proposed projects that are to receive federal funds and that could contaminate the aquifer. The EPA Sole Source designation is also referred to in several state statures as justification for applying a state program.

Washington State Statutes and Programs

The Water Resources Act of 1971

Chapter 90.54.140 of the Revised Code of Washington singles out sole sources and is referenced in several Department of Ecology groundwater programs:

> The legislature hereby declares that the protection of groundwater aquifers which are the sole drinking water source for a given jurisdiction shall be of the uppermost priority of the state department of ecology, department of social and health services, and all local government agencies with jurisdiction over such areas. In administration of programs related to the disposal of wastes and other practices which may impact such water quality, the department of ecology, department of social and health services, and such affected local agencies shall explore all possible measures for the protection of the aquifer, including any appropriate incentives, penalties, or other measures designed to bring about practices which provide for the least impact on the quality of the groundwater.

Regulation of Public Groundwaters Act, Chapter 90.44 RCW

Excerpts from RCW 90.44.400, Groundwater Management Areas:

> (1) This legislation is enacted for the purpose of identifying groundwater management procedures that are consistent with both local needs and state water resource policies and management objectives; including the protection of water quality, assurance of quantity, and efficient management of water resources to meet future needs. In recognition of existing water rights and the need to manage groundwater aquifers for future use, the department of ecology shall, by rule, establish standards, criteria, and a process for the designation of

specific groundwater areas or sub-areas, or separate depth zones within such area or sub-area, and provide for either the department of ecology, local governments, or groundwater users of the area to initiate development of a groundwater management program for each area or sub-area, consistent with state and local government objectives, policies, and authorities. The department shall develop and adopt these rules by January 1, 1986.□□

(2) The department of ecology, in cooperation with other state agencies, local government, and user groups, shall identify probable groundwater management areas or sub-areas. The department shall also prepare a general schedule for the development of groundwater management programs that recognizes the available local or state agency staff and financial resources to carry out the intent of RCW 90.44.400 through 90.44.420. The department shall also provide the option for locally initiated studies and for local government to assume the lead agency role in developing the groundwater management program and in implementing the provisions of RCW 90.44.400 through 90.44.420. The criteria to guide identification of the groundwater areas or sub-areas shall include but not be limited to, the following:□□

(a) Aquifer systems that are declining due to restricted recharge or over-utilization;□□

(b) Aquifer systems in which over-appropriation may have occurred and adjudication of water rights has not yet been completed;□□

(c) Aquifer systems currently being considered for water supply reservation under chapter 90.54 RCW for future beneficial uses;□□

(d) Aquifers identified as the primary source of supply for public water supply systems;□□

(e) Aquifers designated as a sole source aquifer by the federal environmental protection agency; and□□

(f) Geographical areas where land use may result in contamination or degradation of the groundwater quality.□

(3) In developing the groundwater management programs, priority shall be given to areas or sub-areas where water quality is imminently threatened.

Special Protection Area – Department of Ecology

Excerpt from WAC 173-200-090:

(1) The purpose of a special protection area is to identify and designate ground waters that require special consideration or increased protection because of one or more unique characteristics.

(2) The unique characteristics of a special protection area shall be considered by the department when regulating activities, developing regulations, guidelines, and policies, and when prioritizing department resources for ground water quality protection programs.

(3) The characteristics to guide designation of a special protection area shall include, but not be limited to, the following:

(a) Ground waters that support a beneficial use or an ecological system requiring more stringent criteria than drinking water standards;

(b) Ground waters, including, but not limited to, recharge areas and wellhead protection areas, that are vulnerable to pollution because of hydrogeologic characteristics; and

(c) Sole source aquifer status by federal designation.

(4) Special protection areas may be proposed for designation at any time by the department upon its own initiative or at the request of a federal agency, another state agency, an Indian tribe, or local government.

Statutes for Counties and Cities

Aquifer Protection Areas Act (RCW 36.36.010)

The purpose of this statute is to allow counties to create

…aquifer protection areas to finance the protection, preservation, and rehabilitation of subterranean water…. When a county legislative authority proposes to create an aquifer protection area it shall conduct a public hearing on the proposal…. After the public hearing, the county legislative authority may adopt a resolution causing a ballot proposition to be submitted to the registered voters residing within the proposed aquifer protection area to authorize the creation of the aquifer protection area, if the county legislative authority finds that the creation of the aquifer protection area would be in the public interest…. An aquifer protection area shall be created by ordinances of the county if the voters residing in the proposed aquifer protection area approve the ballot proposition by a simple majority vote. The ballot proposition shall be in substantially the following form:

Aquifer protection areas are authorized to impose fees on the withdrawal of subterranean water and on on-site sewage disposal…to fund:□□

(1) The preparation of a comprehensive plan to protect, preserve, and rehabilitate subterranean water, including groundwater management programs adopted under chapter 90.44 RCW. This plan may be prepared as a portion of a county sewerage and/or water general plan pursuant to RCW 36.94.030;□□

(2) The construction of facilities for:

(a) The removal of water-borne pollution;
(b) water quality improvement;
(c) sanitary sewage collection, disposal, and treatment;
(d) storm water or surface water drainage collection, disposal, and treatment; and
(e) the construction of public water systems;

□□

(3) The proportionate reduction of special assessments imposed by a county, city, town, or special district in the aquifer protection area for any of the facilities described in subsection (2) of this section;

□□

(4) The costs of monitoring and inspecting on-site sewage disposal systems or community sewage disposal systems for compliance with applicable standards and rules, and for enforcing compliance with these applicable standards and rules in aquifer protection areas created after June 9, 1988; and

□□

(5) The costs of:

(a) Monitoring the quality and quantity of subterranean water and analyzing data that is collected;

(b) ongoing implementation of the comprehensive plan developed under subsection (1) of this section;

(c) enforcing compliance with standards and rules relating to the quality and quantity of subterranean waters; and

(d) public education relating to protecting, preserving, and enhancing subterranean waters.

Critical Aquifer Recharge Areas – The Growth Management Act (Chapter 36.70A RCW)

The GMA requires all counties and cities, even those not planning under the Act, to designate and protect critical areas, among which are critical aquifer recharge areas. Critical aquifer recharge areas are defined as "areas with a critical recharging effect on aquifers used for potable water." As examples of critical aquifer recharge areas, the Washington Administrative Code, Chapter 365-190-080, lists:

(i) Sole source aquifer recharge areas designated pursuant to the Federal Safe Drinking Water Act.

(ii) Areas established for special protection pursuant to a ground water management program, chapters 90.44, 90.48, and 90.54 RCW, and chapters 173-100 and 173-200 WAC.

(iii) Areas designated for wellhead protection pursuant to the Federal Safe Drinking Water Act.

(iv) Other areas meeting the definition of "areas with a critical recharging effect on aquifers used for potable water" in these guidelines.

Chapters 36.70 and 35.63 RCW for Non-GMA Counties and Cities

Counties and cities not planning under the Growth Management Act, such as Grays Harbor County and the City of McCleary, must include two elements in their comprehensive plans – a land use element, which designates the proposed general distribution, location, and extent of land uses, and a circulation element, consisting of the general location, alignment, and extent of major thoroughfares, transportation routes, terminals, and trunk utility lines. The statutory language for the required lnd use element includes the following wording: "The land use element shall also provide for protection of the quality and quantity of groundwater used for public water supplies…." [RCW 36.70.330 and RCW 35A.63.061]

Consistency of Development Regulations with Comprehensive Plan

> Beginning July 1, 1992, the development regulations of each city and county that does not plan under RCW 36.70A.040 [The Growth Management Act] shall not be inconsistent with the city's or county's comprehensive plan. For the purposes of this section, "development regulations" has the same meaning as set forth in RCW 36.70A.030. (RCW 36.70.545 and RCW 35.63.125)

Grays Harbor County Comprehensive Plan

As a result of the Rural Lands Study, 1982, two elements were added to the Grays Harbor County Comprehensive Plan: The Rural Lands Element and the Community Plan Coordination Element.

The Rural Lands Element

The Rural Lands Element established the policy basis for deciding how 29,000 acres of marginally productive agricultural land in the eastern part of the county were to be zoned. As stated in its introduction, “One of the key purposes of a comprehensive plan is [to] guide decisions and the Rural Lands Element’s goals, objectives, and policies are intended to guide the manner in which the rural areas of Eastern Grays Harbor County are zoned.” [p. vi]

For purposes of managing and protecting the Wildcat Creek Aquifer, the important policies in the Rural Lands Element are those that guide the designation of land use densities of less than one unit per five acres. Reprinted below are the Rural Lands Element’s two goals and the relevant objectives, followed by the policies for the RR – Rural Residential Zone and the R2 – General Residential Zone.

Goals

> 1. To provide opportunities for rural development at appropriate intensities while protecting the natural resources and character of the rural lands.
> 2. To develop a land use pattern which minimizes development, service, and maintenance costs for residents, property owners, builders, and public agencies. [p. 2]

Objectives

> 5. To protect and maintain the high quality of the air, water, and groundwater resources of the rural lands.
> 11. To ensure that County, Regional, City, and Town development plans, programs, and policies are well coordinated and integrated.
> 13. To ensure County policies, programs, and ordinances, especially zoning and capital improvement programs, will be coordinated with and support the goals, objectives, and policies of this plan. [p. 2]

Policies for Rural Residential

Reprinted below are the relevant sections from the Plan:

Purpose: The purpose of the Rural Residential designation is to provide areas for small acreage rural residential development where compatible with the area's natural resources, natural limitations, public facilities, and public services. [p. 3]

Description: These areas would be primarily composed of rural residential uses with a maximum density of not more than one (1) unit per acre. The permitted density may vary depending on the suitability of the site for development. During the platting process a determination shall be made as to whether conditions are present which limit the site's development potential. These conditions include:

(a) Areas within the one hundred year flood plain.
(b) Areas subject to riverbank erosion.
(c) Areas of very steep slopes.
(d) Areas of low suitability for on site waste disposal systems.
(e) Areas of high groundwater tables or ponding.
(f) Other conditions or hazards which limit development.

If any of these conditions are present, measures may be required as necessary to overcome the limitations including, but not limited to: special site designs, the clustering of structures, special construction requirements, engineered drainage and/or waste disposal systems, and reductions in the maximum permitted density. While the primary character of these areas will be rural residential, a mix of compatible forestry and agricultural uses will be permitted and encouraged.

…

Criteria for Designation: [p. 4]
Areas suitable for this designation shall meet the following criteria:

(a) The areas shall have an adequate supply of ground water given the one acre density or access to a community water system.
(b) The areas shall be located to minimize the travel distances of residents, school buses, and emergency equipment over substandard roads.
(c) The areas shall be located to minimize their impact on those fire and school systems least able to accommodate growth.
(d) In addition, designated urbanizing areas may be designated Rural Residential until they are served by adequate public facilities, including streets, water, and sewer systems.

Areas to be avoided by this designation: [p. 4]

(a) Areas which would require major public expenditures to adequately accommodate the permitted growth.
(b) Areas substantially or wholly within the one hundred year flood plain.
(c) Areas subject to major riverbank erosion.
(d) Extensive areas of soils with a poor suitability for on site waste disposal systems.
(e) Areas where septic systems may contaminate groundwater resources.

Policies for R-1 and R-2 Zones

Reprinted below are the relevant sections from the Plan:

Purpose: The purpose of the Residential designation is to provide for low and moderate density residential communities adjacent to developed areas where adequate facilities and services are available or can be economically provided. [p. 13]
…

Criteria for Designation: Areas suitable for this designation include either:

(a) The designated urban service areas of a city, town, water or sewer district. Or;
(b) Areas which have all of the following characteristics:

(i) The area is adjacent to either the corporate limits of a city or town or the built-up portions of a developed area. Areas designated Residential shall not be more than a half mile from the corporated limits or built-up area. (See definition of developed area.) [DEVELOPED AREA: An area of compact, continuous development containing residences, businesses, and other land uses served by a water system(s), a road system and other public facilities. The built-up portion of the developed area is the area of contiguous development. p.33]

(ii) An adequate public water system shall be available to serve the area or expansion of a public water system into the area must be planned.

(iii) An adequate sewer system shall be available to service the area or the area shall be suitable for the long term use of on-site septic systems at the permitted density.

(iv) The area should be located to minimize the impact of new residences on those fire and school systems least able to accommodate growth.

Areas to be avoided by this designation:

(a) Areas within the one hundred year flood plain.
(b) Areas subject to riverbank erosion.
(c) Areas where the available public facilities and services are not adequate to serve the development.
(d) Areas adjacent to planned agricultural lands.
(e) Areas of high resource value.

Community Plan Coordination Element

Reprinted below are the Goal, Objectives, and Relevant Policies of the Community Plan Coordination Element:

Goal
To ensure the continued development of a balanced land use pattern with adequate areas for housing, commerce, industry, agriculture, forestry, recreation, and other uses through the development of a coordinated land use plan. [p. 29]

Objectives

1. To encourage the development of urban land uses within areas designated to be served by urban facilities and services.
2. To promote appropriate land uses within suitable areas.
3. To ensure the coordination of the region's land use pattern by considering the plans and concerns of cities, towns, and other affected agencies during the development and administration of county plans and implementing ordinances.
4. To encourage cities, towns, and other agencies to consider county plans and concerns during the development and administration of their plans and implementing ordinances thereby ensuring the continuity of land uses throughout the region.
5. To ensure that county, regional, city, and town development plans, programs, and policies are well coordinated and integrated.
6. To ensure that jointly adopted plans, programs, and policies are incorporated into land use, public facilities, and public services decisions.
7. To coordinate amendments and updates to jointly adopted plans with all affected jurisdictions.
8. To encourage the joint review of development proposals which because of size, location, or public services needs affect more than one jurisdiction.

Policies

1. [Adoption of city and town plans by reference.]
2. Residential and commercial growth should be encouraged in areas designated for urban services including water, sewer, and other public services.
3. [Procedure for joint adoption of plans.]
4. The jointly adopted plans should guide county decisions on rezones, conditional uses, site plans, subdivisions, the provision and extension of public facilities and services, appropriate densities, land use plan revisions, and other land use matters within the areas to which they apply.
5. [Evaluating development proposals and joint review.]
6. [Procedure for county to inform other jurisdictions.]
7. [Joint review is advisory.]
8. [Providing public services to a development.]
9. The County should encourage community comprehensive plans to designate urban services areas. Urban services areas are those lands that cities, towns, and special districts intend to incorporate into their communities and provide with urban services, such as water and sewer.
10 – 12. [More about providing urban services.]
13. [Special district plans.]

City of McCleary Comprehensive Plan

Introduction

Three subjects in the City of McCleary's Comprehensive Plan bear on aquifer protection and management: (1) development in the wellhead protection area; (2) industrial zoning; and (3) stormwater management.

1. Development in the Wellhead Protection Area

The City's Comprehensive Plan, adopted in 2002, has two objectives that are relevant for managing and protecting the aquifer:

LU 2.1 Protect critical areas within the city: [including]…areas with critical recharging effect on aquifers.

LU 2.3 Manage development so growth does not negatively affect the quality and quantity of groundwater and surface water.

These objectives are followed by Implementation Steps:

- Manage areas with development constraints by:
  - Enforcing the city's critical areas ordinance.
  - Protecting Wildcat Creek as a Critical Area.
- Maintain water quality and quantity by:
  - Keeping the city's wellhead protection program current to protect the public water supply;
  - Developing and enforcing [words appear to missing here in the City text] that protect the city's aquifer recharge areas;
  - Requiring new development in all zoning districts to be on the city sewer system to protect ground water quality;
  - Requiring new development to provide adequate stormwater management as specified and adopted by the City.
  - Adopting requirements for minimum removal of vegetative cover for reducing storm water runoff.

With the City's approval of 125 new homes in the City's recharge area not long after the Comprehensive Plan was adopted, the City's emphasis for aquifer management and protection is now focusing on the second set of implementation steps, those for maintaining water quality and quantity. Because the new homes are served by City water and sewer, the approach now is on maximizing recharge given the additional impervious surfaces and educating residents about proper use of pesticides and fertilizers.

Although the 2002 Comprehensive Plan did not anticipate the new growth along Summit Road, it did project that the City would encompass the developed area along Lynch and Larson Roads, presently zoned R2 – General Residential by the County. Both the Hart Crowser and Horsley Witten reports cite this area as one of concern because of the proximity of private on-site sewage systems to City wells, some of which are within the wells' one-year travel time capture zone.

2. Industrial Zoning

Goal 5, on Industrial Development, calls for increasing "… McCleary's economic diversity by encouraging new industrial land uses in suitable locations." The associated objective, LU 5.1, calls for maintaining "… a supply of industrially zoned land for new industry that will provide minimal disruption to existing citywide land use patterns." The associated implementation step calls for pursuing "… the potential for industrial expansion in northern areas of McCleary."

Land to the north of the City is zoned industrial, but its development for industrial use would need to overcome several constraints: a high water table making it unsuitable for the construction of heavy buildings; delineated wetlands between the zone and Simpson

Road to the south complicating access to the freeway; and the only other access being Larson Road, a residential neighborhood. In addition, the land lies at the center of the aquifer, between the Middle Fork and East Fork of Wildcat Creek. As such, its undeveloped condition may prove to be useful to the City as an area worth investigating for a back-up wellfield – and associated recharge area.

3. Stormwater Management

The purpose of "low impact development" is to maximize recharge to groundwater and reduce stormwater runoff. A technical manual published by the Puget Sound Action Team and the Washington State Extension Service uses the following definition:

> Low impact development is a stormwater management and land development strategy applied at the parcel and subdivision scale that emphasizes conservation and use of on-site natural features integrated with engineered, small-scale hydrologic controls to more closely mimic pre-development hydrologic functions. (Hinman, 2005)

The City of McCleary can employ low impact development in two ways – by requiring this approach in new development and by using it to the extent feasible when upgrading existing neighborhoods and managing stormwater.

Part 3 -- Recommendations

A. Joint County – City Recommendations

1. Establish the Wildcat Creek Aquifer Management Area by inter-local agreement.

a. Purpose: To coordinate risk management and other actions to ensure the long-term benefits to the economy and to public health and safety provided by the Wildcat Creek Aquifer.

b. Management Principles: To ensure a margin of safety, manage the aquifer in accordance with the following principles:

i. Maximize recharge to the aquifer.
ii. Minimize the transmission of contaminants to the aquifer.
iii. Monitor well water and measure streamflows to learn more about the aquifer's hydrogeology, groundwater conditions, and safe yield.
iv. Regulate land use in a manner that is clear, fair, and assures that groundwater will be protected.
v. Manage the aquifer comprehensively through compatible city and county policies, actions, and ordinances.

c. Responsibility:

i. Designate staff with responsibility for each action listed under (e) below.
ii. Designate lead officials from each jurisdiction to oversee staff.
iii. Publish an annual report on aquifer management.

d. Funding: Where appropriate, apply jointly for funding to carry out the management purposes of the Management Area.

e. Actions:

i. Update the list of potential point-source contamination sites within aquifer boundaries. Include sites on surrounding hillsides from which surface runoff could carry hazardous contaminates to the aquifer.
ii. Monitor individual wells in the RR and R2 zones for quality. If water quality tests show a problem with a well, work with the landowner to correct the problem; the emphasis should be on assistance, not penalty.
iii. Measure streamflow below the confluence of the three branches of Wildcat Creek and measure water levels in several wells to learn more about groundwater movement and quantity.
iv. Review and coordinate spill-response plans(s) for accidental spills along transportation corridors within the Wildcat Creek Aquifer Management Area. Include Fire District 12 in this action.

v. Educate the public about the do's and don'ts of living above their water supply.
vi. Adopt by reference the Low Impact Development Technical Guidance Manual for on-site development and surface water management.
vii. Review and, where appropriate, revise the zoning ordinances of both jurisdictions to prevent the location above the aquifer of land uses and activities that would introduce risks that could not be eliminated by development conditions and operating practices. This would include a review of a zoning district reclassification of general development five–acre (G-5) for any property currently zoned industrial (I-1 or I-2).

2. Under the Community Plan Coordination Element of the Grays Harbor County Comprehensive Plan, review and, if necessary, revise the City and County plans for the area. In accordance with Policy (9), designate an urban services area for the City of McCleary.

B. Recommendations for Grays Harbor County

1. Adopt an ordinance that (1) affirms the Grays Harbor County Comprehensive Plan's policy basis for zoning in the Wildcat Creek Valley and (2) cancels the development moratorium upon the completion of the adoption process for amending Grays Harbor County Code 17.56.180 governing critical areas.

2. Designate the City of McCleary's wellhead 1-year capture zone, the 5-year capture zone, and the 10-year capture zone, as delineated by Pacific Groundwater Group in this report, as a critical aquifer recharge area.

3. Amend the Grays Harbor County Code for critical areas, Title 17, to define the Wildcat Creek Aquifer as a specific area.

4. Set forth requirements and review responsibilities for development activities, including rezones and subdivisions, located within the Wildcat Creek Aquifer.

5. Set forth requirements for development activities, including rezones and subdivisions, located within a Wildcat Creek critical aquifer recharge area, including a wellhead and wellhead time-of-travel protection plan. Specify that purveyors shall review the proposals and that the Grays Harbor County Environmental Health Division shall determine whether the proposal would provide a reasonable margin of safety for the critical aquifer recharge area; and further, that the if proposal does not, the proposal shall be (a) required to be revised to increase the margin of safety, including a reduction in lot density, or (b) shall be denied based upon evidence that the proposal represents a probable significant adverse impact to the critical aquifer recharge area.

C. Recommendations for the City of McCleary

1. Investigate the feasibility of establishing a back-up wellfield.

2. Designate the City portion of the wellhead protection area for the City wells as a critical aquifer recharge area.

3. Revise the City's wellhead protection area to conform to the ten-year time-travel capture zone, based on the delineation by Pacific Groundwater Group.

4. Revise the City's Integrated Pest Management program to make it more workable.

5. Develop a monitoring program to determine whether on-site sewage systems located in the wellhead protection area on Lynch and Larson Roads are contributing contaminants to City wells.

6. Reconsider the existing industrial zoning above the aquifer.

7. Continue efforts to reduce per capita water consumption.

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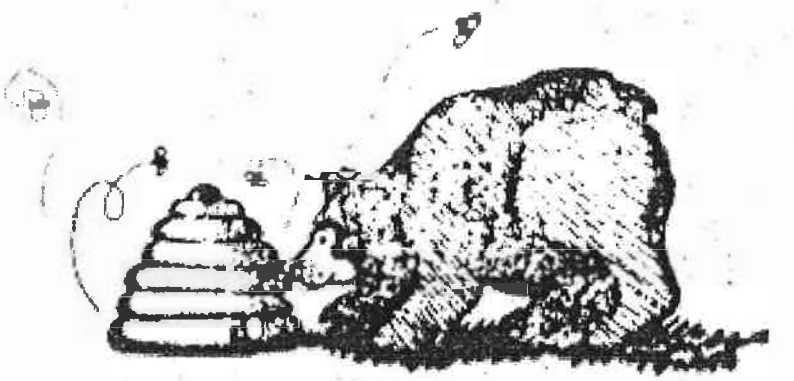
McCleary Planning Commission

Comprehensive Land Use Plan



Adopted by Resolution #478
On September 25, 2002

City Elected and Appointed Officials

McCleary City Council

Wally Bentley, Mayor

Ray Bohling

Rob Jhanson

Chris Vessey

Sue Portschy

Helen Lake

McCleary Planning Commission

Michael Green, Chairman (8/2000 – 1/2003)

Evert Challstedt (8/2000 – 1/2006)

Teri Franklin (8/2000 – 1/2002)

Helen Lake (8/2000 – 1/2002)

Alice Soulek (8/2000 – 1/2004)

Mary Thornton (1/2002 – 1/2007)

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Introduction

This Comprehensive Plan is a revision and update of the City of McCleary 1979 Comprehensive Plan. The plan is a picture of the community's preferred future for the year 2022 and the steps necessary to move towards it.

It is mandatory for the city to have a "comprehensive plan for anticipating and influencing the orderly and coordinated development of land and building uses".[1] The plan, both in content and form, meets the requirements of Chapters 35A.63.060 and 36.70A of the Revised Code of Washington (RCW). The City is the only entity, private or public, with both the opportunity and the responsibility to direct the overall development of the community in a unified manner. The Comprehensive Plan is the official document adopted by the McCleary City Council to guide decisions about future growth and the physical development of the city. It provides a practical working tool for everyday decisions and a basis for various implementation strategies.

The plan has three basic characteristics. It is:

- Comprehensive - encompassing all geographical and functional elements that have a bearing on the community's physical development;
- General - summarizing major policies and proposals, but does not indicate detailed locations or regulations; and
- Long Range - looking beyond present issues to possibilities and problems 20 years into the future.

These characteristics help the community and their elected and appointed officials look at the "big picture" and step away from current pressing issues. They also help make explicit the plan's goals, objectives, and implementation Steps so they may be viewed critically and subjected to the democratic process.

The organization of the plan contains four parts. Part I is a statement of the community vision for the future. Part II includes four individual plan elements: Land Use, Housing, Public Facilities and Services, and Transportation. Each plan element has:

[1] RCW 35A.63.061

Goals: general statements of the desired long-term future toward which the plan aims

Objectives: short-term, measurable accomplishments that show achievement of the goal

Implementation Steps: specific actions, both legislative and administrative, that implement the plan's goals and objectives

The Land Use and Transportation elements are required by RCW. 35A.63.061. The optional elements are allowed by RCW. 35A63.062.

Part III of the plan, Community Action, provides a goal, and describes objectives and activities that can enhance the plan elements and make community planning an ongoing partnership between city government, citizens, and businesses. Part IV of the plan provides essential background technical planning information and analysis. A bibliography follows with a list of supporting information sources for the plan.

Section I
Community Vision for the Future

Exploring The Past

McCleary's community vision rests upon a foundation of understanding the community's past history and the realities of the present as the reference points for building a vision of the future.

1860 - 1950: The Early Years

The abundant supply of lumber in nearby forests shaped the City of McCleary's early growth and development. Settlers homesteaded the area in the 1860's and by the early 1900's the community became a lively company mill town owned by Henry McCleary:

- Employment centered around the mill and a door plant;
- Rental houses for employees, utilities, hotel, bank, and the community church were owned by the McCleary Company;
- The community was a focal point for the area with a post office, school, telephone service, and a public building for community gatherings called the New Dance Hall built in 1903;
- The McCleary Company assets were purchased by the Simpson Timber Company in 1941 and the community incorporated as the Town of McCleary in 1943; and
- The Shelton Cooperative Sustained Yield Unit, an agreement between Simpson and the U.S. Forest Service for joint management of company and federal forest lands for a period of 100 years, ensured a continuing supply of raw materials for the mill and door plant.

1950 - 1970: The Growth Years

The community grew at a moderate pace and the mill and door plant continued to be the major employer. "Operation Second Growth" inspired a new building period in McCleary. This community study planned for growth and economic stabilization. Significant changes, many inspired by the study, followed:

- The town constructed a new school, hospital, fire and police facilities, library and city hall in the 1950's;
- A newly built freeway bypassed the downtown center;
- The townspeople organized the "McCleary Bear Festival", a community wide celebration held annually in July;
- Economic development efforts focused on potential opportunities created by planned Washington Public Power Supply projects in the McCleary area; and
- The community adopted its first Comprehensive Plan.

1980's: Overcoming Outer Challenges

Events outside McCleary, especially the national economic recession, influenced community development in this decade. The community experienced little growth and some economic hardship, but citizens continued to be forward-looking. Key events from this period were:

- The Washington Public Power Supply failed and the promise of new employment opportunities faded;
- Lending interest rates rose 22%, discouraging the construction of new homes;
- Timber workers went on strike;
- Citizens expressed confidence in the future by supporting a substantial upgrade of the sewer system;
- The upgrade of Sam's Canal improved community aesthetics and stormwater management capabilities; and
- The library lost its Timberland staffing for two years but continued operating with the help of volunteers.

1990's: Overcoming Inner Challenges

In the 1990's, slow growth and the loss of the plywood division at the mill, coupled with political tensions in city government, tested citizens' resolve while new improvements provided hope for the future.

- Land south of the city was annexed and then de-annexed;

- Substantial playground improvements were made with active community participation;
- Simpson developed Evergreen Heights subdivision and completed a waterline upgrade;
- The electrical utility built the new substation;
- Beerbower Park upgrades included an information kiosk for visitors and new restroom facilities; and
- The newly constructed transit station downtown included commuter parking and attractive landscaping.
- The Chamber of Commerce and the Bear Festival remain active after many years.

A Vision of the Future: McCleary, 2022

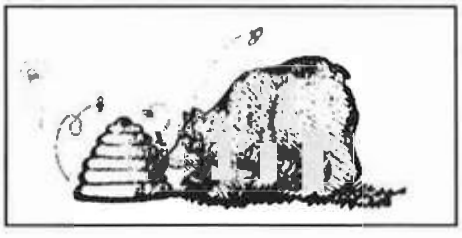
The City Planning Commission sponsored an informational open house and a series of five community workshops in the spring and summer of 2001 to gather citizens' viewpoints about the future growth and development of McCleary. This participatory process yielded the following snapshots of McCleary's future that hang in the vision gallery below:

McCleary is a city that effectively accommodates growth pressures while preserving its small community character. The city has grown moderately over the years and has a balance of safe, friendly residential neighborhoods, commercial activities, and industrial development. The historical qualities of the city complement the modern technology that offers residents and businesses a good place to live and work.

Intellectual banking, investing in our kids and our future, is a major feature of community life. Necessary, affordable water and sewer services are available and people and products move through the city efficiently and safely. A variety of business developments has kept our economy healthy. Our community is clean, attractive, and maintains a charming visual quality. Fun and festivals give our city vitality by providing activities for people of all ages.

Downtown is the activity center of our community with commercial and professional services, city government facilities, and Beerbower Park. A variety of housing choices is available for people in city neighborhoods and on rural acreage. Trails and linear greenbelts are a distinctive feature found throughout McCleary. A carefully planned business and industrial park, along with the Simpson door plant, provide reliable employment opportunities. Visitor services are available both downtown and along State Highway 8.

Section I I
Plan Elements



Land Use Element

Goal 1: Preserving McCleary's Traditional Development Patterns

Preserve the City of McCleary's traditional land use pattern which separates homes from intrusion by commercial and industrial activities, supports a vital downtown, offers locations for new business and industry, and protects important natural community resources and assets.

Objectives

LU 1.1 Plan for a 2020 future population of 2,412 residents. Economic development and the migration of people moving to McCleary from the urban areas will contribute to this growth.

LU 1.2 Maintain existing overall land use patterns, created through earlier planning and zoning programs, by controlling the general distribution, location, and extent of development of land and buildings in zoning districts that provide:

- Permitted uses with density and intensity requirements;
- Compatible conditional uses with additional standards to mitigate potential adverse impacts; and
- Prohibit uses detrimental to the public health, safety, and welfare.

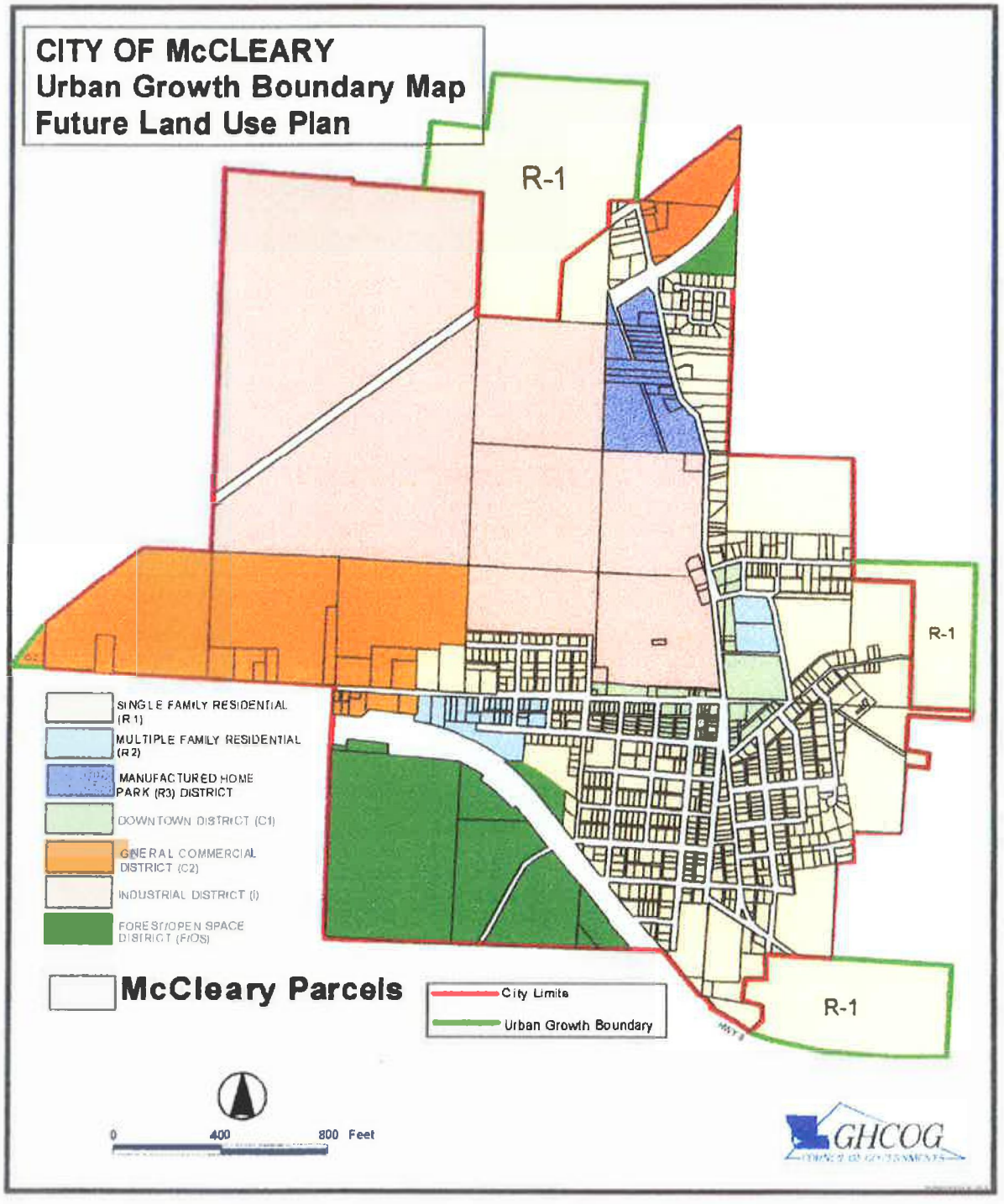
LU 1.3 Manage land use densities and development practices to protect the quality and quantity of groundwater for public use and surface water.

LU1.4 The city shall encourage economic development and population growth within the city.

Implementation Steps

- Create zoning districts that will manage residential, commercial, and industrial land uses as shown in the Future Land Use Map in Figure 1:

Figure 1: Future Land Use Map



- Single-Family Residential (R-1) District. The R-1 District preserves the small city qualities enjoyed by city residents by limiting development to a minimum lot size of 7,500 square feet.

  Examples of other compatible uses eligible for conditional uses permits in the R-1 District may include: bed and breakfast inns, home businesses, parks, schools, churches, and other public and semipublic uses as long as such uses will not create a significant traffic or parking problem, noise or light pollution, and water and sewer facilities are capable of supporting such development.

- Multi-Family Residential (R-2) District. The R-2 District provides for a mix of single- and multi-family housing types. New single-family residences in the district will have a minimum lot size of 7,500 square feet. The maximum building height above finished grade is two stories.

  Examples of other compatible uses eligible for conditional use permits in the R-2 District may include: bed and breakfast inns, home businesses, parks, schools, churches, and other public and semipublic uses as long as such uses will not create a significant traffic or parking problem, noise or light pollution, and water and sewer facilities are capable of supporting such development.

- Manufactured Home Park (R-3) District. The R-3 District provides for a mix of manufactured home parks and multi-family dwelling units. Manufactured home parks shall have an approved binding site plan. The maximum building height above finished grade is two stories.

  Examples of other compatible uses eligible for conditional use permits in the R-3 District may include: bed and breakfast inns, home businesses, parks, schools, churches, and other public and semipublic uses as long as such uses will not create a significant

traffic or parking problem, noise or light pollution, and water and sewer facilities are capable of supporting such development.

- Downtown (C-1) District. The C-1 District provides for a wide range of small to medium retail businesses, eating and drinking establishments, government activities, and professional offices concentrated in the traditional downtown area of the city. Uses in this district serve the needs of the immediate area as well as tourists to the community. The C-1 District is a compact, intensive activity area that emphasizes pedestrian access to and between businesses. The minimum lot size in the C-1 District is 2,500 square feet.

  Examples of compatible uses requiring a conditional use permit in the Downtown District may include second-story residential housing, housing for the elderly, such as senior apartments, assisted living units, or residential care centers, and other public and semipublic uses.

  General Commercial (C-2) District. The General Commercial District provides for a mix of single-family residential, large retail, professional offices, storage, and light manufacturing activities outside the downtown area that are dependent on arterial or highway traffic and large lot sizes. The minimum lot size in the C-2 District is 10,000 square feet. Types of land uses appropriate for this zone are: large retail establishments, clinics, vehicle repair, automobile dealerships, machine shops, building supply stores, mini-storage, and tourist services oriented to highway access such as restaurants and motels.

  Types of compatible land uses in the General Commercial District eligible for a conditional use permit may include recreational vehicle parks and retail businesses requiring outdoor storage and/or sales space.

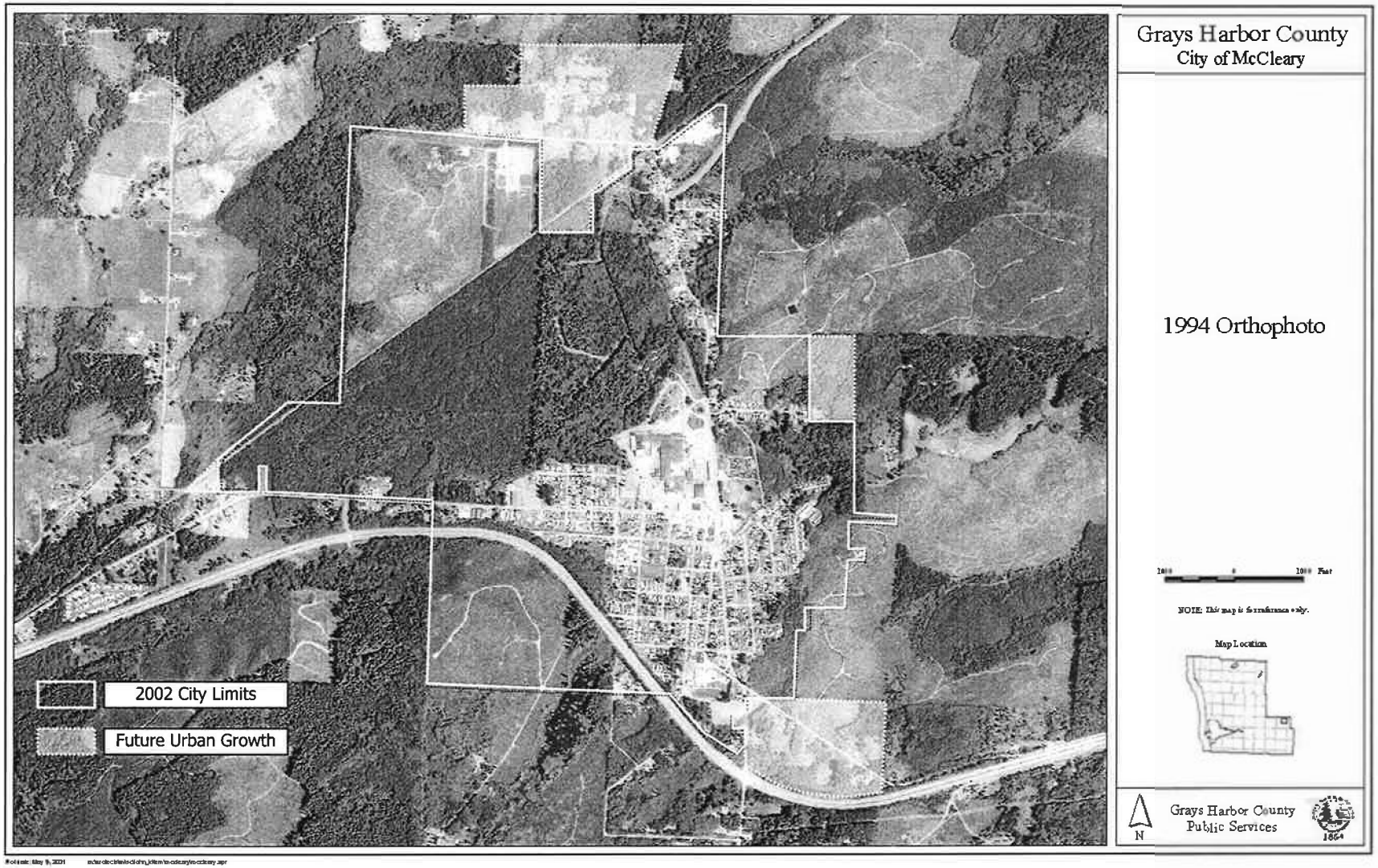
- Industrial (I) District. The Industrial District provides space for intensive manufacturing, processing, research laboratories, wholesale sales and storage, contractor's offices and shops, and other industrial uses. The minimum lot size in the Industrial District is 10,000 square feet. These uses should be located adjacent to major transportation facilities such as SR 8, SR 108, and/or the east-west railroad. All uses which are not enclosed and/or which have high noise, odor, water pollution, or vibration levels, are a conditional use.

  Industrial parks are allowed under binding site plans and may use a cluster development approach to meet density and intensity requirements. Commercial uses are allowed in industrial parks as conditional uses.

- Forest/Open Space (F/OS) District. The Forest/Open Space District protects the city's natural resources and open spaces. Land uses in this zone include all commercial forestlands, non-commercial forests, critical areas with restricted development potential, and land areas protected by open space designations or long-term conservation easements. Buildings or structures are prohibited except for public parks, nature trails, public roads, streets, bridges, and flood control measures. There is no minimum lot size.

- Annexation should be consistent with objectives stated in this plan:
  - Figure 2 shows those areas that the City will encourage annexation over the next 20 years. The City will consider other annexation requests on a case-by-case basis.
  - All utilities for newly annexed areas should meet City standards.
- Residential uses that are nonconforming in zoning districts shall have the right to maintain, improve, or expand their properties. If a property owner removes a nonconforming residence, s/he has up to three years to replace it with a new one. After this time, the future use on the parcel must be conforming to the zoning district.

Figure 2: Urban Growth Area



Goal 2: Managing the Natural Environment

Reduce the negative impacts from future development on McCleary's natural environment and visual amenities to the greatest extent possible.

Objectives

LU 2.1 Protect critical areas within the city: wetlands; areas with critical recharging effect on aquifers; fish and wildlife conservation areas; frequently flooded areas; and geologically hazardous areas.

LU 2.2 Future development in the city shall be compatible with the topography of the land.

LU 2.3 Manage development so growth does not negatively affect the quality and quantity of groundwater and surface water.

LU 2.4 Carefully manage development in geologically hazardous areas to protect the public safety.

LU 2.5 Preserve natural open space and visual amenities of the McCleary area.

LU 2.6 Safeguard air quality by controlling slash burning and providing for dust control.

Implementation Steps

- Manage areas with development constraints by:
  - Enforcing the city's critical areas ordinance.
  - Carefully regulating land development in land areas with hazardous building conditions such as landslide potential, poor foundation soils, and slopes of 10% or greater.
  - Enforcing the Federal Emergency Management Agency standards for flood plain management.
  - Including requirements for buffers, berms, and industrial emission controls to reduce or control pollution from land uses generating

dust, slash burning, noise, noxious weeds, and odors in city land use ordinances.

- Protecting Wildcat Creek as a Critical Area.
- Assuring that increased runoff resulting from forest practices will not negatively impact existing water resources or development.

- Encourage the preservation of open space by:
  - Developing standards for natural and landscaped greenbelt areas and the retention of a percentage of native trees and vegetation in new developments.
  - Finding funding sources to purchase land which is not suitable for development such as flood plains, steep slopes, and narrow drainage ways to be used for walking and bicycle paths and linear open space greenbelts connecting city neighborhoods and downtown.
  - Including incentives in the city's land development regulations, such as cluster developments, that gives landowners and development interests flexibility while protecting sensitive lands and open space.
- Maintain water quality and quantity by:
  - Keeping the city's wellhead protection program current to protect the public water supply;
  - Developing and enforcing that protect the city's aquifer recharge areas;
  - Requiring new development in all zoning districts to be on the city sewer system to protect ground water quality;
  - Designing public drainage facilities to control both storm water quality and quantity;
  - Requiring new development to provide adequate stormwater management as specified and adopted by the City; and

- Adopting requirements for minimum removal of vegetative cover for reducing storm water runoff.

- Require the design of new parking lots and large work areas to have dust control.

Goal 3: Residential Development

Maintain a balanced and efficient residential pattern in McCleary to preserve the livability, small city atmosphere, and character of the city's neighborhoods.

Objectives

LU 3.1 Preserve the mostly low-density residential character of the city.

LU 3.2 Emphasize the retention of single-family homes throughout the community.

LU 3.3 Mitigate the impacts of multi-family, commercial, and industrial uses on adjacent single-family properties.

LU 3.4 Encourage residential development in areas currently having adequate streets, sewer, and water facilities.

LU 3.5 Improve and protect the appearance of neighborhoods by eliminating junk and inoperable vehicles.

LU 3.6 Encourage innovative incentives for property owners to maintain their homes and land.

LU 3.7 Expand public improvements in neighborhoods, such as sidewalks, looped water lines, and upgraded streets.

Implementation Steps

- Encourage predominately single-family housing in neighborhoods south of Fir Street, North of Beck Street and west of 7th Street.
- Locate multi-family housing units near main thoroughfares.

- Lessen the visual impact of multi-family, commercial, and industrial uses that abut residential properties through screening requirements.
- Require water, sewer, and transportation facilities for residential land uses.
- Locate residential development so that further development will not create strains upon public facilities.
- Encourage infill of vacant lots in residential neighborhoods.
- Prohibit incompatible redevelopment projects in established residential neighborhoods.
- Invite organizations, such as Aberdeen Neighborhood Housing Services, to assist property owners in rehabilitating their homes.
- Apply for Community Development Block Grant funds to help low- and moderate-income neighborhoods make general infrastructure improvements.
- Develop opportunities for property owners and the city to work together in extending sidewalks to all city neighborhoods.

Goal 4: Commercial Development

Promote and maintain economically viable commercial businesses and professional service activities serving McCleary area residents, visitors, and highway travelers.

Objectives

LU 4.1 Keep the city's downtown business district as the major place to conduct retail business and professional services in McCleary.

LU 4.2 Encourage a variety of commercial establishments and professional services to locate in the city by maintaining public improvements that encourage private investment.

LU 4.3 Promote commercial activities with easy access for tourists.

Implementation Steps

- It is consistent with this plan to rezone properties in the R-1 District along Simpson Avenue and Maple Street west of 7th Street and between Main and 4th Streets north of Pine Street to multi-family or C-1.
- Increase emphasis on infrastructure improvements in the Downtown District to anticipate and encourage expansion of the commercial center of the city as demand develops.
- Locate commercial establishments, serving the needs of travelers, in areas with access to SR 8.
- Commercial uses requiring large amounts of land are appropriate for the General Commercial District and not the Downtown District.
- When siting commercial uses, require adequate water, sewer, storm water, traffic circulation, and parking to support the land use.
- Require commercial development adjacent to residential neighborhoods to have buffers that shield residents from noise, light, glare, and traffic generated by the commercial use.
- Assure timely administration of land development regulations for commercial proposals and business permits.

Goal 5: Industrial Development

Increase McCleary's economic diversity by encouraging new industrial land uses in suitable locations.

Objectives:

LU 5.1 Maintain a supply of industrially zoned land for new industry that will provide minimal disruption to existing citywide land use patterns.

LU 5.2 Select areas for future industrial uses that have short commuting distances for employees, existing public services, and provide adequate space for expansion over time.

LU 5.3 Encourage grouping of industrial land uses into an industrial park with amenities such as day care, landscaping, and commercial support services.

⇨ Implementation Steps:

- Locate industrial land uses in a manner that coordinates with existing and/or planned water, sewer, and transportation facilities.
- Develop industrial uses adjacent to existing industrial lands where possible and in areas that will not hinder commercial activity or disturb residential neighborhoods.
- Pursue the potential for industrial expansion in northern areas of McCleary.
- Provide regulatory incentives for the development of an industrial park through a binding site plan.

Housing Element

Goal

Provide a housing supply in the City of McCleary that is adequate to meet the needs of populations of all age and income groups.

Objectives:

H 1.1 Maintain and upgrade the city's existing supply of safe and affordable housing of choice.

H 1.2 Emphasize retention of single-family homes throughout the community.

H 1.3 Promote new housing that maintains the character of city neighborhoods and is sensitive to people with moderate or low incomes.

H 1.4 Maintain acceptable levels of public facilities and services in city neighborhoods to safeguard home values.

H 1.5 Allow accessory dwellings in all residential districts.

Implementation Steps:

- Promote public and private efforts for renovation of older housing in established neighborhoods.
- Provide appropriate standards for doublewide or larger manufactured homes on individual lots to ensure their compatibility with surrounding residences. Restrict singlewide manufactured homes to manufactured home parks.
- Require all manufactured home parks to have buffers and a binding site plan to reduce incompatible impacts on adjacent land uses.
- Seek assistance from people or groups who can help low- and moderate-income people with housing renovation and rehabilitation.
- Support development of special housing programs for senior residents who are no longer financially or physically able to maintain their

household to allow them to remain city residents as long as they desire.

- Locate affordable housing for elderly age groups adjacent to downtown and basic services.
- Develop zoning incentives that encourage innovative urban design for neighborhoods that emphasize open space, and flowing circulation patterns.

Public Facilities and Services Element

Goal

Ensure that public facilities and services meet the existing and future needs of homes, businesses, and industry.

Objectives:

PF 1.1 Carefully monitor the need for expanded or new capital facilities over the 20-year planning period to meet growth demands.

PF 1.2 Plan for all public facilities and services in a fair and cost-effective manner.

PF 1.3 Site and design public facilities to complement the quality of life and function of neighborhoods and commercial areas.

PF 1.4 Manage public facilities and services so that adequate capacity is available for future growth needs within the city before extending them beyond the city limits.

PF 1.5 Strive to maintain adequate levels of police and fire service that meet acceptable health, safety, and public welfare standards.

PF 1.6 Actively plan for the clustering of future public facilities that deliver direct services to the public, such as a new city hall, library, museum, police station, hospital, and schools. Prospective sites should offer convenient public access and room for future expansion.

PF 1.7 Preserve existing recreation and cultural facilities and develop new recreational facilities for residents and visitors of all ages.

Implementation Steps:

Sewer and Water Facilities

- Make it a priority to make sewer and water improvements in accordance with existing plans.

- Plan and budget annually to address existing problems with the city's sewer and/or water systems.
- Require the looping of new and existing water lines when possible.
- Actively develop a new Wastewater Treatment Plant as well as other priority improvements noted in the sewer plan.
- Require annexation as a precondition to extending sewer and water service beyond the city limits.
- Coordinate water and sewer projects with transportation projects to achieve cost savings.

Stormwater Facilities

- Require adequate stormwater facilities that meet City standards.
- Develop minimum landscaping design standards for stormwater facilities.

Telecommunication Utilities

- Encourage new power and telecommunication lines underground, at the rear of properties, or in alleyways.

Other Municipal Facilities and Services

- Before approval of a land development permit, identify and require mitigation of negative impacts to police and fire services, parks, and the school.
- Conduct an annual review of "needs and maintenance" for each city owned facility and property.
- Bring all city-owned buildings up to code and make ADA accessible with some progress demonstrated each year.
- Construct or rehabilitate an adequate space for a new and bigger library.
- Restore the area surrounding the Community Center into a nice small park and identify a designated parking area.
- Build a historical kiosk at the city cemetery.

- Research the possibility of adding a 'waterhole' and skateboard park with fountain and wading pool to the city park system.
- Look into establishing a hiker/tent area in conjunction with the development of a natural trails system for the city.
- Plan for a future all ages recreation center with growth.

Financing

- Expenditures for new or expanded capital facilities will be based on the following priorities:
    1. Remedy urgent or emergency conditions which are dangerous to public health or safety;
    2. Correct existing deficiencies;
    3. Meet the needs of planned growth; and
    4. Add desirable new facilities.
- Revenue sources to finance capital facilities that benefit the public, in order of priority, are: grants, private donations, loans, public/private partnerships, utility rates, ULID's, the electric fund, and as a last option, revenue and general obligation bonds.
- The cost of new or expanded capital facilities for future private land development projects will be the responsibility of the property owner or land developer.
- New development will pay its own way through requirements for infrastructure improvements in subdivision regulations, development charges for utility hook-ups, and negotiated contributions for off-site impacts.

Transportation Element

Goal

The City of McCleary will provide for a system of public and private transportation choices that compliment community character and reinforce the land use element of the city's comprehensive plan.

Objectives:

T 1.1 Plan for a coordinated street system that maximizes the safety and efficiency of the movement of people and goods within and through the city.

T 1.2 Develop a system of sidewalks and paths to separate pedestrian and bicycle traffic from vehicular traffic.

T 1.3 Integrate amenities such as landscaping, coordinated signage, and street lighting into street system projects to compliment the visual appeal of the city.

T 1.4 Encourage efforts to maximize public transit opportunities for residents and employers.

Implementation Steps:

Streets

- Adopt design standards for both public and private street improvement or expansion which provide safety, efficient traffic flow, and adequate off street parking.
- Work with the Washington State Department of Transportation to provide safe pedestrian and bicycle improvements along SR 108.
- Plan and coordinate any expansion of the street system in a manner that will provide for extensions and connections with existing streets.
- Require all land uses to have safe access to a public street.
- Restrict truck traffic in neighborhoods.

- Support bicycle paths on city arterial streets and state roads passing through the city.
- Incorporate sidewalks into all new street construction projects and require the installation of sidewalks in all new developments.
- Develop and enforce off street parking standards through city zoning and subdivision ordinances.
- Consider the need for traffic studies based upon the City's Development Standards.
- New development shall pay its own way for streets and utilities.
- Rely on grants for street construction projects and fund annual operating needs for street maintenance with property taxes, state shared motor vehicle taxes, and investment interest.

Amenities

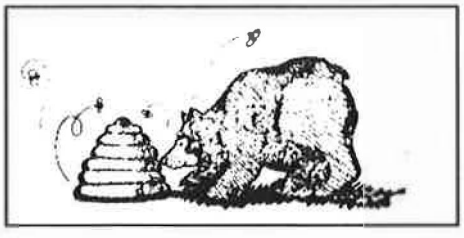
- Incorporate landscaping, green strips, and trees into new or street rehabilitation projects.
- Prepare and implement a decorative street lighting plan for the city financed by grants and the city's electric fund.
- Develop and enforce street landscaping, sign, and street lighting requirements in private development projects through the city zoning and subdivision ordinances.
- Seek funds to develop a plan that will identify both appropriate locations and funding sources for a citywide system of natural trails and walking, bicycle, and skating paths.
- Review city requirements and amend as necessary, to allow innovative technology to reduce impervious surfaces throughout the city.

Coordination

- Coordinate water and sewer projects with transportation projects to achieve cost savings.
- Work closely with the Washington State Department of Transportation (DOT) to identify and monitor traffic safety concerns: especially access

to, from and across SR 8; at the intersection where SR 108 leads to SR 8 just west of the city limits; and the intersection where SR 108 and the Summit McCleary Road split at the northeast city limits.

- Maintain an active partnership with Grays Harbor Regional Transit to sustain effective public transportation options for citizens.



Section III
Community Action

The purpose of this Community Action section is to provide the city with implementation strategies for the plan and inspire the participation of residents and community groups. It stresses effective plan administration by city officials and staff as well as volunteer efforts as being critical keys to successful realization of the community's vision for the future. The strategy described below is sustainable only if city government and citizens work and communicate together in a sincere effort that promotes McCleary.

Goal

Make the comprehensive plan, a reflection of citizen's vision for McCleary, a living document.

Objectives:

CA 1.1 Assure that the City Council, Planning Commission, and staff actively use the comprehensive plan to guide land use decision-making actions.

CA 1.2 Encourage citizens to take part in community planning through creative and open discussion and fair decision procedures.

CA 1.3 Coordinate city and county planning and zoning activities thereby insuring compatible land uses and sufficient public facilities and services throughout the area.

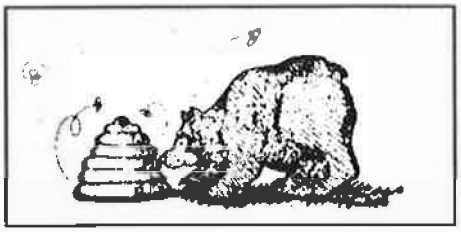
CA 1.4 Support public/private partnerships and volunteer efforts that aid in plan implementation, community improvement, and economic development.

CA 1.5 Invite the Grays Harbor Planning Commission and staff to meet once a year with the McCleary Planning Commission and staff to discuss and evaluate development beyond the city limits.

⇨ Implementation Steps:

- Consider conducting an annual review of the comprehensive plan and land development regulations.
- Consider conducting an annual evaluation of the status and condition of city-owned properties and facilities.
- Collaborate with the county to prevent potential contamination of the city's well field recharge area through the development and implementation of groundwater protection measures.
- Coordinate with the county on all land use and development issues regarding the city's Urban Growth Area.
- Collaborate with community-oriented projects and/or non-profit organizations, including but not limited to the Chamber of Commerce, the Bear Festival, and the Museum.

Section IV: Technical Data Report



The Natural Environment

Location

The City of McCleary is on the western slope of the Black Hills in eastern Grays Harbor County. City Hall is at Latitude N. 47°3'19" and Longitude W. 123°15'54". The city limits extends over Sections 11 through 14, Township 18 N., Range 5 W.

McCleary lies north of SR 8, about 18½ miles west of Olympia. Communities west of McCleary include the Cities of Elma (7.3 miles), Montesano (18 miles), and Aberdeen (28 miles).

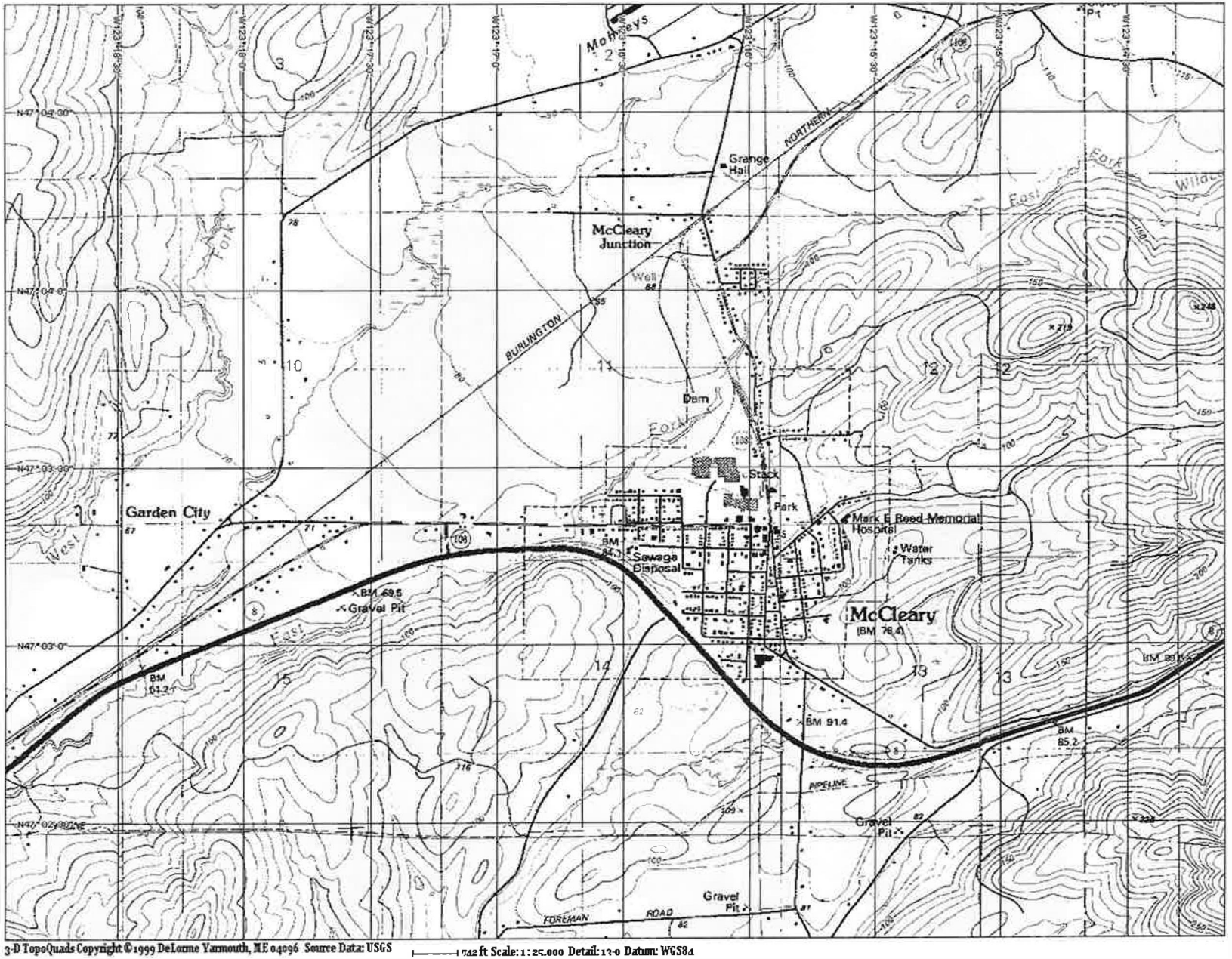
Climate

Weather in the McCleary area is typical of Pacific Northwest maritime climate: cool, dry summers and mild, wet winters. Elma has the nearest official weather reporting station. Records for average daily temperatures show that January has the lowest at 39.5° F while August has the highest at 63.5° F. Precipitation normally averages 68.4 inches annually.

Topography

Topography in the City of McCleary includes moderately steep slopes to relatively flat ground. The highest elevation is 426 at the water tanks just beyond the eastern city limits. From that point, the slope drops to about 280 feet in the center part of the community. The lowest elevation is 262 feet at the western city limits along SR 108. Generally, development in McCleary has avoided slopes steeper than 20%. Figure 3 is the USGS topographical map for the McCleary area.

Figure 3: McCleary Area Topography, adapted from USGS 7½ minute quadrangles



Soils

There are 11 different soil series in and around McCleary. Each of these soil series has differing characteristics that affect their suitability for development. Soil characteristics that influence development include slope, erosion potential, flooding, depth to water table, depth to bedrock, and drainage capabilities. These factors in turn create building limitations for residential and commercial structures as well as public infrastructure improvements like streets. The presence of hydric soils, often associated with wetlands, also point to regulatory concerns.

All soil types in the McCleary area have one or more characteristics that create constraints for future development. While it is rare for these constraints to totally prevent development, they may warrant special design considerations that can significantly add to project costs. For instance, on-site sewage disposal systems universally face severe limitations for development most often due to slope, poor percolation, and wetness. Development would have to connect to the city sewage collection and treatment system to prevent groundwater contamination. In similar ways, streets and structures that contend with slope, wetness, and low soil strength must rely on special design and construction techniques to overcome resulting problems.

Soils that present the most difficult problems to overcome include:

- Buckpeak silt loam (15): slope
- Schneider gravelly silt loam (131): slope
- Tebo silt loam (143): slope
- Nemah silty clay loam (91): depth to water table, hydric conditions
- Norma sandy loam (101): depth to water table, hydric conditions
- Salzer silty clay (127): depth to water table, hydric conditions

Figure 4 is an aerial photograph showing the location of all local soil types, and two tables summarizing their characteristics and building limitation follows on the next three pages.

Figure 4: McCleary Area Soils, from the Soil Conservation Service Manual

13	Buckpeak silt loam
15	Buckpeak silt loam
23	Carstairs very gravelly loam
48	Humptulips silt loam
71	Lyre very gravelly loamy sand
72	Lyre variant very gravelly loamy sand
79	Montessa silt loam
91	Nemah silty clay loam
101	Norma sandy loam
105	Olympic clay loam
106	Olympic clay loam
127	Salzer silty clay
131	Schneider very gravelly silt loam
142	Tebo silt loam
143	Tebo silt loam
146	Udipsamments, level

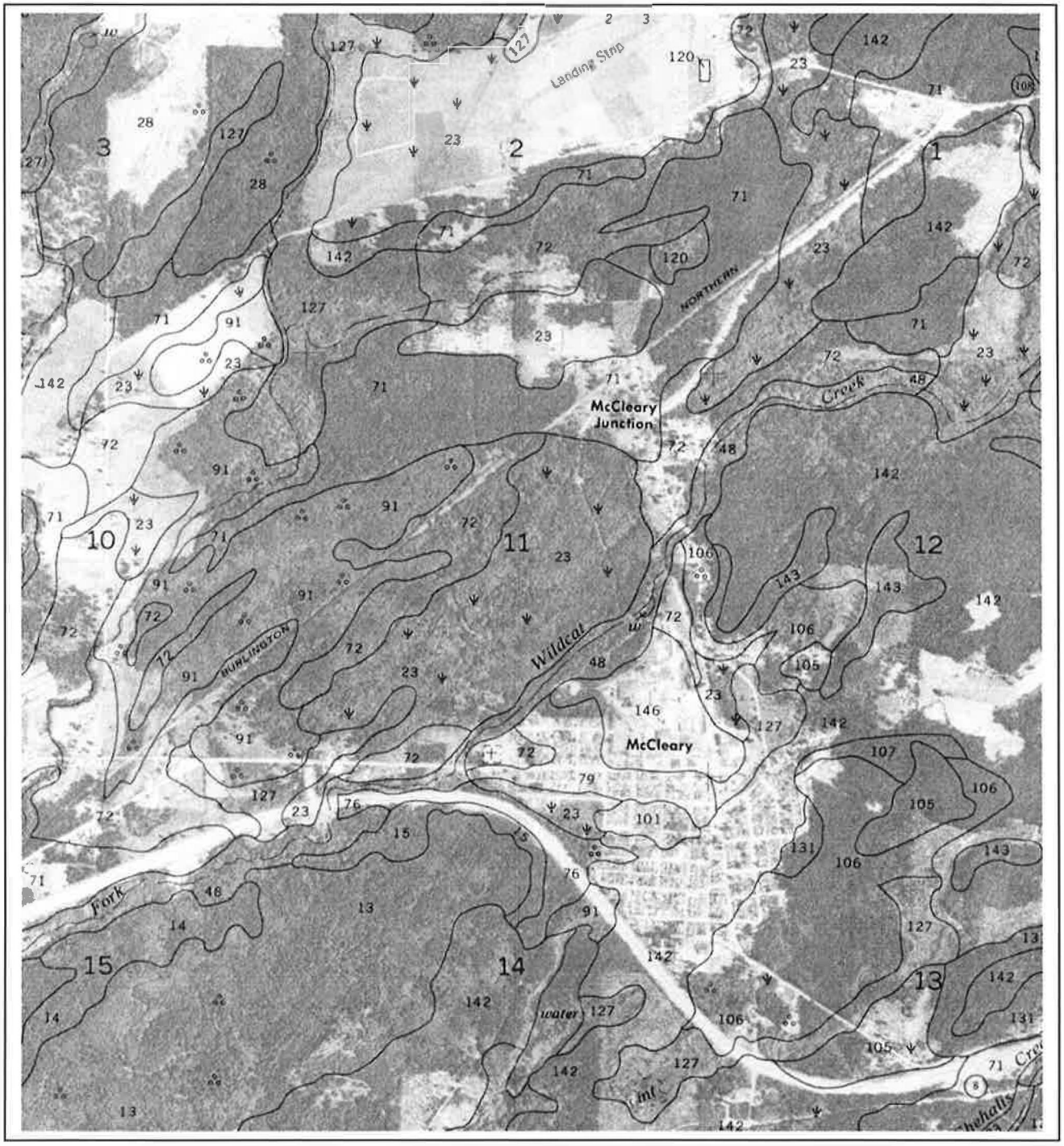


Table 1: Soil Characteristics for City ef McCleary and Vicinity

Soil Type	Number	Slope	Flooding	Depth to Water Table	Depth to Bedrock	Erosion Potential	Drainage	Hydric
Buckpeak silt loam	13	8 - 30%	None	>6′	40 - 60″	Slight	Well drained	No
Buckpeak silt loam	15	65 – 90%	None	>6′	40 - 60″	Moderate	Well drained	No
Carstairs very gravelly loam	23	1 - 8%	None	>6′	>60"	Slight	Somewhat excessively drained	No
Humptulips silt loam	48	0 - 3%	Frequent	>6′	>60"	Slight	Somewhat excessively drained	No
Lyre very gravelly loamy sand	71	0 - 8%	None	>6′	>60"	Slight	Somewhat excessively drained	No
Lyre variant very gravelly loamy sand	72	0 – 3%	None	1.5 – 3′	>60"	Slight	Moderately well drained	No
Montessa silt loam	79	1 - 8%	None	1.5 - 2.5′	>60"	Slight	Somewhat poorly drained	No
Nemah silty clay loam	91	0 - 2%	None	+1 - 0.5′	>60"	Slight	Poorly drained	Yes
Norma sandy loam	101	0 - 2%	None	+1 – 1′	>60"	Slight	Poorly drained	Yes
Olympic clay loam	105	0 – 8%	None	>6′	>60"	Slight	Well drained	No
Olympic clay loam	106	8 – 30%	None	>6′	>60"	Slight	Well drained	No
Salzer silty clay	127	0 – 2%	Frequent	+1 - 0.5′	>60"	Slight	Very poorly drained	Yes
Schneider very gravelly silt loam	131	30 –65%	None	>6′	>60"	Moderate	Well drained	No
Tebo silt loam	142	5 – 30%	None	>6′	>60"	Slight	Well drained	No
Tebo silt loam	143	30 – 65%	None	>6′	>60"	Moderate	Well drained	No
Udipsamments, level	146	0 - 2	Rare	>6′	>60"	None	Excessively drained	No

Table 2: Soil Building Limitations for City of McCleary and Vicinity

Soil Type	Number	On-site sewage disposal systems	Shallow excavations	Dwellings with basements	Small commercial buildings	Streets
Buckpeak silt loam	13	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength
Buckpeak silt loam	15	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength
Carstairs very gravelly loam	23	Severe: poor filter	Severe: cut banks cave	Slight	Moderate: slope	Slight
Humptulips silt loam	48	Severe: flooding, poor filter	Severe: cut banks cave	Severe: flooding	Severe: flooding	Severe: flooding
Lyre very gravelly loamy sand	71	Severe: poor filter	Severe: cut banks cave	Slight	Moderate: slope	Slight
Lyre variant very gravelly loamy sand	72	Severe: poor filter, cemented pan, wetness	Severe: wetness	Severe: wetness	Moderate: wetness	Moderate: wetness
Montessa silt loam	79	Severe: wetness	Severe: wetness	Severe: wetness	Moderate: wetness, slope	Moderate: wetness
Nemah silty clay loam	91	Severe: ponding, percs slowly	Severe: ponding	Severe: ponding, shrink-swell	Severe: ponding, shrink-swell	Severe: low strength, ponding, shrink-swell
Norma sandy loam	101	Severe: ponding	Severe: cut banks cave, ponding	Severe: ponding	Severe: ponding	Severe: ponding
Olympic clay loam	105	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength
Olympic clay loam	106	Severe: percs slowly, slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength
Salzer silty clay	127	Severe: flooding, percs slowly, ponding	Severe: ponding	Severe: flooding, shrink-swell, ponding	Severe: flooding, shrink-swell, ponding	Severe: flooding, low strength, ponding
Schneider gravelly silt loam	131	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Tebo silt loam	142	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength
Tebo silt loam	143	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength
Udipsamments, level	146	Severe: poor filter	Severe: cut banks cave	Severe: flooding	Severe: flooding	Moderate: flooding

Geology and Groundwater

Below its soil layer, the geology of modern day McCleary is a combination of Quaternary sediments and Tertiary sedimentary and volcanic rock. The topography of the area reflects its geologic makeup.

Sedimentary and volcanic bedrock that formed 55 to 65 million years ago during the Lower Tertiary period covers the entire area, but it is closest to the surface on the hillsides surrounding the city. Groundwater typically is unavailable in this bedrock. Rainfall percolating through the soil stops at this dense rock layer and flows downhill, collecting in the Quaternary sediments below in the valley floor.

Between 18,000 and 40,000 years ago, glaciers once flowed through what is now the Wildcat Creek Valley, carving the land and depositing deep layers of silt, sand, and gravel over the bedrock. These Quaternary sediments can range from 50 to 100 feet thick and their highly permeable nature creates an aquifer bearing large quantities of groundwater. Groundwater supplies generally run from 10 to 20 feet below the surface in the valley and flows at a slow rate of from the northeast to the southwest. Rainfall and surface water bodies contribute to this groundwater supply.

The City of McCleary relies on this aquifer as the only source for its municipal water supply. The highly permeable nature of Quaternary sediments makes them susceptible to surface pollution.

Surface Water: Rivers and Wetlands

The East Fork of Wildcat Creek is the largest flowing water body within the McCleary city limits. The stream travels for about 1½ miles through McCleary in a southwesterly direction and eventually joins with the Middle Fork to create Wildcat Creek about a mile west of where it leaves the city limits. The entire Wildcat Creek system joins with the Cloquallum River just east of the City of Elma.

Being a major tributary of the Cloquallum River, which in turn joins the Chehalis River, Wildcat Creek is undergoing greater scrutiny for its water quality impacts on fisheries. Biological assessments of Wildcat Creek rate riparian

conditions as poor, which likely contribute to warm water temperatures. The East Fork of Wildcat Creek does not come under the Shoreline Management Act until its confluence with the Middle Fork of Wildcat Creek. The City of McCleary sewage treatment plant discharges into the East Fork just west of the end of Maple Street.

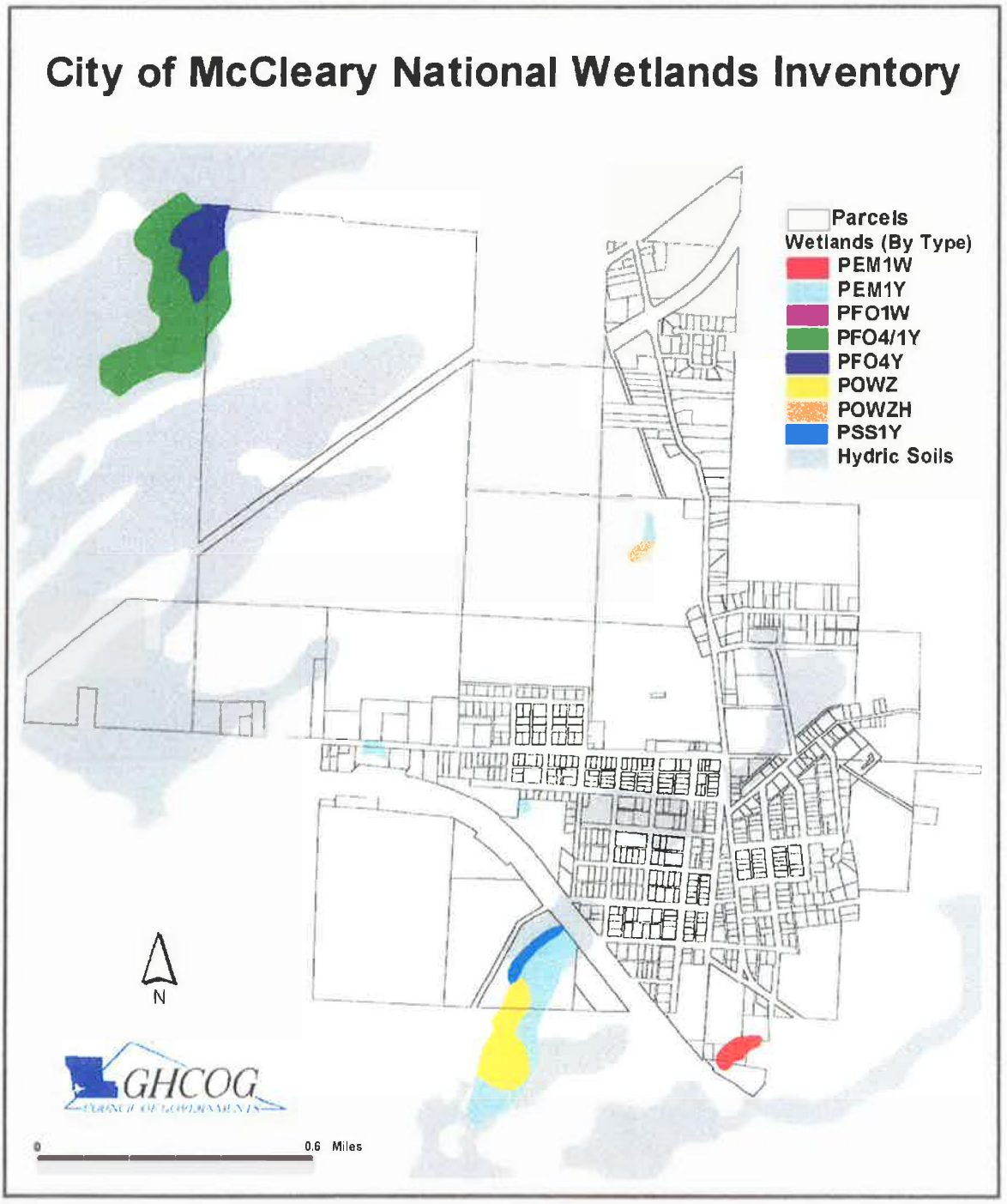
The only other natural waterway within the city is Sand Creek. Sand Creek is a tributary of Mox Chehalis Creek, which begins within the city limits south of SR 8. Less than 1,000 feet of one of two small marshy lakes that make up its headwaters is within the city limits. Sam's Canal, a drainage ditch that runs east to west that drains into the East Fork of Wildcat Creek, captures a small creek that runs adjacent to Mommsen Road east of the city limits.

The National Wetlands Inventory Map shows a limited number of wetlands in McCleary. Most are palustrine, or freshwater wetlands, such as swamps, bogs, and marshes. A few are riverine, or stream-associated wetlands along the East Fork of Wildcat Creek, Sand Creek, and Sam's Canal. The two largest of these wetlands in the city straddle the northwest boundary and the headwaters of Sand Creek south of SR 8. Figure 5 shows the approximate location of these wetlands.

The Natural Resource Conservation Service (formerly known as the Soil Conservation Service) identifies the Nemah (91), Norma (101), and Salzer (127) soil series as hydric soils. Hydric soils form under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper layers that may indicate the presence of wetlands. Salzer soils roughly occur in the 100-year floodplain west of North Summit. Nemah soils cut a large swath of area extending in from the western city limits north of the railroad track. An oval-sized pocket of Norma soils lies between Maple and Fir Streets from Main to 7th Streets. Areas with these soils may have wetlands that often do not show up on the National Wetlands Inventory Map. On-site verification is the only method to determine if wetlands exist and to what extent.

WAC 365-195-030(7), the state's adopted definition for wetlands, excludes artificial wetlands created from non-wetland sites, such as irrigation ditches, swales,

Figure 5: General Location of Potential Wetlands, adapted from the National Wetlands Inventory and Natural Resource Conservation Service Soil Maps



detention facilities, landscaping, and farm ponds. This regulation also requires using the 1987 Federal Manual for Identifying and Delineating Jurisdictional Wetlands.

Frequently Flooded Areas

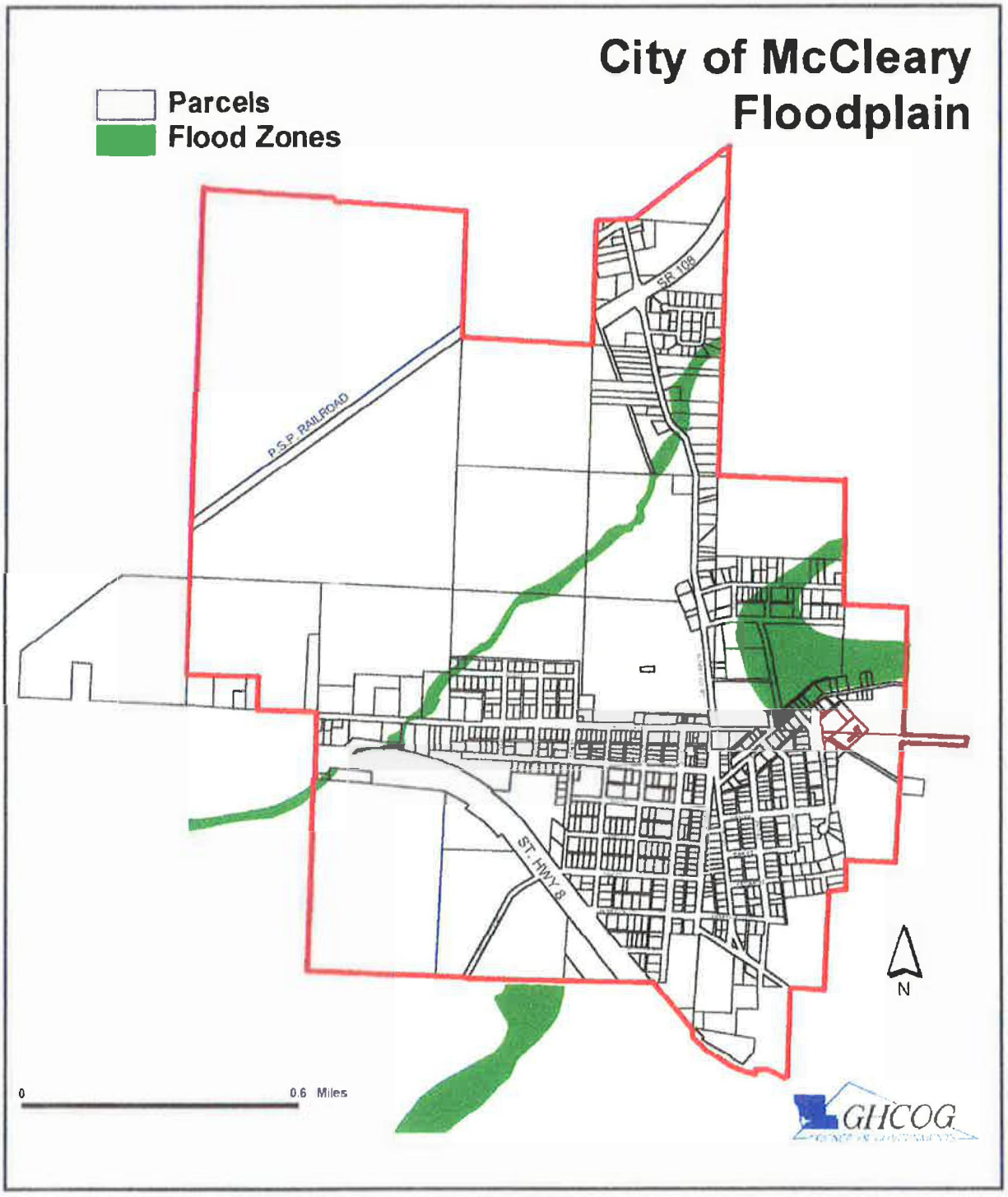
Frequently flooded areas are lands in the floodplain subject to a one percent or greater chance of flooding in any given year. These areas may include streams, rivers, lakes, wetlands, and the like.[+]

The Federal Emergency Management Agency (FEMA) has designated two frequently flooded areas within the city as lying within a 100-year floodplain. The first is a narrow band that runs the full length of the East Fork of Wildcat Creek through the city. The floodplain can vary from 200' to 500' in width. Most of the flood area passes through undeveloped parcels except east of Summit Road and south of Simpson Avenue.

The second 100-year floodplain is a large area that straddles 2nd Street between Mommsen Road and Beck Street. Most of this area is undeveloped, although parcels with homes border its edges. The source of this flooding appears to be from an unnamed creek that flows from hills east of the city limits. Sam's Canal helps to drain this area. Figure 6 shows the location of the 100-year and 500-year floodplains.

[+] WAC 365-195-030(7)

Figure 6: City of McCleary Floodplains



Adapted from the McCleary Flood Insurance Rate Map (FIRM), Federal Emergency Management Administration

The Developed Environment

History of McCleary

The Northern Pacific Railroad first owned the land area that would later become the City of McCleary. The railroad acquired the site through a land grant in 1864. In the 1860's, there were also several homesteads in what is today downtown McCleary. The abundant acres of timber attracted other settlers to the area, including Henry McCleary who started a cedar mill at the present town location in 1897. The mill expanded in 1912 to include a door company. McCleary gradually became a "company town", since the mill owned most of the buildings, homes and utilities. The community attracted more settlers, drawn by employment opportunities, and continued to grow until the Great Depression of 1929. The mill closed in the 1930's and the town declined some in population and business activity.

The Simpson Logging Company purchased the mill from Henry McCleary in 1941, assets that included homes, utilities, hotel, and church. Simpson Logging Company renamed the plant the Simpson Door Company, which is today one of the oldest continuously operating door plants in the nation.

Simpson Logging Company was not interested in operating a "company town", so it improved utilities and offered residents a chance to purchase homes in anticipation of incorporation. The City of McCleary incorporated on January 9, 1943.

The physical layout of the city has not changed dramatically since the 1950's when a new school, hospital, fire and police station, library and city hall were built. Substantial upgrade and expansion of city utilities also happened in during this time. While these facilities have improved over the years, the character and pattern of the community has remained very stable. The timber industry still heavily influences the economy and today, the major employment center is the Simpson Door plant. Other major employers include the grade school, Mark Reed Hospital, and the Beehive Retirement Center. Employment opportunities in nearby South Puget Sound make many McCleary residents daily commuters.

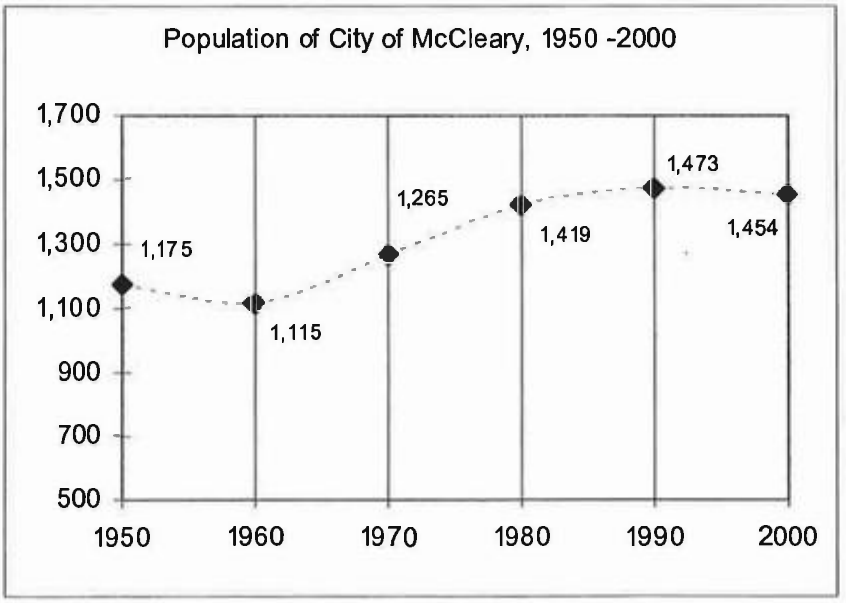
The City, which was originally incorporated as a town, now operates as a code city under Chapter 35A of the Revised Code of Washington (RCW). McCleary has a Mayor - Council form of government with a mayor and five councilpersons. Volunteers serve as appointed officials on the Planning Commission, Civil Service Commission, and Library and Park Boards. The City employs a staff of 16 people supervised by a city administrator. The city uses the hearing examiner system for making major land use permit decisions.

Historic and Future Population Trends

Historic Trends

The first official census of the City of McCleary occurred in 1950 when the U.S. Census recorded a population of 1,175. Overall, the city has grown at a relatively slow rate since that first count. Fifty years later, the 2000 US Census reports that McCleary grew by 279 people for a total population of 1,454. This is an overall population jump of 19.2% based on a 0.4% annual growth rate. Population actually declined from 1950 to 1960 and again from 1990 to 2000. The single largest percentage gain, 21%, occurred between 1960 and 1980. From 1980 to 2000, the city grew 2.4%.

Figure 7: Population of City of McCleary, 1950 through 2000



The Office of Financial Management (OFM) in 1995 prepared a series of 20-year population projections for each county in the state as required under the Growth Management Act. These are complex calculations based on a variety of factors such as birth and death rates, net migration rates, and economic forecasts. The OFM produced a high, medium, and low forecast for each county. While these OFM estimates sometimes underestimated growth for some counties in Western Washington, the opposite was true for Grays Harbor County. Grays Harbor County actually failed to reach the estimated high, medium, or low projections for the year 2000. The most recent 2000 OFM estimate for the county is 67,100, which is nearly 3,500 less than even the lowest growth management estimate.

Although there have been noticeable variations in the city's growth rates over time, McCleary's population has consistently averaged 2.2% of Grays Harbor County's total population in every U.S. Census since 1950.

Future Trends

The City of McCleary, just as the rest of Grays Harbor County and western Washington, will continue to grow over the next 20 years. The following four projection scenarios represent a likely range of population change from the year 2000 to the year 2020.

1. The first scenario assumes that the trend representative of the last 20 years will project into the future. This is a 2.4% population increase.
2. The second scenario assumes the city's population will experience both periods of growth and decline just as it has done over the past 50 years. Pro-rating the 19.2% growth to the 2000 – 2020 planning period, the city would increase by 7.7% over the next 20 years.
3. The third scenario assumes the City's population will continue to remain at 2.2% of the county's medium-range future population estimate of 86,309 in 2020.
4. The fourth scenario adopts the projection from the City of McCleary Wastewater Facility Plan. This projection assumes an annual growth rate of 2%, resulting in a 2020 population of 2,412.

The results of these projections follow below.

Table 3: Future 20-Year Population Projection Results

Scenario	Rate of Growth	Future Population by 2020
Scenario #1	Increase by 2.4%	1,489
Scenario #2	Increase 0.4% annually	1,575
Scenario #3	Increase 2.2% of projected county population	1,899
Scenario #4	Increase by 2% annually	2,412

It is important to note that these scenarios are simply "best guesses" of the possible future. A wide variety of events can dramatically change these projections. For example, decisions to annex large land areas to the city or the success of economic development projects bringing new employment to the area, such as the Satsop Industrial Park, may place added growth pressures on the city. It will be important for the city to monitor population growth and make adjustments as new information becomes available.

Population Profile

The most recent demographic information specific to McCleary is from the 2000 US Census. The US Census Bureau is just beginning to release general demographic information from the 2000 count by city, with more specific information by census tract due later in 2001 and 2002. The tables below present data about McCleary residents concerning sex and age, race, and household types.

Table 4: City of McCleary Residents by Sex, 2000 US Census

Sex	Number	Percent
Male	693	47.7
Female	791	52.3

Table 5: City of McCleary Residents by Age, 2000 US Census

Age	Number	Percent
Under 5 years	98	6.7
5 to 19 years	294	20.2
20 to 44 years	477	32.8
45 to 64 years	312	21.4
65 years and over	273	18.7

Table 6: City of McCleary Residents by Race, 2000 US Census

Race	Number	Percent
Total population	1,454	100.0
One race	1,403	96.5
• White	1,372	94.4
• Black or African American	3	0.2
• Asian	13	0.9
• Native Hawaiian or other Pacific Islander	4	0.3
• Some other race	0	0.0
Two or more races	11	0.8
Hispanic of any race	32	2.2

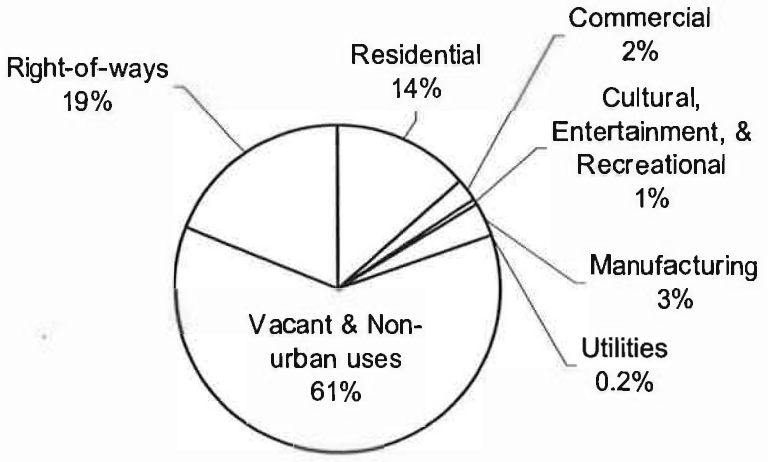
Table 7: City of McCleary Residents by Household Type, 2000 US Census

Household by Type	Number	Percent
Total households	555	100.0
Family households	377	67.9
• With own children under 18 years	178	32.1
Married-couple family households	279	50.3
• With own children under 18 years	118	21.3
Female householder, no husband present	76	13.7
• With children under 18 years	48	8.6
Non-family households	178	32.1
• Householder living alone	151	27.2
• Householder 65 years and over	73	13.2
Households with individuals under 18 years	194	35.0
Households with individuals 65 years & over	155	27.9
Average household size	2.48	--
Average family size	3.00	--

Land Use

Land uses in McCleary are typical of a rural community that has evolved around a single large, industrial employer, the Simpson Door Company. The official city boundaries encompass 1,205 acres or 1.9 square miles, making McCleary the sixth largest municipality in area in Grays Harbor County.

Figure 8: McCleary Land Uses by Percent of Total Land Area



The Grays Harbor County Assessor lists 26 different land uses in the community as shown in Table 8 on the next page. Vacant and non-urban uses make up the single largest land use category in McCleary, covering 740 acres or 61% of the city. These lands consist of undeveloped residential, commercial, and industrial parcels as well as timberlands classified under RCW 84.33. The timberlands themselves account for 578 acres or 78% of all lands in this category. Most of this land is in large parcels, although the undeveloped residential and commercial parcels tend to be much smaller. Currently, the city designates only 161.1 acres, or 16% of its total land area, as under its Forest Zoning District.

Right-of-ways that include highways, streets, alleys, and railroads make up the next largest land use. These cover 19% of the city or 226 acres and fall under a variety of zoning districts.

Developed residential areas extend over 14% of the city, a total of 163 acres. Parcels with single-family homes make up 94% of all residential lands, followed by apartments with five or more units, homes with two to four units, and mobile home parks. The city has designated 34% of its land base, or 347 acres within its single-

Table 8: Land Use Codes, Number of Parcels, Total Acres, and Assessed Value for City of McCleary Parcels, 2001

Land Use	Land Use Code	Number of Parcels	Total Acres	Value
Household, single family unit	11	487	152.9	$ 35,603,045
Household, 2 to 4 Units	12	13	3.0	$ 1,179,920
Household, 5 or more units	13	4	5.2	$ 1,879,455
Mobile home parks or courts	15	1	2.3	$ 60,000
All other residential not elsewhere coded (bare land platted & outside plats and sheds in city limits)	18	112	138.3	$ 1,523,475
Lumber and wood products	24	1	0.2	$ 6,331,275
Industrial land	36	3	45.2	$ 958,500
Industrial land with building	37	1	8.5	$ 202,920
Utilities	48	1	0.2	$ 20,000
Commercial land	50	23	8.7	$ 449,743
Retail trade - general merchandise	53	1	0.8	$ 278,500
Retail trade - food	54	1	0.3	$ 347,000
Retail trade - automotive, gas stations, parts stores	55	4	0.8	$ 953,113
Retail trade - eating & drinking, restaurants	58	3	0.3	$ 203,250
Other retail trade	59	5	2.5	$ 683,000
Commercial land with single family residence	60	18	2.6	$ 856,325
Finance, insurance, & real estate services	61	3	0.7	$ 385,000
Personal services	62	3	1.3	$ 1,052,530
Professional services	65	3	0.6	$ 206,325
Governmental services	67	3	1.6	$ 210,825
Educational services	68	1	6.0	$ 2,467,700
Miscellaneous services	69	14	8.7	$ 2,670,375
Public assembly - church	72	4	1.7	$ 847,250
Recreational activities - RV parks	74	1	6.6	$ 57,620
Classified forest land RCW 84.33	87	13	578.3	$ 1,226,253
Undeveloped land	91	1	2.0	$ 9,500
Subtotal		724	979.0	$ 60,662,899
Right-of-ways			226.1	
TOTAL			1,205.1	$ 60,662,899

Note: The assessed values above include tax-exempt properties, such as public properties and churches.

family and multi-family zoning districts. The 2001 total assessed value of all developed residential lands is $38,722,420.

Commercial lands under the Assessor's land use codes include parcels with structures conducting trade and services activities as well as educational and governmental services. Developed commercial parcels cover 26 acres or 2% of the total city. Ten percent of lands in the city, or 104.1 acres, have a commercial zoning designation. The 2001 total assessed value for these parcels is $10,313,943.

As significant as manufacturing is to McCleary, 41.3 acres, only slightly more than 3% of the total land area, is devoted to this use. However, the city has placed 420 acres, or 40% of its land base, into an Industrial zoning district. Although there are just three developed parcels in this category at the present time, they have a total assessed value of $7,402,695.

Lands used for cultural, entertainment, and recreational activities cover account for 8.3 acres or less than 1% of all lands. The assessed value for these uses is $962,490.

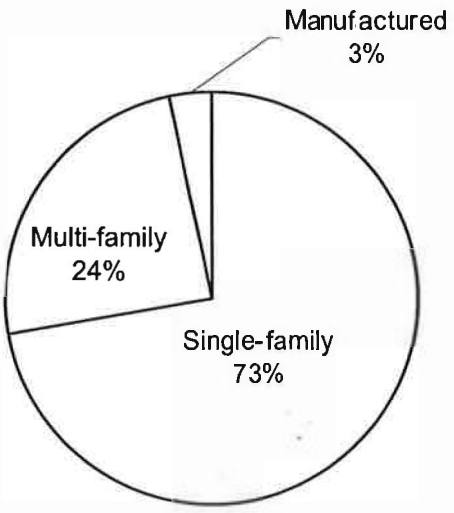
Housing

Statistics from the Office of Financial Management (OFM) for 2000 show there are 716 housing units within the city limits. Multi-family housing units have seen substantial growth over the last ten years, followed by manufactured homes. The number of single-family homes continues to grow as well.

Table 9: City of McCleary Housing-types, 2000 OFM

Housing-type	1990	2000	Percent change
One-unit	498	517	4%
Two or more units	82	175	53%
Manufactured home/trailer	14	24	42%
Total units	594	716	17%

Figure 9: Housing-Types by Percent of Total Housing, 2000 OFM



Single-family housing units account for nearly three-quarters of all homes in McCleary. Homes with two or more units make up another quarter. Manufactured homes are only 3% of the housing stock, which is the lowest rate of any community in Grays Harbor County.

The records of the Grays Harbor County Assessor as of May 2001 offer a considerable source of housing data. For instance, they indicate that the median year of construction for single-family residences was 1950. The top three years for the most homes built in McCleary were: 1912 (38), 1924 (28), and 1978 (25). The past ten years, 2001 – 1991 saw 38 single-family homes built.

The median size for all single-family homes, without counting garages and carports, is 1,192 square feet. The median size for single-family homes built in the last ten years grew to 1,245 square feet. The median assessed value for structures on parcels with single-family homes is $50,390. The median lot size was 9,030 square feet and the median lot value was $21,000. Vacant residential lots have a median lot size of 12,253 square feet.

The 2000 US Census also provides data about housing in the City of McCleary. Table 9 summarizes information about housing occupancy and tenure.

Table 10: Housing Occupancy and Tenure, 2000 US Census

Housing Occupancy & Tenure	Number	Percent
Total housing units	583	100.0
Occupied housing units	555	95.2
Vacant housing units	28	4.8
• Homeowner vacancy rate	–	2.7
• Renter occupied vacancy rate	–	6.1
Homeowner housing units	355	64.0
Renter housing units	200	36.0
Average household size for owner-occupied units	2.57	–
Average household size for renter-occupied units	2.33	–

Public Facilities and Services

City Owned and Operated Facilities and Services

The city provides basic government services and a municipal court; law enforcement; fire protection; public water and sewer; electricity; a community center; parks and a city cemetery. The city contracts for solid waste collection and disposal services with LeMay Enterprises.

Public Buildings

Public buildings owned and operated by the City of McCleary include the City Hall, Fire Department, and City Shop complex located adjacent to each other on a parcel of land downtown on 3rd Street. The City Hall itself is somewhat crowded serving both city functions and the Timberland Library branch. The city completed a remodel of the Community Center, located at the west end of the city on Simpson Avenue, in the spring of 2001. The Center, with a capacity for approximately 80 people, is available for community events year round.

The city has a storage warehouse know as the "float shed" adjacent to the wastewater treatment plant. This facility serves as a storage location for food bank supplies and the city's parade float. A new Transit Center owned by the city is south of the City Hall on 3rd Street. In addition, the city owns a 12-acre former gravel pit on Mox-Chehalis Road East south of State Route 8.

Police Department

The City of McCleary Police Department is responsible for law enforcement. The Department is located in the south portion of City Hall with no direct access from the Department to other areas in City Hall. Staffing includes a chief, three commissioned officers and five reserves. The Department has five vehicles: a chief's car, three black and white patrol cars and one vehicle for the reserve force. Call response time is five minutes or less. Over 60% of police activity is related to traffic management. The city police officers also frequently respond to traffic problems outside the city limits on SR 8 and 108 due to the proximity of these state routes to the department. The city has an inter-local agreement with the Grays Harbor County to house its prisoners at the county correctional facility.

Fire Protection

The City of McCleary Fire Department, located in a free standing building adjacent to City Hall, provides fire suppression for the city. This in an all volunteer department with a chief and approximately 25 volunteers. The department has 1998 and 1972 pumper trucks and all new equipment. Rural Fire District #12 stores a tanker truck in the department's building which is available for city use. Response time is 5 minutes or less. The city has a mutual aid agreement with Fire District #12 and the City of Montesano has a ladder truck available to respond to requests for assistance in case of fire at the Mark Reed Hospital or Simpson door plant.

City Parks and Cemetery

Beerbower Park, located adjacent to City Hall on 7 acres, is a fully developed active public recreation area. Facilities include a lighted ball field, tennis court, basketball half court with two goals, picnic area with shelter, fenced play area, restrooms, and horseshoe court. A covered display with a historic steam locomotive from the original Henry McCleary Mill and antique fire engine plus an adjacent information kiosk are at the park entrance on Curran Street. There is an off street parking lot easily accessible to the park at the corner of Fir and 1st Streets. The park serves at the site for the annual McCleary Bear Festival every summer in July.

There are two other city-owned recreation spaces. Eddie Beirs Memorial Park is a small passive recreational area that is 0.02 acres. It lies between South 1st and South Main Streets. The park has landscaping and a picnic table. The one-acre parcel at the McCleary Community Center has a small wooded area and playground equipment. This site is neither fenced nor landscaped.

The City cemetery is located on Simpson Avenue directly to the west of the Community Center. The community uses approximately one acre of the cemetery; there is some additional acreage available for expansion.

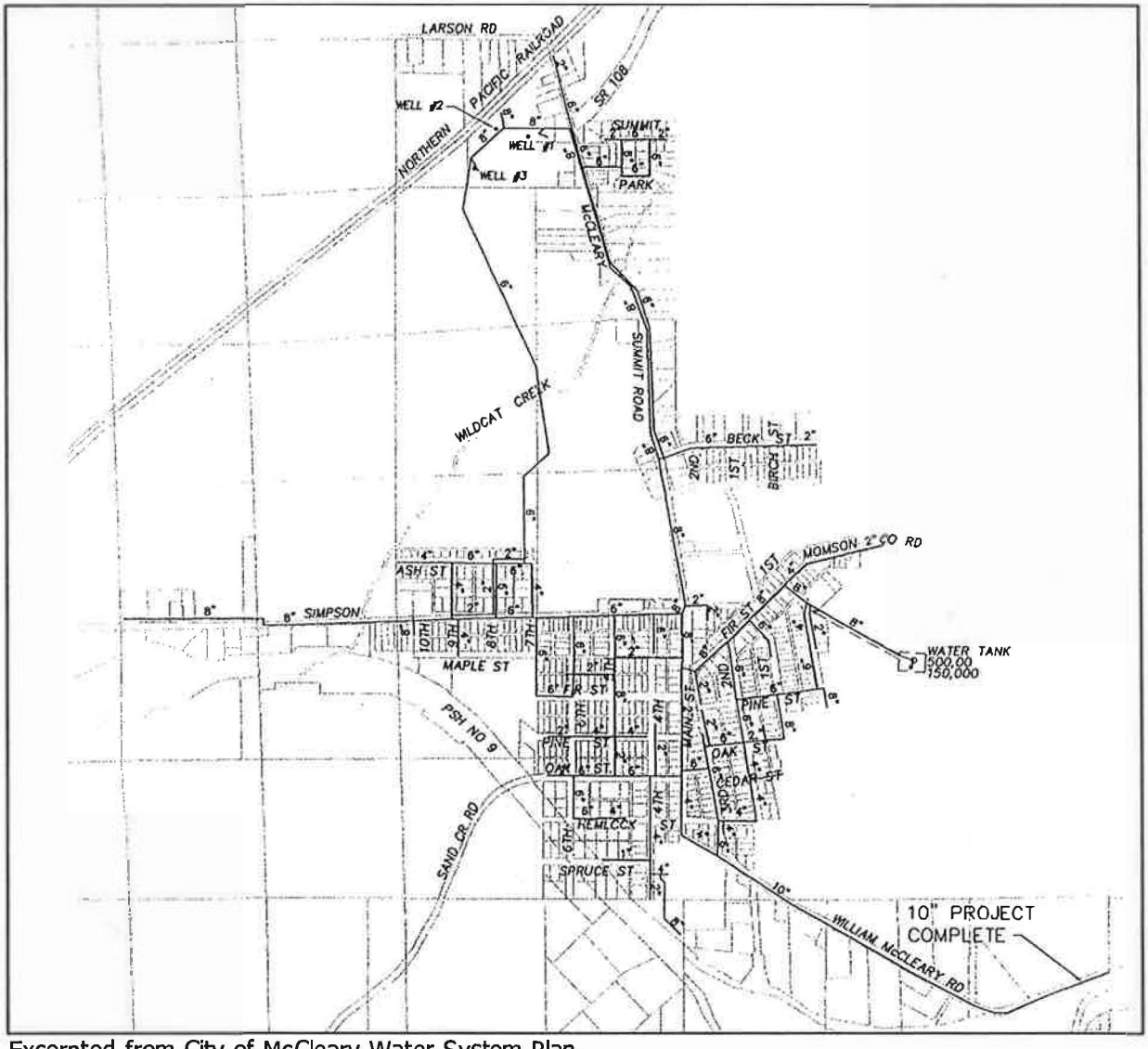
There is no planned expansion of the city's park system; however, any large annexations to the city will require the acquisition of additional parkland to meet minimum standards. The cemetery is beginning to reach capacity and the city anticipates an expansion will become necessary within the next 20 years.

Water System

The City of McCleary owns and operates a Group A municipal water supply system serving the city and adjacent service area. There are 681 water service connections within the city limits and approximately 30 residential connections located outside the city limits. According to the most recent data, the system produces around 81.24 million gallons of water annually. Residential, commercial and industrial customers use approximately 84% of this supply. The remaining 16% is unaccounted water, which can include leaks and services without meters, such as the city parks, cemetery and the McCleary Bear Festival.

There are three wells serving the system, all located near the intersection Summit and Larson Roads. The primary source of supply for the system is Well #2 with well #3 used as a back-up during periods of high demand. Well #1 is inactive and unconnected to the system due to its shallow depth in the aquifer. Pumping capacity is 330 gallons per minute (gpm) for Well #2 and 500 gpm for Well #3. The current average daily flow is 22,562 gallons per day. The treatment system uses chlorine to disinfect and polyphosphates to remove high levels of iron and manganese.

Figure 11: Water System



Excerpted from City of McCleary Water System Plan

Two steel reservoirs for water storage, 500,000-gallon and 150,000-gallon tanks respectively, are on the east side of town and provide a combined capacity of 650,000 gallons. The current storage requirement for the city is 270,00 gallons and the available storage capacity is 467,920 gallons. The water distribution system, as shown in Figure 11, has of 54,340 lineal feet of pipe of various widths.

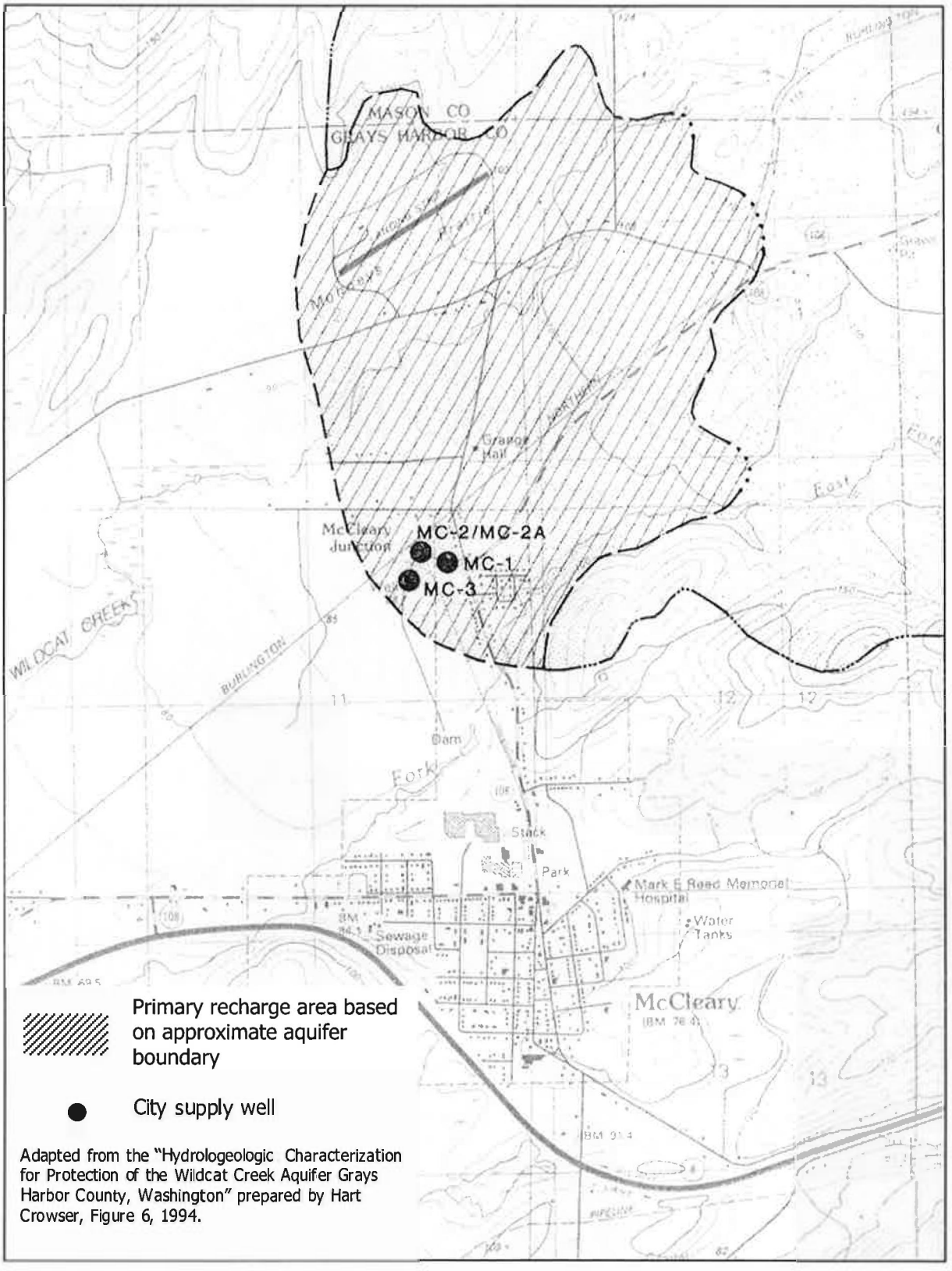
The existing water system is more then adequate to accommodate projected growth to the year 2020, assuming there is no addition of a new large volume commercial or industrial user. There is no need for additional reservoir capacity unless the city annexes any large land areas or aggressively extends water connections outside the city limits. However, long-range capacity analysis indicates that if a higher then expected growth rate occurs, an additional well or the installation of a new 300,000-gallon reservoir will be necessary.

The current system has a fire flow capacity of at least 500 gallons per minute with the exception of Ash Street between 9th and 10th and Cedar Street. Adding a 12-inch main from the reservoir to Cedar Street and Hemlock and looping within the system will solve these problems. It will also increase fire flow within the existing commercial area to 1,000 gpm or greater. Areas of concern include providing industrial fire flow and minimum fire flow to all residential areas in the city. The city does not have adopted fire flow standards; however, total storage capacity required to provide fire flow, 120,000 gallons, is adequate.

The Simpson Timber Company operates its own water system for fire protection at the Simpson door plant. This is a non-potable system for fire protection only. The system includes an impounding dam on Wildcat Creek that provides approximately six acre-feet of water. A 22-inch supply main transports water from the dam to the pumping plant. The pumping plant has a capacity of 3,850 gpm at 110 psi.

All city wells rely on the Wildcat Creek Valley aquifer for their supply. Given the geologic and soil make-up of the valley, this aquifer is highly susceptible to point and non-point contamination by land uses. The 1994 HartCrowser aquifer study delineated the aquifer through a generalized well field recharge area map.

Figure 12: Primary Recharge Area Map



As Figure 12 shows, the majority of this primary recharge area lies outside of the city's jurisdiction in Grays Harbor County.

The city developed a wellhead protection program in 1998. The most common potential threats to the water supply in McCleary are residential on-site sewage disposal systems and accidental spillage of hazardous substances along SR108 and the Puget Sound and Pacific Railroad Company tracks. A public education campaign and plans for hazardous spill response are in place.

There are no significant deficiencies in the system, but the city's 1999 Water System Plan recommended the following improvements over the 20-year planning horizon:

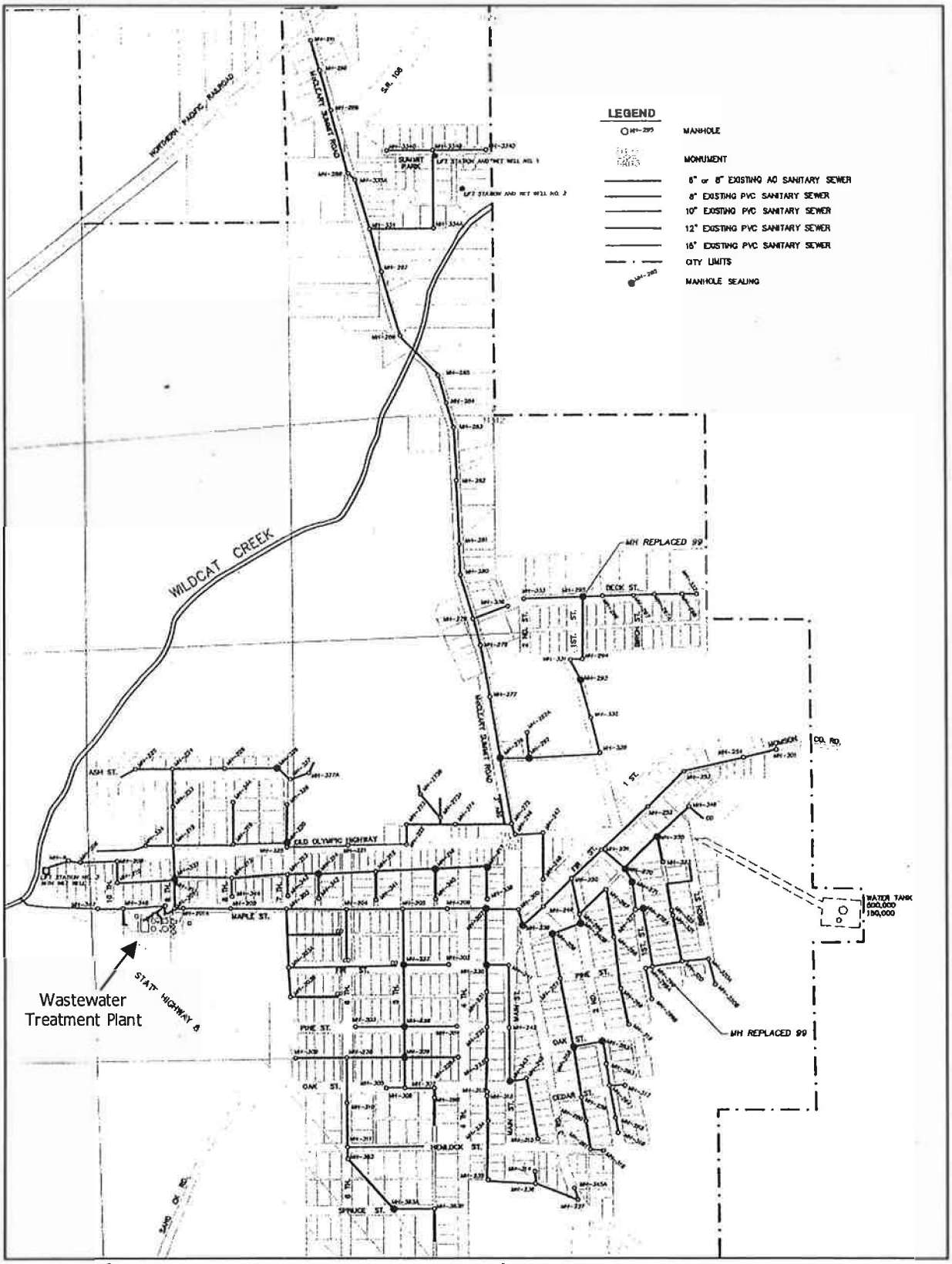
1. Source: Redevelop Well #1 to maintain water rights, automate Well #3, and monitor aquifer levels.
2. Storage: A new reservoir.
3. Distribution System: Main improvements to reduce water leaks, fire flow improvement, and growth driven improvements if development occurs south of State Route 8.
4. Treatment: Upgrade hypo-chlorination system.

Sewer System

The City of McCleary operates a sewage collection and treatment system. The collection system relies on approximately 53,000 feet of pipe, as shown in Figure 13 to deliver sewage to the wastewater treatment plant. The city first built the plant in 1952 and substantially upgraded it in 1982. There are 674 sewer connections and 593 sewer accounts within the city limits. The only significant commercial or industrial user is the Simpson door plant.

The majority of sewage flows by gravity to the city's wastewater treatment plant located south of Simpson Avenue between 9th and 10th Streets. There are three small lift stations: Lift Stations 1 and 2 serve the Summit Park area at the north end of the city and Lift Station 3 serves an area adjacent to Wildcat Creek at the west end of the city.

Figure 13: Sewer System



Excerpted from City of McCleary Wastewater Facility Plan

The city operates a trickling filter/anaerobic digestion wastewater treatment plant. The plant is designed to treat a maximum monthly flow of 0.25 million gpd. Current maximum average monthly flows are 0.43 gpd. Effluent is discharged at an outfall 50 feet downstream of the confluence of Sam's Canal and the East Fork of Wildcat Creek. Treatment plant effluent constitutes 10 to 15% of the total creek flow during seasonal low flow conditions. The plant dewaters sludge and biosolids, which the city stockpiles and composts.

The wastewater treatment plant is inadequate to meet the needs of the existing population and cannot accommodate any growth without significant improvements. The city received Notice of Violation of their National Pollution Discharge Elimination System Permit (NPDES) for exceeding flow and water quality standards in 1996. In 1997, the state reissued the city's NPDES permit with conditions specifying the city undertake studies, develop design plans and complete required capital projects within a designated timeframe.

To meet the permit requirements, the city began addressing infiltration (groundwater entering the system) and inflow problems (surface runoff entering the system) in 1998 and 1999. A Wastewater Facilities Plan prepared in 2000 recommended projects that will meet both the NPDES permit stipulations and projected population increases to the year 2020. The city anticipates completion of the appropriate improvements as follows:

1. Wastewater Treatment Plant upgrade and expansion that includes: replacement of the existing treatment process with a sequencing batch reactor activated sludge treatment process; installation of a UV disinfection system to replace the existing chlorination/dechlorination disinfection system; repair of plant outfall; and, a new sludge handling system. The expanded treatment plant will be designed to treat a maximum monthly average flow rate of 0.57 million gpd. Completion date: 2004.
2. Simpson Avenue sanitary sewer extension. Completion date: 2008

3. Exiting collection system and pump station maintenance and replacement, including infiltration and inflow correction. Completion date: 2006
4. Second phase composting facilities expansion. Completion date: 2014

Stormwater

The city's major stormwater facility is Sam's Canal. The Canal runs east to west through the city and goes under Maple Street from 2nd to 7th Streets. Additional facilities include street ditches and/or culverts. The city does not have a stormwater management plan or ordinance, but it has adopted the Washington State Department of Ecology's 1996 Stormwater Management Manual for stormwater guidelines. The current stormwater system is adequate according to the city's 1992 Capital Improvement Plan, but should be reviewed in light of new environmental standards.

Electricity

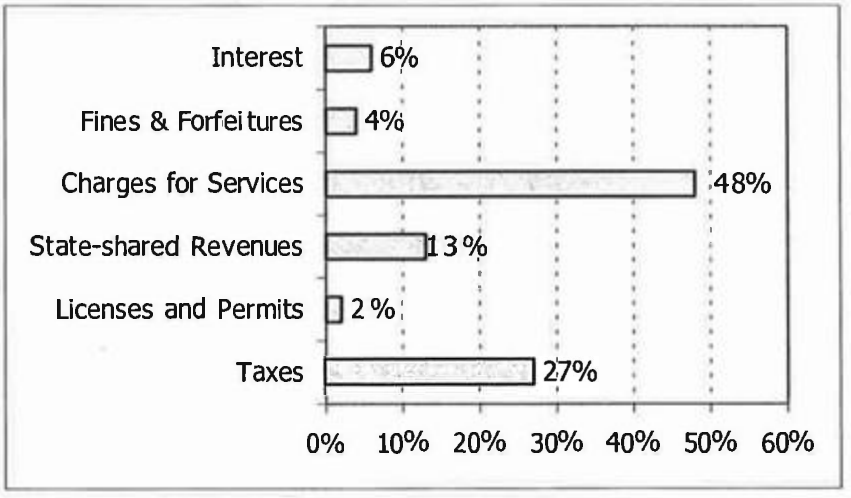
The City of McCleary purchases electricity from the Bonneville Power Administration (BPA) and distributes it throughout the city. The city also provides electric services to about 200 residential customers outside the city limits, mainly to properties to the north of the city. The power distribution system uses a combination of above ground and underground lines. A new substation built in 1999 is part of a complete system upgrade that will be finished in 2004. The city recently signed a new 10-year agreement for supply with BPA. At this time, growth is not limited by the availability of electricity.

Financing City Facilities and Services

The City of McCleary depends on a combination of revenues to finance the city services. The major funds in the city's annual budget are Current Expense, Parks and Cemetery, Street, Light and Power, Garbage, Water and Sewer. Expenditures from these funds are made for two purposes: operations and maintenance and capital expenditures for items that are expensive and have a service life of more then one year.

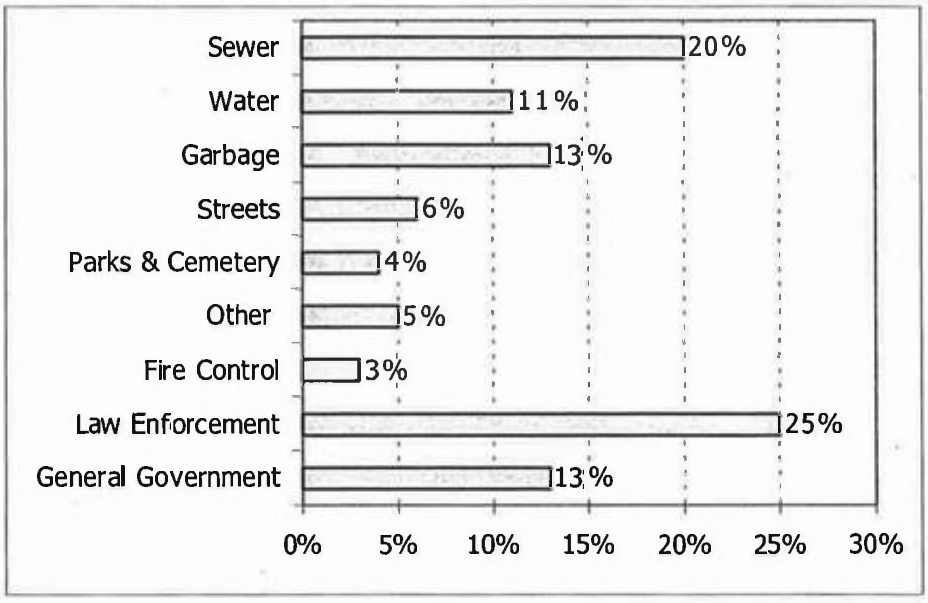
General property taxes are a significant revenue source for the city and it is important to note that the community has not added any new residences or commercial structures on its tax rolls in the past several years. The city's assessed value grew by only 2% from $54,603,420 in 1998 to $55,751,896 in 2000, which is less then the current rate of inflation. Other revenue sources are sales taxes, fines, interest and state shared revenues such as the motor vehicle fuel tax and sales tax equalization help pay annual expenses. Service charges cover operating expenses for water, sewer, electricity and garbage. State and federal grants programs supplement local revenue sources.

Figure 14: Average Revenue by Source & Percent, Fiscal Years 1999 & 2000



Capital expenditures make up approximately 16% of total expenditures. The city currently has one outstanding capital debt, the sewer revenue bond that will retire in the year 2022. There is no other long-term debt anticipated at this time. The city presently depends on grants to finance capital projects, such as street improvements and the recently constructed Transit Center.

Figure 15: Average Expenditure by Function & Percent, Fiscal Years 1999 & 2000



The city's most expensive planned capital improvements relate to the sewer and water systems. Costs for the sewer system improvement are necessary for bringing the system into NPDES permit compliance for existing users. The Wastewater Facilities Plan recommends that the city immediately seek grant and low interest loan funding for upgrading the wastewater treatment plant. Other recommendations for revenue enhancement are increasing service charges, relying on volunteer/self-help where possible, and allocating approximately 10% of annual rate revenues to the city's Capital Replacement Account to fund replacements and repairs overtime. The city's Water System Plan recommends funding for system improvements; except for a new storage reservoir, if needed, with modest rate and connection fee increases.

Table 11: Sewer and Water Capital Improvements, Years 2000 - 2020

Improvement	Cost
Sewer	
• Treatment Plant Upgrade	$4,730,000
• I & I Correction	$47,500
• Simpson Avenue Extension	$654,000
• Composting Expansion	$40,000
• Subtotal	$5,471,500
Water	
• Source	$53,900
• Main Replacement	$20,020
• Fireflow	$408,045
• Storage*	$444,000
• Subtotal	$925,965
Total Cost for Sewer & Water Improvements	$6,397,465

Financing other new capital improvements will be a challenge for the city. The most common approaches are: government grants and low-interest loans, bonds, and local improvement districts. Current policy is to depend on grants to fund all new capital projects other then sewer and water. The city has been very successful to date in securing grant funding, but it is important to remember competition for limited public resources is always high. Developer agreements are a tool available to the city to deal with future growth. These agreements assure that growth pays its fair share of the necessary improvements to service their property.

Other Public Facilities and Services

There are four other public service providers located within the corporate limits: School District #65, Hospital District #1, a branch of the Timberland Regional Library, and the U.S. Postal Service. East Grays Harbor Medic #1, located in the City of Elma, is responsible for emergency services for the community and Grays Harbor 911 provides all dispatch for police, fire and the hospital.

McCleary School District #65

McCleary School District #65 covers 20 square miles and provides a full range of educational services for children from kindergarten through 8th grade. Student enrollment has remained very stable over the past 15 years with an annual average

of 284 students. Enrollment has decreased slightly since the 1996-97 school year from 301 to 266 students to-date for the 2000-2001 school year. The District also operates a preschool program serving about 50 students. Elma High School, located in the City of Elma about 10 miles west of McCleary, is the designated high school for resident secondary students. The District operates busing services to this site. Secondary students may also chose to attend another high school in the area, but must provide their own transportation.

All school facilities are located on South Main Street. Facilities include aK-8 grade school and administrative service building and a large outdoor recreation area with football field, running track, softball diamond, and playground equipment. The school building, constructed in 1949, has had several major additions and the community passed a recent six-year levy for new facility improvements. The District has ample capacity to meet growth projections for the City of McCleary. Rapid growth trends outside the city limits in the District's service area, however, may influence facility capacity needs in the future.

McCleary Timberland Library

The McCleary Timberland Library, located in a small space in City Hall, is a branch of the Timberland Regional Library which services Grays Harbor, Lewis, Mason, Pacific, and Thurston Counties. The Library is open 20 hours a week at various hours. Residents can access additional library services through the regional system. The library facility is very small and community efforts are underway to address this issue. The city is responsible for providing physical facilities for the library.

Mark Reed Hospital

Hospital District #1 operates Mark Reed Hospital located on the east side of the city on South Birch Street. This is a community hospital with 5 inpatient beds, 24 hour emergency services, and specialty and after hours clinic services. The hospital has radio contact with Grays Harbor Medic #1 and a helicopter pad for patient evacuation to other medical facilities as needed.

McCleary Museum

The McCleary Museum is a private museum with an all-volunteer staff. The museum in located in the Carnell House on 2nd Street. The museum is open June through August on weekends and by appointment. The museum displays historical items from the area and has an extensive collection of documents indexed as a research tool for genealogical studies and local history.

Other Providers

The U.S. Postal Services operates a Post Office in the city with a combination of home delivery and box services. The Post Office has its current building on South 4th Street, but it plans an expansion to a new site in the future. CenturyTel, Cascade Natural Gas, and AT&T provide telephone, natural gas and cable television services.

Transportation

The majority of transportation facilities to, from, and within the City of McCleary are state roads and city streets and sidewalks. McCleary has a flashing caution signal and except for a small pedestrian footbridge that crosses Sam's Canal near City Hall, there are no bridges.

State Routes

State Route 8 (SR 8) is a limited access road crossing a corner of the southwestern portion of the city for a little over three quarters of a mile from west to the east. This is a major road linking traffic from the southern Olympic Peninsula and Grays Harbor County to the City of Olympia and Interstate 5. Washington State Department of Transportation (WSDOT) traffic counts just west of the city limits (Mile Post 6.03) indicate this route had 13,750 average daily trips (ADT) from 1996 to 1999.

SR 108 serves as a link north from SR 8 to U.S. Highway 101. It begins just west of the city and terminates four miles south of Shelton in Mason County. SR 108 serves as the main west-to-east arterial road through the city along Simpson

Avenue to Curran Street as well as the main south-to-north route on Summit to the city limits. SR 108 is a limited access route for 1.1 miles from Beck Street north. Traffic counts along SR 108 reflect both inter- and intra-city travel. ADT increased by 12% on Simpson Avenue and by 20% on Summit Avenue north to the city limits from 1996 to 1999. WSDOT actual traffic counts in 1999 were 5,100 ADT along Simpson Avenue, 4,200 ADT north on Summit Road, and 2,700 ADT at the northeast city limits.

City Streets

The city street network has 9.54 miles of roadway. The city's arterial street system includes

- SR 108;
- 3rd Street southeast to the city limits at SR 8;
- 4th Street;
- 6th Street;
- Simpson Avenue to Maple Street;
- Maple Street from 3rd to 6th Streets;
- Fir Street from Birch to Pine to 3rd Streets; and
- Main Street, Simpson Avenue to 3rd Street.

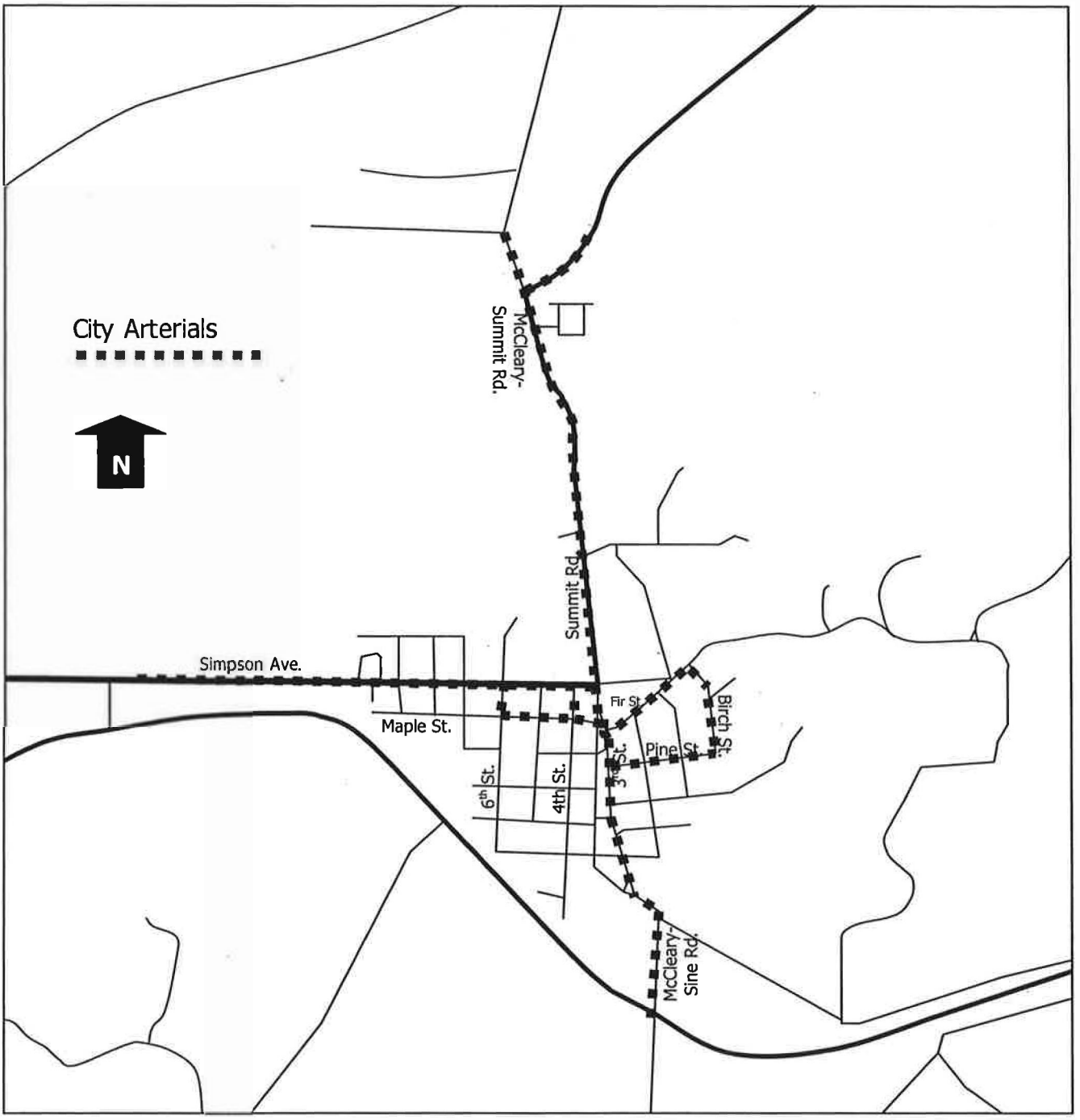
Simpson Avenue and Summit Road (SR 108) are included because they serve as integral components of the city's street system. All other city streets are local collectors.

Table 12: City of McCleary Street by Type and Linear Feet

Type	Length
Arterial	10,700
City Arterial	10,250
Local Collector	29,500
TOTAL	50,450

Figure 16 on the next page shows the location of arterials and city arterials

Figure 16: City of McCleary Designated Arterials and City Arterials



The street pattern is a classic grid with most streets having an asphalt or chip seal surfacing. Streets in the downtown core and south along 3rd Street to the new Transit Center have sidewalks. There is a small public, paved parking lot at the corner of Fir and Curran Streets serving the City Hall complex and Beerbower Park.

The city's current street system can accommodate some limited growth in the developed areas, but it needs street improvements, such as resurfacing and widening as well as sidewalk repair. The city's Six-Year Transportation Improvement Program for the years 2000 to 2005 projects a need for $760,000 in street and sidewalk improvements and $1,000,000 for new construction. Current city policy is to rely on intergovernmental revenue sources and grants to fund the street projects identified in the Program. Funding sources for routine operation and maintenance will be locally generated revenues. There is one sizable new WSDOT road project in the planning phase, an SR 8 overpass connecting McCleary Sine and Mox Chehalis Roads.

Major street projects are necessary to accommodate growth in all undeveloped areas of the city. New streets must be capable of supporting the development they serve. It is critical that the design of these streets assure appropriate linkages to existing streets and coordinate with utility system plans including stormwater management. Substantial new growth to the northwest will require an expansion of the city's arterial system. Growth south of SR 8 will require an entire new system of arterial streets, local collectors and sidewalks.

Safety is another consideration as population and traffic volume increase; especially the danger of conflicts between pedestrians, bicycles and vehicles. A caution signal at the Simpson and Curran Street intersection and additional marked crosswalks should be a consideration if ADT increases significantly on SR 108. It is important to monitor all school bus routes for safety issues as traffic volumes grow. New streets should be required to serve vehicle, bicycle, and pedestrian traffic to guarantee safety of residents and visitors. Any development south of SR 8 will raise crucial concerns of safe north/south access across this highway. It is important to recognize the cost of providing safe and convenient travel throughout the city in the future can be substantial.

Public Transit

Grays Harbor Transit Authority provides public bus service to and from the City of McCleary. Service is available throughout Grays Harbor County and to the City of Olympia with connections available to Lewis and Pacific Counties. The city owns the new McCleary Transit Center, on 3rd and Main Streets south of City Hall. The center serves as the public bus station, offering amenities including a park-and-ride lot, covered benches, and restrooms. There are 13 round trips to and from McCleary, Monday through Friday, with reduced service on the weekends. Grays Harbor Transit also offers Dial-a-Ride to residents of the city, a door-to-door transportation service for seniors and people with disabilities.

Railroads

The Puget Sound and Pacific (PSP) Railroad Company owns the rail line that traverses through the McCleary City Limits from its southwest to its northeast corners. This east-west PSP Railroad line begins in Hoquiam and connects at Shelton with track owned by the United States Navy that serves US Naval Submarine Base Bangor. The train running through McCleary requires greater locomotive power than other short-line tracks in the area due to the heavier grade between Elma and Shelton. Normally, three locomotives are necessary for the Bangor Turn. Center-beam flats and boxcars are also common on this train as are general-service gondolas and special loads for the navy at Bangor.

The track crosses the McCleary-Summit Road at the northeast city limits and relies only on stop signs. This lower level of caution could present a hazard if substantial development happens in the northeast area of the city.

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State of Washington
Source Water Protection

Case Study: City of McCleary Public Water Supply Wells

1.0 BACKGROUND

The purpose of this study is to assess the current conditions of the City of McCleary's public water supply with respect to water quantity and water quality, and provide recommendations for protection and management strategies for future growth to both county and city officials. The study is also designed to provide guidance to Grays Harbor County residents who rely upon private domestic wells for water supply. This study is a case study for a larger effort being conducted at the State level to provide guidance to local governments in the form of training workshops and materials to include both technical (hydrogeologic) and planning (land use) concepts.

The City of McCleary draws water from the Wildcat Creek Aquifer in Grays Harbor County. A development moratorium has been imposed within the Wildcat Creek Aquifer by the county commissioners during which some of the issues raised at public meetings can be investigated and a sustainable level of development within the area can be determined. According to local sources, there are at least two subdivisions that are on hold as a result of the moratorium (The Vidette, 2007).

In order to assess the amount of groundwater available for McCleary's public drinking water supply wells, a hydrologic budget and safe yield analysis were conducted. In order to further characterize the hydrogeology within the aquifer, and how it impacts the water table, private and public well installation logs were examined and hydrogeologic studies conducted by the United States Geological Survey (USGS) among others were reviewed.

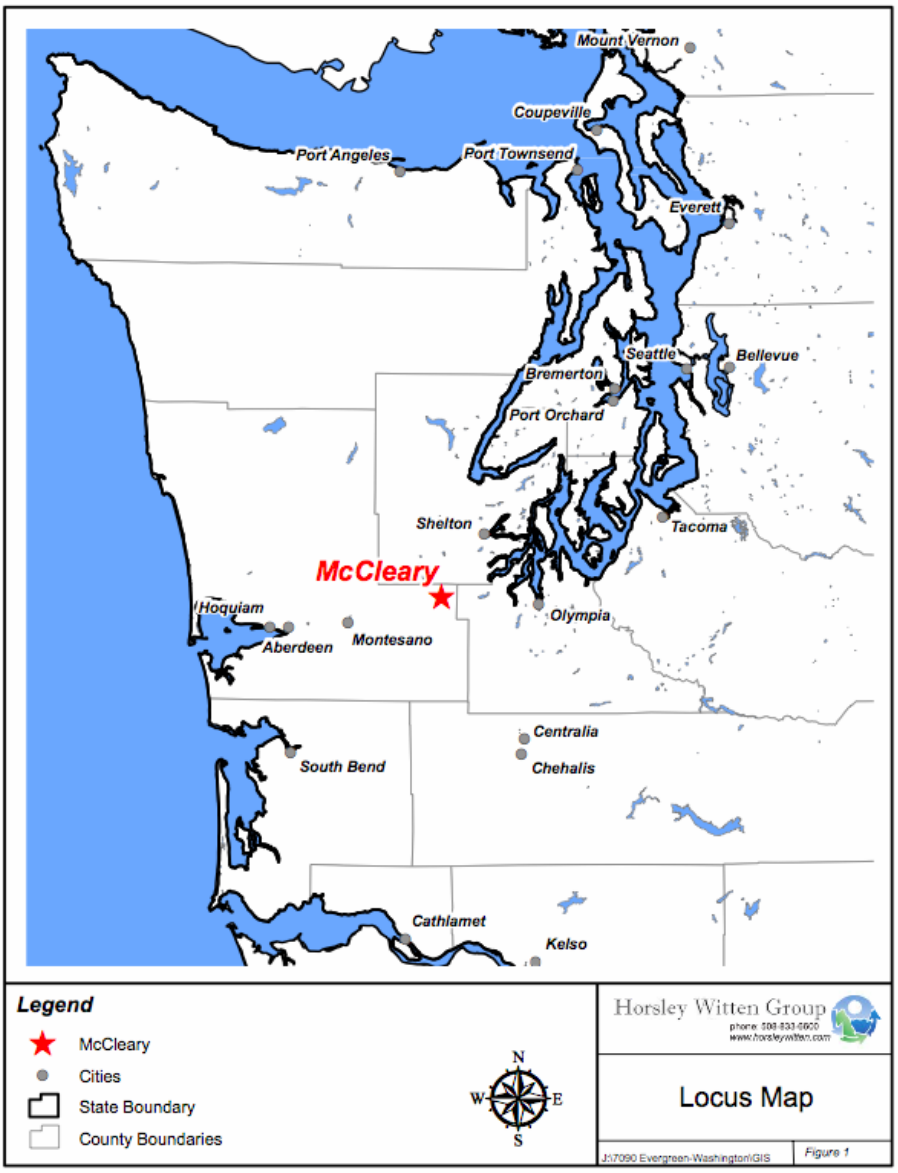
There are several types of assessment techniques which can be used to evaluate the water quality of a water resource (EPA, 2004). For the purpose of this study, a nitrogen loading analysis was conducted, since the potential threat to the regional drinking water supply is increased development in the area. Elevated nitrogen levels found in groundwater and surface waters are often directly related to increased development in their respective contributing areas, due to infiltration of nitrogen contained in wastewater effluent, fertilizers and stormwater runoff. A nitrogen loading analysis was conducted for the current conditions of the recharge area as well as the buildout conditions.

Site Description

Founded as a logging camp in 1898 (McCleary, 2007), the City of McCleary is set within the northeast corner of Grays Harbor County in the State of Washington (Figure 1). The City is experiencing growth over the last several years, partly due to its convenient location, approximately 30 miles from Interstate 5 at Olympia, and also within an easy commute to expanding job opportunities in the Thurston County area (McCleary, 2007).

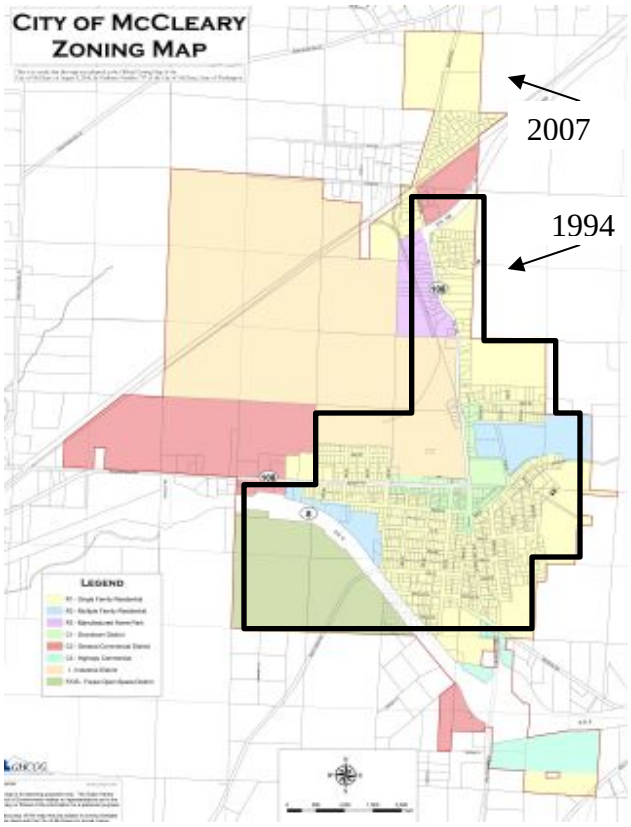
The City has also expanded geographically as a result of annexations of adjacent County lands (Figure 2).

Figure 1. Locus Map of McCleary



The County area outside of McCleary within the recharge area to the McCleary Public Wells is very rural, and is primarily composed of single family residences, agricultural land, and forested area. A small airport is also located within the northern portion of the County in the recharge area.

Figure 2. Comparison of McCleary City Boundaries.



Hydrogeologic Conditions

The Wildcat Creek aquifer system sits within a valley composed of a sequence of recent alluvial and glacial sediments overlying bedrock to depths of approximately 100 feet. The boundaries of the aquifer were more or less defined by the bedrock topography (Hart Crowser, 1994). The aquifer system is composed of two groundwater systems: a shallow unconfined glacial aquifer and a deeper partially-confined glacial aquifer system. The deeper aquifer is a "leaky confined aquifer", meaning that it has an overlying layer that is partially confining and allows some water to drain from or into the lower aquifer (Hart Crowser, 1994).

Although the relationship and interaction between the two aquifers throughout the valley is not clearly defined, local experts believe that in the area surrounding the McCleary public water supply wells, groundwater within the deeper aquifer is confined and is under pressure with an upward hydraulic gradient (Cappellini, 2007). There is also some indication that the public supply wells may be partially screened in both the upper and lower aquifers. This is important to note, since the shallow unconfined aquifer is highly susceptible to contamination.

Safe Yield

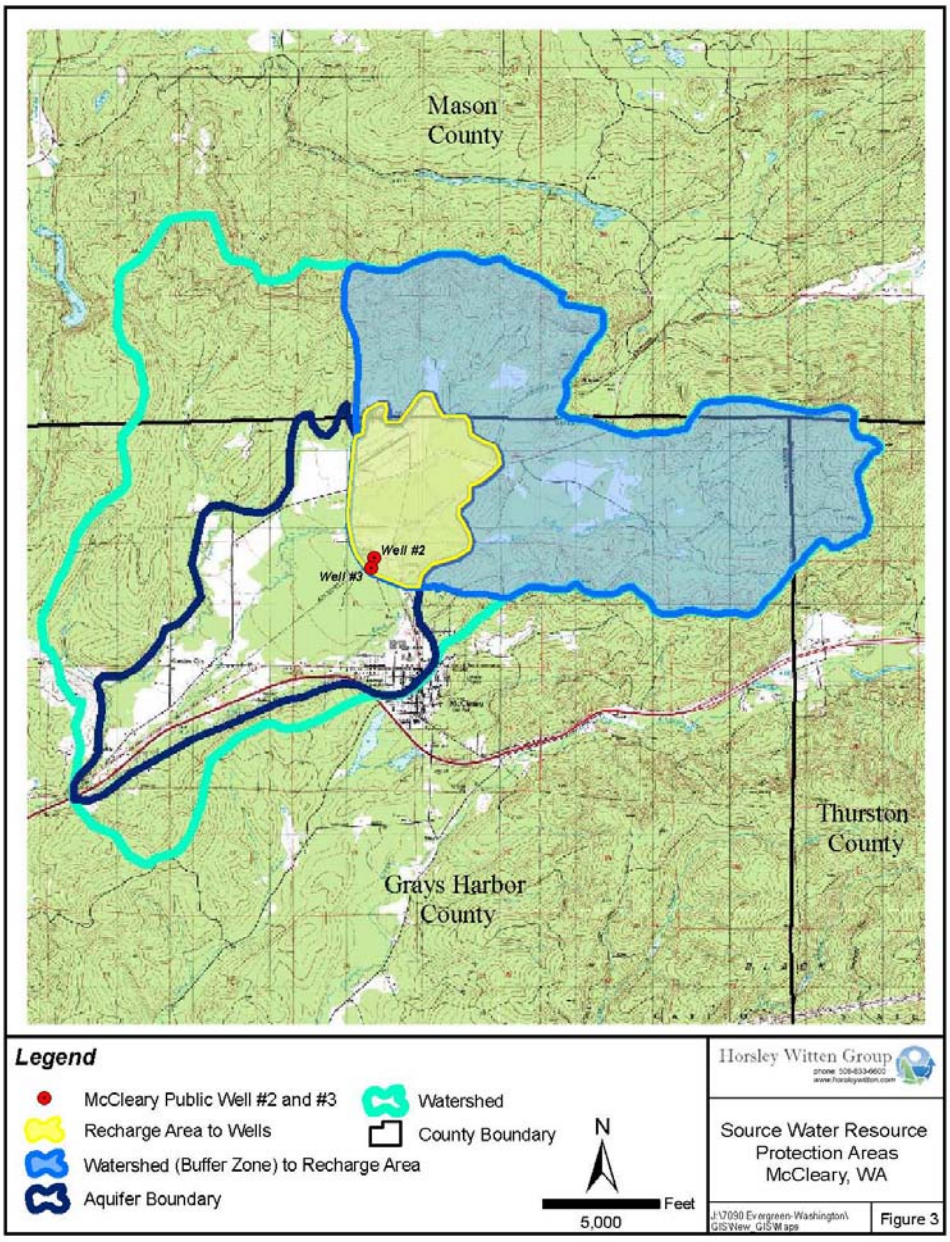
The concept of safe yield is used to determine how much water can be safely withdrawn from an aquifer. Theoretically, one can withdraw the same amount of water that is recharged. Practically, rarely can this occur without significant impacts. In the case of an unconfined, shallow aquifer groundwater withdrawals result in lowering the water table to a new equilibrium point, resulting in reduced flows to wetlands and streams with corresponding ecological impacts.

In the case of a confined aquifer (such as the one that the McCleary wells withdraw from), withdrawals will change the hydraulic gradient (or pressure difference) between the overlying aquifer and the confined unit. If sufficient withdrawals occur the hydraulic gradient (and flow direction) can be reversed. We recommend that the safe yield of the lower semi-confined aquifer that the McCleary wells draw from be established in this manner, so as to prevent the downward flow of groundwater from the upper aquifer that is more vulnerable to contamination.

Recharge Areas

The primary recharge area to the City of McCleary public drinking water wells was delineated by Hart Crowser, Inc. in 1994, based on the aquifer boundary, the direction of groundwater flow, and the Wildcat Creek watershed area. This is where infiltration of precipitation to the aquifer that is pumped by the McCleary well most likely occurs (Hart Crowser, 1994). However, the aquifer is also likely to receive runoff and recharge from the upstream portions of the watershed area of the Wildcat Creek drainage. Using USGS topographic maps, Horsley Witten Group, Inc. (HW) delineated this upper watershed area as a “buffer zone”.

Figure 3. Source Water Protection Areas



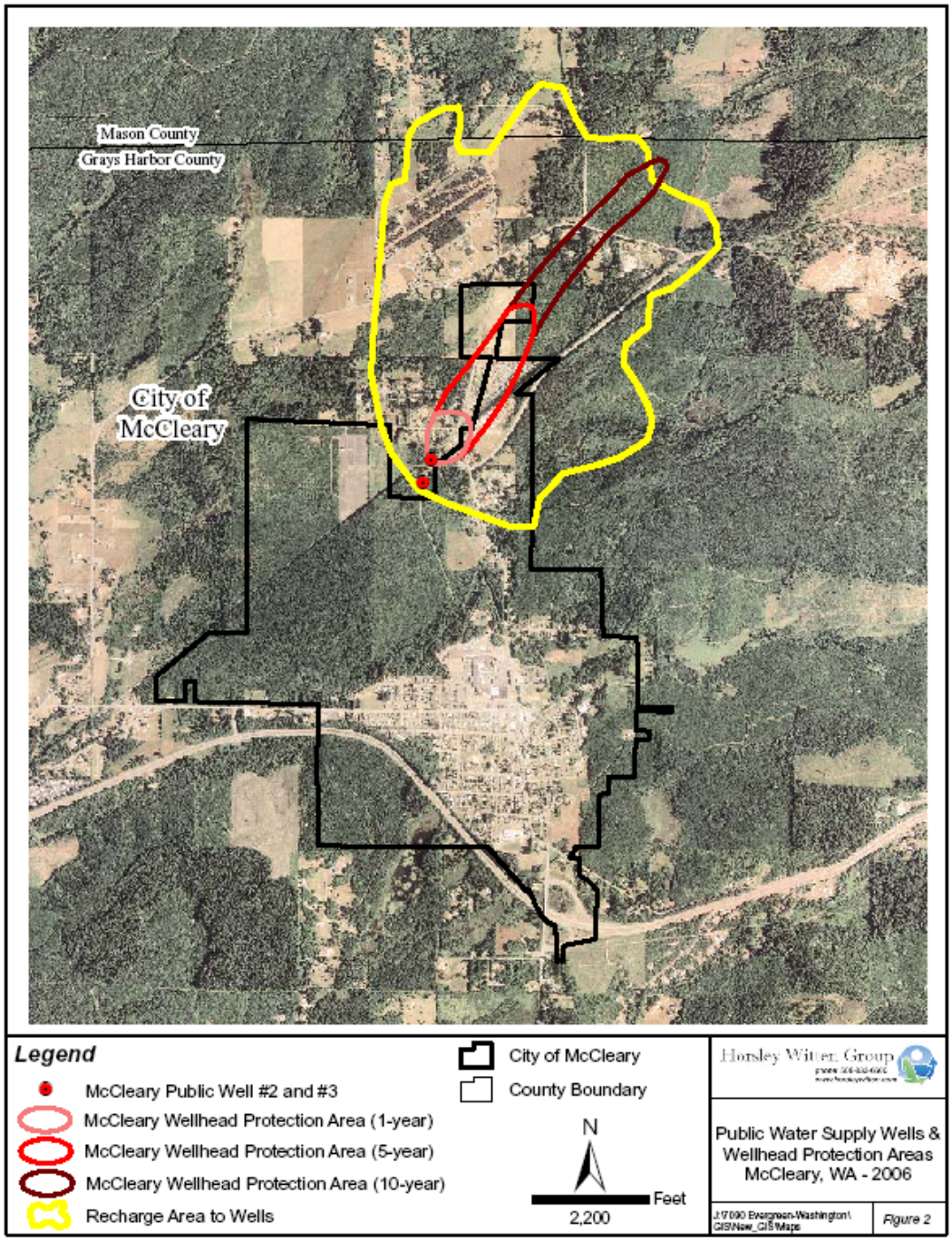
This upper watershed is characterized by fractured basalt. During our field trip in October 2007 we visited two quarries that exhibited groundwater seeps from the fractures indicating that significant groundwater recharge exists in this area and that it can be transported to the deeper aquifer via the fractures.

Basalt quarries in the upper watershed showing fractures

Groundwater seeps from fractures in basalt bedrock in upper watershed.

McCleary Wellhead Protection Areas (WPAs) were also delineated by Hart Crowser in 1994 (Figure 4). "Zone 1" is the one year horizontal time of travel boundary for groundwater, and is managed to protect the drinking water supply from viral, microbial and direct chemical contaminants. "Zone 2" is the five year time of travel boundary and should be managed to control potential chemical contaminants. "Zone 3" is the ten year time of travel boundary.

Figure 4. Public Water Supply Wellhead Protection Areas



2.0 WATER QUANTITY AND QUALITY

Hydrologic Budget

A hydrologic budget was calculated to analyze water inputs to and withdrawals from the confined aquifer. The following components were analyzed in the hydrologic budget:

- Natural recharge from precipitation;
- Wastewater discharges from septic systems;
- Stormwater runoff from impervious surfaces;
- Private well withdrawals; and
- Public well withdrawals.

However, because of the confining nature of the aquifer, the final hydrologic budget focused on the effects of natural recharge and public well withdrawals.

Natural Recharge

The study area receives approximately 59 inches/year of precipitation (Hart Crowser). Accounting for losses to evaporation and transpiration (evapotranspiration) and some surface runoff, Hart Crowser estimated a recharge rate to groundwater of 24 inches/year. This recharge rate was applied to the total pervious area within the aquifer and primary recharge area. Based upon our field observations at several excavation pits that showed fractured basalt, the recharge rate was also applied to the upper watershed (buffer) zone.

A portion of this recharge makes its way to the lower confined aquifer. It is very difficult to accurately determine how much of this occurs without extensive hydrogeologic field studies. For the purposes of this assessment we assumed that 10% of the surficial recharge enters the lower confined aquifer and 90% flows laterally through the upper aquifer.

This is generally supported by stream flow measurements that were made during our field trip on October 30, 2007 that demonstrated gaining stream conditions (meaning that a significant amount of the groundwater in the upper unconfined aquifer is flowing laterally and discharging into the stream). Specifically, measurements were made at two locations approximately one mile apart: 1) at the Elma Hicklin road crossing and 2) at a new bridge constructed by Larry Birindelli on his property. The measured flow at these two locations was 0.24 cubic feet per second (cfs) and 1.4 cfs respectively. While these are likely to be low flows representative of the dry season, they equate to 57 and 331 million gallons/year.

Measuring stream flow at the Elma Hicklin Road Crossing

Wastewater Discharges

On-site septic system discharge volumes were calculated for all residential, commercial, industrial, and other land uses based on Grays Harbor County GIS parcel data, and wastewater flows specified in *On-site Sewage Systems Chapter 246-272A WAC* and *On-site Wastewater Treatment Systems Manual*, USEPA, EPA-625/R-00/008, February 2002. GIS parcel data were used to determine land use coverage within the primary recharge area. The residential wastewater flows were then applied to the residential areas using wastewater flow estimates defined in WAC Chapter 246-272A-0230 (2)(d)(i). The US Census 2000 average household size within Grays Harbor County (2.48) was used in the calculation. WAC Chapter 246-272A-0230 (2)(d)(ii) requires that all facility design flows other than residential be calculated according to the "On-site Wastewater Treatment Systems Manual," USEPA, EPA-625/R-00/008, February 2002. EPA's manual sets standards for most of the design flows for facilities other than residential uses, based on number of employees. In order to derive number of employees from land use acreage, conversion factors relating employee to square footage of land use area that were calculated in a local study conducted by the University of Washington were used (UW, 1998). Public wastewater discharge volumes were not calculated, since there are no permitted sewage treatment plant groundwater discharges within the Wildcat Creek aquifer.

Stormwater Runoff

Precipitation that falls on impervious surfaces moves as surface runoff into open ditches along the sides of streets. Based upon observed high-permeability soils at the surface and observations by local residents that the majority of stormwater infiltrates within the basins during most storm events, we assumed that stormwater runoff that is collected in these ditches is recharged to the shallow groundwater system. Based upon an average annual rainfall of 59 inches per year, an assumption that approximately 10% of the

rainfall is lost to evaporation, and an assumed 50% recharge rate (with the remainder being evapotranspired within the vegetated drainage ditches), the net recharge rate was calculated to be 26.5 inches/year.

Public and Private Well Withdrawals

Private well data was obtained from the State of Washington's Department of Ecology's online well database. Since well locations are provided in township/range/section format, it was difficult in some areas to determine which wells were within the aquifer boundary as mapped by Hart-Crowser. It is believed that these wells draw from the upper unconfined aquifer and therefore do not directly affect the hydrologic budget for the confined aquifer. The total number of private wells within the aquifer was estimated based on the percentage of each township/range/section that fell within the aquifer or recharge area. An average household water use of 257 gpd for winter use and 600 gpd in summer is reported and the US Census 2000 Grays Harbor County average household size (2.48). Since public wells are included in this database, the total number of public wells within the primary recharge area was subtracted from the estimated number of wells in the database. The quantity of public wells and withdrawal volume capacity for each public well within the primary recharge area were determined using WA State Department of Health public well data.

Results of Water Budget Analysis

The results of the water budget assessment are presented in Table 1. This represents inputs to and withdrawals from the lower confined aquifer. As can be seen from the budget, the City of McCleary wells are withdrawing an average of 105 million gallons/year from the confined aquifer. This is approximately 14% of the estimated 773 million gallons/year that is estimated to recharge this aquifer. This does not mean that there is a surplus of water that can be withdrawn. The maximum withdrawal rate should be established through a safe yield analysis that incorporates vertical hydraulic gradient considerations (See report section, "Safe Yield").

Table 1 Hydrologic Budget for Lower Confined Aquifer

	Area (acres)	Recharge (inches/year)	Flow (Q) (M gallons/year)
Recharge			
Primary Recharge Area	819	2.4	54
Buffer Zone (Secondary Recharge Area)*	11,000	2.4	719
Total	11,819		773
Withdrawals			
Total withdrawal volume from public wells			105
Total			105

*The buffer zone is defined by the Washington Wellhead Protection Program as an area up-gradient from Zone 3, potentially extending to include the entire zone of contribution. The buffer zone may also identify additional non-contiguous critical aquifer recharge areas (as defined under Section 36.70A.170 of the Growth Management Act) requiring protection from contamination.

Nitrogen Loading Analysis

Nitrate-nitrogen is a primary drinking water criterion with a maximum contaminant level of 10 mg/liter. It is considered a public health hazard causing methemoglobinemia (blue baby syndrome) in infants and is considered a precursor to carcinogenic compounds such as nitrosamines. Nitrates are also an indicator of other contaminants including agricultural chemicals, pharmaceuticals and pathogens such as E. Coli bacteria, viruses and other microorganisms.

A nitrogen loading analysis was conducted for the upper unconfined aquifer to determine the total annual nitrogen load (in pounds) to the recharge area from existing land uses within the area. The expected nitrogen concentration in groundwater was then calculated based on the total recharge to the recharge area. First, a land use survey was conducted to determine land use areas within the recharge area. Then, nitrogen loading rates specified for the different land uses were applied to the respective areas.

The 819-acre recharge area is composed of land within both the City of McCleary, and Grays Harbor County. In addition, a small portion of the upper recharge area lies within the adjacent Mason County. Land uses within the recharge area are dominated by residential and forested areas (indicated as “Resource Production & Extraction”; Figure 5). There are also a limited number of manufacturing, governmental uses, and other uses, including churches within the recharge area. County of Grays Harbor zoning within the recharge area includes “General Development,” “Residential”, “Agricultural”, and a small portion of the “Industrial” zone (Figure 6). City of McCleary zoning includes mostly “Residential” and some “Commercial”.

Grays Harbor County within the Primary Recharge Area

There are a significant number of livestock (horses, cattle and elk) in the primary recharge are. A site inventory concluded a total of 9 cows, 11 horses, and 25 elk within the primary recharge area at the time of the study.

Results of Nitrogen Loading Analysis

The Nitrogen Loading analysis results are shown in Table 2.

Table 2. Nitrogen Loading Results

NITROGEN LOADING: EXISTING CONDITIONS	**Acres**
Total Area	819
Nitrogen Inputs	**Lbs/yr.**
Residential septic systems (129)	1,600
Commercial septic systems	180
Livestock (47)	2,450
Stormwater	1,029
Lawn fertilizers	2,016
TOTAL LOADING	7,275
Estimated nitrate-nitrogen concentration (mg/liter)	1.6

NITROGEN LOADING: BUILDOUT CONDITIONS	**Acres**
Total Area	819
Nitrogen Inputs	**Lbs/yr.**
Residential septic systems (514)	6,374
Commercial septic systems	161
Livestock (47)	2,450
Stormwater	2,145
Lawn fertilizers	6,818
TOTAL LOADING	17,947
Estimated nitrate-nitrogen concentration (mg/liter)	3.7

Figure 5. Land Uses within the Primary Recharge Area

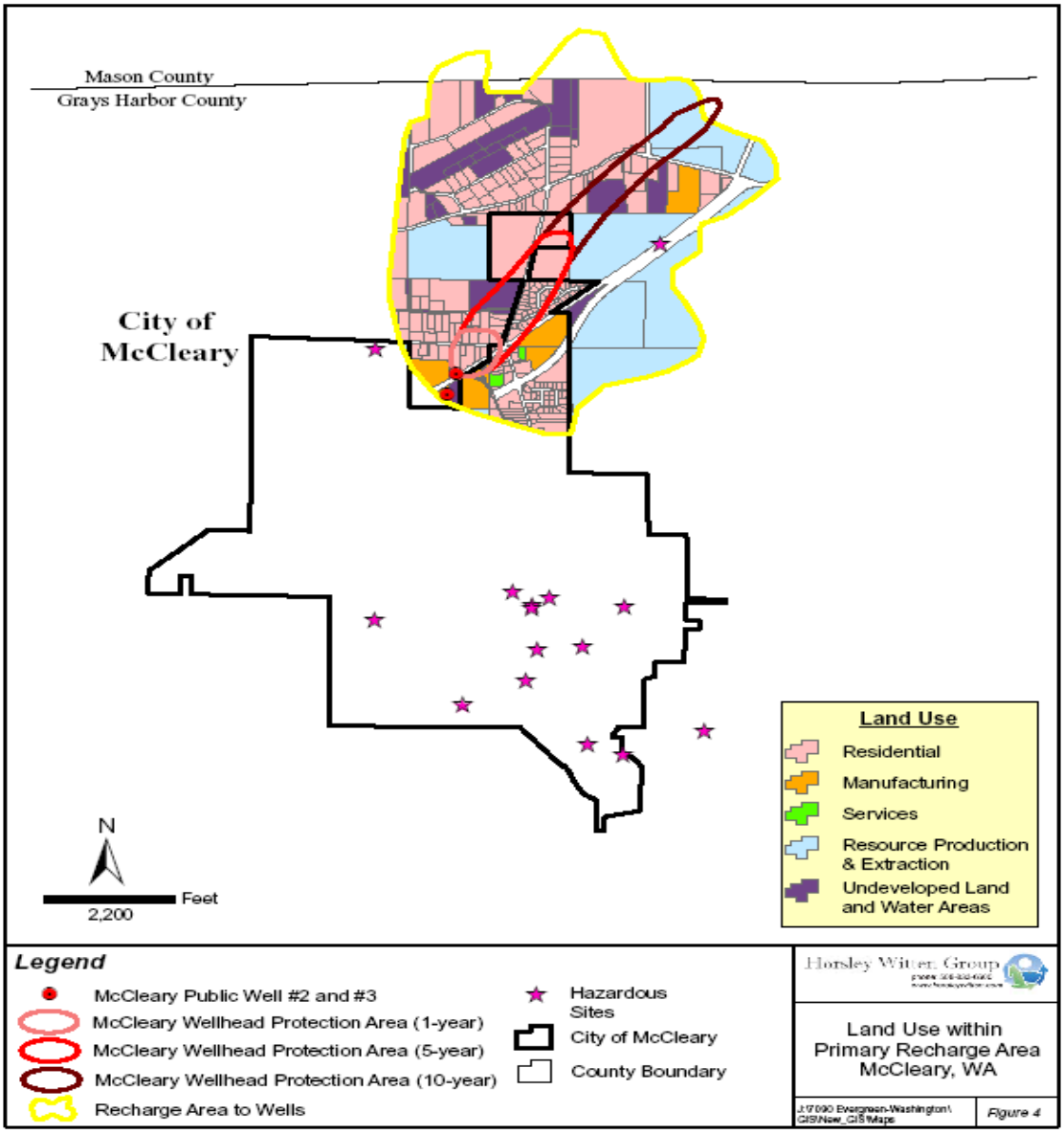
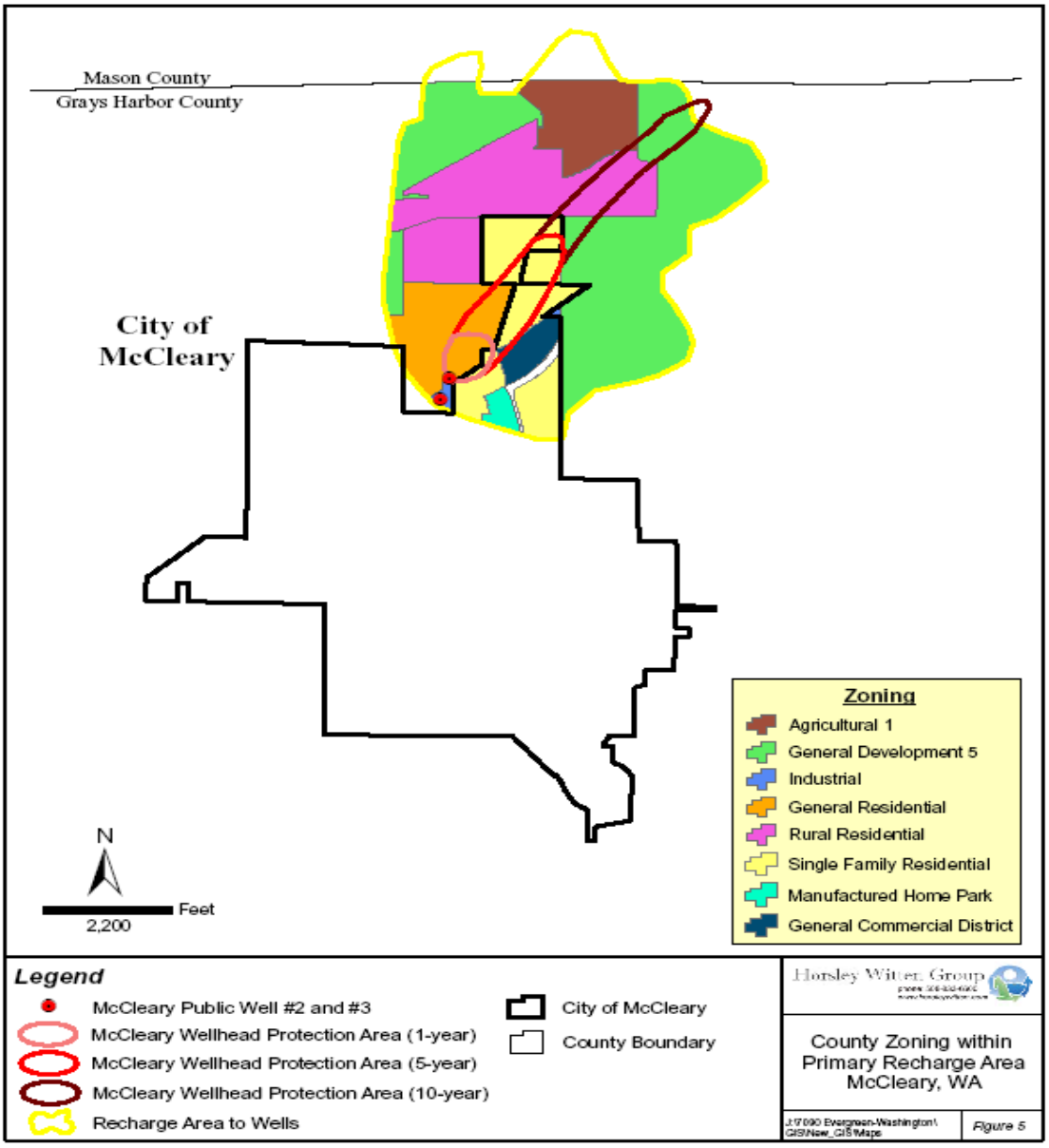


Figure 6. Zoning within the Primary Recharge Area



Discussion

The results of the hydrologic budget analysis indicate that approximately 14% of the water that is recharged into the lower confined aquifer is being extracted via the public supply wells. While this seems like a relatively small percentage, future increases in the withdrawal rate are likely to change the equilibrium balance between the upper and lower aquifers, possibly causing a reversal of vertical hydraulic gradient. Currently, it is presumed that the lower aquifer is under higher pressure than the overlying surficial aquifer resulting in an upward flow. Increased withdrawals will reduce and possibly reverse this pressure gradient, potentially resulting in a downward gradient with water (and pollutants) from the upper aquifer flowing downward into the confined aquifer.

Baseline, natural concentrations of nitrate-nitrogen in groundwater are less than 0.1 mg/L. Based upon the predicted high existing nitrogen loading to the upper aquifer (1.6 mg/liter) and the low measured baseline concentrations in the public supply wells (0.2 mg/liter), it appears that the confining layer is providing a significant level of protection to the lower aquifer.

Future growth in the primary recharge area will threaten water quality if it is not guided. The buildout analysis suggests that zoning in the County lands within the recharge area will allow another 385 homes on septic systems to be built. Along with these homes will come additional nitrogen loading that could raise nitrogen concentrations to 3.7 mg/liter. Although this concentration is below the drinking water standard, it should be recognized that nitrate-nitrogen is an indicator of other potential contaminants such as agricultural chemicals (applied at residential rates), pharmaceuticals and pathogens such as E. Coli bacteria, viruses and other microorganisms. Increases in nitrogen loading should be minimized. Some viruses remain viable in groundwater for time periods of up to two years. Pharmaceuticals can remain in the groundwater for longer periods of time.

3.0 WELLHEAD PROTECTION AREA MANAGEMENT STRATEGIES AND IMPLEMENTATION

Approach and Strategy

The issues regarding the City of McCleary's public water supply include both concerns of water quantity (safe yield) and water quality. At the source of both of these concerns is increased development which conventionally necessitates larger withdrawal volumes and emits more pollution. Therefore, carefully planning development that provides low impacts to the public water supply wells, as well as decreasing development pressure altogether within the recharge areas, is integral to the protection of the water supply wells. These goals can still be achieved while increasing growth, vitality, and economic development within the City of McCleary through the use of smart growth techniques.

Smart growth is a principle of land development that emphasizes mixed land uses; increases the availability of a range of housing types in neighborhoods; takes advantage of compact design; fosters distinctive and attractive communities; preserves open space, farmland, natural beauty and critical environmental areas; strengthens existing communities; provides a variety of transportation choices; makes development decisions predictable, fair and cost effective; and, encourages community and stakeholder collaboration in development decisions. It also reduces water demands, provides enhanced treatment of stormwater pollutants and encourages re-use of wastewater and stormwater.

Protecting the rural character of the community is especially significant in the State of Washington. In fact, the purpose of the State of Washington Growth Management Act (GMA) is to "recognize the importance of rural lands and rural character to Washington's economy, its people, and its environment, while respecting regional differences. Rural lands and rural-based economies enhance the economic desirability of the state, help to

preserve traditional economic activities, and contribute to the state's overall quality of life."

HW recommends two strategies to better assess existing conditions: water level monitoring and water quality testing. A public education program is also recommended. Two regulatory/smart growth techniques that would be particularly useful to the City of McCleary to maintain growth while providing protection of the public water supply wells include Transfer of Development Rights (TDR) and Low Impact Development (LID).

1. Water Level Monitoring

   HW recommends that the City develop a water level monitoring protocol to further clarify the vertical hydraulic gradient between the upper and lower (confined) aquifer units. This is best established with the installation of three multi-level well clusters (each with a shallow well in the upper aquifer and a deeper well in the deeper confined aquifer). The well clusters should be installed at distances of approximately 20 feet, 100 feet and 400 feet from the pumping wells along a transect.

   Water levels should be measured in each of the six wells using a continuous-recording pressure transducer (approximate cost is $600/transducer). This data should be plotted and analyzed in relation to pumping records at the two pumping wells.

   Changes in the hydraulic gradient between the shallow and confined aquifers can then be assessed under a range of pumping conditions. These data can then be used to refine a safe yield estimate, defined as that quantity of water that can be safely withdrawn from the lower aquifer without reversal of the hydraulic gradient and subsequent water quality threats from contaminated water in the shallow aquifer.

2. Water Quality Testing (Private Wells)

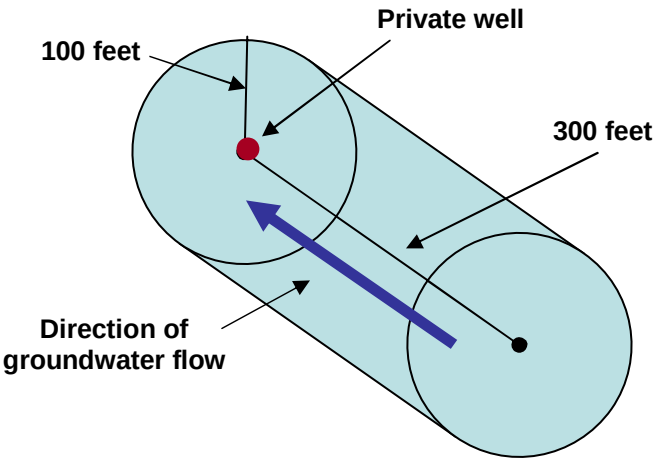
   To confirm the nitrogen loading results HW recommends that private wells located up-gradient of the public supply wells that draw from the upper (unconfined) aquifer be tested for nitrate-nitrogen. Approximately 30 wells should be sampled and tested. The locations should be plotted. Only wells that have drilling logs that suggest they are shallow and screened in the unconfined aquifer (less than 30 feet) should be selected.

3. Private Well Protection

   Much of Grays Harbor County will continue to rely upon private domestic wells as their source of drinking water. The majority of the wells are shallow and draw from the unconfined aquifer. This aquifer is vulnerable to pollution from nearby land uses including septic systems, fertilizers, and livestock. To provide safe drinking water, the County could consider developing private well protection zones and locating significant pollution sources such as septic systems and livestock away from wells.

Private well protection zones can include a fixed radius (such as 100 feet) and an extended area up-gradient to take into account groundwater flow direction. As an example, the Town of Nantucket, Massachusetts has adopted a local health regulation that prohibits septic systems within a 100-foot radius and a 300-foot up-gradient area based upon potential virus transport distance.

Figure 7. Example Private Well Protection Area



4. Public Education

A critical part of any drinking water protection program is public education. Homeowners and business operators must be aware of the sensitivity of the groundwater system and the potential impacts that their individual activities may have. Homeowner practices such as lawn fertilization, application of pesticides, pet and livestock waste management and failing on-site systems all can have direct water quality impacts. Cumulatively, these impacts can add up and may cause significant degradation to the community drinking water supply.

The State of Washington has been a national leader in the development of public education campaigns directed at environmental protection. Posters, newspaper advertisements, training workshops and cable television are all effective means to get the message out.

5. Transfer of Development Rights

Transfer of Development Rights (TDR) is a regulatory strategy that harnesses private market forces to accomplish two smart growth objectives. First, open space is permanently protected for water supply, agricultural, habitat, recreational, or other purposes via the transfer of some or all of the development that would otherwise have occurred in these sensitive places to more suitable locations. Second, other locations, such as city and town centers or vacant and underutilized properties, become more vibrant and successful as the development potential from the protected resource areas

is transferred to them. In essence, development rights are "transferred" from one district (the "sending district") to another (the "receiving district"). Communities using TDR are generally shifting development densities within the community to achieve both open space and economic goals without changing their overall development potential. Implementing a TDR program would provide protection of McCleary's public water supply and would also benefit the city by refocusing development attention and growth to the city. Prior to implementing a TDR program, however, the community should attain the following characteristics:

- Clearly Identified Resource Areas for Protection. The foundation of any TDR program is a resource area that requires protection. Sending area communities should clearly identify the resources they would like to protect as these choices will shape many of the TDR program elements such as the method of calculating development rights, the types of incentives that will be offered to developers, and the type of restriction recorded. In this case we are recommending the primary recharge area identified in the Hart Crowser study.

- Consensus Regarding the Location and Extent of Receiving Areas. Communities must develop consensus regarding which areas will receive higher densities than what is allowed under existing zoning. Higher density development is a politically charged topic in communities and often requires a significant outreach effort to gain acceptance. Detailed discussion regarding the intensity and types of use should be a part of the TDR planning process. The City of McCleary downtown area appears to be appropriate for re-development within the existing City urban growth boundaries. During our site visit on October 31, 2007 we toured the downtown area and spoke to City officials. There are many properties and sections of town that could be re-developed at greater densities than currently exist in a sustainable manner. This would provide economic incentive, would limit the urban sprawl into the wellhead protection areas and could serve to conserve water demands.

- Infrastructure that can Support Increases in Density. Another critical element to TDR program is the district(s) to which increased growth will be directed. Communities should be able to identify areas where existing infrastructure can accommodate higher densities. Infrastructure concerns include wastewater, water supply, traffic, and other utilities. Market considerations should also be evaluated when residential and/or commercial development rights may be transferred as the market in receiving areas must be able to support increased densities. McCleary has an existing sewer system. We have not evaluated the capacity or expansion issues associated with this facility.

- A Clearly Written Ordinance. TDR legislation can become very complex as municipalities attempt to create guidelines for market transactions with various incentives to the development community. The goal of a community should be to develop a concise permitting process that does not add unnecessary layers of review for the development community. Ordinances

should include an attractive incentive for TDR transactions in the form of density above that otherwise possible in the receiving zone.

- Strong Market Conditions. The goal of increased density in receiving areas must be supported by a strong market demand for either residential or commercial development. Communities should consider enlisting the help of a qualified real estate or economic development professional to assess whether the market in receiving areas is strong enough to support increases in growth.

- TDR Credit Bank. Due to the complexity of TDR transactions, the timing involved with buying, selling, and developing properties may not always be seamless. In the event that specific elements of a transaction are delayed, it may be beneficial for a community to establish a TDR Credit Bank where development rights can be temporarily stored before being purchased by a developer. Communities can also use these banks to store credits that are purchased by the Town for parcels of high conservation priority.

- A Sophisticated Reviewing/Permitting Authority. The permitting authority for a TDR transaction should have a clear understanding of the program guidelines to ensure that development rights and density increases are correctly calculated in permit applications. Reviewing agencies should also be able to prioritize those design elements that are most important to the final project and identify alternative approaches that may simplify the application process.

- Open Communication between Local Agencies. The permitting authority for TDR transactions should have access to other agencies that may help to clarify opportunities or constraints associated with either the sending or receiving districts. Inter-agency cooperation can be formally integrated into the review process using the provisions of the TDR ordinance where commentary may be required from other agencies such as the Board of Health or the City Engineer. Other agencies or groups that could be involved in the review process, formally or informally, include local watershed groups, the local Open Space Committee, or the Agricultural Commission.

Local Model

An example community in the area that has implemented a TDR program is Thurston County, WA, which created a TDR ordinance in 1995 for the purpose of protecting agricultural lands (Chapter 20.62 Transfer of Development Rights). The sending area for the TDR program consists of any land zoned as "long-term agricultural," a zoning classification required by the state's Growth Management Act. All of this land is within the unincorporated area of the county and is zoned for one dwelling unit per 20 acres. Landowners in the sending area are entitled to one development right for every five acres of land they own, regardless of whether the land is suitable for development. They are required to reserve one development right for each unit they

want to build. The county maintains a list of interested sellers, and development rights are traded on the open market. The receiving areas are located throughout the unincorporated area of the county and within each of the three largest cities. Four ordinances, one for the county and one for each of the three largest cities (Lacey, Tumwater and Olympia), were adopted in 1995 (AFT, 2001).

5. Low-Impact Development

Decreasing water consumption rates within the city, whether through regulations or incentive programs, is an important consideration to protect the water supply. Not only is water quantity threatened by increased withdrawal and consumption, but in the case of the Wildcat Creek aquifer, water quality is also at risk. It is believed that groundwater within the deeper aquifer is under pressure and currently has an upward flow potential. However, the upward flow potential is dependent upon maintaining an upward gradient and increasing withdrawals may cause the water to flow downward, threatening the drinking water supply with contaminated groundwater from the overlying shallow unconfined aquifer.

One strategy that could successfully reduce water demand on public drinking water supply wells would be to implement a Low Impact Development (LID) ordinance. The ordinance may require changes to both the City of McCleary's and Grays Harbor County's Comprehensive Plans, zoning codes, design standards, and other applicable regulations. Some of the Comprehensive Plan's primary planning goals include:

- Urban growth;
- Reduction of sprawl;
- Efficient multi-modal transportation;
- Diverse and equitable housing;
- Economic development;
- Encouragement of natural resource industries;
- Open space and recreation; and
- Environmental protection.

LID is a more sustainable land development pattern that results from a site planning process that first identifies critical natural resources, and then determines appropriate building envelopes. LID also incorporates a range of best management practices (BMPs) that preserve the natural hydrology of the land. Best management practices can include bioretention systems, infiltration systems, green roofs and cisterns to treat, store and re-use stormwater runoff as an irrigation source. The principles of LID are also in direct alignment with the Comprehensive Plan goals.

Examples of Rain Gardens and Bioretention Areas

The LID ordinance could require water conservation devices for public buildings and provide incentives for their implementation in private business and residences. The ordinance should also include design criteria that require the collection and re-use of stormwater as an irrigation source (using rain barrels, cisterns or recharge to the local groundwater system). This would significantly reduce water demands on the public drinking water system during the growing season and provide water allocation to future growth within the city limits. According to local sources, the winter water demand averages 257 gallons/day per residence. This demand increases to 600 gallons/day per residence during the summer growing season. A significant portion of this increase is believed to be irrigation.

Infiltration and recharge of roof runoff into stone infiltration chambers via "rain chains"

In addition to reducing non-point source pollution to drinking water supplies and surface waters, LID provides other important benefits to the municipality, the developer, and the general public. More concentrated (cluster) design, with less impervious area and smaller infrastructure (stormwater drainage and other utilities), means significant cost savings to developers. Less impervious surface creates less surface runoff, which will decrease the burden to municipal drainage infrastructure.

Local Model

Thurston County and the City of Olympia have adopted LID principles into their Comprehensive Plans, zoning and tree protection ordinances; street, sidewalk, and parking standards; and drainage design and erosion control standards. The Comprehensive Plan amendment process began earlier and took a year, from September 2000 to September 2001. The Olympia Planning Commission reviewed the entire package – the first time it had considered anything other than Comprehensive Plan revisions. During review of the Comprehensive Plan amendments, the chart comparing impacts with conventional and low-impact design helped convince both City and County Planning Commissions that the approach was viable (Olympia, 2002).

By adoption of Ordinance 6140 (Olympia's LID ordinance), the City supplemented the Comprehensive Plan's Chapter 1 (Land Use and Urban Design), Chapter 2 (Environment), Chapter 5 (Utilities and Public Facilities), and Chapter 6 (Transportation) with goals and policies that establish Green Cove basin as a unique

area, subject to enhanced environmental regulations. Primary goals and policy changes for Green Cove basin included the following (Olympia, 2002):

- Designate Green Cove Creek as a sensitive drainage basin.
- Avoid high-density development where new development would have a significant adverse impact upon the habitat within designated sensitive drainage basins.
- Administer development regulations that protect critical areas and designated sensitive drainage basins.
- Adopt low-impact development regulations within designated sensitive drainage basins that may include stormwater standards, critical area regulations, zoning designations, and other development standards.
- Establish street designs that minimize impacts to the natural environment especially within a designated sensitive drainage basin.

The City of Olympia also used Ordinance 6140 to amend the municipal code with requirements for designated sensitive drainage basins, Green Cove basin in particular. The ordinance created a new zoning district and increased tree protection and replacement requirements. The new zoning district, Residential Low Impact (RLI), applied to Green Cove basin within Olympia's city limits. Parcels along the basin boundary that have at least 50% of their surface area within the basin were included in the district. Traits of the district included:

- Residential densities of two to four units per acre. Duplex, townhouse, and multifamily uses are allowed.
- Lot widths and rear setbacks are reduced and maximum building heights are increased, compared to the other residential districts.
- Maximum impervious surface coverage per lot is limited to 2,500 square feet.
- Several land uses, including duplexes and parking lots, not typically permitted in single-family residential developments, are allowed in the Green Cove basin.

Olympia also enacted a new Chapter 16.54 Tree Protection and Replacement for Green Cove Basin, which requires a minimum tree density of 220 tree units per acre. The requirement will result in approximately 55% tree cover in any given development.

Thurston County amended their Olympia Urban Growth Area Zoning Code (TCC 20.23), to be generally consistent with City of Olympia zoning. The urban growth area within Green Cove Creek Drainage Basin was rezoned from predominately 4-8 units per acre to 2-4 units per acre. The exception was a forested area along the creek where density was limited to one unit per five acres, to reduce the overall impervious surface in the basin to levels likely to enable preservation of anadromous fish and to buffer the creek from the impacts of urban density development up slope. The zoning amendments also required that, within the urban growth area, 60% of each site be retained in open space and that existing vegetation in these areas be preserved.

6. New Well Construction

A recent communication from City of McCleary officials suggests that the public supply well may actually be screened partially in the upper aquifer. In the event that the water quality testing confirms the nitrogen loading estimates, HW recommends that the City includes the possibility of eliminating the shallow screens using "packers" that cold seal off these intake areas and limit the wells intakes to the lower confined aquifer. If this is not feasible another option would be to drill a new well in the confined aquifer.

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Mr. Brian Shay, City Administrator
City of McCleary
100 South 3rd Street
McCleary, WA 98557

Re: Clarification of Recommendations Regarding Wellhead Protection
3500-01

Dear Mr. Shay:

I have reviewed your letter of January 10, 2003, seeking clarification regarding Hart Crowser, Inc.'s April 1994 report: Hydrogeologic Characterization for Protection of the Wildcat Creek Aquifer, Grays Harbor County, Washington. The Wildcat Aquifer is a shallow glacial outwash aquifer that should be considered highly susceptible to contamination. WAC 246-290-135 outlines state requirements regarding source water protection, including sanitary control areas and wellhead protection.

As you noted, recommendations were made in the report to change zoning within the wellhead protection area to prevent industrial and urban-type land uses from being located in the upgradient capture zones. While this approach would help to ensure that water quality in the aquifer is protected, it may not be supportable under current legislation. Other steps may be taken to achieve this goal, including, but not necessarily limited to:

- Conduct an inventory on a biannual basis of potential contamination sources in the wellhead protection area (WHPA);
- Educate landowners and tenants regarding the sensitive nature of the aquifer and appropriate methods for chemical handling and disposal;
- Educate homeowners regarding appropriate maintenance of septic systems and avoidance or minimal use of lawn chemicals;
- Avoid location of new businesses within the WHPA that handle significant amounts of potential contaminants (such as those involving electroplating, wood treatment, fuel storage, etc.), or require that they install monitoring wells and regularly monitor groundwater quality. Storage of hazardous substances should be above ground, and

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secondary containment should be employed for any significant potential contaminant sources; and

- Emergency response plans should be in place to address existing and future hazards within the WHPA.

Also, if significant areas of the aquifer are to be paved as part of future development (including areas outside the WHPA), water quantity may be adversely affected. Future development should be encouraged to infiltrate stormwater back into the subsurface following appropriate treatment.

I would be pleased to provide you with a proposal to address these issues in more detail. Please let me know if you need additional assistance or have other questions.

Sincerely,

HART CROWSER, INC.

CARL M. EINBERGER, L. HYD.
Principal Hydrogeologist

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HARTCROWSER

Earth and Environmental Technologies

Hydrogeologic Characterization for Protection of the Wildcat Creek Aquifer Grays Harbor County, Washington Centennial Clean Water Fund Grant G93

Prepared for
City of McCleary

April 12, 1994
J-3500-01

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HYDROGEOLOGIC CHARACTERIZATION FOR PROTECTION OF THE WILDCAT CREEK AQUIFER GRAYS HARBOR COUNTY, WASHINGTON

INTRODUCTION

This report presents the results of hydrogeologic characterization activities conducted to provide a basis for protecting the Wildcat Creek Aquifer in Grays Harbor County, Washington. This aquifer serves as the only water supply source for the City of McCleary. Our work focused on evaluating the hydrogeology and determining where land use activities may directly impact groundwater used by the City. As a result of this work we provide several recommendations for protecting the water supply.

This project provides information to be included in a Wellhead Protection Program for the City of McCleary. WAC 246-290-100 requires all public water systems to prepare a Water System Plan, which after modification in early 1994, will require explicit wellhead protection components (Washington State Department of Health, 1993)

According to the state requirements, wellhead protection areas are delineated based on time-related capture zones. These zones define the areas where if a contaminant were to enter groundwater, it would travel to the wellfield within a specified time period. The three primary zones in a wellhead protection area are defined as the 1-, 5-, and 10-year capture zones.

For this study, we defined the extent of the aquifer, evaluated groundwater flow conditions, determined aquifer hydraulic properties, and estimated time-related capture zones for the City's wellfield. As part of this study we also preliminarily identify land uses that have the potential to affect groundwater quality, and provide recommendations for the development of a wellhead protection plan. This information should enable the City, working in cooperation with Grays Harbor County, to develop a comprehensive wellhead protection plan that will ensure the protection of the City's water supply.

Study Area Description

The Wildcat Creek Aquifer and City of McCleary are located in the northeastern portion of Grays Harbor County, Washington (T18N, R5W). The location of the study area is shown on Figures 1 and 2.

The aquifer is named for the creek that drains the sand and gravel-filled valley from which the City of McCleary obtains its water supply. The sand and gravel fills a northeast-southwest trending valley between hills and upland areas composed of basalt. The aquifer material includes rocks from the southeastern Olympic mountains as well as granitic pebbles and rocks derived from the northern Cascades that were deposited from glacial meltwater (Eddy, 1966). The floor of the valley has very little relief and slopes gently to the southwest.

The City operates a wellfield located approximately 3/4 of a mile north of the city center as shown on Figure 2. The wellfield consists of a primary pumping well (MC-2) and back-up well (MC-3). A third well (MC-1) is located in the wellfield, but is not connected to the City's distribution system. A fourth well (MC-2A) is located approximately 7 feet from well MC-2. According to employees of the City of McCleary, this well was drilled crooked and is therefore unsuitable for use as a pumping well. The construction details (e.g., presence and location of screen) of this well are unknown.

Each of the wells in the wellfield are at an elevation of approximately 290 feet (88 meters) above mean sea level, and are completed at depths of between 60 and 90 feet (18.5 to 27.5 meters) below ground surface. The McCleary water system serves approximately 1,500 residents located within the City Limits shown on Figure 2.

The McCleary city center lies on the southeastern edge of the valley. Land use in the valley is predominantly rural/residential; however, a few industrial operations related to the timber industry are present north of the City. The population of the McCleary region has been reasonably stable over the last thirty years, but has recently experienced moderate growth. Most of the recent growth has occurred north of the City, near the wellfield. This study was conceived to provide planning information to ensure that this increased growth does not degrade the quality of the shallow groundwater used by the City.

Scope of Work

The purpose of this study was to evaluate the hydrogeology in the vicinity of the wellfield to identify locations where land use in the McCleary area is most likely to have the potential to affect the City's water supply. Our scope of work included:

- Reviewing existing data to help prioritize field data collection and develop a conceptual picture of the hydrogeologic and land use issues that may affect the wellfield;

- Conducting field work, including aquifer hydraulic testing, measuring groundwater elevations, and identifying current land use issues;

- Analyzing the information gathered during the data review and field work to determine aquifer properties and estimate 1-, 5-, and 10-year capture zones for the wellfield; and

- Developing recommendations for wellhead protection and preparing this report.

EXISTING DATA REVIEW

We reviewed existing data to develop a conceptual picture of the aquifer and identify areas of interest requiring additional study. The data we reviewed included the following:

- **Surficial Soil Survey.** The soil survey for the area (Pringle, 1986) provides maps of surficial soil types and descriptions of soil properties. We reviewed this information to help identify the extent of glaciofluvial deposits in the study area, and identify where surficial soils are permeable, exposing the aquifer to greater potential adverse impacts.

- **Regional Geologic Reports.** We reviewed a Washington State Water Resources Bulletin (Eddy, 1966) a Ph.D. thesis by Carson (1970), and the Washington State Department of Resources Open File Report 87-9 prepared by Robert L. Logan in December 1997 to obtain general regional information on the geologic processes that formed the Wildcat Creek Aquifer.

- **Well Log Records.** We obtained copies of 67 well logs from the area that were on file with the Washington State Department of Ecology (Ecology). These logs proved to be invaluable for determining the extent, thickness, and character of aquifer materials tapped by these wells.

- **McCleary Water System Plan.** A Water System Plan for McCleary was prepared by Byrne-Stevens & Associates (1977). This planning document discusses the existing water system in detail, including a description of the facilities, operation and maintenance, and water consumption. The document also has important information concerning land use and social and economic issues.

- **Aerial Photograph.** A 1:12,000 scale orthophoto map of the N.E. 1/4 of T 18N, R 5 W from the Washington State Department of Natural Resources helped identify existing land uses.

- **Zoning Map.** The Grays Harbor Regional Planning Commission produced a land use plan for the McCleary Planning Area in 1978. We reviewed a map showing the existing zoning classifications to identify areas where planned land use may impact water quality.

- **City Wellfield Operations Records.** We evaluated monthly total pumping data supplied by the City to determine a steady state pumping rate used for capture zone estimation.

FIELD DATA COLLECTION

We conducted general reconnaissance and field testing during the week of July 26 to 30, 1993. During this week we gathered data on groundwater elevations to evaluate groundwater flow conditions, and conducted an aquifer pumping test to estimate permeability, which is necessary to determine time-related capture zones. We also visually surveyed land use to help identify potential sources of contamination.

The following sections describe the field activities and identify the data collected.

Water Level Measurements

We estimated the wellhead elevations and measured the depth to water in 16 domestic wells. These data were used to map groundwater flow directions and provide a basis for calibrating the groundwater flow model used for estimating time-related capture zones for the McCleary wellfield. We also precisely surveyed wellhead elevations and measured water levels at the McCleary wellfield to assess groundwater gradients under pumping and non-pumping conditions.

We only considered measuring water levels in domestic wells for which we had wells logs from Ecology. This enabled us to ensure that each well we measured was completed in the same aquifer as the McCleary wells. The sixteen wells were selected in the field based on owner's permission, accessibility, and location (we attempted to have an even geographic distribution of measurement points across the aquifer).

The depth to water in domestic wells was measured with an electric water level sounder. The wellhead elevations were estimated with a surveying

altimeter which was calibrated to a known elevation point every two hours during the survey to account for barometric pressure effects. Groundwater elevations for each measuring point were determined by subtracting the measured depth to water from the wellhead elevation.

We conducted a precise vertical elevation survey of wells MC-2 and MC-3 using a benchmark located on Summit Road. We determined the monitoring point elevations for MC-2 and MC-3 to be 295.33 and 291.67 feet above mean sea level, respectively. We used these data to verify that the surveying altimeter was functioning properly. This information will be useful for any future groundwater investigations.

Aquifer Testing

Because the groundwater flowrate, in response to a given hydraulic gradient, is dependent on the permeability of the aquifer, a quantitative estimate of this parameter is required for the determination of time-related capture zones. We conducted an aquifer pumping test to collect data necessary to estimate the permeability of the aquifer. During the aquifer pumping test, we measured the effect of pumping well MC-2 on the water levels in several monitoring locations near the pumping well.

Prior to conducting the aquifer test, we established three monitoring points in the aquifer near well MC-2 and installed pressure transducers and computerized data acquisition equipment to monitor water levels. The principal monitoring point was well MC-3, located approximately 400 feet southwest of well MC-2. Additional monitoring points included an unused well (MC-2A) located adjacent to (approximately 7 feet from) well MC-2, and a 12-foot-deep temporary drive point piezometer (DP-1), which we installed immediately west of the East Fork of Wildcat Creek, approximately 1,500 feet southeast of the pumping well. These monitoring locations are shown on Figure 2.

After monitoring non-pumping water levels for 24 hours to evaluate baseline trends, we pumped well MC-2 for approximately 48 hours at a constant rate of about 425 gallons per minute while continuously monitoring water levels in adjacent monitoring locations. Following the 24 hours of pumping, we continued to monitor the recovering water levels at the monitoring points for an additional 24 hours. These data, as well as discussion of testing procedure and methods of analysis, are presented in Appendix A.

Land Use Survey

We conducted a preliminary land use survey in the McCleary area to identify potential sources of groundwater contamination. This survey was conducted to get a general idea of the land uses and the type of sources to be expected, and to identify anything that could be an immediate threat to the wellfield. A more detailed survey will likely be required to comply with the state Wellhead Protection Program (Washington State Department of Health, 1993).

Due to the reasonably undeveloped nature and manageable size of the Wildcat Creek Valley, we elected to conduct a "windshield survey" of the entire valley to identify potential land use concerns. That is, we drove through the area guided by the telephone directory yellow pages (PTI Communications, 1993) and identified land uses and facilities that could be associated with potential groundwater contamination.

There were two types of potential sources identified in our survey: point sources associated with specific activities at specific places; and non-point sources, which are areally extensive and may be associated with a variety of contamination mechanisms such as transportation accidents and domestic wastewater disposal. The potential point sources we identified are listed in Table 1 and illustrated on Figure 6. Non-point sources of concern to the wellfield include the Burlington Northern Railroad, Highway 108, and an area of unsewered homes along the Elma-Hicklin Rd as shown on Figure 6.

HYDROGEOLOGIC CONDITIONS (CONCEPTUAL MODEL)

Developing an understanding of the groundwater system was our primary goal. This understanding is necessary for selecting and implementing the modeling tools used for capture zone calculation. We used the results of our review of existing data and field testing to develop a conceptual model. The conceptual model consists of our understanding of the configuration and characteristics of the aquifer, and how groundwater is moving through it. Developing this conceptual picture not only helps us model the system and evaluate aquifer vulnerability, but it also helps identify areas where limited data create uncertainty in our results.

Geology

Our geologic interpretation was developed from our field reconnaissance, existing well log information, extrapolation of regional information

contained in Logan (1987) and Carson (1970), and soil studies (Pringle, 1986).

The general surficial geology of the area is depicted on Figure 2 and by the geologic cross sections shown on Figure 4. Figure 3 shows the locations of the cross sections. The geology consists of a sequence of recent alluvial and glacial sediments overlying bedrock to depths of up to approximately 100 feet. The boundaries of the aquifer, shown on Figure 3, generally follow the bedrock topography. Uncertainty in the location of the boundary, indicated by dots on Figure 3, exist in some areas because of a lack of well log information. Although it is likely that recharge to the aquifer occurs from areas beyond this boundary, shallow outcrops of bedrock in a close vicinity to these areas suggest that the area outlined on Figure 3 represents the principal area of the aquifer.

Within the valley, the deposits in the first 10 to 20 feet tend to be composed of silt, sand, clay, and peat, and are likely to be of recent alluvial origin. These deposits are underlain by glacial outwash materials, which form the aquifer. The outwash consists of reasonably permeable sand and gravel with some silt and clay.

Although the overlying alluvial material is generally finer-grained and therefore less permeable than the aquifer material, the aquifer is still vulnerable because the overlying deposits are relatively thin and of variable character. Most of the surficial soils of the valley floor mapped by Pringle (1986) are also highly permeable.

Groundwater Conditions

Groundwater in most wells in the valley is encountered at depths of 10 to 20 feet below ground surface. The fine-grained materials at the surface create a partial confining layer in many locations. Figure 3 shows the groundwater elevations as measured in July 1993. Most groundwater in the valley likely enters the aquifer as direct precipitation recharge. The flow is from the northeast to southwest with a gradient of 0.009 ft/ft. Discharge from the aquifer is likely to be to Wildcat Creek as it leaves the valley.

Aquifer Characteristics

We used the data from the aquifer test on well MC-2 to determine aquifer characteristics. The data from the aquifer test and a description of the data analysis methods are contained in Appendix A. The data show a recharge effect (i.e., a slowing of the rate of drawdown) after approximately 2.5 hours of pumping. Our analysis indicates that the formation tapped by the

McCleary wells is a "leaky confined aquifer" with a transmissivity of 25,000 to 30,000 gpd/ft, and a storage coefficient of 0.001. A leaky confined aquifer has an overlying layer that is partially confining and allows water to drain from or through it as the aquifer is drawn down. This is consistent with our geologic interpretation which shows fine-grained strata above the principal aquifer material. It is also possible that effects of recharge from Wildcat Creek through the alluvial layer explain, in part, the recharge effect seen in the later time data.

Wellfield Recharge Area

A generalized concept of the recharge area for a wellfield may be developed by considering aquifer boundaries, the direction of regional groundwater flow, and the Wildcat Creek watershed area. The primary area for recharge (infiltration of precipitation to the aquifer) likely occurs within the boundary of the aquifer as shown on Figure 3. However, additional recharge is likely received from runoff in the surrounding watershed area of the Wildcat Creek drainage. In fact groundwater elevations coincident with Wildcat Creek elevation in the 90 and 100 meter contour areas suggest some surface water/groundwater interaction occurs. Based on this understanding, we identified the area shown on Figure 5 as the generalized recharge area of the wellfield.

WELLFIELD CAPTURE ZONES

We conducted a capture zone analysis to determine areas within the generalized recharge area where the McCleary wellfield is most vulnerable to land use impacts. Capture zones may be used to define wellhead protection areas under the proposed Washington State Wellhead Protection Program (Department of Health, 1993).

Delineation Approach

According to the state Draft Wellhead Protection Program, considerable flexibility will be allowed in the methodology used for delineating time-related capture zones. For this study, we elected to use a numerical modeling method, which is one of the more sophisticated approaches available. In its most basic form, as has been implemented, this approach requires a similar level of effort as the simpler methodologies. The benefit of using such an approach is that more detail and predictive accuracy may be added in the future, if necessary. The approach consists of simulating groundwater elevations and conducting a pathline analysis to define capture zones. Appendix B provides a more detailed description of the

groundwater modeling and capture zone calculation procedures, as well as discussions of input parameters and assumptions.

Groundwater Flow Modeling

Groundwater flow modeling is used to simulate groundwater elevations across an aquifer that are consistent with hydraulic parameters estimated from the aquifer test analysis and actual field measurements of groundwater elevations. The model predicts groundwater elevations in greater detail than can be practically measured in the field.

We implemented our numerical approach for solving the groundwater flow equation with the computer code PLASM (Prickett and Lonquist, 1971). This approach allows the simulation of two-dimensional steady flow of groundwater in heterogeneous aquifers. The model can easily consider spatially varying hydraulic conductivity should more data become available in the future. The model also has sufficient flexibility to allow it to simulate transient groundwater flow, if necessary. Simpler approaches do not provide this flexibility, and do not consider important aquifer characteristics such as non-uniform flow due to boundaries and aquifer recharge. Both of these factors are considered by the numerical modeling approach used for this study.

Time-related capture zones are typically based on "steady-state" groundwater elevations. That is, short-term temporal changes in groundwater levels are not considered, and groundwater pumping rates in the simulation are set at a constant value based on yearly averages for pumping. To develop a steady-state pumping rate for the McCleary wellfield, we determine how much water is pumped in an average year and selected a pumping rate to achieve this quantity if the pump were operated continuously. This is a reasonable approach given the length of the travel time criterion used for the capture zones (i.e., 1, 5, and 10 years). For the McCleary wellfield, records of monthly pumping for 1991 and 1992 indicate that the well probably operates an average of 10 hours per day at a rate of 425 gpm. Therefore, we assumed a steady-state pumping rate of 200 gpm.

Capture Zone Calculation

Capture zones are determined by defining groundwater flow pathlines based on the gradients set up by the modeled groundwater elevations, and calculating travel times along the pathlines based on hydraulic conductivity values. Using the modeled groundwater elevations, we calculated 1-, 5-, and 10-year capture zones for well MC-2 using the computer code GWPATH (Shafer, 1987b). Well MC-3 is typically only used as a backup,

and located quite close (approximately 400 feet) to MC-2. Therefore, capture zones would be quite similar if MC-3 were to be operated exclusively instead of MC-2.

Results

The 1-, 5-, and 10-year capture zones for the McCleary wellfield are shown on Figure 6. The location of potential contaminant sources and existing land use plans are also shown on this figure. The capture zones, which are approximately 2,000 feet wide, intersect several potential sources of contamination located to the northeast of the wellfield.

It is important to recognize that these modeled capture zones are subject to uncertainty (Varljen and Shafer, 1991). This uncertainty, which could be quantified with a more rigorous study, is inherent to all studies of this nature. The uncertainty is unavoidable because it is not possible to have perfect knowledge of the aquifer and its hydraulic properties. In the recommendations section below we suggest two approaches for addressing this uncertainty when defining the wellhead protection area.

RECOMMENDATIONS

We have defined the hydrogeology of the Wildcat Creek Aquifer, determined approximate time-related capture zones for the McCleary wellfield, and conducted a preliminary land use assessment to evaluate potential threats to water supply. We conclude that the McCleary water supply is most vulnerable to contamination northeast of the wellfield within the capture zones shown on Figure 6, and secondarily within the recharge area outlined on Figure 5.

Our recommendations for wellhead protection are based on the vulnerability of the aquifer and the lack of an existing alternative water supply for the city. In the interest of ensuring a continuous, safe water supply, we recommend that the City consider the activities discussed in the following sections.

Take Immediate Actions

Of immediate concern are four facilities, which pose the potential to affect the wellfield (numbered 1, 2, 3, and 17 on Figure 6), the Burlington Northern Railroad and Highway 108 corridors, and areas of unsewered housing. We recommend the following actions to immediately address these potential sources of contamination.

Notification

Inform persons responsible for the identified potential contaminant sources that they are located in a wellhead protection area. Also notify the federal, local, or state agency having jurisdiction over the potential contaminant source.

Education

Initiate a public outreach and educational program concerning the water supply and potential means of contamination. The Washington State Department of Health will likely require such a program and it will be one of the most immediately effective measures for preventing future problems, since most of the recharge areas for the wellfield are located outside the City Limits, and therefore beyond the City's ability to directly control without interagency coordination. These programs are also especially effective for managing household hazardous waste issues.

Labeling

Install wellhead protection area boundary signs for transportation corridors. This low cost action not only encourages extra care within the wellhead protection area, but also functions to increase the level of awareness of local residents.

Petition EPA for a Sole Source Aquifer Designation

We recommend petitioning the Environmental Protection Agency (EPA) to designate the Wildcat Creek Aquifer as a "sole source" aquifer. The Sole Source Aquifer Designation Program is a federal program mandated by the Safe Drinking Water Act. According to the Act, an aquifer may be designated as a sole source aquifer if "the (EPA Regional) Administrator determines, on his own or upon petition, that an area has an aquifer which is the sole or principal drinking water source for an area and which, if contaminated, would create a significant hazard to public health."

After EPA designates a sole source aquifer, a notice is published in the Federal Register. After this notice is published, "No commitment for federal financial assistance (through grant, contract, loan guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such an aquifer. . ."

Although the effect of evaluating federal projects in the area by itself will not address existing issues, we recommend petitioning for the designation because it will give the aquifer publicity and raise the level of awareness

concerning the vulnerability of the aquifer. Concerns over groundwater contamination may be perceived as more "real" with this federal designation.

Establish Reliable Wellhead Protection Area

The definition of the wellhead protection area should consider the hydrogeology, the need for protection, the potential negative impacts on development, and the uncertainties in the hydrogeologic characterization. Due to uncertainty in the capture zones, we caution against simply using the capture zones on Figure 6 to define the wellhead protection area.

To provide more reliable protection that accounts for hydrogeologic uncertainty, we recommend applying management strategies to the entire aquifer recharge area upgradient of the wellfield (as shown on Figure 5). Due to the undeveloped nature, small area, and moderate growth of the area, we feel that this conservative approach will not be unnecessarily costly, and should produce few negative impacts on development.

If costs associated with applying management strategies to this entire area are prohibitive, or if impacts to growth and development are a concern, we recommend refining the capture zones to reduce uncertainty and define a more reliable wellhead protection area. This may be accomplished with additional hydrogeologic investigations. The additional study should focus on the northeastern boundary of the aquifer where existing data are sparse. The study should involve monitoring seasonal changes in groundwater flow conditions, and constructing test borings to define the aquifer boundaries where existing information is not available. The test borings, if completed as observation wells, would allow for additional hydraulic conductivity testing.

Develop Wellhead Protection Program

Developing a formal wellhead protection plan will provide a management tool for growth and development of the area and will ensure that the results of this study and future hydrogeologic investigations will be considered in any future land use decisions.

The following activities should be undertaken as part of the wellhead protection program.

Establish a Local Wellhead Protection Committee

Groundwater protection efforts are likely to be more effective if implementation is coordinated between programs, agencies, and various

levels of government. Representatives from all affected jurisdictions, regulatory agencies, and other constituents (private sector, citizens groups, and media) should be participants.

Conduct a More Detailed Source Assessment

Our preliminary assessment identified obvious issues; however, a more detailed assessment should be undertaken and will likely be required by the Department of Health. Also, a detailed management plan cannot be developed until a detailed source inventory is complete. The assessment will need to be expanded to identify specific threats. For example, the detailed assessment should identify specific chemicals, underground storage tanks, etc. that are associated with each land use.

The wellhead protection section of a Water System Plan will have to include documentation of how the detailed inventory was conducted and what follow up work was done to contact both the identified potential contaminant sources as well as the federal, local, or state agency having jurisdiction over the potential contaminant source. In light of our preliminary assessment, we recommend the following for the detailed assessment:

- Conduct a field search for domestic wells (especially improperly decommissioned wells) that may be a potential direct conduit for contamination to reach the aquifer;

- Determine if nitrates from residential septic systems are a potential source by sampling and analyzing domestic wells; and

- Identify specific threats (hazardous chemicals, underground storage tanks, etc.) associated with properties by reviewing federal, state, and local databases dealing with commercial permits and performing real estate title searches.

The results of this survey should be carefully documented and prioritized for additional action as needed.

Develop a Source Management Plan

In addition to the immediate management actions recommended, other longer term management strategies should be part of the wellhead protection program. Development of other management strategies will require identification of existing authorities at the local, state, and federal levels, and an understanding of interagency cooperation. We also cannot recommend specific long-term strategies without completing the detailed

source assessment. Therefore, our goal at this time is to present *possible* source management options, rather than specific courses of action.

When presenting source management options, it is useful to consider the level of protection that should be required in each zone of the wellhead protection area. General guidelines for source management for each capture zone identified in the state Draft Wellhead Protection Program (Department of Health, 1993) include:

1-Year Capture Zone. Within this zone, the water supply should be protected from microbial contamination and direct chemical contamination. To accomplish this, chemicals capable of contaminating groundwater should not be stored or used, or should be used with sufficient precautions to protect the groundwater resource. The 1-year capture zone should be intensely monitored to provide response time.

5-Year Capture Zone. Source management in this zone should be conducted similarly to that in the 1-year capture zone. Within this zone, potential sources should be identified and controlled with an emphasis on pollution prevention and risk reduction management. This zone will also be used by agencies for targeting inspections and enforcement actions.

10-Year Capture Zone. Source management within this zone may be less active, although high risk sources should be identified and actively managed. The zone is defined to encourage planning to recognize the long-term source of drinking water to allow the community to plan and site future high risk sources outside the recharge area.

Based on the issues of hydrogeology and current land use that we have identified during this study, we feel that the following source management options may be appropriate and should be considered in the wellhead protection program:

- **Source Removal**. Household hazardous waste collection decreases the possibility of improper disposal and accidental spillage. If nitrates are identified as a problem, city sewers could be extended to replace on-site wastewater (septic tank) disposal.

- **Land Use Management**. Zoning in the wellhead protection areas should be changed to prevent industrial and urban-type land uses from locating in the capture zones.

- **Ordinances**. Groundwater protection ordinances could include facility design requirements, operating standards, and direct spill reporting requirements for facilities located in the capture zones.

- **Groundwater Monitoring**. A monitoring well network installed within the wellhead protection area would help in early detection of contaminants and provide a basis for requesting enforcement of water quality standard violations by Ecology.

Prepare a Contingency Plan

We recommend preparing a contingency plan to address emergency replacement of the water supply source if it were to be contaminated. Options for source replacement might include identifying a back-up well, or identifying feasible interties with other water systems. The existing back-up well, MC-3, unfortunately would not be suitable because of its close proximity to MC-2. If MC-2 were to become contaminated, MC-3 would also likely be contaminated. The location of a new back-up well should consider the land uses indicated on Figure 6 and the groundwater flow directions shown on Figure 3. The new well should be located such that potential sources of contamination are not located upgradient from it.

The contingency plan should also include a spill response plan which documents coordination with local first responders (police/fire). Procedures for emergency events (fires, transportation accidents) should consider protection of the water supply (for example, ensuring that sufficient quantities of adsorbents are on hand to respond to a large transportation spill, or recognition that, in the event of a fire, it may be best to allow certain facilities or structures to burn rather than to have contaminated runoff pollute the aquifer).

Efforts should be made to coordinate contingency plan development with other existing or on-going contingency planning. The plan should be updated every two years, or more often if the situation warrants.

LIMITATIONS

Work for this project was performed, and this report prepared, in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. It is intended for the exclusive use of the City of McCleary for specific application to the referenced location. This report is not meant to represent a legal opinion. No other warranty, express or implied, is made.

Any questions regarding our work and this report, the presentation of the information, and the interpretation of the data are welcome and should be referred to the undersigned.

We enjoyed working with you on this project and we trust that this report meets your current needs.

Sincerely,

HART CROWSER, INC.

Lori Herman

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Senior Associate
LJH:cen
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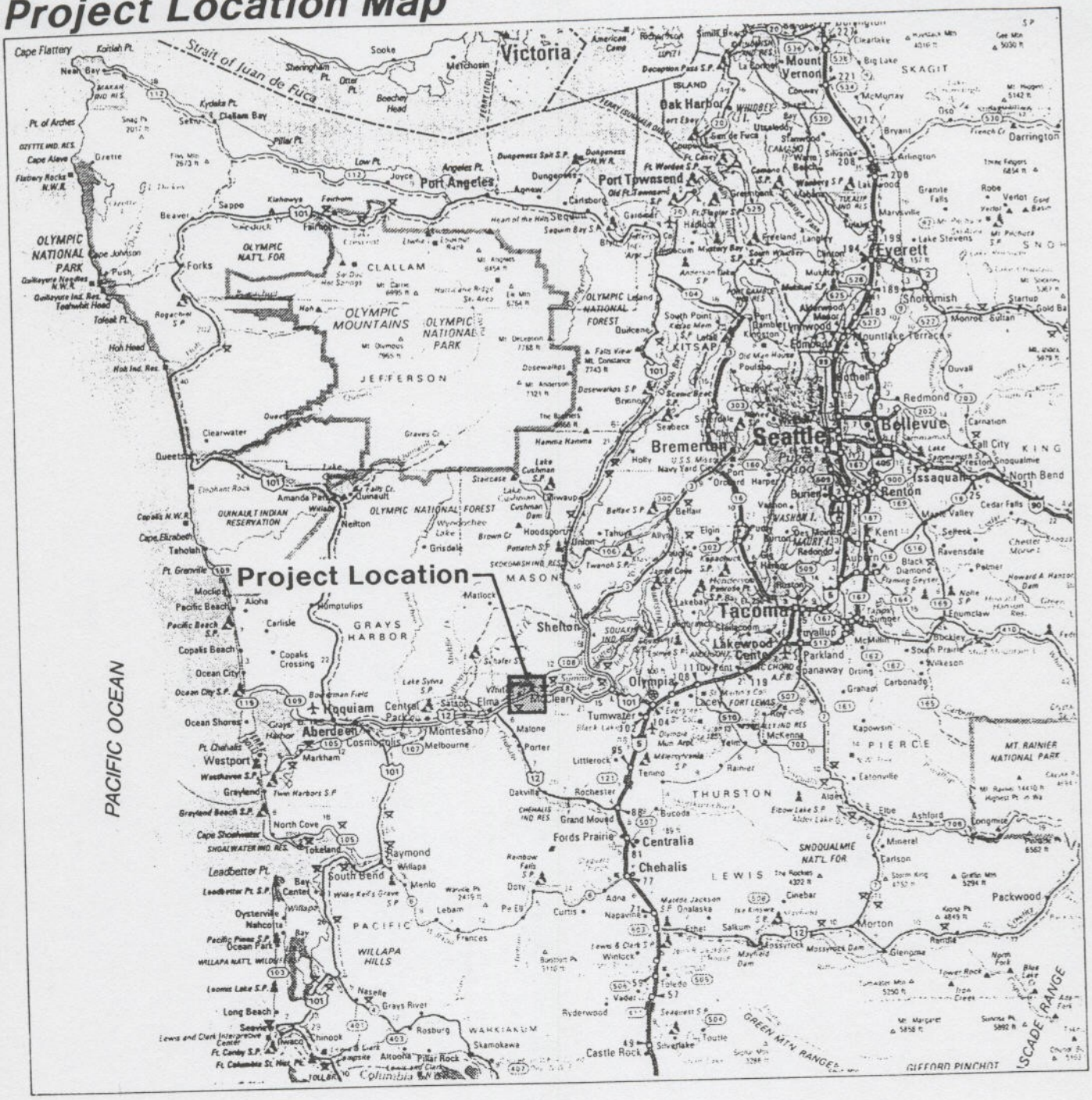
Table 1 - Potential Point Contaminant Sources

Map Number	Address	Description/Business Name
1	96 Elma-Hicklin Road	Grays Harbor Shake
2	Elma-Hicklin Road	Former Logging Equipment Maintenance Facility
3	162 North Summit Road	Quality Lumber Remanufacturing
4	Church Rd./Elma-McCleary Road	Former Gas/Service Station, Existing Junk Yard
5	Elma-McCleary Road	Jack's Welding/Fabrication, Former DOT Maintenance
6	157 Elma-McCleary Road	Sunrise Autobody
7	Elma-Hicklin Road	Alternator/Generator Rebuild
8	Elma-Hicklin Road	Gravel Pit w/ Garbage & Junk Autos
9	Elma-McCleary Road	Auto Service/Junk Autos
10	Elma-McCleary Road	Cemetery
11	3rd Street & Fir Street	Former Gas/Service Station
12	Simpson Avenue & Summit Road	Former Gas/Service Station
13	Simpson Avenue	Former Gas/Service Station
14	Simpson Avenue	Active Gas Station
15	Simpson Avenue	Simpson Door Factory
16	3rd Street	McCleary City Maintenance Shop
17	160 North Summit Road	Brooks Timber

Project Location Map



0 20 40

Approximate Scale in Miles

N

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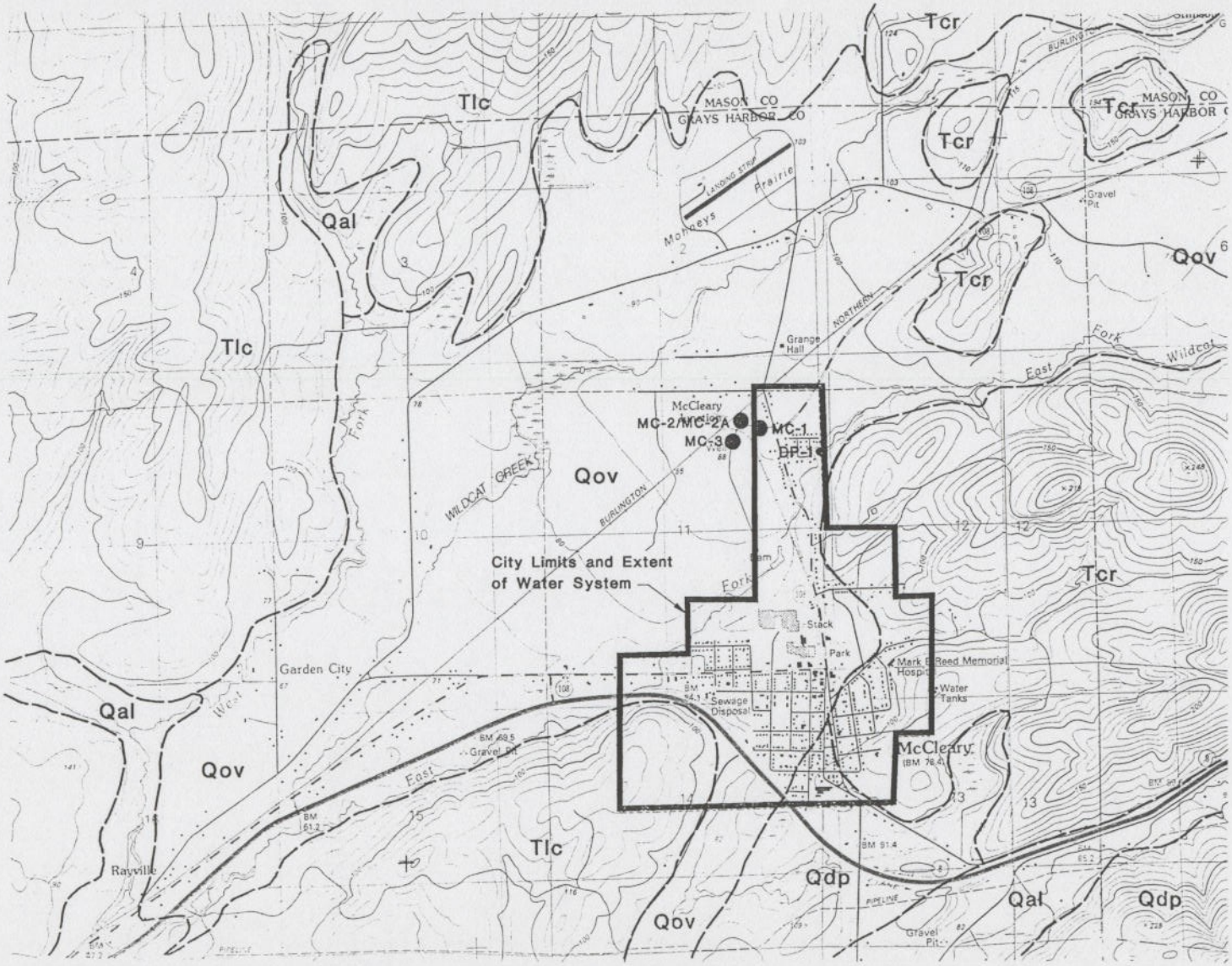
Figure 1

McCleary Study Area Map Showing Surficial Geology



Geologic Contact

Qal Alluvium

Qov Vashon Outwash

Qdp Pre-Vashon Drift

Tlc Lincoln Creek Formatio (Sedimentary Rock)

Tcr Crescent Formation (Volcanic Rock)

MC-1 City Supply Well Location and Number

DP-1 Drive Point Piezometer Location and Number

Note: Geology based on Logan, 1987.

0 2000 4000

Scale in Feet

N

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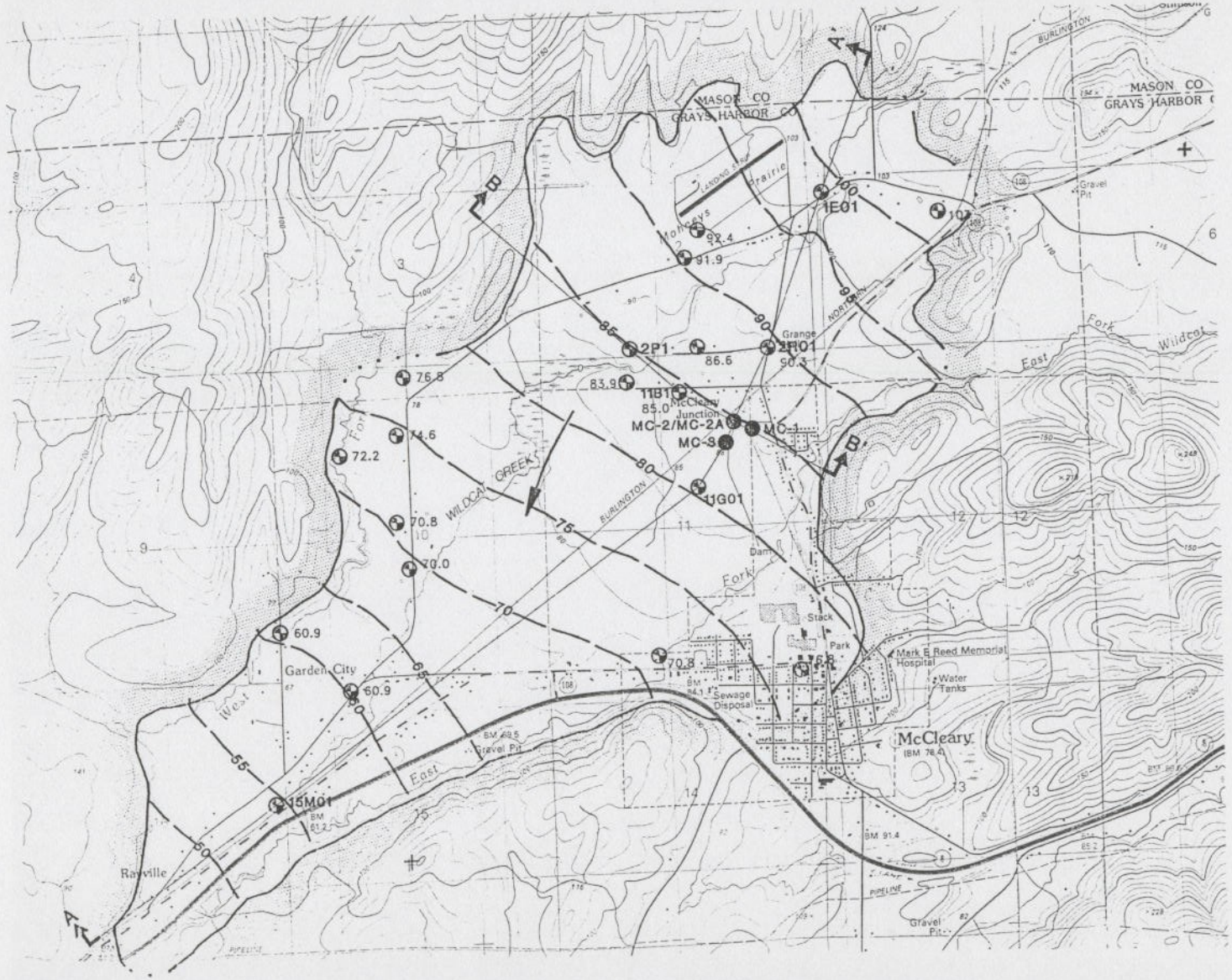
Figure 2

Groundwater Elevation Contour and Aquifer Boundary Map



N

MC-1 City Supply Well Location and Number

2R01 Domestic Well Location and Number

296.26 Groundwater Elevation in Meters (7/93)

—75— Groundwater Elevation Contour in Meters

Approximate Aquifer Boundary

A A' Geologic Cross Section Location and Designation

Groundwater Flow Direction

Note: Base map topographic elevations expressed in meters (10 meter contour interval).

0 2000 4000
Scale in Feet

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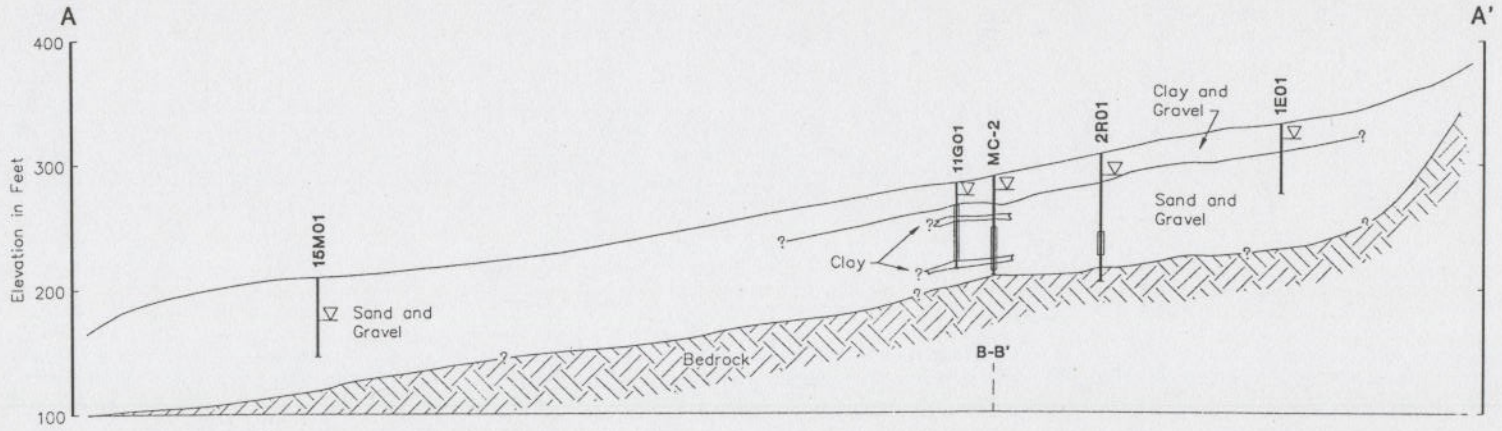
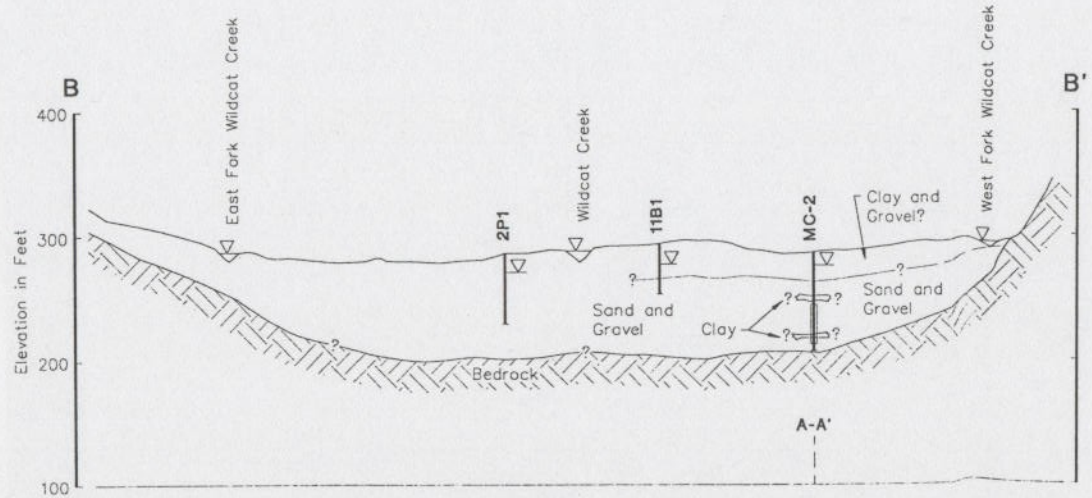
J-3500-01 3/94
Figure 3

Geologic Cross Sections A-A' and B-B'



Horizontal Scale in Feet
0 2000 4000
0 100 200
Vertical Scale in Feet
Vertical Exaggeration x 20



Horizontal Scale in Feet
0 1000 2000
0 100 200
Vertical Scale in Feet
Vertical Exaggeration x 10

1E01 Domestic Well Number
MC-2 City Supply Well Number
Well Location
Groundwater Level
Screened Section

Note: Refer to Figure 3 for Cross Section locations.

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Figure 4

JCH 3/21/94 1=2000 HC.pcp
35000116

Generalized Wellfield Recharge Area Map

- **MC-1** City Supply Well Location and Number
- Primary Recharge Area based on Approximate Aquifer Boundary
- Generalized Wellfield Recharge Area based on Wildcat Creek Watershed Divide
- Surface Water Divide
- Upgradient Aquifer Area Boundary

N

0 2000 4000
Scale in Feet

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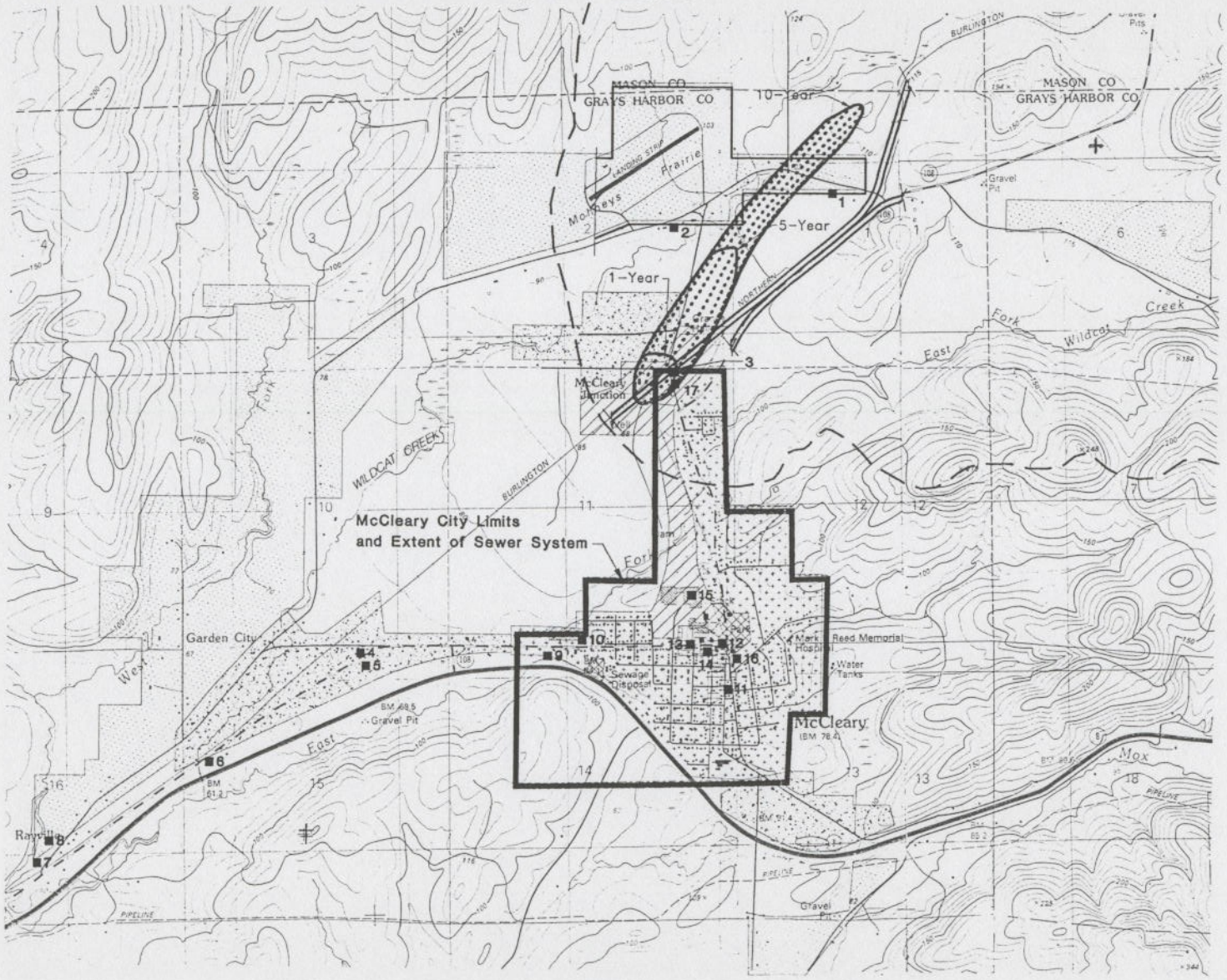
Figure 5

Land Use Map and Time-Related Capture Zones



HARTCROWSER
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Figure 6

JCH 3/25/94 1=2000 HC.pcp 35000118 T=2000 HCpcp
35000119

APPENDIX A
AQUIFER TEST PROCEDURES AND RESULTS

APPENDIX A
AQUIFER TEST PROCEDURES AND RESULTS

The McCleary Well aquifer test was conducted between July 26 and 30, 1993. 24 hours prior to starting the test, pressure transducers and data loggers were installed in the observation wells MC-2A, MC-3, and DP-1. The City filled the storage tank, then removed the well from service for approximately 8 hours. The test was started at 7:10 a.m. on July 27, 1993, and was conducted by pumping water directly into the system. The pumping portion of the test was conducted for 2,994 minutes until 9:04 a.m. on July 29, 1993. At that time the well was shut off and allowed to recover for approximately 24 hours until 9:30 a.m. on July 30, 1993. The average pumping rate used for our analysis was determined to be 425 gpm based on the totalizing meter at the wellhead. Periodic measurements made on a flowmeter adjacent to the wellhead during the test confirmed this flowrate.

Aquifer Test Data and Analyses

We used the data from the aquifer pumping test conducted on well MC-2 to estimate aquifer properties to be used in the capture zone analysis. Graphs of drawdown versus time after pumping started were used to solve formulas which express the relation between the hydraulic properties of an aquifer and the lowering of water levels in the vicinity of the pumped well.

Methods of aquifer test analysis are described in detail by Walton (1962). For this analysis, we used a curve-matching technique to estimate aquifer transmissivity (permeability times aquifer thickness). To use this technique, observed drawdown data are matched to theoretical "type curves," which have been developed for different types of aquifers with various properties. Each type curve has a set of parameters associated with it. The parameters of the curve that best matches the observed data are then used in a formula to calculate transmissivity.

Figures A-1, A-2, and A-3 show the observed drawdown/recovery data for monitoring locations MC-3, MC-2A, and DP-1, respectively. The data from well MC-2A were not used in the analysis due to the uncertain construction of the well (there is no well logs, it is shallower than the others suggesting partial penetration of the aquifer), which could bias the results. Additionally, the drawdown data was lost in translation from the transducer equipment to the desk top system. Data from DP-1 were not used because it was not possible to distinguish water level changes that might have been caused by the pumping test from those caused by fluctuations in the nearby East Fork of the Wildcat Creek.

MC-3 provided the best data for analysis. Figure A-1, a semi-log plot of the MC-3 data and Figure A-4, a log-log plot of the MC-3 data indicate a "recharge" type effect in the data after about 300 minutes of pumping. This recharge effect is shown by a decreased rate of drawdown and typically occurs as another source of water is supplied to the well. This can be from the drawdown core of the well intersecting a more transmissive portion of the aquifer, a surface water source, or as leakage from water storage in overlying materials. In this case we believe the recharge effect is from leakage based on the hydrogeologic conditions in the vicinity of the well and a Theis curve matching analysis.

To allow a Theis curve matching analysis, data from well MC-3 were plotted on a log-log graph (Figure A-4). The MC-3 drawdown data very closely matched the type curve of a leaky confined aquifer under non-steady state conditions at leak and factor of 0.4. Analysis of semi-log data plots of the data using Jacob Cooper methods was not used because the validity condition of $U \leq 0.01$ was not met until between 400 and 700 minutes into the test at which time the recharge effect was already seen.

The drawdown data from well MC-3 do not match a "Theis" type curve (also shown on Figure A-4), which describes drawdown from an ideal confined aquifer of infinite extent. The actual drawdown observed during the test is less than what would be expected for an ideal aquifer, indicating that the aquifer is receiving recharge that is offsetting the drawdown. The data matched a curve for a "leaky confined aquifer" with a transmissivity of 25,000 to 30,000 gpd/ft and a storage coefficient of 0.001.

The original time-drawdown and time-recovery data are not produced in this report because of the volume (measurements were obtained every 5 to 15 seconds for 4 days) but can be obtained upon request from the City of McCleary.

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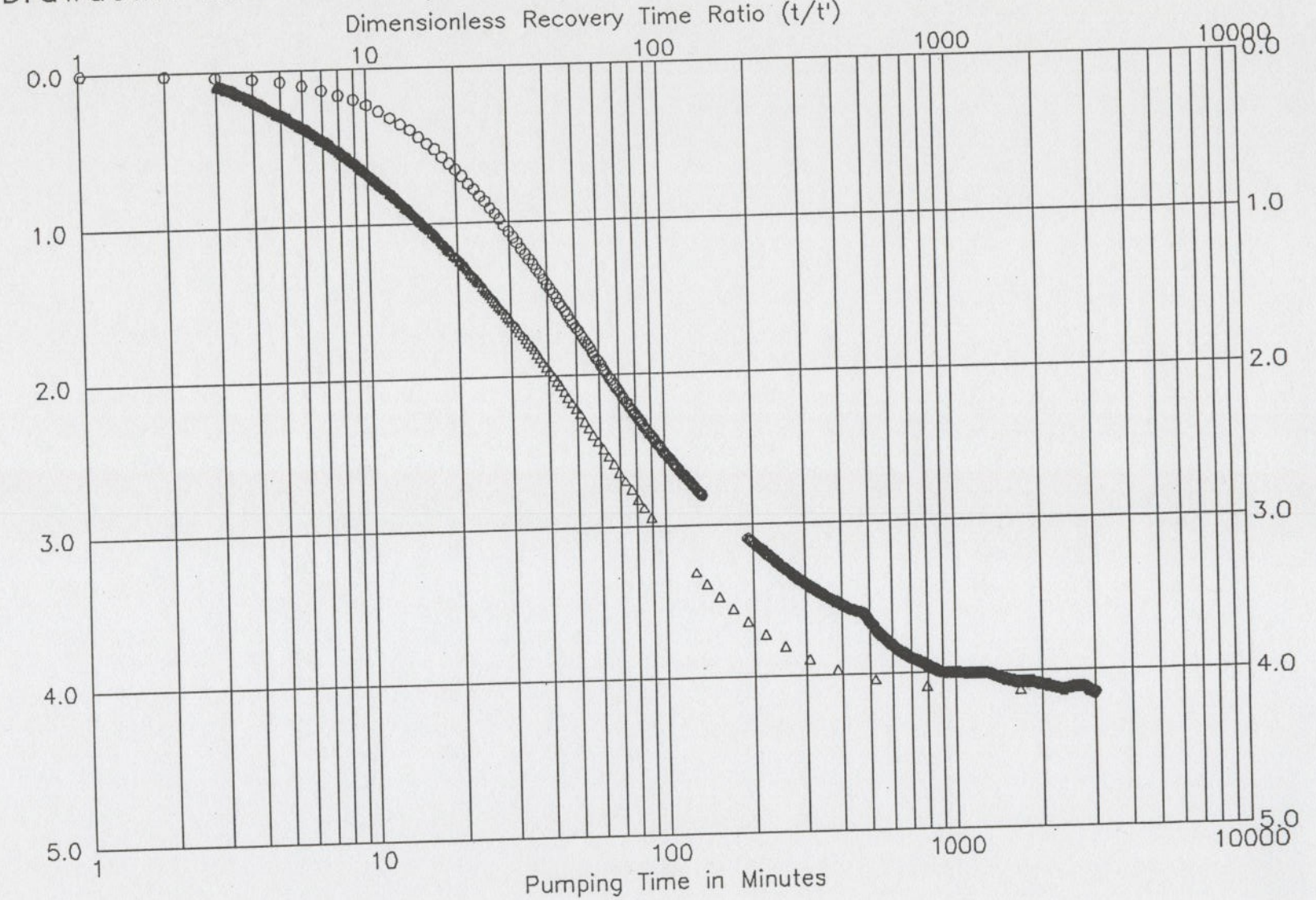
Constant Rate Pumping Test in Well MC-2
Drawdown and Recovery Measured in Observation Well MC-3



Drawdown Data ○
Recovery Data △
Pumping Rate: 425 gpm

t = Total Time since Start of Pumping
t' = Time since Pump Shut Off

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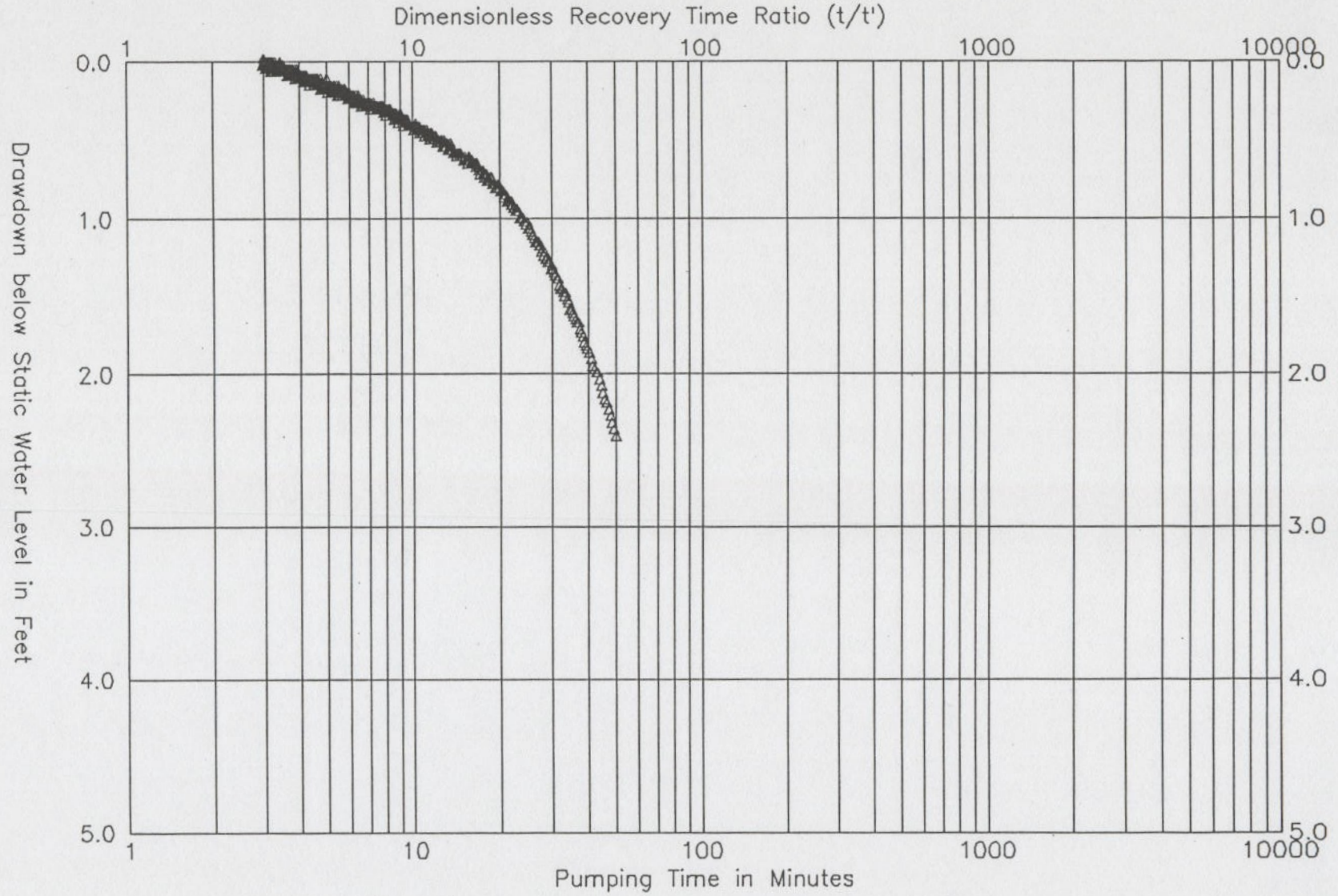
Figure A-1

Constant Rate Pumping Test in Well MC-2
Recovery Measured in Well MC-2A



Recovery Data Δ
Pumping Rate: 425 gpm

t = Total Time since Start of Pumping
t' = Time since Pump Shut Off

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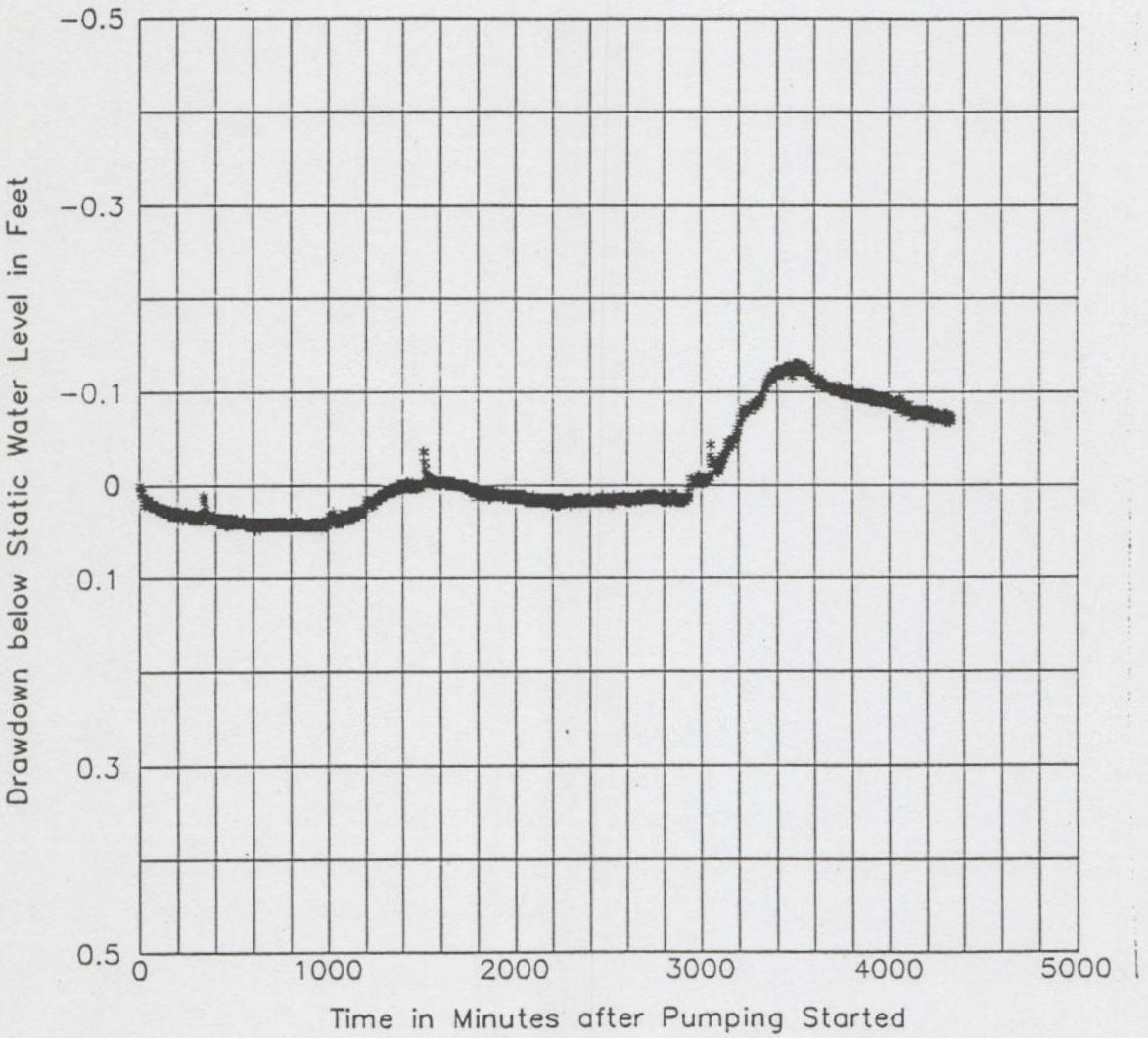
J-3500-01 4/94
Figure A-2

Constant Rate Pumping Test

McCleary Well MC-2

Measurements in Well DP-1



Pumping Rate = 425 GPM

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Figure A-3

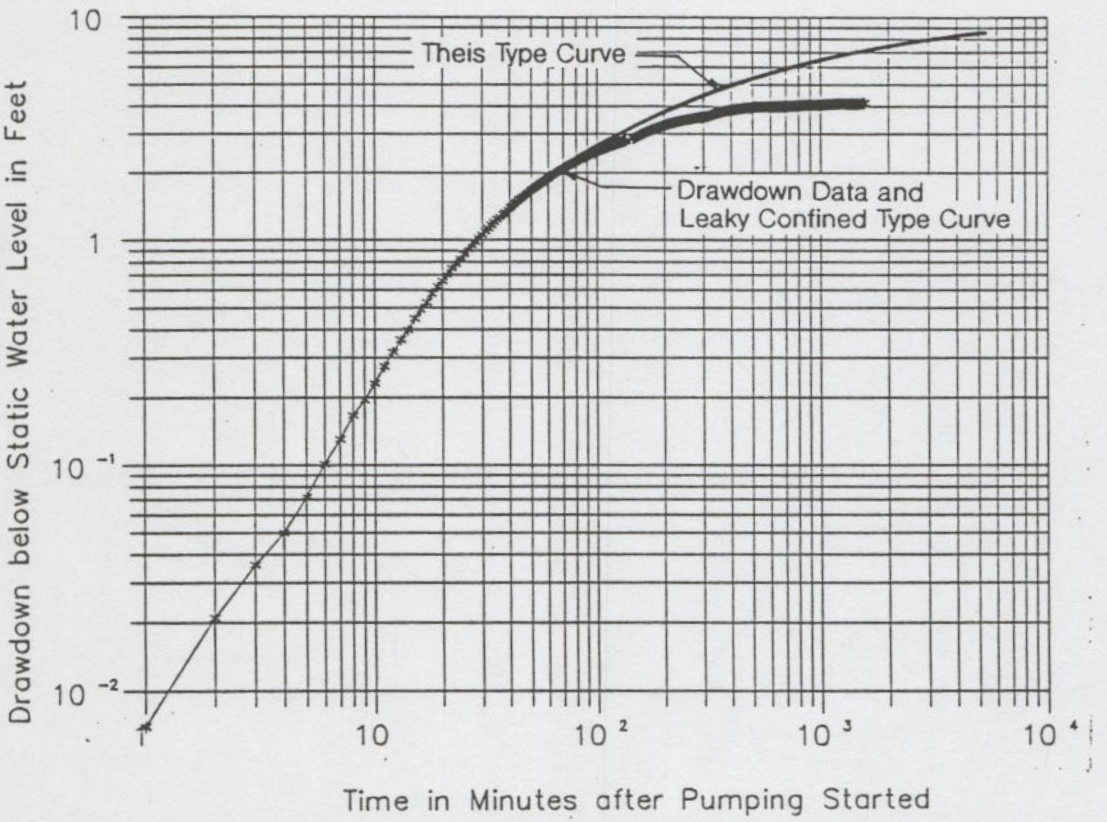
EJC 11/16/93 1=1 Default.pcp

35000111

Constant Rate Pumping Test

McCleary Well MC-2

Log-Log Plot of Measurements in Well MC-3



Pumping Rate = 425 GPM

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Figure A-4

EJC 11/16/93 1=1 Default.pcp

35000112

APPENDIX B
GROUNDWATER MODELING AND CAPTURE ZONE ANALYSIS

APPENDIX B
GROUNDWATER MODELING AND CAPTURE ZONE ANALYSIS

Model Description

PLASM (Prickett and Lonquist, 1971) is based on a mesh-centered finite-difference approach for solving the groundwater flow equation. The set of simultaneous algebraic equations that are produced from this technique are solved using the alternating direction implicit method of Peaceman and Rachford (1955). The model is capable of assessing aquifer response (in terms of water level elevations and therefore gradients) to stresses such as wells, precipitation recharge, and streams.

GWPATH (Shafer, 1987b) is a computer program for estimating horizontal fluid pathlines and travel times in non-uniform groundwater flow fields. The program is based on the numerical method presented by Shafer (1987a). This method is basically a particle tracking method, whereby infinitely small imaginary fluid particles are placed in the flow domain and their positions are tracked as they move through the flow field in a series of small time steps. The movement of the particles is driven by the hydraulic gradients calculated from hydraulic heads determined in the flow modeling step. Capture zones for pumping wells are estimated by placing imaginary particles immediately around the pumping well and tracking them *backward* in time.

Physical Configuration

Application of PLASM requires that the physical configuration of the aquifer be hypothetically discretized into a grid. The intersection of each grid line is referred to as a node. The program calculates groundwater elevations at each node. The discretization employed for modeling the McCleary Aquifer is shown on Figure B-1. The orientation of the grid on Figure B-1 was specified such that the regional groundwater flow field would be oriented along the direction of the grid (i.e., flow would be parallel and perpendicular to grid lines). Such a configuration avoids the possibility of errors in the pathline analysis step that frequently occur when the principal flow directions are oriented at an angle to the grid lines.

An irregular grid spacing (82 × 37 nodes covering an area of 22,000 × 10,000 feet) was developed to minimize the total number of nodes in the model and maintain an adequate resolution near the pumping center. The minimum cell dimension is 200 feet; the maximum is 1,400 feet. The solid circles on Figure B-1 indicate no-flow nodes, used to represent aquifer boundaries. The open circles indicate constant head cells which

represent the groundwater elevations of the natural flow system outside the area of influence of the modeled stresses. The constant head values were selected to produce a regional hydraulic gradient of 0.009 ft/ft, which was observed from the water levels measured in domestic wells in July 1993. The specific values used in the model were obtained by projecting observed water levels to the model edge based on this gradient.

Aquifer Parameters

The flow model requires a number of input parameters that are specific to the hydrogeologic system. These parameters include aquifer thickness, hydraulic conductivity, and recharge rate. In addition to hydraulic conductivity data, the pathline analysis also requires specification of effective porosity. Each of these input parameters are discussed below.

Aquifer Thickness

A saturated aquifer thickness of 75 feet was assumed throughout the domain. This assumption was supported by several well logs. Based on our conceptual model of the aquifer, we feel that the aquifer thins near the boundaries; however, these thinner areas are sufficiently far from the pumping center to be insignificant for this application.

Hydraulic Conductivity

Our pumping test analysis yielded an average aquifer transmissivity of about 28,000 gal/day/ft. Given the assumed aquifer thickness of 75 ft, this corresponds to a hydraulic conductivity of 375 gal/day/ft^2. This is a reasonable value for a predominantly sand aquifer (Freeze and Cherry, 1979), which is indicated by the drillers logs from the area. Although the groundwater modeling and pathline analysis schemes that we employed are capable of considering spatially varying hydraulic conductivity, the only data available were from the pumping test. Therefore, we specified a hydraulic conductivity of 375 gal/day/ft^2 everywhere in the domain.

Recharge Rate

Recharge to the aquifer from precipitation can affect the size of the steady-state drawdown cone of a pumping well, and is therefore important for estimating time-related capture zones accurately. Recharge is not a parameter that can be measured directly. It must be inferred from precipitation data by considering climatologic (evapotranspiration), topographic and geologic conditions that affect how much of the precipitation can actually reach the aquifer.

Detailed analyses of recharge in similar geologic settings in Western Washington using a model developed by the U.S. Geological Survey (Bauer and Vaccaro, 1987) have indicated that typically 30 to 40 percent of precipitation is available as groundwater recharge. We assumed the larger percentage due to the shallow depth to water, presence of permeable soils, and generally level topography (limiting runoff).

The closest weather observation station is in Elma, located approximately 8 miles west of McCleary. Elma lies approximately 200 feet lower in elevation than McCleary; however, it was considered to be representative of McCleary due to its proximity. A study of precipitation records dating back to 1931, indicated a yearly average of 59 inches (Byrne-Stevens & Associates, 1977).

Using these data as guidance, we assumed a recharge rate of 24 inches/year. This corresponds to 800 gpm/mi^2.

Effective Porosity

In practice, it is extremely difficult and uncommon to determine actual field values of effective porosity. A value of 0.25, taken from literature values for a well-sorted medium sand (Freeze and Cherry, 1978), was used for the pathline and capture zone analysis. Fortunately, the effect of uncertainty in effective porosity on time-related capture zone calculations is small compared that associated with other parameters (Varljen and Shafer, 1991).

Model Calibration

Model calibration was accomplished through a trial and error process of parameter adjustment to force simulated groundwater elevations to match those observed in July 1993, including the drawdown observed during the pumping test. An initial simulation was conducted and modeled groundwater elevations were visually compared with those observed during July 1993.

Modeled groundwater elevations initially produced an unrealistically steep gradient in the extreme northeast corner of the aquifer. This likely occurred because the initial model configuration produced a low transmitting capacity in this region created by the close proximity of the boundaries. The transmitting capacity was increased by changing the hydraulic conductivity in this region to 425 gal/day/ft^2 to produce groundwater elevations that matched those measured in July 1993.

This increased hydraulic conductivity is certainly within the range of possible conductivities indicated by the pumping test, allowing for uncertainties in the analysis and assumed aquifer thickness. A higher hydraulic conductivity in this region is also consistent with the conceptual geologic model of the area, which indicates outwash material was carried into the valley from the northeast, with coarser material being deposited first.

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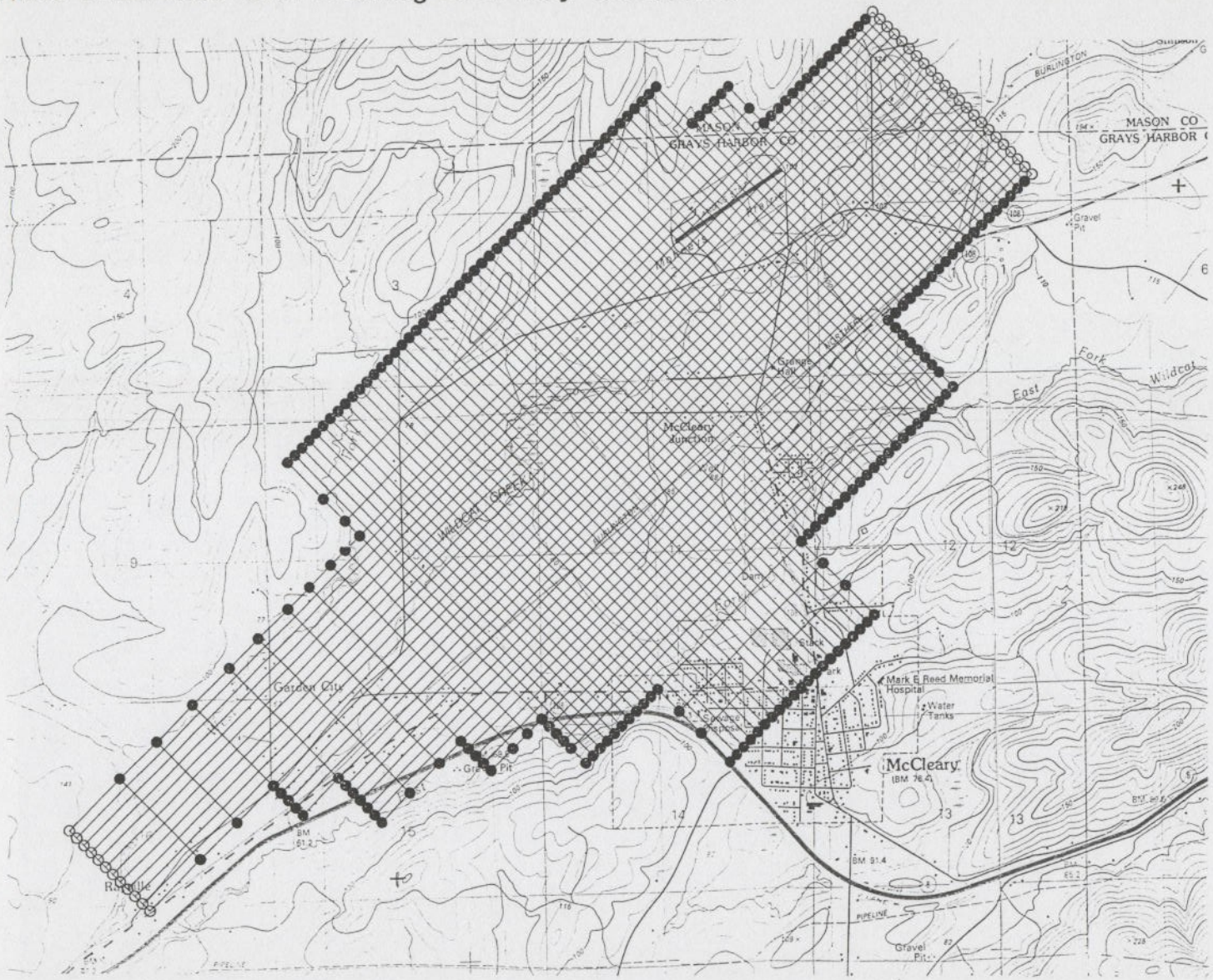
Finite Difference Grid Showing Boundary Conditions



O Constant Head Boundary

● No Flow Boundary

N

0 2000 4000

Scale in Feet

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J-3500-01 11/93

Figure B-1

Earth and Environmental Technologies

Corporate Headquarters:
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Anchorage, Alaska 99503
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Lake Oswego, Oregon 97035
503.620.7284

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San Diego, California 92101
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808.521.5955

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Col. Hipódromo Condesa
C.P. 06170, México, D.F.
525.277.1155

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Lakewood, Colorado 80228
303.986.6950

Grays Harbor County & City of McCleary

Wildcat Creek Aquifer

R 5 W

T 18 N

Mason County

McCleary

Mark Reed Hospital

10-Year

10-Year

5-Year

1-Year

10-Year

Legend

- Wildcat Creek Aquifer
- Wellhead Protection Area
- City of McCleary
- Group "A" Wellheads
- Group "B" Wellheads
- R2 County Zoning
- RR County Zoning

Wellheads

- #1 - MCCLEARY, CITY OF
- #2 - MCCLEARY, CITY OF
- #3 - PIT WATER CO 328
- #4 - FORESTVIEW SENIOR 55+ COMMUNITY
- #5 - FORESTVIEW SENIOR 55+ COMMUNITY
- #6 - WINTERCREEK MHP
- #7 - SKY ACRES
- #8 - OLIN 330

Grays Harbor County

1854

City of McCleary

1" = 500'

1000 0 1000 Feet

S.R. 108

S.R. 8

108

8

Middle Fork Wildcat Creek

West Fork Wildcat Creek

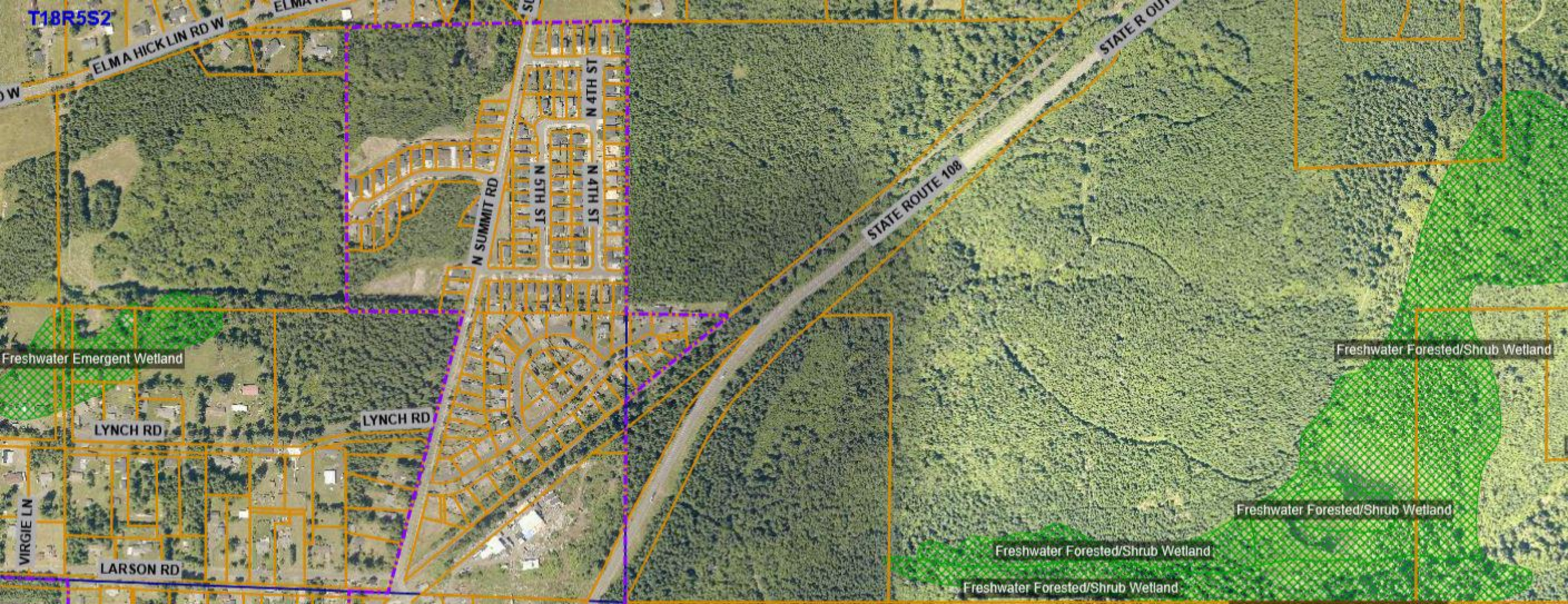
East Fork Wildcat Creek

Wildcat Creek

Grand Creek

Chehalis River

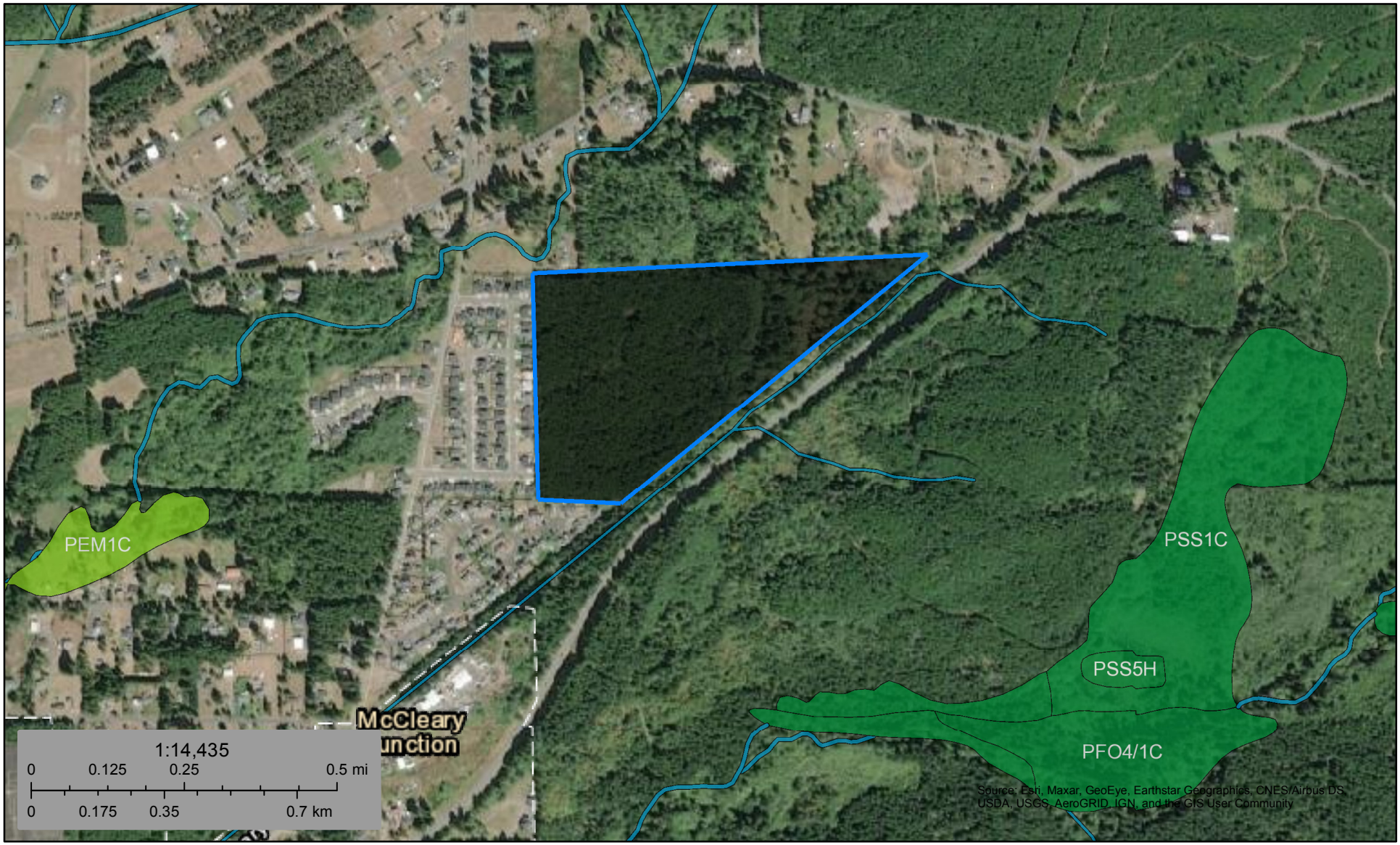
m:\projects\ul&d\wildcat_aquifer_zoning\wildcat_aquifer_zoning.apr


T18R5S2
ELMA HICK LIN RD W
N SUMMIT RD
N 5TH ST
N 4TH ST
STATE ROUTE 108
Freshwater Emergent Wetland
LYNCH RD
LYNCH RD
VIRGIE LN
LARSON RD
Freshwater Forested/Shrub Wetland
Freshwater Forested/Shrub Wetland
Freshwater Forested/Shrub Wetland
Freshwater Forested/Shrub Wetland

U.S. Fish and Wildlife Service

National Wetlands Inventory

PB Annexation



July 26, 2021

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine