Table of Attachments

Attachment A: Utilities and Community Facilities Map

Village of Oregon Comprehensive Plan

Map 8
Utilities and Community Facilities

Community Facilities

- Cemetary
- Fire Station
- Library
- Police Station
- Senior Center
- Village Hall
- Wastewater Treatment Plant
- Schools

Parkland

- Town / Village Park
- School Park
- Private Park
- County / State / Federal Park

Proposed Future Facilities

- Short Term Park
- Long Term Park
- Well

- Village of Oregon
- Town Boundary
- Village of Oregon Extraterritorial Jurisdiction
- Surface Water

0 1,000 2,000 3,000 4,000 Feet

N

May 6, 2013
Source: Dane Co. LIO, 2011; Vandewalle & Associates

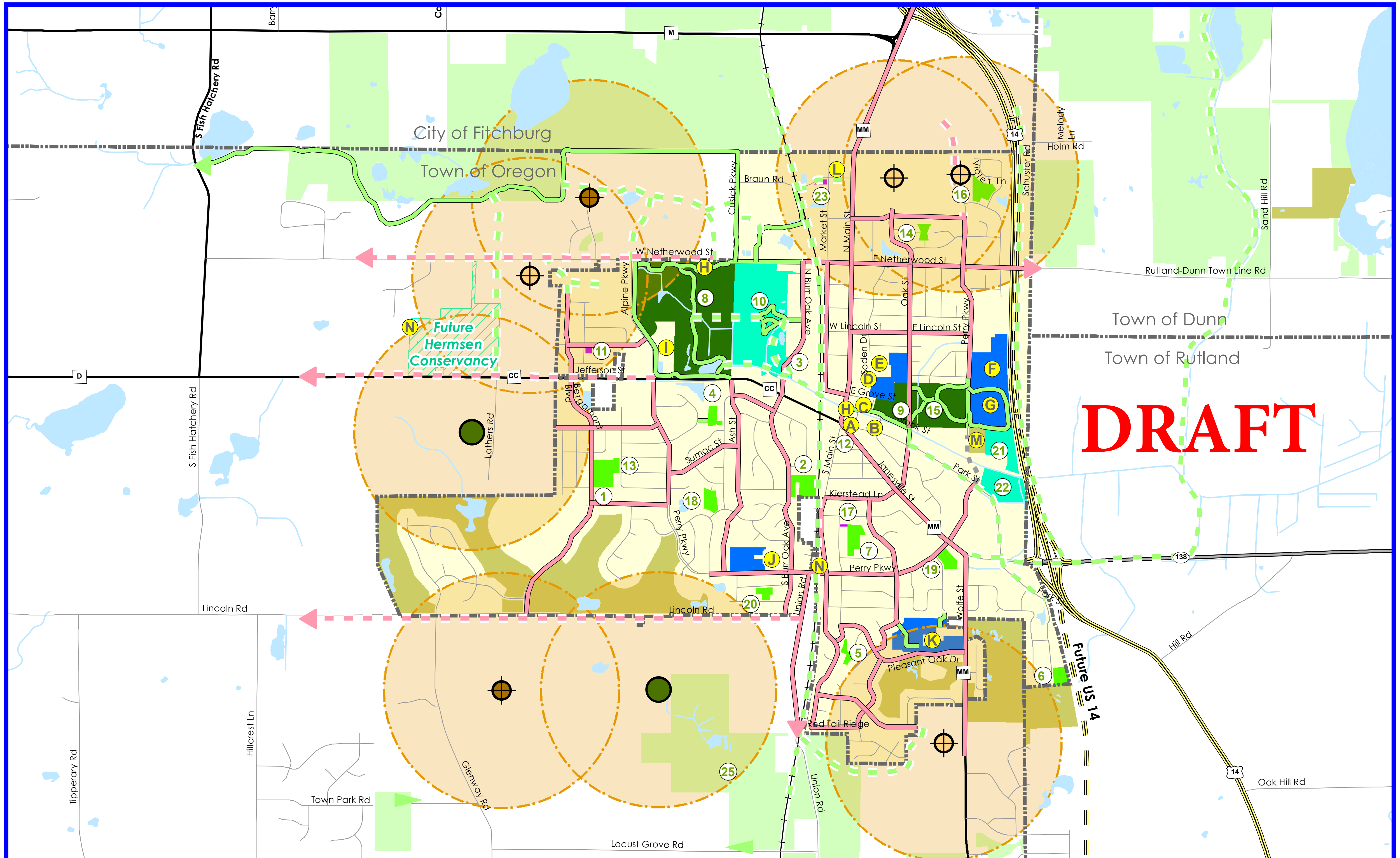
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

Downtown Detail

Grove Street
Main Street
Brook Street
Spring Street
Park Street
Janesville Street

Lake Barney
Wisconsin DNR
City of Fitchburg
Town of Oregon
MM
14
Braun Rd
Cusick Pkwy
Rustic Vineyards Park
Richards Rd
Merri Hill Park
Schuster Rd
Wisconsin DNR
Rutland-Dunn Town Line Rd
Dunn Ave
Netherwood Rd
W Netherwood St
E Netherwood St
Keller Apline Meadows Park
Lerner Conservation Park
N Burr Oak Ave
Orchard Dr
E Lincoln St
N Main St
Market St
Town of Dunn
Town of Rutland
Liberty Park
Dega Park
Prairie View Elementary School
Oregon High School
CC
Jefferson St
Alpine Pkwy
Kiser Fireman's Park
Oregon Jaycee Park
Perry Pkwy
Oak St
Lathers Rd
Walnut St
Forest View Park
Drumlin Dr
Ice Arena
Park St
Janesville St
S Burr Oak Ave
S Main St
Ash St
Riviera St
Bergamont/ Meadow View Park
Sumac St
Bethel Greenacres Park
Stone Ridge Park
Augusta Dr
Sterling Dr
High Meadows Park
Thomson Park
138
Rimpoche Ln
Inverness St
Bergamont Blvd
Rome Corners Intermediate School
Perry Pkwy
Bergamont Golf Club
Windcrest Park
Leeward Ln
Lincoln Rd
Scott St
Ciedell St
Oregon Middle School
Gasner Memorial Park
Union Rd
Wolfe St
Concord Dr
Hawthorne Estates
14
Glenway Rd
Foxboro Golf Club
Foxfield Rd
Foxboro Golf Club
MM
Windridge Rd
Anderson County Park
Harding St

Attachment B: Future Park Facilities Map



Existing Village Parks

1. Bergamont Park
2. Bethel Greenacre Park
3. Dega Park
4. Forest View Park
5. Gasner Memorial Park
6. Hawthorne Estates Park
7. High Meadows Park
8. Keller Alpine Meadows Park
9. Kiser Firemen's Park
10. Lerner Conservation Park
11. Liberty Park
12. Madsen Memorial & Waterman Triangle Parks
13. Meadow View Park
14. Merri-Hill Park
15. Oregon Jaycee Park
16. Rustic Vineyards Park
17. Scott Street Tot Park
18. Stone Ridge Park
19. Thomson Park
20. Windcrest Park
21. Lacrosse Field, Sledding Hill, and Dog Run Area
22. Jon Blanchard Dog Park
23. Elving Kjellstrom Memorial Park

County Parks

24. Anderson Farm County Park
25. Anderson Farm County Park (Planned Future Expansion)

Community Facilities

A. Village Hall
B. Library
C. Community Pool
D. Netherwood Elementary School
E. Prairie View Elementary School
F. Oregon High School
G. Jaycee Park East
H. Trailhead
I. Future Elementary School Site
J. Rome Corners Intermediate School
K. Oregon Middle School
L. Soccer Club
M. Ice Arena
N. Proposed Trailhead

Village of Oregon Outdoor Recreation Plan

Map 3: Future Facilities

- Community Parks
- Neighborhood Parks
- Mini Park / Tot Lot
- Special Use / Open Space
- School Parkland
- Private Parks, Open Space, and Golf Courses
- Other Public Open Space
- Existing Off Road Bike Trails
- Proposed Off Road Bike Trails
- Existing On Road Bike Routes
- Proposed On Road Bike Routes
- X Community Facilities
- # Exisiting Parks
- Proposed Short Term Neighborhood Park likely within 10 years
- Proposed Long Term Neighborhood Park likely beyond 10 years
- Proposed Community Park
- 1/2 Mile Proposed Neighborhood or Community Park Service Area
- Future Hermsen Conservancy
- Village of Oregon
- Other Municipal Boundary
- US Highway
- State Highway
- County Highway
- Local Road
- Railroads

0 1,000 2,000 4,000 Feet

Amended: January 17, 2018
Source: CARPC, V&A, Dane County LIO, Village of Oregon

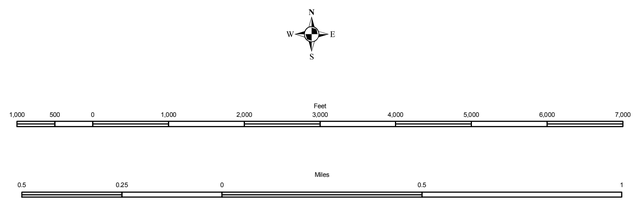
VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

N

Attachment C: Town of Oregon Planned Land Use Map

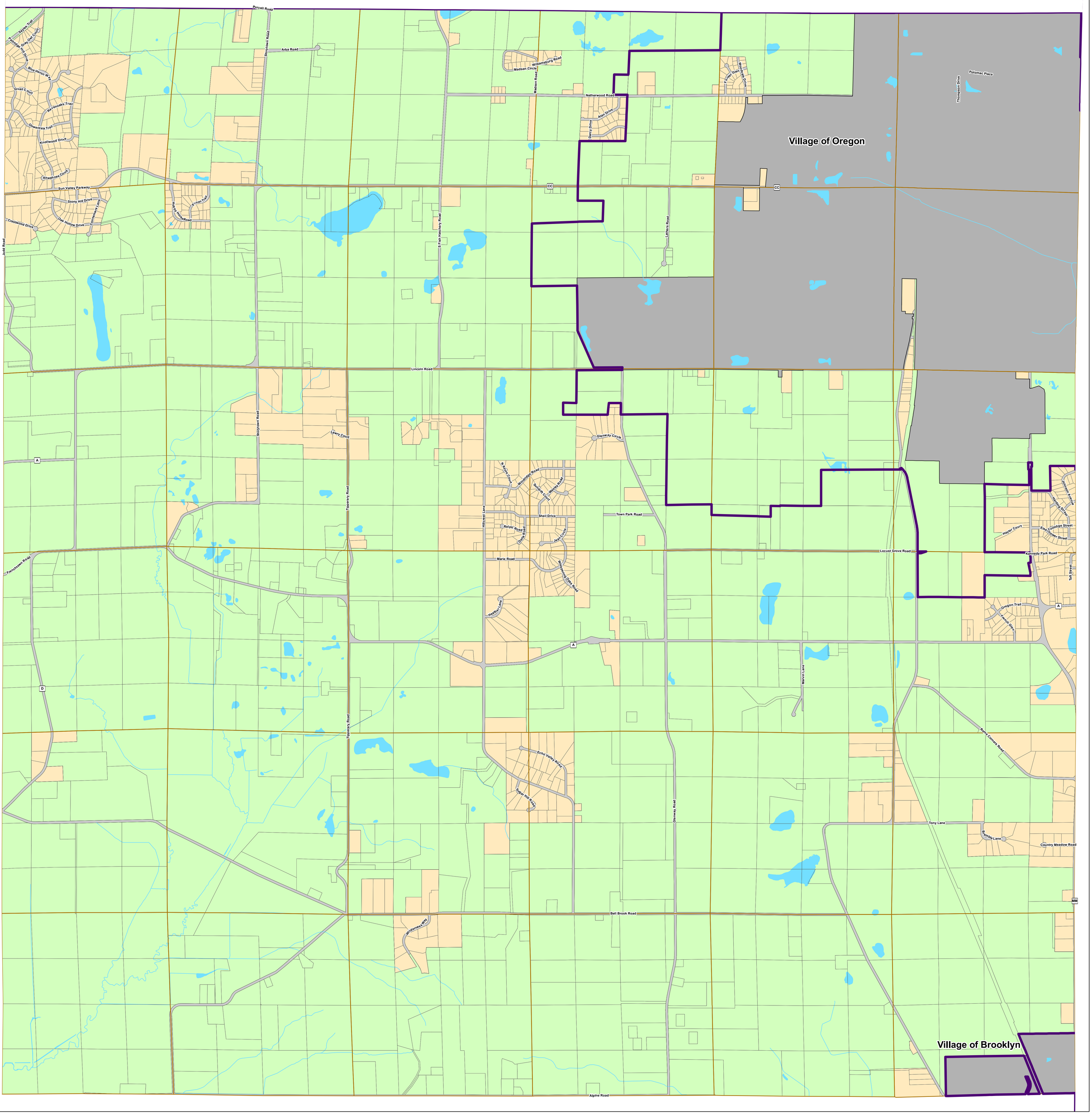
Dane County Comprehensive Plan Town of Orgeon Planned Land Use

Map created July 2010 by
Dane County Planning and Development
608-267-4115



Farmland Preservation Categories

- AGRICULTURAL PRESERVATION AREAS
- RURAL DEVELOPMENT/TRANSITIONAL
- City and Village Plans
- Section Boundary
- Parcel Boundary
- Water
- Village Boundary



Attachment D: Westside Planned Neighborhood Description (from Oregon Comprehensive Plan)

This land use category encourages a mix of residential development. *Single-Family Residential* development is planned to make up the majority of the residential units (approximately 70 percent of residential), integrated with well-designed, limited components of *Two-Family Residential* (approximately 10 percent of residential), *Mixed Residential* (approximately 20 percent of residential), *Institutional, Parks and Open Space, Neighborhood Office*, and *Neighborhood Business* land uses. Such plans encourage the use of complementary vehicle and pedestrian transportation networks, urban design strategies including the preservation and enhancement of vistas, neighborhood gathering places, and visual focal points. The mix of development types is expected to result in densities that match or exceed historic densities within the Village.

The ideal end result for these new areas is new neighborhoods that capture much of the charm and unique character of the best historic neighborhoods in the community, and the added benefit of more completely coordinated land use, open space, and transportation patterns. Areas planned in this manner will be more marketable to a greater diversity of ages, incomes and lifestyles, and will typically appreciate in value faster than single-use neighborhoods employing the same lot sizes and structures over very large areas, and which become indistinguishable from each other. The combination of a fine-grained land use pattern with careful aesthetic planning is one of the critical factors in creating the lasting charm of a historic village like Oregon.

The *Planned Neighborhood* area is intended to provide a highly-planned mix of residential dwelling units and density types; neighborhood-oriented shopping opportunities, such as convenience store or small specialty grocery stores, beauty shops, bakeries, or pharmacies; a range of employment opportunities (usually located on the edges of the neighborhood), including small offices and businesses such as those mentioned above; live-work arrangements, such as apartments or lofts over studio or other commercial space; and educational facilities, such as elementary schools and day care. These neighborhoods should be connected to other neighborhoods by a network of streets that discourage high travel speeds, but still allow access to emergency and maintenance vehicles.

The following areas are proposed as *Planned Neighborhoods*:

Westside Planned Neighborhood

A large (approximately 640 acres) *Planned Neighborhood* area is located to the west and northwest of the Village, adjacent to the developing Bergamont and Oregon Parks subdivisions and Westside Park, and extending north of West Netherwood Road. This part of the neighborhood also abuts the *Planned Industrial* area to the north. Sensitivity in site design will be needed to adequately separate and buffer the residential uses in the neighborhood from this industrial land use. Sensitivity will also be required in design of areas that will abut existing rural residential development and lands in agricultural use.

A portion of this area is specifically planned as a Traditional Neighborhood Development (TND). This 75-acre area is located north of CTY CC and south of West Netherwood Road, directly west of the Oregon Parks subdivision. TND emphasizes a human scale—buildings are placed close together, and exteriors are designed to be attractive to pedestrians. Garages and driveways are de-emphasized with greater setbacks, architectural details and landscaping. Within a TND, the transportation system also focuses on providing safe, attractive connections for pedestrians. Following this emphasis, this area is planned for small lot residential development served by alleys, with some limited multi-family housing. The southwestern portion of this site is reserved for an Institutional land use or uses.

Before development on this site will be approved, the Village will require that the entire property be platted and North Bergamont Boulevard be extended north to and west to connect to West Netherwood Road.

Another portion of the Westside Planned Neighborhood is planned for conservation development. This property is located at the southwest corner of West Netherwood Road and North Alpine Parkway. This property currently supports mature hardwood woodland, and as such it is subject to the Village's woodland protection ordinance. In order to develop this property, 70% of the healthy, mature hardwood trees must be protected or replaced. This can most easily be accomplished by using large conservation-sized lots and small clustered single-family development, clustered multi-family, or attached single-family development.

Southwest Planned Neighborhood

Another large (approximately 800 acres) *Planned Neighborhood* area is located to the south and west of the Village. This area is south of the single-family golf course development mentioned above. Sensitivity will again be needed to design new development in harmony with existing rural residential and agricultural land uses.

Southeast Planned Neighborhood

The smallest *Planned Neighborhood* area is shown south and east of the Village, in the area between the current and future alignments of US 14. This area is approximately 280 acres in area, and will abut the *Planned Office* area to the north. The future alignment of US 14 will need to be addressed in the site design of this area, to ensure adequate buffering of land uses along the roadway.

E. COMMUNITY CHARACTER AND DESIGN

The friendly, small-town character of the Village was one of the most frequently expressed strengths at the Vision Workshop. Residents cherish the feeling of Oregon, and wish to preserve it. This character comes from the Village's relatively compact development, the proximity of rural and open spaces, and the historic downtown, which provides a central focus for the community, as well as the potential for a gathering place.

While the Village still retains the basic form that lends itself to small-town character, it is extremely important that future planning keep in mind this overall character and quality of life. Development standards and procedures need to ensure that new development is not only safe and efficient, but maintains the desired character of the community. Specific, critical aesthetic components include architecture, open space connections, and the design of community entryways.

The Village has been maintaining a high level of detailed site plan review, required landscaping, and sign controls, and providing support for the revitalization of the downtown area. However, these endeavors cannot ensure that a community will retain its identity, neighborhoods will remain attractive to new residents, or aging commercial areas will continue to compete successfully with new edge-oriented projects. In recognition of this, this portion of the *Plan* provides the basis of a comprehensive approach to community character planning.

1. Community Character Components

A wide variety of elements contribute to the creation of community character. These elements should be considered with all development proposals and government actions associated with implementation of this *Plan*. The Village has some measure of control over nearly

Attachment E: USA Developable Acres Analysis – Oregon

Oregon USA Developable Land

Developable Land Type	Acres	Percent
Vacant Subdivided Prime	10.9	4%
Vacant Subdivided Land	158.5	54%
Agriculture	88.5	30%
Open Land	33.6	12%
Total Developable in Current USA	291.5	
CARPC Est. Acres needed by 2040	614.0	
Difference	322.5	

Village of Oregon

Urban Service Area

Developable Land*

CARPC Environmental Corridors

Existing Land Use

- Vacant Subdivided Land*
- Vacant Subdivided Prime*
- Open Land*
- Agriculture*
- Residential
- Commercial
- Wholesale and Retail Trade
- Industrial
- Manufacturing
- Institutional/Governmental
- Under Construction
- Recreation
- Woodlands
- Water

*Vacant Subdivided Land, Vacant Subdivided Prime, Open Land, and Agriculture Land were the land use categories, after removing Environmental Corridors, calculated as "Developable" within the current Oregon Urban Service Area.

Vacant Subdivided Prime land is Vacant Subdivided Land believed to be most primed for development, or which may already be under construction, as it has been purchased by an individual from the developer.

0.5 Miles

VANDEWALLE & ASSOCIATES INC.
Shaping places, shaping change

Date: 2/23/2017
Sources: CARPC, Dane Co. LIO, NAIP

Attachment F: Annexation Petition

STATE OF WISCONSIN **VILLAGE OF OREGON** **DANE COUNTY**

In the Matter of the Direct Annexation of Land to the Village of Oregon, Dane County, Wisconsin	Unanimous Petition for Direct Annexation Wis. Stats. 66.0217(2)

To the Village Board of the Village of Oregon, Dane County, Wisconsin:

1. The undersigned hereby petition for direct annexation of the territory described in Annexation Exhibit A hereto to the Village of Oregon, Dane County, Wisconsin, whereby said territory will be detached from the Town of Oregon, Dane County, Wisconsin, pursuant to Section 66.0217(2), Wisconsin Stats.
2. Attached hereto as Exhibit B is a scale map which accurately reflects the legal description of the property to be annexed and the boundary of the annexing Village and includes a graphic scale on the face of the map.
3. The current population of the territory proposed to be annexed is 0.
4. This petition has been signed by the owners of all of the land in area within the territory proposed to be annexed, and by all of the electors residing within the territory proposed to be annexed.

Owners of All Lands Within The Territory Proposed To Be Annexed:

Date of Signing:
January 16, 2018

Name of Owner: Lutheran Church Extension Fund – Missouri SYNOD
Rick Lauer

Address of Owner: 10733 Sunset Office Drive
Suite 300
St. Louis, MO 63127

Signature: Rick Lauer

Tax Parcels:
050903480010
050903495009

EXHIBIT A

Legal Description

Forward Development Group
161 Horizon Drive, Suite 101A
Verona, WI 53593

ANNEXATION DESCRIPTION

Part of the East Half of the Southeast Quarter of Section 03, Town 05 North, Range 09 East, Town of Oregon, Dane County, Wisconsin.

More particularly described as follows:

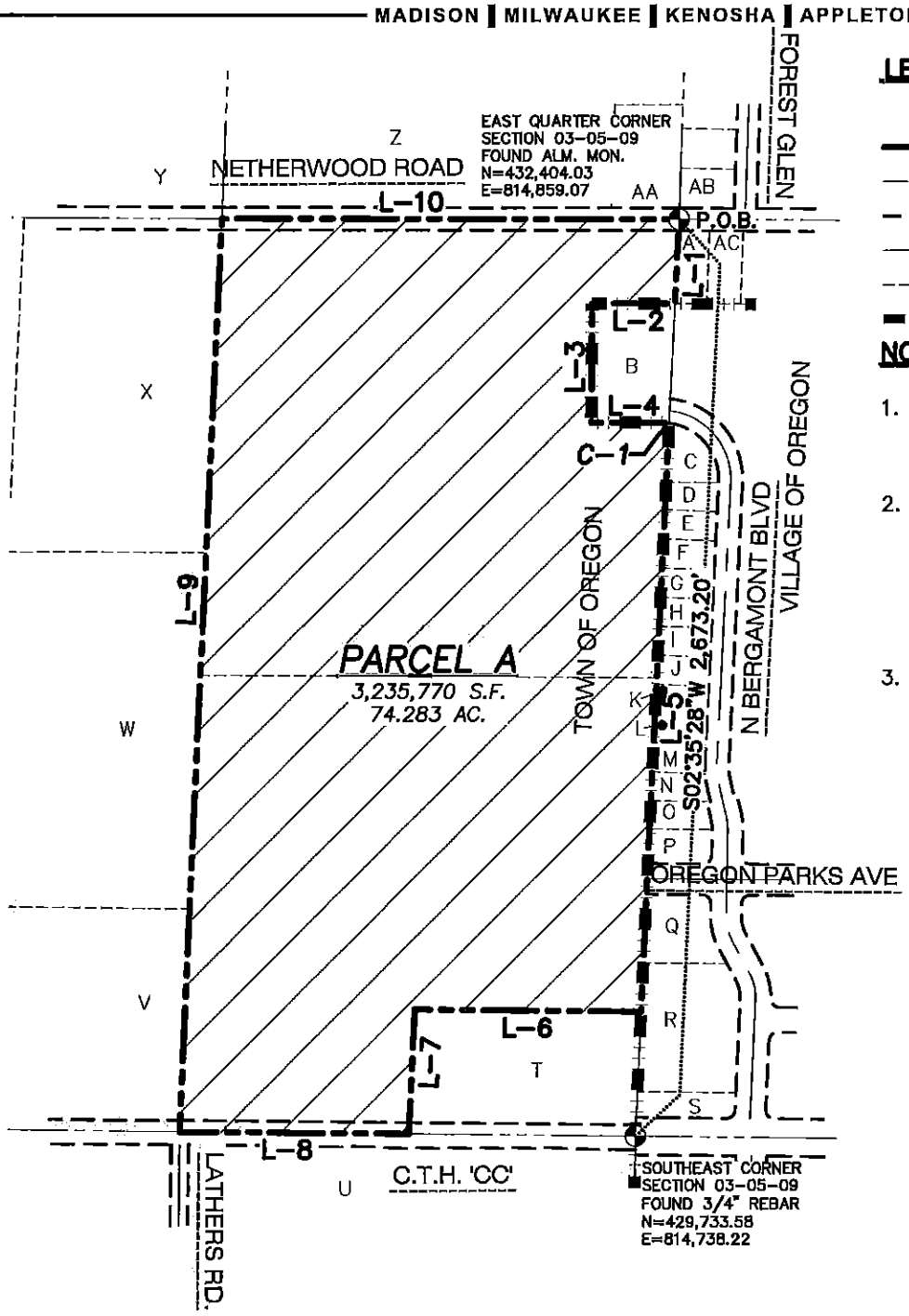
Beginning at the East Quarter corner of Section 03, aforesaid; thence South 02 degrees 35 minutes 28 seconds West along the East line of the said Southeast Quarter, 245.84 feet to the North line of Lot 1, Certified Survey Map No. 14326, as recorded in Volume 98, pages 7-9, as Document No. 5262945; thence North 89 degrees 54 minutes 06 seconds West along said North line, 242.27 feet to the West line of said Lot 1; thence South 00 degrees 05 minutes 54 seconds West along said line, 346.64 feet to the South line of said Lot 1; thence South 89 degrees 54 minutes 06 seconds East along said South line, 207.98 feet to the West line of Oregon Parks Neighborhood Subdivision, also being the East line of the Southeast Quarter of Section 03, aforesaid; thence South 02 degrees 35 minutes 28 seconds West along said line, 1,716.06 feet; thence North 89 degrees 23 minutes 50 seconds West, 660.41 feet; thence South 02 degrees 35 minutes 28 seconds West, 363.22 feet to the South line of the Southeast Quarter of Section 03, aforesaid; thence North 89 degrees 23 minutes 50 seconds West along said South line, 670.77 feet to the West line of the East Half of the Southeast Quarter; thence North 02 degrees 27 minutes 26 seconds East along said West line, 2,661.27 feet to the North line of the Southeast Quarter; thence South 89 degrees 53 minutes 55 seconds East along said North line, 1,337.86 feet to the Point of Beginning.

Said parcel contains 3,235,770 square feet or 74.283 acres.

161 Horizon Drive, Suite 101 • Verona, WI 53593 • Phone: 608.848.5060 • Fax: 608.848.2255

EXHIBIT B

Scale Map



LEGEND

- GOVERNMENT CORNER
- ANNEXATION BOUNDARY
- SECTION LINE
- RIGHT-OF-WAY LINE
- CENTERLINE
- PROPERTY LINE
- CORPORATE BOUNDARY

NOTES

1. FIELD WORK PERFORMED BY JSD PROFESSIONAL SERVICES, INC. FROM JULY 07 TO JULY 12, 2016.
2. BEARINGS FOR THIS SURVEY AND MAP ARE REFERENCED TO THE WISCONSIN COUNTY COORDINATE SYSTEM, (WCCS), DANE COUNTY. THE EAST LINE OF THE SOUTHEAST QUARTER BEARS S02°35'28"W.
3. SEE SHEET 2 FOR OWNERS AND LANDS.

north

0 250' 500'

SCALE: 1" = 500'

CURVE TABLE

CURVE	LENGTH	RADIUS	DELTA	CHORD	CHORD BEARING
C-1	19.19'	165.00'	6°39'50"	19.18'	S86°34'14"E

LINE TABLE

LINE	BEARING	DISTANCE
L-1	S02°35'28"W	245.84'
L-2	N89°54'06"W	242.27'
L-3	S00°05'54"W	346.64'
L-4	S89°54'06"E	207.98'
L-5	S02°35'28"W	1716.06'
L-6	N89°23'50"W	660.41'
L-7	S02°35'28"W	363.22'
L-8	N89°23'50"W	670.77'
L-9	N02°27'26"E	2661.27'
L-10	S89°53'55"E	1337.86'

JSD Professional Services, Inc.
Engineers • Surveyors • Planners
MADISON REGIONAL OFFICE
161 HORIZON COURT
VERONA, WISCONSIN 53593
(608)848-5060 PHONE | (608)848-2255 FAX
www.jsdinc.com

PROJECT: THE HIGHLANDS AT NETHERWOOD
OREGON, WI

SHEET TITLE: ANNEXATION

JSD PROJECT NUMBER: 16-7339
DRAWN BY: JK CHECKED BY: TJB
DATE: JAN. 12, 2018

SHEET NUMBER: 6 of 7

File: I:\2016\167339\DWG\167339 Exhibit-Annexation.dwg Layout: Sheet 1 User: jk Plotted: Jan 12, 2018 - 5:04pm

A.	Rosemary E. Gall	Unplatted lands
B.	Village of Oregon	Lot 1, CSM No. 14326
C.	Stephan & Christine L. Beirne	Lot 1, CSM No. 14153
D.	Thomas J. & Cynthia Mrozenski	Lot 41, Oregon Parks Neighborhood
E.	John P. & Lori K. Rulsch	Lot 42, "
F.	Virginia M. Ward	Lot 43, "
G.	Owner not listed	Lot 44, "
H.	David D. & Mariette A. Donovan	Lot 45, "
I.	Emily M. & Timothy J. Schneider	Lot 46, "
J.	Dale E. & Jennifer L. Dobbratz	Lot 47, "
K.	Lanaville Revocable Trust	Lot 48, "
L.	Glen E. & Kathleen K. Bultman	Lot 49, "
M.	Larry L. & Daine I. Garvoille	Lot 50, "
N.	Eric W. & Kristin M. Taplick	Lot 51, "
O.	Owner not listed	Lot 1, CSM No. 13739
P.	John D. Melby	Lot 2, CSM No. 13739
Q.	Oregon Parks LLC	Lot 53, Oregon Parks Neighborhood
R.	Malokai Homes LLC	Lot 54, "
S.	Village of Oregon	Outlot 3, "
T.	Brian C. Tarkenton	Unplatted lands
U.	Oregon Farm LTD Partnership	Unplatted lands
V.	Patrick J. Hermsen	Unplatted lands
W.	Patrick J. Hermsen	Unplatted lands
X.	Theodore J. & Barbara A. Rowley	Unplatted lands
Y.	Jenkins Family Trust	Unplatted lands
Z.	Jenkins Family Trust	Unplatted lands
AA.	Jenkins Joint Revocable Trust	Unplatted lands
AB.	Donald E. Watzke	Unplatted lands
AC.	John F. & Joy M. Dewild	Unplatted lands

JSD Professional Services, Inc.
Engineers • Surveyors • Planners
MADISON REGIONAL OFFICE
161 HORIZON COURT
VERONA, WISCONSIN 53593
(608)848-5060 PHONE | (608)848-2255 FAX
www.jsdinc.com

PROJECT: **THE HIGHLANDS AT NETHERWOOD**
OREGON, WI

SHEET TITLE: **ANNEXATION**

JSD PROJECT NUMBER: 16-7339
DRAWN BY: JK CHECKED BY: TJB
DATE: JAN. 12, 2018

SHEET NUMBER: 7 of 7

File: J:\2016\167339\DWG\167339 Exhibit-Annexation.dwg Layout: Sheet 2 User: jk Plotted: Jan 12, 2018 - 2:32pm

Attachment G: Rezoning Petition

VILLAGE OF OREGON
PETITION REQUESTING CHANGE OF ZONING
(Code of Ordinance 17.84)

FEE: $150.00, non-refundable **PERMIT APPLICATION NO.**_____
DEPOSIT: $1,000.00 **RECEIPT NO.**_____ **DATE:**_____

(Fee and deposit to be submitted with application to cover associated costs incurred by the Village for review of documents, administrative, legal, consulting and engineering services).

Applicant will be required to pay any additional costs incurred by the Village over the amount of the fee and will be billed and must be paid prior to the Public Hearing.

Address of Property to be Rezoned: See attached exhibit.
Parcel No: See attached exhibit. Correct Legal Description: See attached exhibit.

(attach separate sheet if necessary)

Present Zoning: See attached exhibit. Proposed Zoning: See attached exhibit.
If request is to rezone to PUD, submit General Development Plan as required by Section 17.24 (5) and (5) (a) of Zoning Code.

Reason for Request: To develop a 163-unit residential neighborhood comprised of single-family and multi-family units and a neighborhood scale park.
Existing use of all building(s) on land (if applicable): N/A
Principal use of all properties within 300 feet: Religious Institution, Single-family residential, Ag
Attach plot plan or survey plat drawn to scale showing property to be rezoned, location of any structure and property lines within 300 feet.
Lot No. of any real estate owned by Petitioners adjacent to area proposed to be changed: N/A
Attach list of property owners within 100 feet of property proposed to be rezoned.

FAILURE TO SUPPLY ABOVE INFORMATION WILL BE GROUNDS FOR DISMISSAL OF PETITION.

Dated this 16th day of January, 2018 Rick Lamm
SIGNATURE OF PROPERTY OWNER

10733 Sunset Office Drive, St. Louis, Mo 63127
ADDRESS Suite 300

(314) 885-6560
TELE PHONE NO. (DAYS)

In case of adverse recommendation by the Planning Commission or of a protest against such change signed and acknowledged by the Owners of 20% of the frontage proposed to be changed or the frontage immediately in the rear thereof or directly opposite thereto, such amendment shall not be passed, except by a 3/4 vote of all members of the Village Board.

Filed:_____ Published:_____
(Class 2) - 7 days prior to hearing
Date adjacent property owners notified: (Certification) _____ (7 days prior to Public Hrg)
Notify Municipality within 1,000 feet of property _____
Planning Commission Meeting _____ Recommendation_____
Village Board Public Hearing _____ Action _____
Ordinance No._____ Date Published_____

Date Zoning Map amended_____

EXHIBIT: Village of Oregon

Petition Requesting Change of Zoning

	Parcels to be Rezoned				
	Access Dane Legal Description	**Parcel Number**	**Parcel Size (acres)**	**Present Zoning**	**Proposed Zoning***
1	LOT 1 CSM 14326 CS98/7&9-8/29/2016 DESCR AS SEC 3-5-9 PRT NE1/4SE1/4 (1.794 ACRES)	050903484601	1.79	I (Village Zoning)	MR-8
2	SEC 3-5-9 NE1/4SE1/4 EXC PRT ANNEXED TO VIL OF OREGON IN ORD. NO. 16-24 DOC #5258563	050903480010	40.40	A-3 (County Zoning)	SR-5 and MR-8
3	SEC 3-5-9 SE1/4SE1/4 EXC S 363 FT OF E 660.01 FT THF EXC HWY IN R6009/75	050903495009	35.00	A-3 (County Zoning)	SR-5 and SR-6

***Refer to Rezoning Legal Descriptions and Exhibits for zoning district boundaries.**

JSD Professional Services, Inc.
• Engineers • Surveyors • Planners

VERONA | WAUKESHA | KENOSHA | APPLETON | WESTON

Forward Development Group
161 Horizon Drive, Suite 101A
Verona, WI 53593

ZONING DESCRIPTION
MR-8

Part of the East Half of the Southeast Quarter of Section 03, Town 05 North, Range 09 East, Town of Oregon, Dane County, Wisconsin.

More particularly described as follows:

Beginning at the East Quarter corner of Section 03, aforesaid; thence South 02 degrees 35 minutes 28 seconds West along the East line of the said Southeast Quarter, 33.03 feet to the Southerly Right-of-Way of W Netherwood Road and the Point of Beginning; thence continuing South 02 degrees 35 minutes 28 seconds along said East line, 490.76' to a point on a curve; thence Northwesterly 22.23 feet along a curve to the left having a radius of 235.00 feet, whose chord bears North 87 degrees 11 minutes 30 seconds West, 22.22 feet; thence North 89 degrees 54 minutes 06 seconds West, 111.68 feet to a point of curve; thence Northwesterly 15.69 feet along a curve to the right having a radius of 10.00 feet, whose chord bears North 44 degrees 57 minutes 03 seconds West, 14.13 feet; thence North 00 degrees 00 minutes 00 seconds West, 222.80 feet; thence North 07 degrees 15 minutes 15 seconds East, 158.39 feet; thence North 00 degrees 00 minutes 00 seconds East, 79.28 feet to a point of curve; thence Northeasterly 31.45 feet along a curve to the right having a radius of 20.00 feet, whose chord bears North 45 degrees 03 minutes 03 seconds East, 28.31 feet to the Southerly Right-of-Way of W Netherwood Road; thence South 89 degrees 53 minutes 55 seconds East along said Right-of-Way, 126.01' feet to the Point of Beginning.

Said parcel contains 72,162 square feet or 1.657 acres.

JSD Professional Services, Inc.
• Engineers • Surveyors • Planners

VERONA | WAUKESHA | KENOSHA | APPLETON | WESTON

Forward Development Group
161 Horizon Drive, Suite 101A
Verona, WI 53593

ZONING DESCRIPTION
SR-5

Part of the East Half of the Southeast Quarter of Section 03, Town 05 North, Range 09 East, Town of Oregon, Dane County, Wisconsin, more particularly described as follows:

Beginning at the East Quarter corner of Section 03, aforesaid; thence South 02 degrees 35 minutes 28 seconds West along the East line of the said Southeast Quarter, 33.03 feet to the Southerly Right-of-Way of W Netherwood Road; thence continuing South 02 degrees 35 minutes 28 seconds along said East line, 490.76' to the Point of Beginning; thence continuing South 02 degrees 35 minutes 28 seconds along said East line 1,786.19 feet; thence North 89 degrees 23 minutes 50 seconds West, 660.41 feet; thence South 02 degrees 35 minutes 28 seconds West, 330.20 feet to the Northerly Right-of-Way of C.T.H. CC; thence North 89 degrees 23 minutes 50 seconds West along said Northerly Right-of-Way, 99.37 feet to a point of curve; thence Northeasterly 30.72 feet along a curve to the left having a radius of 20.00 feet, whose chord bears North 46 degrees 35 minutes 49 seconds East, 27.79 feet; thence North 02 degrees 35 minutes 28 seconds East, 88.03 feet to a point of curve; thence Northeasterly 119.74 feet along a curve to the right having a radius of 702.89 feet, whose chord bears North 07 degrees 28 minutes 16 seconds East, 119.59 feet to a point of reverse curve; thence Northeasterly 115.65 feet along a curve to the left having a radius of 678.89 feet, whose chord bears North 07 degree 28 minutes 16 seconds East, 115.51 feet to a point of reverse curve; thence Northeasterly 29.18 feet along a curve to the right having a radius of 261.34 feet, whose chord bears North 05 degrees 47 minutes 22 seconds East, 29.16 feet; thence North 87 degrees 00 minutes 00 seconds West, 125.76 feet; thence North 39 degrees 00 minutes 00 seconds West, 119.31 feet; thence South 89 degrees 00 minutes 00 seconds West, 219.81 feet; thence North 56 degrees 00 minutes 00 seconds West, 221.56 feet; thence North 02 degrees 27 minutes 26 seconds East, 2,012.20 feet to the Southerly Right-of-Way of W Netherwood Road; thence South 89 degrees 53 minutes 55 seconds East along said Southerly Right-of-Way, 1,211.77 feet to a point of curve; thence Southwesterly 31.45 feet along a curve to the left having a radius of 20.00 feet, whose chord bears South 45 degrees 03 minutes 03 seconds West, 28.31 feet, thence South 00 degrees 00 minutes 00 seconds West, 79.28 feet, thence South 07 degrees 15 minutes 15 seconds West, 158.39 feet; thence South 00 degrees 00 minutes 00 seconds East, 222.80 feet to a point of curve; thence Southeasterly 15.69 feet along a curve to the left having a radius of 10.00 feet, whose chord bears South 44 degrees 57 minutes 03 seconds East, 14.13 feet; thence South 89 degrees 54 minutes 06 seconds East, 111.68 feet to a point of curve; thence Southeasterly 22.23 feet along a curve to the right having a radius of 235.00 feet, whose chord bears South 87 degrees 22 minutes 30 seconds East, 22.22 feet to the Point of Beginning.

Said parcel contains 2,903,499 square feet or 66.655 acres.

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Forward Development Group
161 Horizon Drive, Suite 101A
Verona, WI 53593

ZONING DESCRIPTION
SR-6

Part of the East Half of the Southeast Quarter of Section 03, Town 05 North, Range 09 East, Town of Oregon, Dane County, Wisconsin.

More particularly described as follows:

Beginning at the East Quarter corner of Section 03, aforesaid; thence South 02 degrees 35 minutes 28 seconds West along the East line of the said Southeast Quarter, 2,640.18 feet to the Northerly Right-of-Way of C.T.H. CC; thence North 89 degrees 23 minutes 50 seconds West along said Northerly Right-of-Way, 759.77 feet to the Point of Beginning; thence continuing North 89 degrees 23 minutes 50 seconds West along said Right-of-Way, 571.48 feet; thence North 02 degrees 27 minutes 26 seconds East, 583.03 feet; thence South 56 degrees 00 minutes 00 seconds East, 221.56 feet; thence North 89 degrees 00 minutes 00 seconds East, 219.81 feet; thence South 39 degrees 00 minutes 00 seconds East, 119.31 feet; thence South 87 degrees 00 minutes 00 seconds East, 125.76 feet to a point on a curve; thence Southwesterly 29.18 feet along a curve to the left having a radius of 261.34 feet, whose chord bears South 05 degrees 47 minutes 22 seconds West, 29.16 feet to a point of reverse curve; thence Southwesterly 115.65 feet along a curve to the right having a radius of 678.89 feet, whose chord bears South 07 degrees 28 minutes 16 seconds West, 115.51 to a point of reverse curve; thence Southwesterly 119.74 feet along a curve to the left having a radius of 702.89 feet, whose chord bears South 07 degrees 28 minutes 16 seconds West, 119.59 feet; thence South 02 degrees 35 minutes 28 seconds West, 88.03 feet to a point of curve; thence Southwesterly 30.72 feet along a curve to the right having a radius of 20.00 feet, whose chord bears South 46 degrees 35 minutes 49 seconds West, 27.79 feet to the Northerly Right-of-Way of C.T.H. CC and the Point of Beginning.

Said parcel contains 275,195 square feet or 6.318 acres.

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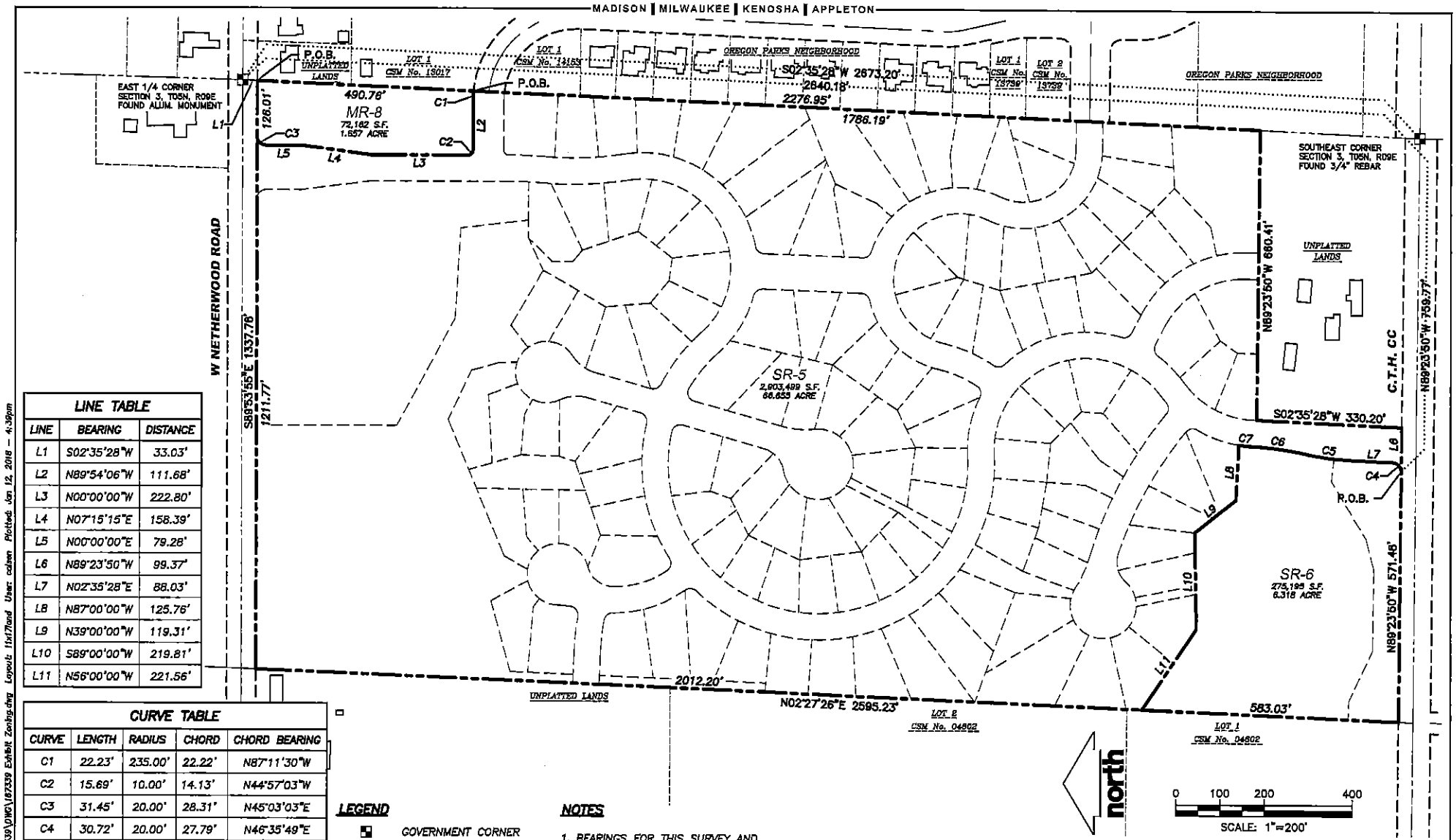

LINE TABLE		
LINE	BEARING	DISTANCE
L1	S02°35'28"W	33.03'
L2	N89°54'06"W	111.68'
L3	N00°00'00"W	222.80'
L4	N07°15'15"E	158.39'
L5	N00°00'00"E	79.28'
L6	N89°23'50"W	99.37'
L7	N02°35'28"E	88.03'
L8	N87°00'00"W	125.76'
L9	N39°00'00"W	119.31'
L10	S89°00'00"W	219.81'
L11	N56°00'00"W	221.56'

CURVE TABLE				
CURVE	LENGTH	RADIUS	CHORD	CHORD BEARING
C1	22.23'	235.00'	22.22'	N87°11'30"W
C2	15.69'	10.00'	14.13'	N44°57'03"W
C3	31.45'	20.00'	28.31'	N45°03'03"E
C4	30.72'	20.00'	27.79'	N46°35'49"E
C5	119.74'	702.89'	119.59'	N07°28'16"E
C6	115.65'	678.89'	115.51'	N07°28'16"E
C7	29.18'	261.34'	29.16'	N05°47'22"E

LEGEND

- GOVERNMENT CORNER
- ZONING BOUNDARY LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE
- SECTION LINE

NOTES

1. BEARINGS FOR THIS SURVEY AND MAP ARE REFERENCED TO THE WISCONSIN COUNTY COORDINATE SYSTEM, DANE COUNTY ZONE. THE EAST LINE OF THE SOUTHEAST QUARTER BEARS S 02°35'28" W.

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MADISON REGIONAL OFFICE
161 HORIZON COURT
VERONA, WISCONSIN 53593
(608)848-5060 PHONE | (608)848-2255 FAX
www.jsdinc.com

PROJECT: THE HIGHLANDS AT NETHERWOOD

SHEET TITLE: REZONING EXHIBIT

JSD PROJECT NUMBER: 16-7339

DRAWN BY: CJO CHECKED BY: TJB

DATE: 12 JANUARY, 2018

SHEET NUMBER: 1

File: I:\2016\167339\DWG\167339 Exhibit Zoning.dwg Layout: 11x17land User: calsen Plotted: Jan 12, 2018 - 4:39pm

Attachment H: Village of Oregon The Highlands at Netherwood Phasing Plan

	ACRES	LOTS	SF UNIT	BAYHOMES	TOWNHOMES	TOTAL UNITS	LF RD
PHASE IA	31.83	31	30	0	13	43	2,634.94
PHASE IB	7.43	1	0	25	0	25	365.68
PHASE II	11.25	28	28	0	0	28	1,135.35
PHASE III	14.31	38	38	0	0	40	2,251.75
PHASE IV	11.28	28	28	0	0	26	1,404.15
TOTAL	76.12	126	124	25	13	162	7,791.87

BERGAMONT BLVD

OREGON PARKS AVE

COUNTY HWY CC

NETHERWOOD ROAD

STREET A

STREET B

STREET C

STREET D

STREET E

STREET F

STREET G

O.L. 1 46,285 S.F. 1.063 ACRE

O.L. 2 53,720 S.F. 1.233 ACRE

O.L. 3 2,774 S.F. 0.064 ACRE

O.L. 4 12,332 S.F. 0.276 ACRE

O.L. 5 7,543 S.F. 0.173 ACRE

O.L. 6 1,841,729 S.F. 42.526 ACRE

O.L. 7 16,836 S.F. 0.386 ACRE

O.L. 8 33,955 S.F. 0.780 ACRE

O.L. 9 6,652 S.F. 0.153 ACRE

THE HIGHLANDS AT NETHERWOOD

OREGON, WI

DATE 01.15.2018

PHASING PLAN

NORTH

0 100 200 400

FDG

JSD Professional Services, Inc.

• Engineers • Surveyors • Planners

Attachment I: DNR ER Review Verification

State of Wisconsin
Department of Natural Resources
Bureau of Natural Heritage Conservation
Endangered Resources Review Program
PO Box 7921, Madison WI 53707-7921
http://dnr.wi.gov/topic/ERReview/
DNRERReview@wisconsin.gov

ER Review Verification

Broad Incidental Take Permit/Authorization for No/Low Impact Activities

Form 1700-079 (R 6/17)

Notice: This form is authorized by s. 29.604, Wis. Stats. This completed signed form fulfills the requirement of an Endangered Resources Review and should be attached to other permits requiring an ER Review to show that Endangered Resources requirements have been met. Personal information collected on this form will be used for administrative purposes and may be provided to requesters to the extent required by Wisconsin's Open Records law [ss. 19.31-19.39, Wis. Stats.].

Instructions: Complete this form if your project is covered under the Broad Incidental Take Permit/Authorization for No/Low Impact Activities and therefore does not require an Endangered Resources Review.

Section 1: Applicant and Project Information

Requester Name	Organization or Agency Name
Dennis Steinkraus	Forward Development Group

Project Name	County	Township	Range	Section
Residential Development	Dane	05 N	9 ◉E ○W	3

Telephone Number	Email Address
(608) 848-9050	dgs@forwarddevgroup.com

Project Description

Development of a residential subdivision within an active agricultural field.

Indicate who you are completing this form as:

- ◉ DNR Staff
- ○ Certified Reviewer
- ○ Other: _____

Section 2: Broad Incidental Take Permit/Authorization Coverage Information

How is your project covered under the Broad Incidental Take Permit/Authorization for No/Low Impact Activities?

- ☐ It is included in the list of activities in Table 1 – No/Low Impact Table for All Species at All Times of the Year.
- ☒ It is included in the list of activities in Table 2 – No/Low Impact Table by Taxa Group for DNR Staff and ER Certified Reviewers Only and the Taxa groups for the species of concern are covered.
- ☒ It is included in the list of activities in Table 2 – No/Low Impact Table by Taxa Group for DNR Staff ER Certified Reviewers Only and the species of concern are covered by the Avoidance Measures document.

Activity Number(s)

Activity 2-A2, Any activity, not otherwise listed, performed in agricultural land or areas covered in crushed stone or gravel

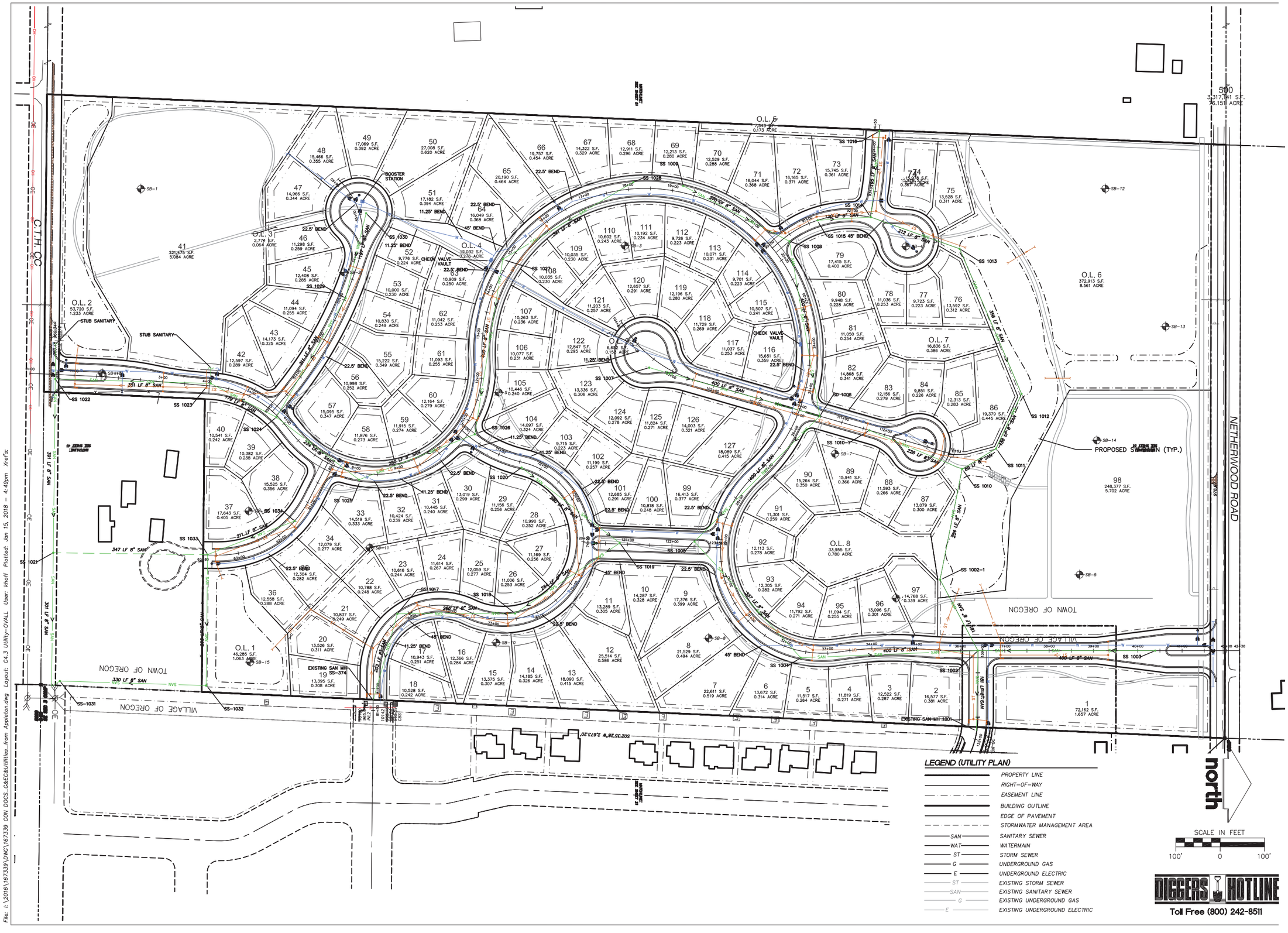
Section 3: Applicant Certification

By my signature below, I certify that to the best of my knowledge, the information stated above is complete and accurate.

NOTE: If submitting this verification electronically, please type your name on the signature line. Your typed name, along with the email message generated from electronic submittal of this form, will be used as an electronic signature which is the legal equivalent to an actual signature.

Melissa Tumbleson	1/9/2018	Melissa Tumbleson
Signature	Date Signed	Requester/Submitter Name (please print)

Attachment J: Overall Utility Plan Map



LEGEND (UTILITY PLAN)

- PROPERTY LINE
- RIGHT-OF-WAY
- EASEMENT LINE
- BUILDING OUTLINE
- EDGE OF PAVEMENT
- STORMWATER MANAGEMENT AREA
- SAN — SANITARY SEWER
- WAT — WATERMAIN
- ST — STORM SEWER
- G — UNDERGROUND GAS
- E — UNDERGROUND ELECTRIC
- ST — EXISTING STORM SEWER
- SAN — EXISTING SANITARY SEWER
- G — EXISTING UNDERGROUND GAS
- E — EXISTING UNDERGROUND ELECTRIC

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MADISON REGIONAL OFFICE
161 HORIZON DRIVE, SUITE 101
VERONA, WISCONSIN 53593
P. 608.848.5060

CLIENT:
FDG

FORWARD DEVELOPMENT GROUP

CLIENT ADDRESS:
161 HORIZON DRIVE
VERONA, WI, 53593

PROJECT:
THE HIGHLANDS AT NETHERWOOD

PROJECT LOCATION:
OREGON, WI
DANE COUNTY

PLAN MODIFICATIONS:

#	Date:	Description:
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Design/Drawn:	EJD
Approved:	PMF
Issue Date:	1/15/2018

SHEET TITLE:
OVERALL UTILITY PLAN

SHEET NUMBER:
C4.3

JSD PROJECT NO: 16-7339

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File: I:\2016\167339\DWG\167339 CON DOCS_G&E\Utilities_from Appleton.dwg Layout: C4.3 Utility-OVALL User: khoff Plotted: Jan 15, 2018 - 4:49pm Xref's:

Attachment K: Village of Oregon Development Impact Analysis

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Development Impact Analysis

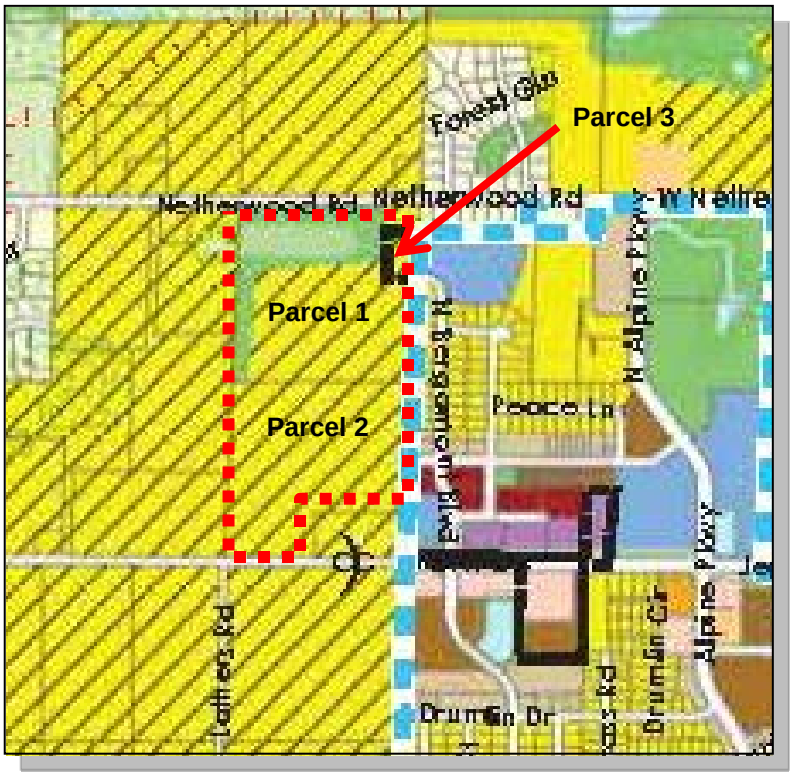
www.jsdinc.com

To:	Michael Gracz, Village Administrator Jeff Rau, Village Zoning Administrator
From:	Jessica Vaughn, AICP, JSD Professional Services, Inc.
Re:	The Highlands at Netherwood Development Impact Analysis
JSD Project #:	16-7339
Date:	January 15, 2018
cc:	Dennis Steinkraus (FDG), Dave Jenkins (JSD)

Project Background/Site Context

The project site is situated between W Netherwood Road and County Highway CC, west of Oregon Parks Neighborhood. The project site is comprised of three parcels as identified in the map at the right, including:

- Parcel 1: Parcel No. 050903480010, fronting on W Netherwood Road, roughly 40 acres in size owned by the Lutheran Church Extension Fund;
- Parcel 2: Parcel No. 050903495009, fronting on County Highway CC, roughly 35 acres in size owned by the Lutheran Church Extension Fund; and
- Parcel 3: Parcel No.050903484601, that is roughly 1.8 acres in size owned by the Village of Oregon.



Parcels 1 and 2 are currently located within the Town of Oregon, just outside of the Village of Oregon's Urban Service Area and are subject to Dane County zoning, and is currently zoned A-3.

Parcel 3 is located within the Village of Oregon and is zoned Institutional (I).

As noted the Village's Comprehensive Plan (the "Plan"), the project site is within the Village's Extra Territorial Jurisdiction and is recommended for Planned Neighborhood development. As stated in the Plan, Planned Neighborhood is a "*carefully planned mixture of predominantly Single-Family Residential with one or more of the following land use categories: Two-Family Residential, Mixed Residential, Neighborhood Office, Neighborhood Commercial, Institutional, and Parks and Open Space*" (Page 42, Village of Oregon Comprehensive Plan). In addition, the Plan identifies this land use category as being intended to support and encourage Traditional Neighborhood Design (TND) elements. The Plan also provides an approximation for the composition of the

residential land uses: 70 percent Single-Family; 10 percent Two-Family; and Mixed Residential comprising no more than 20 percent (Page 50, Village of Oregon Comprehensive Plan).

The project site has unique features, including its significant topography on the western portion of the project site and a neighborhood park area as shown in the Village's Comprehensive Plan located on the north side of the site.

A Concept Plan was reviewed by Village staff, the Village Plan Commission at their October 5 meeting, and the Village Board at their October 23 meeting. The following comments were offered:

- The proposed land uses are generally consistent with the Village's Comprehensive Plan and the Planned Neighborhood land uses in the area;
- The road layout is consistent with the Transportation Plan Map in the Comprehensive Plan;
- Additional right-of-way dedication will be required along Netherwood and Jefferson streets;
- The proposed pedestrian path network extends the larger Village trail system and public access easements will be required for trails not within public lands; and
- The proposed park addresses Village staff suggestions with regard to size and location.

Annexation

As noted above, a large portion of the project site is currently located in the Town of Oregon, adjacent to the Village of Oregon's western boundary. As part of the land use entitlement process, FDG is requesting to annex both Parcel 1 (PIN 050903480010) and Parcel 2 (PIN 05090349009), roughly 75-acres to the Village of Oregon.

As noted in the Village's Comprehensive Plan, the project site is within the Village's Extraterritorial Jurisdiction and within an area designated for future Village growth as Planned Neighborhood development.

An annexation petition has been submitted.

The Village of Oregon has proactively submitted an Urban Service Area Amendment request to CARPC to expand the Village's Urban Service Area to include the project site.

Preliminary Plat: The Highlands at Netherwood

The Highlands at Netherwood subdivision is comprised of roughly 75 acres. The subdivision is planned to be comprised of 124 new single-family residential home sites (77 percent), roughly 13 attached townhome units (8 percent), and 25 small lot single-family detached units (15 percent), or "Bay Homes."

Conceptually, the proposed subdivision design is intended to capitalize on the unique features and planned amenities already present on the site, including its topography, and a future neighborhood park, as well as to create a sense of place and neighborhood identity through design, including:

- Road Network. The proposed road network provides four points of access into the project site; one from the north (W Netherwood Road); one from the south (CTH CC); and two from the east that tie into the existing infrastructure and network (Oregon Parks Avenue and Bergamont Boulevard).

  The proposed road network comprised of loop roads and cul-de-sacs, while curvilinear, is intended to minimize the required grading on site to maintain as much of the existing topography as possible, as well as to create a variety of housing options, including walk-out units, and preserve view corridors.

- Amenities. The park area is intended to serve as a roughly 5.7-acre neighborhood park with a sports field, parking area, structures, trail system, and stormwater amenities. Additional neighborhood amenities, include a hierarchy of pedestrian pathways providing connectivity through the site to the park, detached sidewalks along streets, and pocket parks and stormwater facilities.

- Lot Configuration. The lot layout is intended to create openness with varied setbacks, connectivity, and a sense of community by connecting each resident to an amenity, including pocket parks or stormwater facility. The lot configuration has been strategically laid out to form clusters around the amenities.

Public improvements will include:

- Extensions of water, sanitary sewer, and storm sewer,
- Dedication of street right-of-way (roughly 13.5 acres),
- Dedication of parkland (roughly 6.4 acres, including 5.7-acre park), and
- Stormwater management facilities in three outlots (roughly 10.8 acres).

Please refer to the Land Use Summary Table provided below for the breakdown of the project site at full build-out.

Land Use Summary Table				
	Acres	**% of Site**	**DU**	**Estimated Population***
Single-Family Residential	38.496	51	124	434
Townhome Units	1.657	2	13	45.5
Single-Family Residential - Bay Home	5.084	7	25	87.5
Road ROW	13.50	18	N/A	N/A
Stormwater Management	10.80	14	N/A	N/A
Parkland Dedication	6.368	8	N/A	N/A
Total	75	100	162	567

*The Estimated Population is based on an average household size of 3.5 persons.

See Attached Preliminary Plat.

Zoning

The project site is currently subject to both Dane County zoning (A-3) and the Village or Oregon zoning (I). With annexation to the Village and in order to implement the Preliminary Plat, the project site will need to be rezoned. A Zoning Map Amendment has been submitted as part of the land use entitlement request.

With the intent of providing a variety of housing opportunities, the Highlands at Netherwood Subdivision has been designed to provide three different types of housing options, including single-family detached lots, attached townhome units, and single-family detached condominium units, each with a different zoning classification. Please refer to the Zoning Table provided below for the proposed zoning classifications.

Zoning Table			
	Total	**Lot Numbers**	**Proposed Zoning**
Single-Family Residential	124	2-40, 42-97, 99-127	Single-family Residential-5 (SR-5)
Townhome Units	13	1	Multi-family Residential-8 (MR-8)
Single-Family Residential - Bay Homes	25	41	Single-family Residential-6 (SR-6)
Total	162	N/A	N/A

Single-Family Residential

Single-family Residential-5 (SR-5) zoning is proposed for the single-family lots. The intent of this district is to permit moderate density community character while preserving and protecting the residential character of the area. A maximum gross density of 5.0 dwelling units per acre is permitted within the district. The SR-5 zoning district has a minimum lot area of 7,200 square-feet with a minimum lot width of 60 feet (70 feet for corner lots) and a minimum street frontage requirement of 50 feet for each lot.

As proposed, the single-family lot sizes range from roughly 9,600 square-feet to over 27,000 square-feet. Within the SR-5 zoning district area, the proposed density is 3.22 dwelling units per acre.

Townhome Units

As proposed, roughly 14 townhome units will be provided on Lot 1. Multi-family Residential-8 (MR-8) is proposed for the townhomes. The MR-8 zoning district is intended to preserve and protect community character while providing a variety of residential development options. Townhome units are identified as a principal land use permitted by-right in the MR-8 zoning district with a minimum lot area of 5,445 square-feet per dwelling unit in 3 to 4-unit buildings.

The maximum gross density permitted in the MR-8 zoning district is eight dwelling units per acre. As proposed, the proposed density on Lot 1 is 7.8 dwelling units per acre.

Single-Family Residential - Bay Homes

Lot 41 is planned for roughly 25 single-family detached units or "Bay Homes." It is anticipated that this lot would be either condominiumized or further subdivided to create units or lots. The proposed Single-family Residential-6 (SR-6) zoning district is proposed for this unit type. The SR-6 zoning district is intended to permit single-family detached development at a moderate density, traditional neighborhood community character using homes served by alleys. The minimum lot area in the SR-6 zoning district is 4,000 square-feet, with a minimum lot width of 40 feet (50 feet for corner lots), and a minimum street frontage of 40 feet.

The maximum gross density in the SR-6 zoning district is six dwelling units per acre. As proposed, the Bay Home density is roughly four dwelling units per acre.

Consistency with Comprehensive Plan

The proposed Highlands at Netherwood is in general compliance with Village development policies and is consistent with the Village of Oregon Comprehensive Plan and Future Land Use Plan Map, including the goals and policies related to:

- Preserve the Village's "small-town" community character;
- Establish and maintain attractive gateways areas;
- Ensure that new development is compatible with existing development;
- Planned Neighborhoods' Single-Family Residential, Two-Family Residential, and Mixed Residential land uses;
- Promote a future land use pattern containing a sustainable mix of uses and building types;
- Maintain the single-family character of the Village;
- Provide a safe and efficient transportation system that meets the needs of multiple users;
- Maintain an interconnected road network;
- Support biking, walking, and other modes of transportation;
- Encourage safe, affordable housing and neighborhoods;
- Ensure adequate park and recreational space for the community; and
- Support the provision of housing in the Village to meet the needs of persons of all income levels, age groups, and special needs.

Wetland, Stormwater Management, and Parkland

Wetland

A Wetland Delineation report has been submitted to the Wisconsin Department of Natural Resources (WDNR) for concurrence. The WDNR, in a dated December 28, 2017, concluded that there are no wetlands within the project area.

Stormwater Management

Three stormwater management facilities will be provided to manage and treat stormwater runoff.

Located in the northwest corner of the project site, the largest stormwater facility, roughly 5.9 acres within the platted area, is centered around an existing kettle that is located partially on the project site and the adjacent property to the west. This facility has been designed to not result in adverse impacts to the kettle or surrounding properties. Overall, this facility will provide an additional 60 percent more storage volume within its basins.

Given the location of this facility, it's overall design is intended to serve not only as a stormwater management facility, but also as an amenity. The basins will be enhanced with landscaping and walking trails that provide access around the perimeter of the basins and that connect to the larger Village trail system.

The other two facilities are located on the south side of the project site; one in the southeast corner and the other adjacent to the County Highway CC. These ponds are each approximately 0.7 acres in size.

In surveying the existing site conditions, a ponding condition was noticed along the northeast property line adjacent to the Oregon Parks Neighborhood. Currently, approximately 9.6 acres of land drains through the side yards of these established residential lots. To better manage this stormwater runoff, the combination of a swale and storm sewer pipes are proposed to reroute the runoff to the northwest stormwater facility.

The stormwater management facilities are intended to be dedicated to the Village for ownership and maintenance.

Please refer to the Preliminary Stormwater Management Plan and Report for a detailed analysis of the stormwater facilities.

Parkland

Per the Village's Subdivision Ordinance every plat shall give due consideration to the dedication or reservation of lands suitable to future schools, parks, drainageways and other public purposes. Overall, the land dedication should be sufficient to serve the residential units created. A total of 2,900 square-feet of land shall be dedicated for each residential lot created. Based on the code the total land dedication required, based on the total units created (162) is 469,800 square-feet or 10.78 acres.

A roughly 5.7-acre parcel located on the north side of the project site area will be dedicated to the Village to satisfy the parkland dedication requirements.

As noted in the Village's Comprehensive Plan, this area is recommended for parks and open space. The Village's Comprehensive Plan further delineates the park and open space facilities as being devoted to both active and passive recreation, such as playgrounds, play fields, play courts, trails, picnic areas, natural areas, and related recreational activities (Page 43, Village of Oregon Comprehensive Plan).

An additional 0.7 acres of land will also be dedicated to the Village to satisfy the parkland dedication requirements. The parkland dedication areas outside of the larger park itself, are intended to provide connectivity to the large Village trail and park system.

Cash-in-lieu will be provided to satisfy the remaining parkland dedication requirements (roughly 4.38 acres).

Impact on Municipal Services and Facilities

Municipal Utilities

The Highlands at Netherwood Subdivision will incrementally add to the Village the following quantities of storm sewer, sanitary sewer, and water main:

Street Right-of-Way	Storm Sewer	Sanitary Sewer	Water Main
7,792 Linear Feet	6,182 Linear Feet	9,534 Linear Feet	8,907 Linear Feet

The proposed streets, sanitary sewer, and storm sewer will be dedicated to the Village and will have an incremental impact on the demand for routine maintenance and service of such facilities.

Overall, it is believed that the capacity of the existing Village utility facilities is adequate to serve and support the proposed development.

Sanitary Sewer

Wastewater will be conveyed by extending the existing sanitary sewer system to the project site. The subdivision will have three connection points to the existing system.

Connection point one is at the existing 15-inch interceptor main located in CTH CC. The 15-inch interceptor will be extended west along CTH CC to Cypress Way. At Cypress Way, a new 8-inch main will be extended into the development.

Connection point two is at the existing manhole located at the west end of Oregon Parks Avenue.

Connection point three will be at the existing manhole at the end of N Bergamont Boulevard.

Wastewater flow projections are estimated to be 56,700 gpd based on an estimated population of 567 at build-out. It is believed that the Village's existing system can accommodate this flow projection.

Water

Water will be supplied by the Village of Oregon Water Utility. A new watermain will be looped throughout the project site and will connect with the existing mains at N Bergamont Boulevard and Oregon Parks Avenue. The mains will be stubbed at Netherwood Road, CTH CC, and Street C for future expansion/connections. Water use is calculated based on an average water consumption for single-family homes of 100gpd/person, a 15 percent loss, and an average household size of 3.5.

At full build-out, the development's population water usage is as follows:

Maximum Day Pumpage = (Total # of Dwelling Units)(100 gpd)(1.15)(3.5) = (162)(100 gpd)(1.15)(3.5) = 262,430

The calculated daily flow is **262,430 gpd** with a maximum hourly flow of 10,935 gph (daily flow / 24 hours) and a maximum flow of 182 gpm (hourly flow / 60 minutes). Overall, the calculated average peak hourly water usage is well within the capacity of the proposed and existing Village facilities.

Based the West Side Water System Study a booster station will be needed to provide adequate water pressure in accordance with state code for lots that are expected to have a floor elevation of 1,000 feet or greater. Based on the proposed grading the elevations of the following lots will be at, or above the 1,000-foot threshold:

Lots 49-51, 64-73, 79-80, and 108-115.

Based on the proposed street and water main layout, lots 74-78 will also be connected to the high-pressure main. These lots may require pressure reducing valves on the water laterals serving the lots. Per the West Side Water System Study a booster pump station will be required to boost the pressure in the high-pressure zone. The booster station is planned to be located in the cul-de-sac in Street F. Check valves will be used to allow the low-pressure system to be connected to the high-pressure system as recommended in the study.

Tax Revenue

The Highlands at Netherwood Subdivision will incrementally add to the Village and School district tax base as follows:

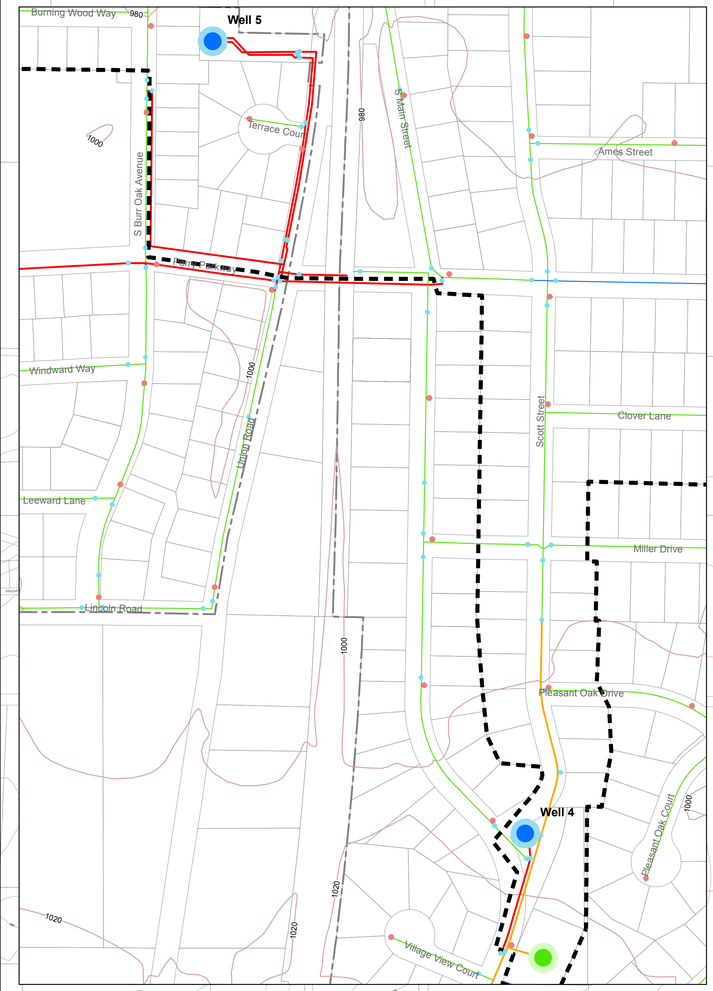
Estimated Tax Revenue			
Housing Type	**Single-Family Detached (124 units)**	**Townhome (13 units)**	**Single-Family Condo (25 units)**
Market Value/unit	$450,000 - $550,000	$275,000	$350,000
Total Value of Units	$5,580,000 - $6,820,000	$3,575,000	$8,750,000
Real Estate Taxes x 19.42 mill rate	$1,083,636 - $1,324,444	$694,265	$1,699,250
Village Share (25%)	$270,909 - $331,111	$173,566	$424,812
School District Share (53%)	$574,327 - $701,955	$368,490	$900,602

Phasing

The development is planned to be a phased development comprised of four phases. Construction is anticipated to begin in June 2018. Please refer to the Phasing Plan for detailed phases.

Attachment L: Water System Map

Village of Oregon
Water System Map



Legend

- Tanks
- Wells
- **High / Low Pressure Zone Boundary**
- **WATER MAIN**
- **PIPE SIZE**
- **4"**
- **6"**
- **8"**
- **10"**
- **12"**
- **UNKNOWN**
- Index Contours
- Municipal Boundaries

Date	Revision
3-2012	1st Presbyterian Church - DLA

N W E S

0 250 500 1,000 1,500
Feet

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engineering solutions for a working world

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Attachment M: West Side Water System Study

WEST SIDE WATER SYSTEM STUDY

VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

NOVEMBER 2017

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Ruekert & Mielke, Inc.
W233 N2080 Ridgeview Parkway
Waukesha, Wisconsin 53188-1020

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CHAPTER 1

INTRODUCTION

The Village of Oregon is a community of approximately 9,900 persons located in south-central Dane County, approximately 7 miles south of the City of Madison, The Oregon Water Utility provides water service to residences and businesses within the Village limits.

The Oregon Water Utility provides water to its customers via three active groundwater wells. The Oregon water system includes two standpipes, one elevated storage tank, and two booster pumping facilities. The Utility maintains approximately 50 miles of transmission and distribution water mains, ranging in size up to 12 inches in diameter.

The customers of the Oregon Water Utility include several major commercial and industrial water users, along with numerous smaller industrial and commercial users as well as residential and public users. Currently, approximately 60 percent of the total water consumption is attributed to residential uses.

The Village's location, with respect to the greater Madison metropolitan area and principal transportation corridors, offers potential for continued future growth and development. Therefore, proper planning is essential to coordinate the expansion of municipal water system facilities with short-term as well as long-term needs of the community.

PURPOSE

The primary purpose of this study was to review and update the present and future water needs to serve current and future Village customers on the west side of the Village. Existing land in the vicinity of and surrounding the previously identified location of a future groundwater well is being considered for development. A portion of the land currently considered for development was previously identified to be served by a future high pressure zone. The existing hydraulic model of the Oregon system was used to assist in the analysis of the existing system and future improvement planning.

This report summarizes the results of a water system evaluation to serve the west side of the Village and the proposed development, and to determine if the previously identified location of the future groundwater well is operationally efficient for the Water Utility. The primary purposes of the study were to evaluate the water needs and system expansion required to serve current and future Utility customers.

Present and future water needs of Oregon have been evaluated, and recommendations made concerning improvements necessary to maintain an adequate level of water service. Current and future water needs were evaluated over a planning period extending to the year 2035. This report will serve as a plan to guide future expansion of the western portion of the water system.

SCOPE

The general scope of work for this study as outlined by the report is as follows:

- Summarize existing facilities. Any future improvements must be based upon the knowledge and understanding of what currently exists. This summary is presented in Chapter 2.

- Chapter 3 discusses existing and expected future land uses and community growth for service area planning. Population, community growth, and water consumption projections serve as the foundation for evaluating and identifying recommended improvements to the system.
- The assumptions and conclusions presented in Chapter 3 were used to develop projections of water requirements that are presented in Chapter 4. Current and future water needs were evaluated extending to the year 2035.
- Chapter 5 summarizes the results an analysis of alternatives to provide service to the proposed development and the west side of the village, and an evaluation for water supply and storage needs.
- Summary of recommended water system improvements is presented in Chapter 6.
- Chapter 7 includes a proposed Utility Capital Improvement Plan.

Because needs change with time, municipal water system planning is a continuous function. Therefore, the long-term projections and improvements discussed in this report should be reviewed, re-evaluated and modified as necessary, to assure the adequacy of future planning efforts. Proper future planning will help assure that system expansion is coordinated and constructed in the most effective manner.

CHAPTER 2

EXISTING WATER SYSTEM FACILITIES

The water system facilities operated and maintained by the Oregon Water Utility include:

1. Three groundwater wells
2. Two booster stations
3. Two standpipes
4. One elevated tank
5. Water system controls located in the utility office
6. A network of transmission and distribution water mains

The general location and layout of the water system facilities are illustrated in Figure 2-1. A schematic of the water system is illustrated in Figure 2-2. This chapter presents a summary of the design and operating characteristics of the existing water system components.

EXISTING WELLS AND BOOSTER STATIONS

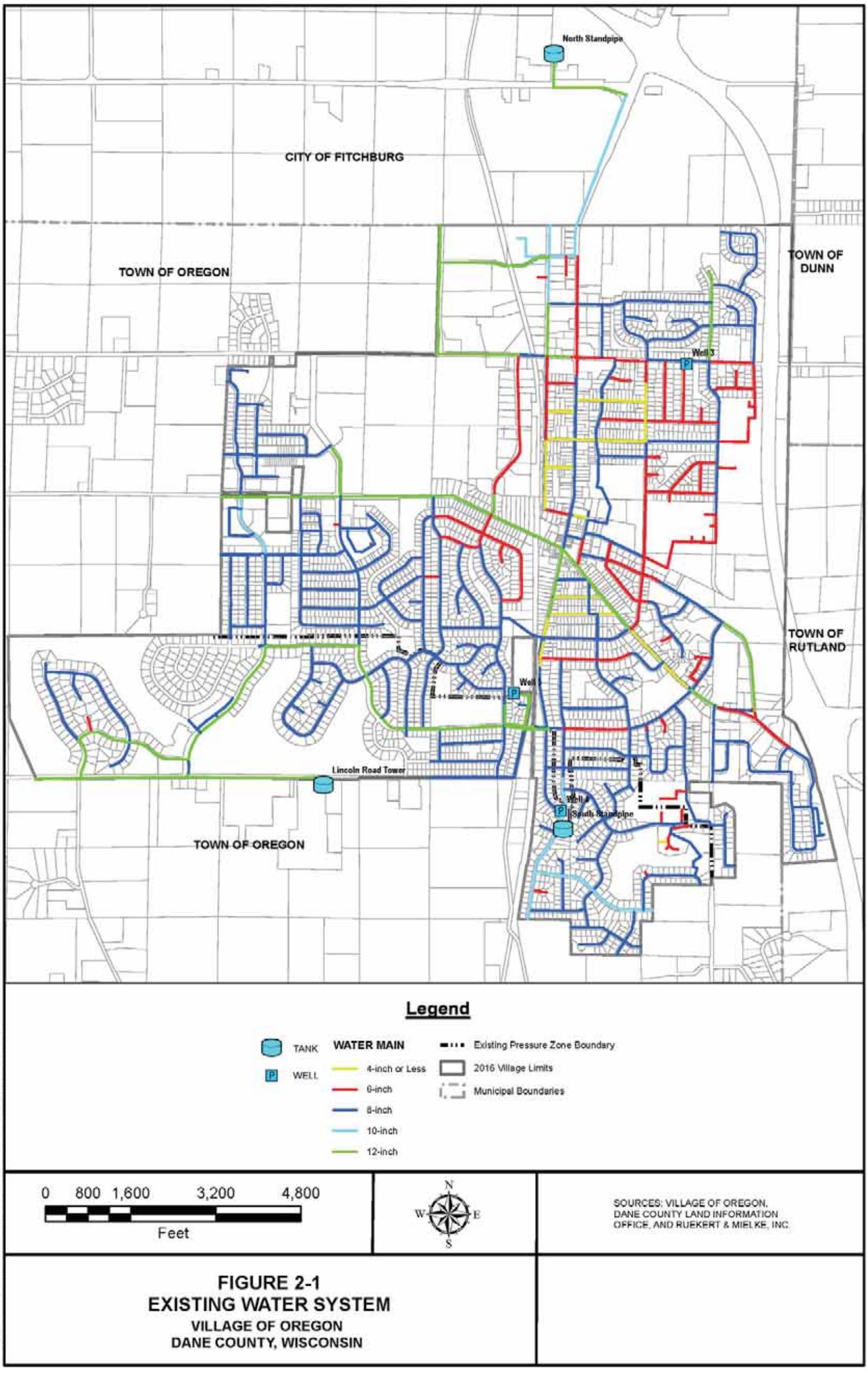
The Village operates three groundwater wells (3, 4, and 5) located throughout the Village. Table 2-1 summarizes data for the Village's supply wells and booster pumps. Well yields are reported to range from approximately 600 gpm to as high as 1,000 gpm. Each well pumps directly into a reservoir. Another pump then transmits the water from the reservoir into the distribution system and booster stations.

Well 3

Well 3 is located at 680 Hillcrest Drive in the northeast area of the Village at the intersection of Hillcrest Drive and East Netherwood Street. The well was constructed in 1967 to a total depth of approximately 953 feet. The Well 3 pump discharges to a belowground reinforced concrete storage reservoir. This 58,000-gallon reservoir serves to settle sand prior to distribution and to act operationally to minimize the well pump start and stops. Two pumps transmit the water from the reservoir into the distribution system. The pump station is not equipped with standby power for emergency operation.

Well 4

Well 4 is located at 830 Scott Street in the south-central area of the Village at the intersection of Scott Street and South Main Street. The well was constructed in 1991 to a total depth of about 853 feet. The pump station is equipped with a natural gas standby generator for emergency operation of the entire facility. Water is pumped from the well to a 70,000-gallon reservoir. The primary pressure zone pump at Well 4 pumps the water from the reservoir into the primary pressure zone. The station also houses four high level pressure zone booster pumps to pump water from the primary pressure zone into the high level pressure zone consisting of three skid mounted pumps rated at 50, 150 and 150 gpm and one pad mounted horizontal centrifugal pump rated at 1,000 gpm. Pressure control valves regulate the pressure after the four high level pressure zone pumps. With the construction of the Lincoln Road tower the three skid-mounted pumps are no longer utilized under normal operation.


North Standpipe
CITY OF FITCHBURG
TOWN OF OREGON
TOWN OF DUNN
Well 3
TOWN OF RUTLAND
Well 1
Lincoln Road Tower
Well 4
South Standpipe
TOWN OF OREGON
Legend
TANK
WELL
WATER MAIN
4-inch or Less
6-inch
8-inch
10-inch
12-inch
Existing Pressure Zone Boundary
2016 Village Limits
Municipal Boundaries
0 800 1,600 3,200 4,800
Feet
N
W
E
S
SOURCES: VILLAGE OF OREGON, DANE COUNTY LAND INFORMATION OFFICE, AND RUEKERT & MIELKE, INC.
FIGURE 2-1
EXISTING WATER SYSTEM
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN
I:\Projects\8113_Oregon\10022\Figures\2017\Fig 2-1 Existing System 2017.mxd

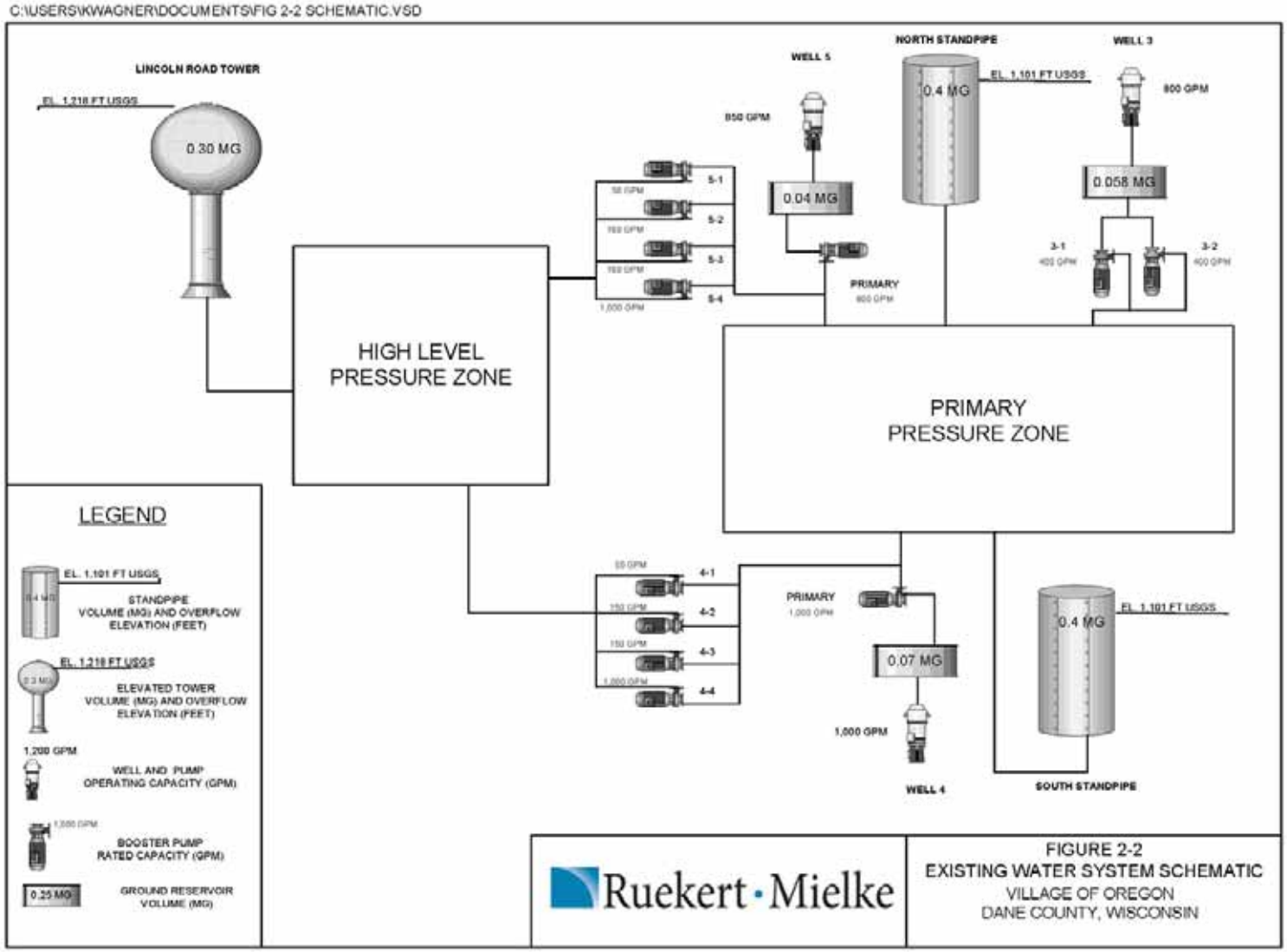

C:\USERS\KWAGNER\DOCUMENTS\FIG 2-2 SCHEMATIC.VSD
LINCOLN ROAD TOWER
EL. 1,218 FT USGS
0.30 MG
HIGH LEVEL
PRESSURE ZONE
WELL 5
850 GPM
0.04 MG
5-1
5-2
5-3
5-4
PRIMARY
NORTH STANDPIPE
0.4 MG
EL. 1,101 FT USGS
WELL 3
800 GPM
0.058 MG
3-1
3-2
PRIMARY
PRESSURE ZONE
4-1
4-2
4-3
4-4
PRIMARY
0.07 MG
1,000 GPM
WELL 4
0.4 MG
EL. 1,101 FT USGS
SOUTH STANDPIPE
LEGEND
EL. 1,101 FT USGS
STANDPIPE
VOLUME (MG) AND OVERFLOW
ELEVATION (FEET)
EL. 1,218 FT USGS
ELEVATED TOWER
VOLUME (MG) AND OVERFLOW
ELEVATION (FEET)
1,200 GPM
WELL AND PUMP
OPERATING CAPACITY (GPM)
BOOSTER PUMP
RATED CAPACITY (GPM)
0.25 MG
GROUND RESERVOIR
VOLUME (MG)
Ruekert · Mielke
FIGURE 2-2
EXISTING WATER SYSTEM SCHEMATIC
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

Table 2-1

Existing Well and Booster Pump Data
Village of Oregon
Dane County, Wisconsin

Well Pumps

	#3 Well	#4 Well	#5 Well
Pump Data			
Type	Vertical Turbine	Vertical Turbine	Vertical Turbine
Manufacturer	Peerless	American Turbine	American Turbine
Year Installed	1967	2014	1998
No. of Stages	3	3	4
Pump Setting (feet)	160	220	280
Rated Conditions:			
Flow Rate (gpm)	1000	1000	850
TDH (feet)	140	210	248
Motor Data			
Manufacturer	G.E.	US Motors	US Motors
Horsepower	60	75	75
Standby Power	None	Generator	Generator
(Fuel)		Natural Gas	Natural Gas
Discharges to:	Reservoir	Reservoir	Reservoir

Primary Pressure Zone Booster Pumps

	#3 Booster Pump 1	#3 Booster Pump 2	#4 Primary Pump	#5 Primary Pump
Pump Data				
Type	Vertical Turbine	Vertical Turbine	Vertical Turbine	Vertical Turbine
Manufacturer	Peerless	Peerless	American Turbine	Goulds Pumps, Inc.
Year Installed	1967	1967	2014	1998
No. of Stages	3	3	2	3
Pump Setting (feet)	16'2"	16'2"	11.5	
Rated Conditions:				
Flow Rate (gpm)	450	450	1000	850
TDH (feet)	150	150	100	145
Motor Data				
Manufacturer	G.E.	G.E.	US Motors	
Horsepower	30	30	40	
Standby Power	None	None	Generator	Generator
(Fuel)			Natural Gas	Natural Gas
Discharges to:	Distribution	Distribution	Distribution	Distribution

High Level Pressure Zone Booster Pumps

	#4 Pump 1	#4 Pump 2	#4 Pump 3	#4 Pump 4	#5 Pump 1	#5 Pump 2	#5 Pump 3	#5 Pump 4
Pump Data								
Type	Horizontal Centrifugal (Closed Couple)	Horizontal Centrifugal (Closed Couple)	Horizontal Centrifugal (Closed Couple)	Horizontal Centrifugal (Closed Couple)	Muti-Stage Centrifugal	End Suction	End Suction	End Suction
Manufacturer	Syncroflow	Syncroflow	Syncroflow	Syncroflow	Grundfos	Peerless	Peerless	Peerless
Year Installed	1991	1991	1991	1991	1998	1998	1998	1998
No. of Stages								
Pump Setting (feet)								
Rated Conditions:								
Flow Rate (gpm)	50	150	150	1000	50	150	150	1000
TDH (feet)	102	102	102	111	101	101	101	110
Motor Data								
Manufacturer	US Motors	US Motors	US Motors	US Motors				
Horsepower	5	7.5	7.5	40	3	7.5	7.5	40
Standby Power	Generator	Generator	Generator	Generator	Generator	Generator	Generator	Generator
(Fuel)	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas	Natural Gas
Discharges to:	Currently not in use	Currently not in use	Currently not in use	Distribution	Currently not in use	Currently not in use	Currently not in use	Distribution

Well 5

Well 5 is located at 1225 Union Road in the south-central area of the Village, to the west of the Union Road and railroad intersection. The well was constructed in 1998 to a total depth of approximately 850 feet. The pump station is equipped with a natural gas standby generator for emergency operation of the entire facility. The well pumps water to a 40,000-gallon reservoir. The primary pressure zone pump at Well 5 pumps the water from the reservoir into the primary pressure zone. The station is also equipped with four high level pressure zone booster pumps pump water from the primary pressure zone into the high level pressure zone. Nearly identical to Well Station 4, the three smaller high level pressure zone booster pumps rated at 50, 150, and 150 gpm are skid mounted. The one large horizontal centrifugal pump is pad mounted and rated at 1,000 gpm. Pressure control valves regulate the pressure after the four high level pressure zone pumps. With the construction of the Lincoln Road tower the three skid-mounted pumps are no longer utilized under normal operation.

EXISTING STORAGE FACILITIES

The Village maintains three water storage facilities consisting of two standpipes and one elevated water tower. The total volume stored is approximately 1.1 MG.

North Standpipe

The north standpipe, constructed in 1975, has an overflow elevation of 1,101 feet United States Geological Survey (USGS) and is located approximately 1/2 mile north of the Village limits along County Trunk Highway (CTH) M. The north standpipe serves the needs of the primary pressure zone and has a total storage capacity of 0.4 MG. The North Standpipe serves as the controlling element for the primary pressure zone booster pumps, which are set upon water level in the standpipe.

South Standpipe

The south standpipe, constructed in 1980, also has an overflow elevation of 1,101 feet USGS and is located approximately one block south of the intersection of South Main Street and Scott Street. The south standpipe serves the needs of the primary pressure zone and has a total storage capacity of 0.4 MG. The South Standpipe is equipped with an altitude valve which prevents the standpipe from overflowing while the primary pressure zone booster pumps are operating. The altitude valve closes when the distribution system pressure at the standpipe exceeds the normal high water level of the standpipe and then opens when the pressure in the distribution system drops below that setting.

Lincoln Road Tower

The Lincoln Road tower was constructed in 2004 and has an overflow elevation of 1,218 USGS. The tower is located along Lincoln Road approximately two-thirds of a mile west of Union Road. The Lincoln Road tower serves the needs of the high level pressure zone and has a total storage capacity of 0.3 MG. The Lincoln Road Tower is the controlling element for the high level pressure zone booster pumps which are set based upon the water level in the tower.

Table 2-2 summarizes design characteristics of the storage tanks.

Table 2-2

Existing Water Storage Data
Village of Oregon
Dane County, Wisconsin

	North Standpipe	South Standpipe	Well 3 Underground Reservoir	Well 4 Underground Reservoir	Well 5 Underground Reservoir	Lincoln Road Tower
Type	Standpipe	Standpipe	Reservoir	Reservoir	Reservoir	Spheroid
Storage Volume (gallons)	400,000	400,000	58,000	70,000	40,000	300,000
Ground Elevation (feet USGS)	1026	1040	946	1,015	990	1,068
Height to Overflow (feet)	75	61	12 (above tank floor)	(above tank floor)	(above tank floor)	150
Overflow Elevation (feet USGS)	1,101	1,101	Ground	Ground	Ground	1,218
Diameter (feet)	30	34				Varies
Normal Operating Water Levels (feet)	67 - 73	52 - 59	5 - 8	5 - 7.5	5 - 7.5	25 - 27
Material	Steel	Steel	Concrete	Concrete	Concrete	Steel
Pressure Zone	PPZ	PPZ	PPZ	PPZ	PPZ	HLPZ
Year Constructed	1975	1980	1967	1991	1998	2004

WATER DISTRIBUTION SYSTEM

The Village's water distribution system provides a means of transporting and distributing water from the supply sources to utility customers and other points of use. The distribution system must be capable of supplying adequate quantities of water at reasonable pressures throughout the service area under a range of operating conditions. Furthermore, the distribution system must be able to provide not only uniform distribution of water during normal and peak demand conditions, but must also be capable of delivering adequate water supply (flow and pressure) for fire protection.

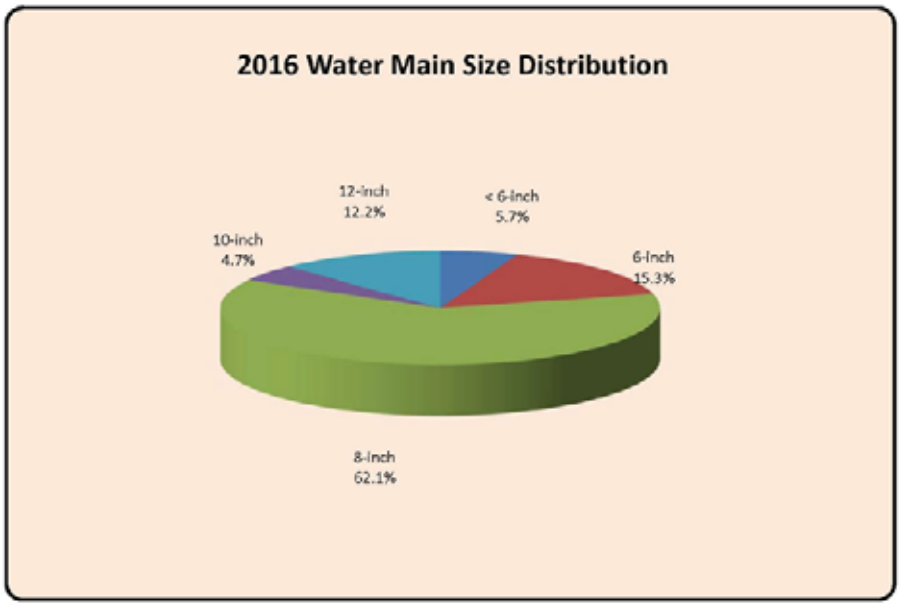
The Village of Oregon's water system is comprised of approximately 50 miles of water mains ranging in size up to 12 inches in diameter. The current water main size inventory is summarized in Table 2-3. Of the approximately 50 miles of water main, 16 percent are 10 inches in diameter or larger. These large diameter water mains represent the system's primary transmission facilities.

Table 2-3

Water Main Size Distribution
Village of Oregon
Dane County, Wisconsin

Diameter (Inches)	Approximate Total Length[1] (feet)	Percentage of Total
Less than 6	15,232	5.7%
6	40,579	15.3%
8	164,723	62.1%
10	12,526	4.7%
12	32,267	12.2%
Total	**265,327**	**100%**

[1] As reported in the 2016 PSC Annual Report.



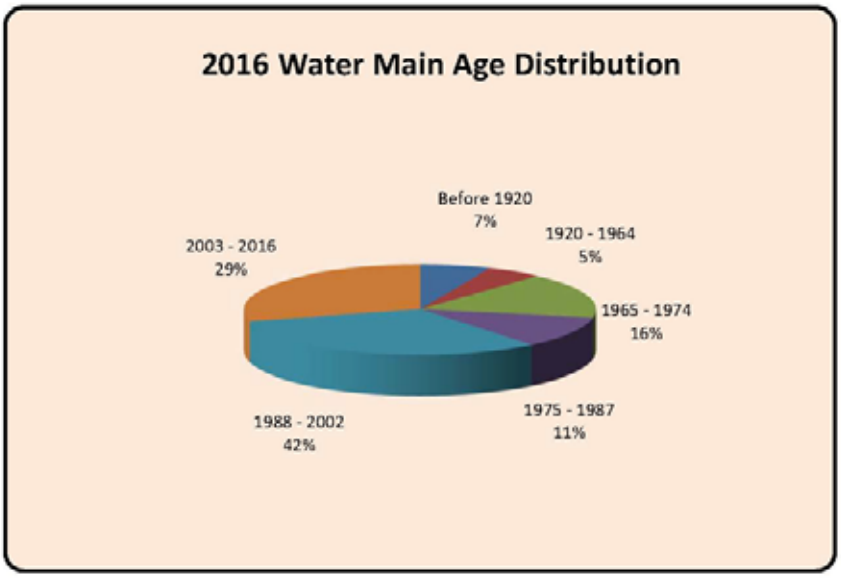
Accurate historical records of water main installation dates and material types were not available; however, based upon estimates from previous reports, an approximate inventory of water main ages is summarized in Table 2-4. Based upon previous estimates of pipe installation, it is believed that approximately 28 percent of the existing water mains were installed prior to 1975. Approximately 43 percent of the existing water mains were installed between 1975 and the master plan update in 2003. Since 2003, approximately 77,000 feet of water main has been installed representing 29 percent of the existing water system. Water mains installed prior to 1975 are believed to be unlined cast iron pipe or cement lined steel pipe. Water mains having been installed since 1975 are believed to be comprised of cement lined ductile iron pipe.

Table 2-4

Water Main Age Distribution
Village of Oregon
Dane County, Wisconsin

Period Installed	Approximate Total Length[1] (feet)	Percentage of Total
Before 1920	17,041	6.5%
1920 - 1964	13,569	5.1%
1965 - 1974	43,043	16.3%
1975 - 1987	29,450	11.2%
1988 - 2002	83,578	31.7%
2003 - 2016	77,092	29.2%
Total	**263,773**	**100.0%**

1 Based upon the estimates from the 2015 Master Plan Update and adjusted based upon water main replacements and additions since that time.
Total length may not match 2016 PSC Annual Report due to original estimated lengths.



CHAPTER 3

POPULATION AND COMMUNITY GROWTH

This chapter reviews Village population growth and land use patterns within the service area and summarizes the planning assumptions made regarding future service area characteristics. To maintain consistency between individual planning efforts, the results of previous and concurrent planning efforts were reviewed which include the Village's 2013 Comprehensive Plan Update. Input received from local officials and Utility staff members was also considered and incorporated.

POPULATION

There is generally a close relationship between a community's population and total water consumption volumes. Future water sales can be expected to generally reflect future changes in service area population. Similarly, commercial, public, and to a lesser extent, even industrial water consumption will also tend to vary proportionately with the population growth of the community.

Since 1960, the Village of Oregon has experienced rapid growth. The community has expanded from 1,701 in 1960 to 9,231 in 2010. Although recent economic factors have slowed growth, the Village of Oregon has experienced a relatively steady increase in population over the last several decades. The Village of Oregon's population grew 66 percent between the 1990 and 2000 censuses and nearly 23 percent between 2000 and 2010. Figure 3-1 graphically shows historical census population data from 1970 to 2010 and three different projections of population extending to 2035; linear, compound, and population projections from the Wisconsin Department of Administration (DOA).

Based upon the Village of Oregon Comprehensive Plan amended in 2016, the linear estimation of population growth is considered most appropriate based upon current political and economical factors. For this reason, the linear growth model was used in this study as a basis for evaluating future community growth and potable water needs. The 2016 Comprehensive Plan identified an average annual growth rate of 236 residents per year.

EXISTING LAND USE

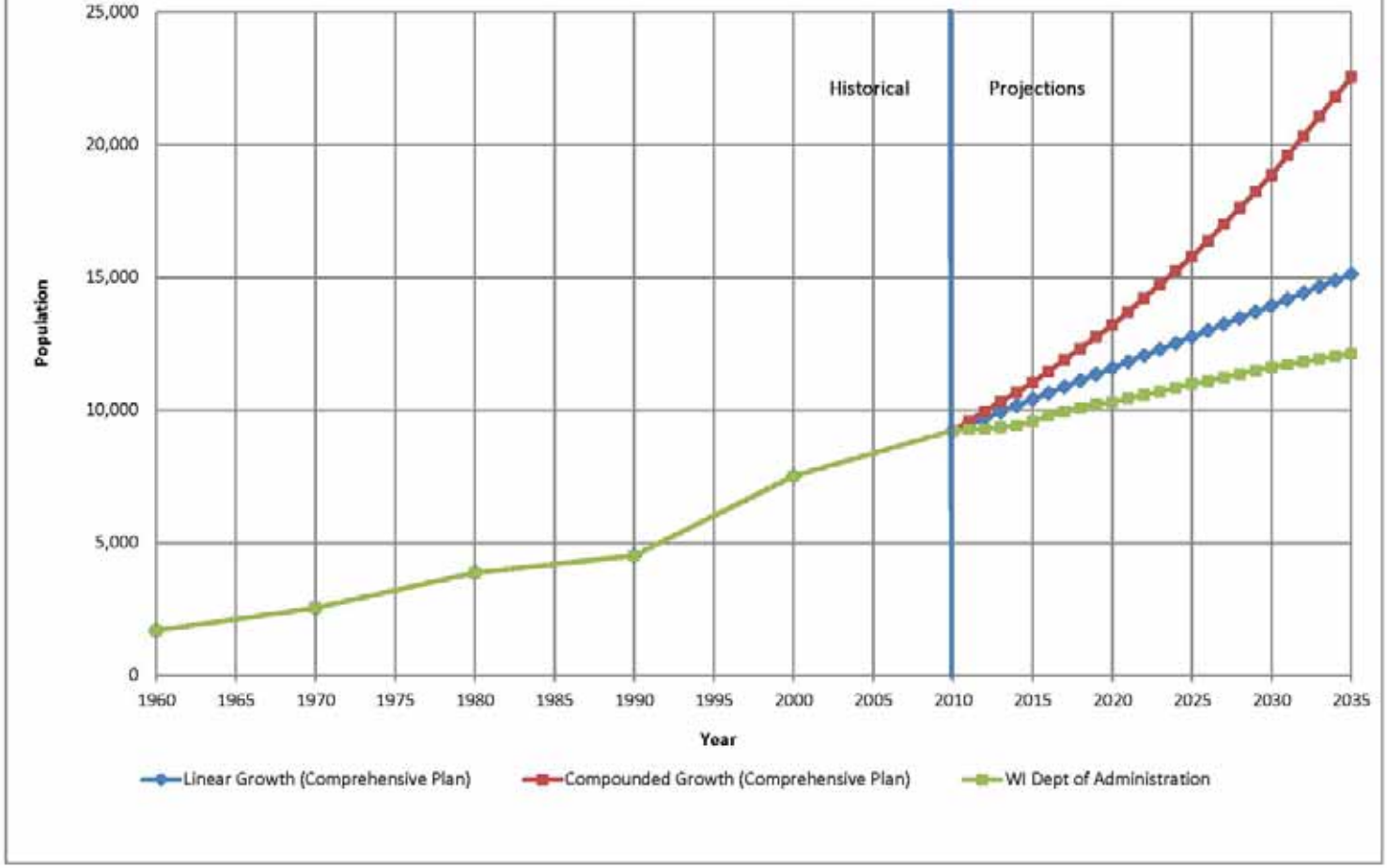
Land uses consist primarily of residential developments, with commercial developments located in the Village's central business district and along principal transportation routes. Industrial development in the Village is limited and consists primarily of small developments along principal transportation routes.

Existing land use within the extraterritorial jurisdiction (ETJ) outside the Village's current corporate boundary consists of primarily agriculture with some existing exurban residential and other uses. To support future growth it is important that the Village has areas to develop or redevelop to meet the needs of an increasing population. Existing agricultural lands within the ETJ will eventually transition to other uses as the need for development occurs to support anticipated growth.

FUTURE COMMUNITY GROWTH

With its close proximity to the City of Madison and ease of travel via USH 14 and Fish Hatchery Road, the Village of Oregon is expected to continue to grow at a rapid rate. Based upon the 2013 Comprehensive Plan Update, the Village is anticipated to expand by up to approximately 2 ½ square miles (1,640 acres) to support projected population growth over the next 20 years.

Figure 3-1
Historical Data and Population Projections
Village of Oregon, Wisconsin



The expected increase in residential development is directly related to projections of population growth. An estimated 550 acres of residential development will be needed to support the anticipated population by 2035. Commercial land use is also expected to increase proportionally with the population and is currently estimated to required 40 acres of additional development by 2035.

Future changes in other land uses, such as office or industrial are much more difficult to estimate, due to the many uncertainties associated with factors that may affect these developments. The growth of the urban area will be a function of changes in the office and industrial activity and employment opportunities in Oregon, as well as neighboring Wisconsin communities.

Major office or industrial expansion or development can have a significant impact on local public water system requirements. It is generally suggested that improvements to support office and industrial growth be re-evaluated as more specific information becomes available. However, current estimates of land development related to mixed, office, and industrial land uses are 160, 130, and 130 acres, respectively.

FUTURE UTILITY SERVICE AREA

Figure 3-2 identifies future land uses within the ETJ and the anticipated 2035 Village of Oregon urban service area. The urban service area is defined as the area in which the Village of Oregon is likely to develop and therefore anticipated to provide water and sanitary service during the planning period. It is important to note that the urban service area is established for planning purposes and not all the land within the urban service area is anticipated to be fully developed within the planning period. The actual location and extent of future developments will be a function of numerous social-economical factors including: need, land availability, land suitability, developer interest, as well as community desire (i.e. agricultural preservation versus development).

Further service area expansion is projected to occur primarily in the south, west, and east portions of the Village. Expansion is not projected to the north because of the municipal boundary between the City of Fitchburg and the Village of Oregon. The water system has no restrictions for serving the entire area outlined by the ETJ, however; water service would most likely be conveyed only where sewer service is conveyed. The future urban service area illustrated in Figure 3-3 corresponds approximately to the anticipated sewer drainage basin identified in the Comprehensive Plan and was used for this study to identify the region in which development may occur over the next 20 years and require Oregon Water Utility service.

PRESSURE ZONE EXPANSION

An important consideration when evaluating future growth is the relative growth within each pressure zone (or the need to establish new pressure zones). To determine the growth of water demand by pressure zone, a review of the location of anticipated growth was completed. Figure 3-4 illustrates the expansion of the pressure zones based upon the limits of acceptable pressures utilizing the overflow elevations of the exiting water storage facilities. Future growth in the water system is anticipated to occur in both pressure zones as illustrated in Figure 3-3.

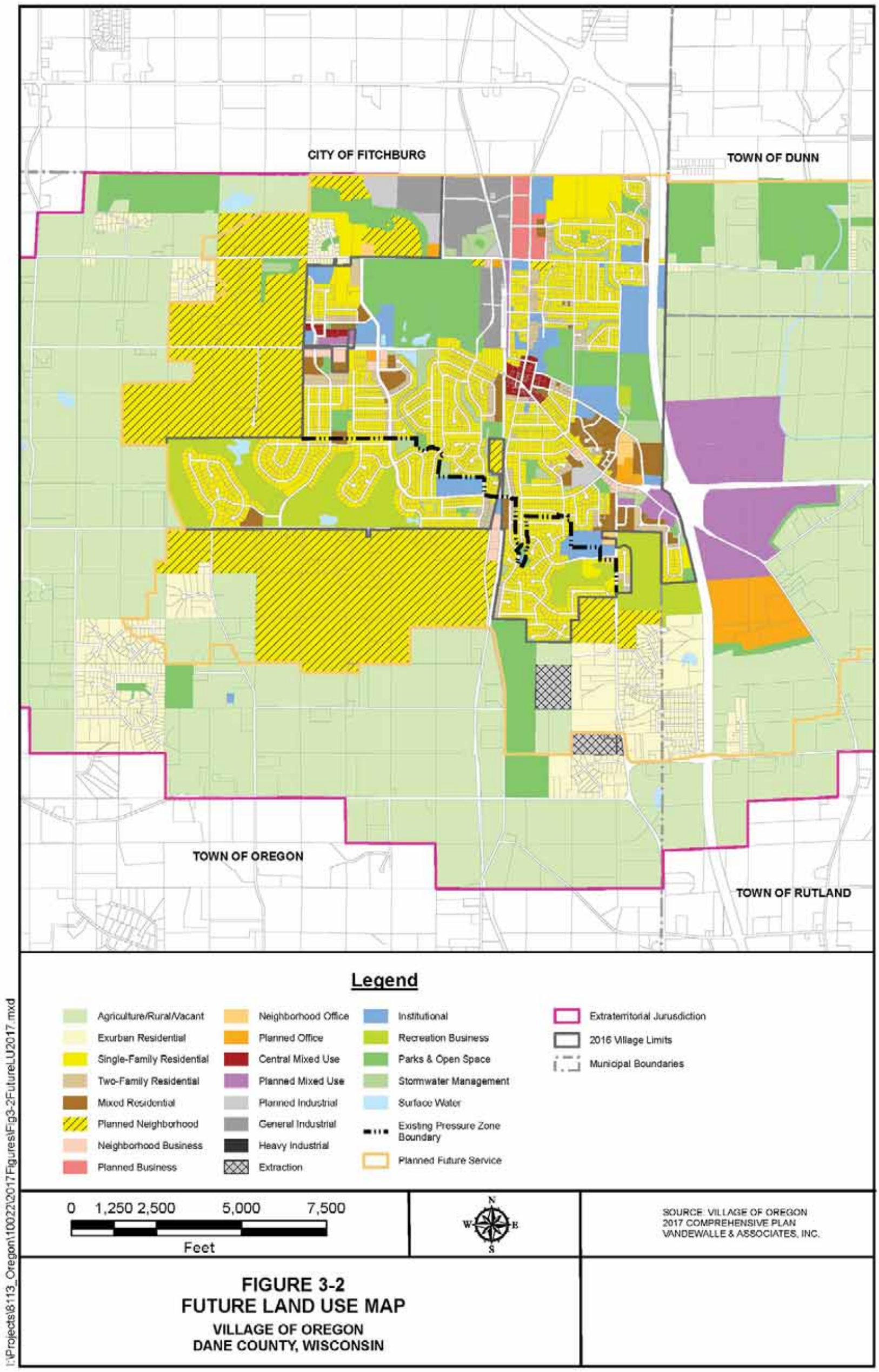


FIGURE 3-2
FUTURE LAND USE MAP
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

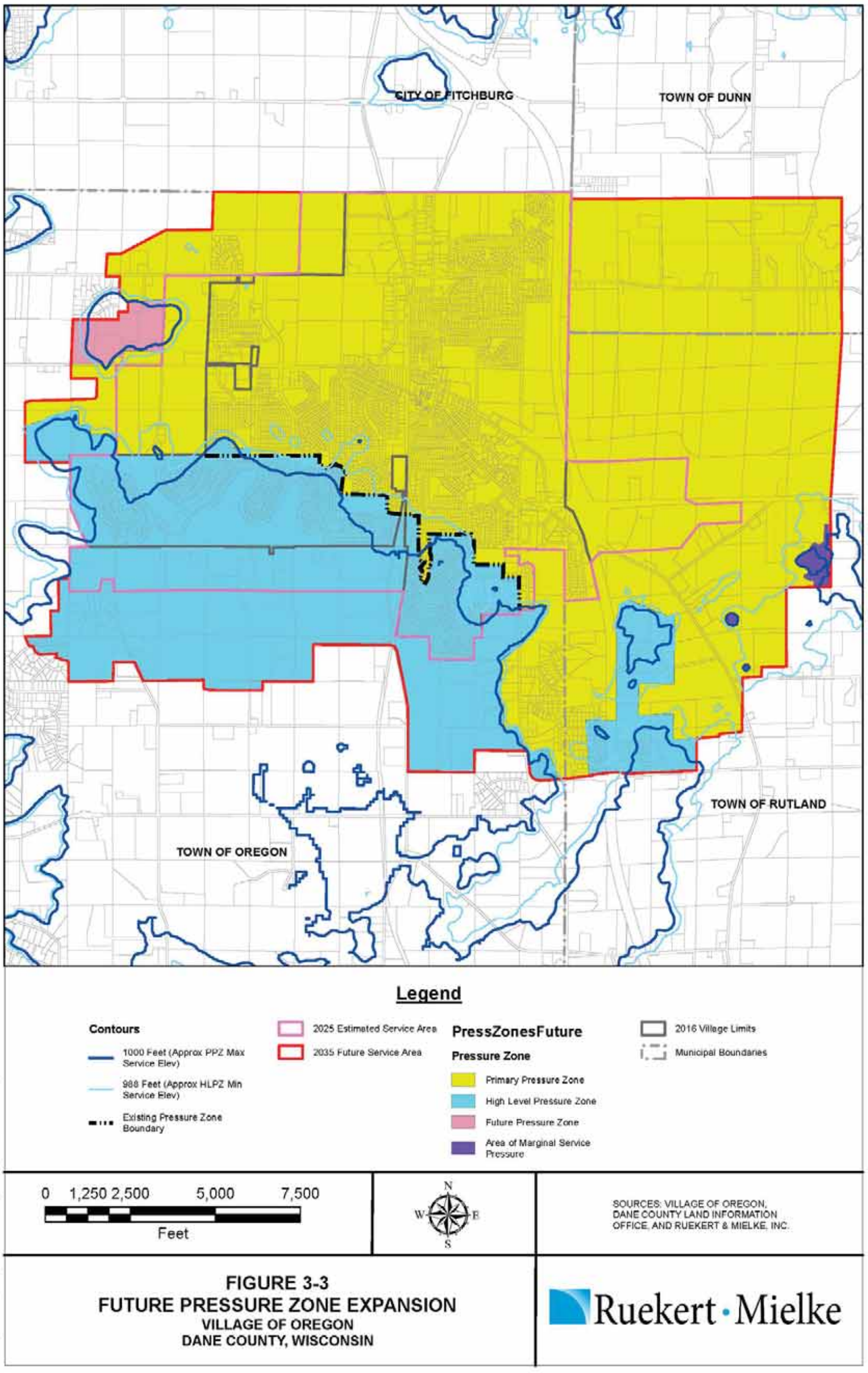


FIGURE 3-3
FUTURE PRESSURE ZONE EXPANSION
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

Ruekert · Mielke

2025 Service Area

The expected increase in residential development is directly related to projections of population growth. Likewise commercial and public land uses are also expected to increase with increases in population. As a result, year 2025 water demand projections discussed in Chapter 4 will be estimated from the population projections as presented in this chapter. For this study, acreage of future growth was calculated in the January 2015 Water System Master Plan Update. Based upon the results of the Water System Master Plan Update, a year 2025 service area was delineated which was believed to identify the most likely area for future development. It is important to note that the 2025 service area is based upon current development activities and interest and actual development may vary significantly.

Future population was assigned by pressure zone based upon the percent of current vacant residential parcels and future non-industrial developable land contained within the assumed future boundaries for each pressure zone. Based upon the analysis, the 2025 population growth is anticipated to be distributed as follows:

Primary Pressure Zone: – 53 percent of population increase
High Level Pressure Zone: – 43 percent of population increase
Future High Pressure Zone: – 4 percent of population increase

Future changes in industrial and business activity are much more difficult to estimate due to many of the uncertainties associated with factors that may affect industrial/business development. The growth of the service area will be a function of changes in industrial and business activity and employment opportunities in the Village of Oregon as well as neighboring communities. To assign water demand projections in Chapter 4 for the industrial and commercial growth areas, the projected number of acres for future industrial and business growth was extracted from future land use data provided by the Village and as illustrated in Figure 3-4. The industrial and business areas indicated in Figure 3-4, are considered to be undeveloped areas which will be developed by 2025 (assuming 100 percent development by 2025) and consist of both existing developable and future developable industrial/business areas within the 2025 service area. Similarly with population projections, by utilizing the land use data provided in the GIS the amount of developable industrial acreage within each pressure zone can be estimated as follows:

Primary Pressure Zone: 97 percent of commercial demand and 100 percent of industrial demand
High Level Pressure Zone: 3 percent of commercial demand and no industrial demand
Future High Pressure Zone: zero percent of commercial and industrial demand

2035 Service Area

Community growth beyond 2025 is believed to fill the future utility service area identified in Figure 3-3. Future residential, commercial, and public demands (2025 through 2035) were calculated based upon the results of the Water System Master Plan Update in 2015 that used the amount of developable residential land area within each assumed future pressure zone boundary, coupled with population projections. The total estimated residential increase for each pressure zone is estimated to be as follows:

Primary Pressure Zone: 60 percent of population increase
High Level Pressure Zone: 40 percent of population increase
Future High Pressure Zone: 0 percent of population increase

While future industrial water sales are not anticipated to represent a significant portion of the total water sales an assumption of future industrial/business water sales is necessary to ensure that future water requirements can be met. Based upon an analysis of the identified future industrial land use areas the following future industrial/business land use demand are estimated for each pressure zone:

Primary Pressure Zone: 82 percent of commercial demand and 100 percent of industrial demand
High Level Pressure Zone: 18 percent of commercial demand and no industrial demand
Future High Pressure Zone: zero percent of commercial and industrial demand

SUMMARY

This chapter summarizes the primary assumptions regarding future growth of the Village of Oregon service area. The present and future needs and characteristics of the identified service area will have a direct impact on the need for expansion of water system facilities; therefore, the conclusions discussed in this chapter were used as a primary basis for projecting future water needs, evaluating the adequacy of existing water system facilities, and identifying needs for future water system expansion.

CHAPTER 4

WATER REQUIREMENTS

Projections of customer demands serve as the basis for capital improvements planning. Several standard methods were used in this study to project water supply and storage needs based on estimates of population and community growth. This chapter summarizes the methodology used and the results of these projections.

WATER CONSUMPTION HISTORY

An analysis was made of past water consumption characteristics by reviewing annual pumpage and water sales records for the period from 1996 to 2016. Average and maximum day water consumption during this period, together with the amount of water sold in each customer category, were analyzed. Projections of future water requirements are based on the results of this analysis coupled with estimates of population and community growth discussed in Chapter 3.

A summary of historical water sales and pumpage is provided in Table 4-1. Over the 21-year period of data summarized in the table, water sales varied from a low of 179 million gallons per year (mgy) in 1996 to a high of 254 mgy in 2012. The Village of Oregon has experienced an approximate 30 percent increase in water demand since 1996. Water sales and total pumpage reached 249 mgy and 284 mgy in 2016, respectively. The difference between water sales and water pumpage is mainly attributed to unaccounted-for water, which is further defined later in this chapter. Water sales trends are graphically illustrated in Table 4-1.

A historical summary of the number of utility customers served is provided in Table 4-2. The total number of water system customers in years prior to 2016 were based on the rate table summary, which or that included move in and move out accounts which artificially increased the total number of customers. Beginning in 2014, multifamily customers were reported in the Public Service Commission (PSC) annual report. Multifamily customers prior to 2014 were reported as commercial customers. Table 4-3 provides the water consumption history of each class of customers. Residential customers presently account for 83 percent of customers and 68 percent of the total sales. The residential user class is by far the largest user class in the Village. Commercial water use in 2016 accounted for 12 percent of total sales and 14 percent of the total number of users. Multifamily water use in 2016 accounted for 9 percent of the total sales and 2 percent of the total number of users. Both industrial and public users account for approximately 1 percent of the total number of customers. Metered industrial sales accounted for just over 4.5 percent of the total sales in 2016. Public users account for approximately 6 percent of the 2016 total sales. The total sales of these customer class users represent 88 percent of total pumpage.

Table 4-1

Historical Water Pumpage and Sales
Village of Oregon
Dane County, Wisconsin

Year	Estimated Population	Total Pumpage (MG)	Total Metered (MG)	Pumpage Metered (%)	Unaccounted Water (%)	Average Day		Maximum Day		Ratio of Maximum to Average Day Pumpage
						MGD	GPCD	MGD	Date	
1996	6,316	217	179	82%	18%	0.596	94.3	0.928	Sept. 8	1.56
1997	6,615	221	181	82%	15%	0.606	91.6	1.169	Sept. 1	1.93
1998	6,915	244	191	78%	20%	0.670	96.8	0.957	Aug. 14	1.43
1999	7,215	249	199	80%	15%	0.681	94.4	1.227	July 15	1.80
2000	7,514	251	201	80%	14%	0.687	91.4	1.125	July 25	1.64
2001	7,814	254	204	80%	12%	0.696	71.4	1.36	July 9	1.95
2002	8,113	275	238	86%	14%	0.754	92.9	1.474	July 15	1.96
2003	8,225	273	229	84%	15%	0.748	90.9	1.656	Sept. 8	2.22
2004	8,337	250	203	81%	17%	0.685	82.2	1.118	Feb. 2	1.63
2005	8,448	282	227	80%	13%	0.773	91.5	1.394	Sept. 12	1.80
2006	8,560	266	216	81%	18%	0.730	85.3	1.149	Sept. 17	1.57
2007	8,672	274	234	86%	13%	0.749	86.4	1.360	June 15	1.81
2008	8,784	275	229	83%	15%	0.753	85.8	1.224	Sept. 2	1.62
2009	8,896	275	231	84%	15%	0.754	84.8	1.161	Sept. 14	1.54
2010	9,231	270	225	83%	17%	0.741	80.3	1.183	June 1	1.60
2011	9,263	273	242	89%	11%	0.748	80.8	1.286	July 12	1.72
2012	9,308	303	254	84%	16%	0.829	89.1	1.836	July 16	2.21
2013	9,343	277	238	86%	14%	0.758	81.1	1.217	Aug 19	1.61
2014	9,420	302	235	78%	22%	0.827	87.8	1.730	June 12	2.09
2015	9,575	282	241	85%	15%	0.772	80.6	1.292	June 6	1.67
2016	9,797	284	249	87%	12%	0.777	79.3	1.223	June 20	1.57

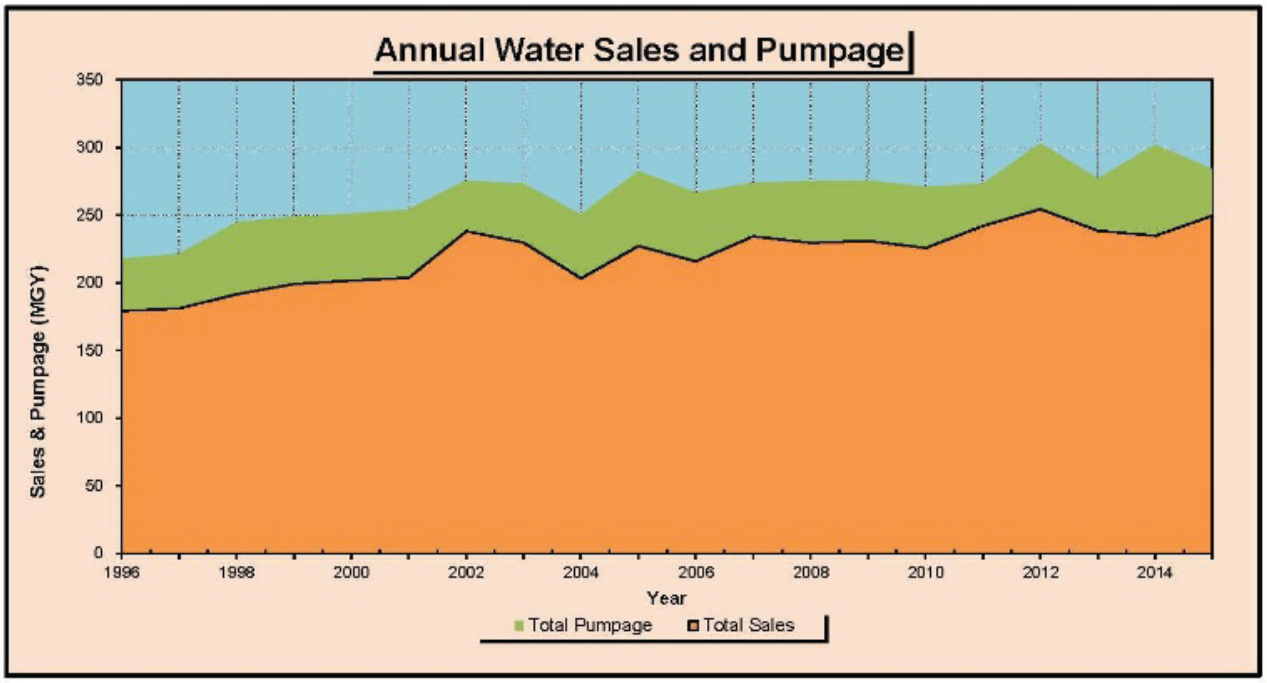


Table 4-2

Historical Customer Summary
Village of Oregon
Dane County, Wisconsin

	Number of Customers					
Year	Residential	Commercial	Industrial	Public	Multifamily	Total
2002	2,364	340	5	18		2,727
2003	2,445	337	5	18		2,805
2004	2,574	334	5	19		2,932
2005	2,668	418	5	19		3,110
2006	2,707	510	9	19		3,245
2007	2,771	517	12	20		3,320
2008	2,813	518	12	20		3,363
2009	2,827	528	12	20		3,387
2010	2,864	541	12	23		3,440
2011	2,885	548	12	24		3,469
2012	3,233	663	13	28		3,937
2013	3,306	669	14	28		4,017
2014	3,335	594	15	28	60	4,032
2015	3,418	620	14	28	87	4,167
2016	3,147	525	14	29	100	3,815

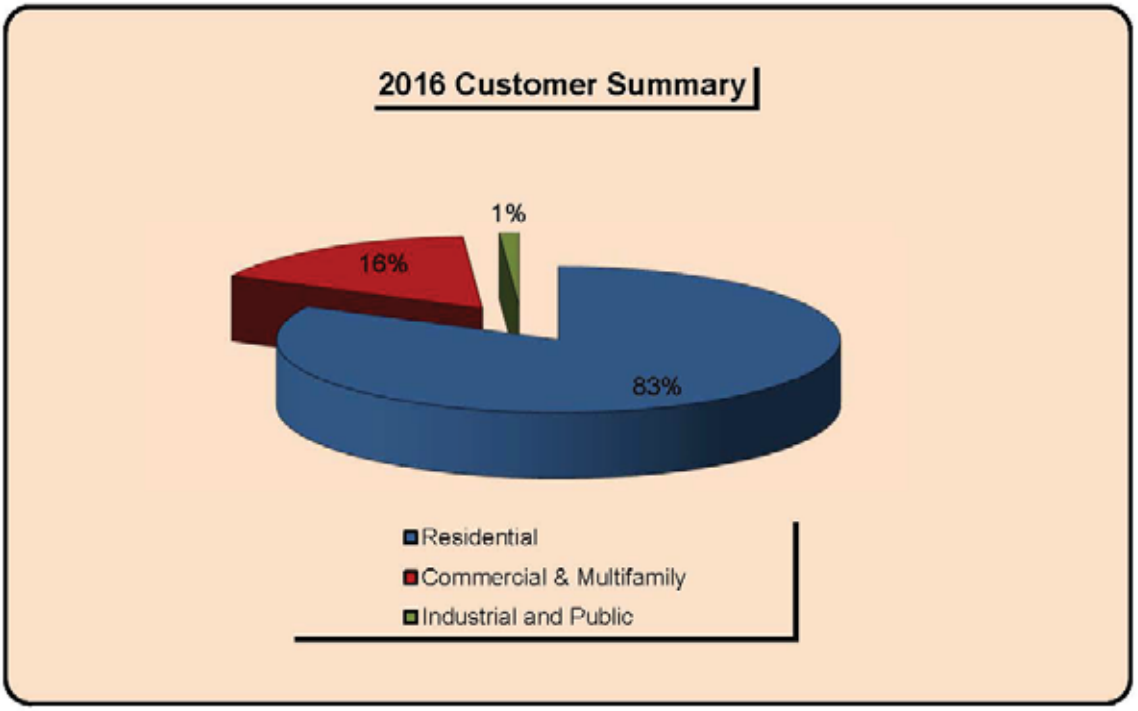
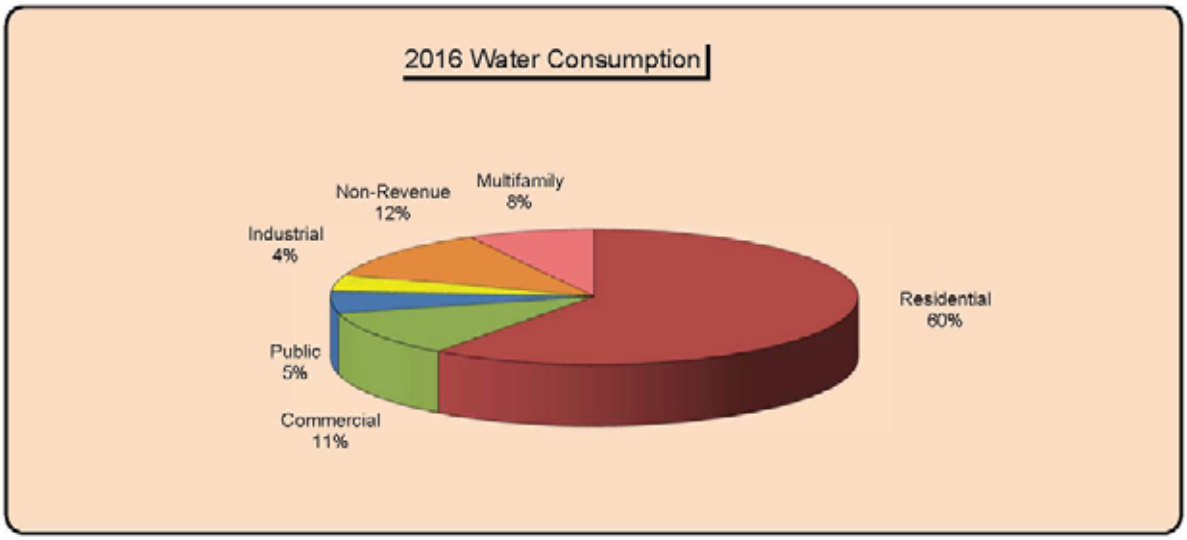


Table 4-3

Water Consumption History
Village of Oregon
Dane County, Wisconsin

Year	Annual Water Sales (MGY) Resi-dential	Com-mercial	Indust-rial	Public	Multi-Family[1]	Total Sales (MGY)	Total Pumpage (MGY)	% Pumpage Metered
2007	167.08	50.40	4.77	11.68		233.94	273.53	85.5%
2008	163.15	50.74	4.51	10.60		229.00	274.99	83.3%
2009	162.14	49.92	3.05	15.65		230.76	275.39	83.8%
2010	158.92	50.23	3.04	13.26		225.43	270.49	83.3%
2011	162.21	49.65	2.98	14.91		229.74	273.12	84.1%
2012	183.36	51.99	3.59	15.36		254.30	302.64	84.0%
2013	168.32	52.26	3.69	14.02		238.29	276.61	86.1%
2014	163.71	30.40	7.71	13.54	19.17	234.52	301.84	77.7%
2015	167.01	31.48	9.42	13.54	19.17	240.62	281.71	85.4%
2016	170.21	31.11	11.25	14.85	22.08	249.49	283.51	88.0%

1. Multifamily water sales were included in Commercial water sales prior to 2014



PER CAPITA WATER USAGE

Water usage can be correlated to a community's population. An analysis of per capita water consumption for each of the customer classifications in the Village was made based on the available sales records and is summarized in Table 4-4. As indicated in Table 4-4, per capita sales to customers have followed certain trends over the previous 10 years.

The apparent trend in per capita residential water usage is consistent with observed results for other Wisconsin municipal water utilities. Although per capita residential water usage in the U.S. had consistently increased until the early 1970s, the increasing rate of per capita consumption has leveled off. This may be due in part to residential customers becoming more aware of water costs, and water conservation measures becoming more common.

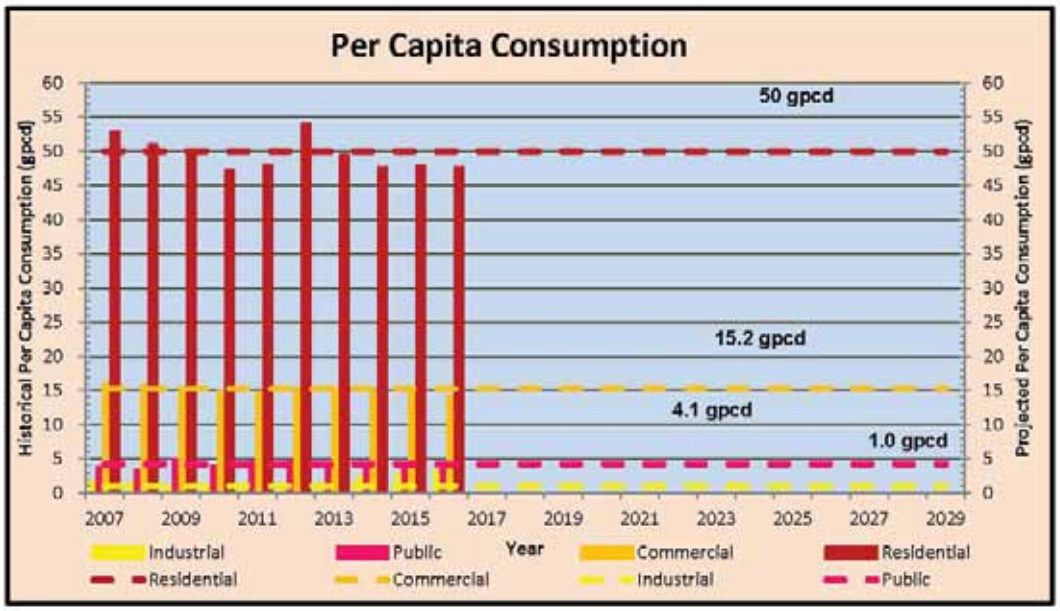
Table 4-4

Historical Per Capita Usage

Village of Oregon
Dane County, Wisconsin

		GALLONS PER CAPITA PER DAY						
Year	Estimated Population	Resi-dential	Com-mercial	Indust-rial	Public	Multi-family[1]	Total Metered	Total Pumpage
2007	8,672	52.8	15.9	1.5	3.7		73.9	86.4
2008	8,784	50.9	15.8	1.4	3.3		71.4	85.6
2009	8,896	49.9	15.4	0.9	4.8		71.1	84.8
2010	9,231	47.2	14.9	0.9	3.9		66.9	80.3
2011	9,263	48.0	14.7	0.9	4.4		68.0	80.8
2012	9,308	54.0	15.3	1.1	4.5		74.9	89.1
2013	9,343	49.4	15.3	1.1	4.1		69.9	81.1
2014	9,420	47.6	8.8	2.2	3.9	5.6	68.2	87.8
2015	9,575	47.8	9.0	2.7	3.9	5.5	68.8	80.6
2016	9,797	47.6	8.7	3.1	4.2	6.2	69.8	79.3

1. Multifamily water usage was included in Commercial water usage prior to 2014



The utility's residential per capita consumption has remained relatively constant over the previous 10 years, averaging nearly 49.5 gallons per capita per day (gpcd). To project future water needs, average daily water usage for residential customers in the Village of Oregon service planning area was projected to be 50 gpcd throughout the planning period.

Over the previous 10 years, per capita commercial and multifamily sales have varied from approximately 14.4 gpcd to nearly 16 gpcd. For this study, it was projected that per capita commercial consumption will average approximately 15.2 gpcd. Since 2007, per capita public sales have varied between 3.3 and 4.8 gpcd. For this study, it was projected that per capita public consumption will average approximately 4.1 gpcd.

INDUSTRIAL WATER USAGE

The industrial per capita water sales ranged from 0.9 to 3.1 from 2007 to 2016. Unlike other water sales components, industrial sales do not necessarily correlate well with population. Industrial water consumption can vary widely on an annual basis depending on the types of industries served and the annual level of production activity. For this reason, other means of estimating future water sales needs are often utilized.

Table 4-5 summarizes the Utility's largest customers in 2013 and includes industrial, commercial and public authority users. As shown in the table, the top 13 users account for slightly more than 39 percent of the Utility's total non-residential water sales. Of the top 13 users, two are industrial customers. Industrial water sales have increased by 281 percent since 2013 based on increased consumption by the two significant industrial customer. The addition of Lycon and increased water demand by All Color Powder Coating increased industrial water demand by approximately 7.5 mgy.

It is anticipated that a certain amount of industrial development will occur to support projected future community and regional growth in population. It is, however, difficult to project future new industrial customer water demands, as they can be highly dependent on the specific type of industries that would locate in Oregon. Often, future industrial demands are projected based upon an estimate of water demand per unit of land (acre). Estimates of future industrial land were obtained from the Village's comprehensive plan as presented in Chapter 3.

Projecting future industrial customer water needs based upon unit of land, typical water consumption values could range from less than 250 gallons per acre per day (gpad) to more than 1,500 gpad. Based upon 130 acres of future industrial development and utilizing 250 gpad, annual water sales to new industrial customers as a result of industrial growth would be estimated to be approximately 11.9 mgy by the year 2035.

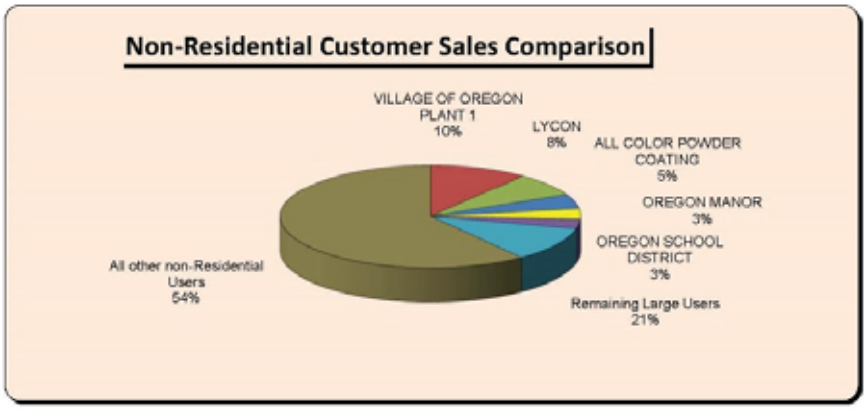
Industrial water sales prior to the addition of Lycon and increased consumption by All Color Powder Coating averaged approximately 1.0 gpcd. For this study projected industrial water use will be estimated based upon a base demand of 7.5 mgy and 1.0 gpcd. This approach would be consistent with recent trends in industrial water use which have been moving toward fewer "wet" industries. It will be important to reevaluate future water demand if high volume users come into the community.

Table 4-5

Summary of Largest Customers
Village of Oregon
Dane County, Wisconsin

2016 Rank	Customer Name	Billing Classification	MAJOR CUSTOMER CONSUMPTION Water Use (GPD)
1	VILLAGE OF OREGON PLANT 1	Public Authority	22,783
2	LYCON	Industrial	16,401
3	ALL COLOR POWDER COATING	Industrial	10,150
4	OREGON MANOR	Commercial-Multifamily	6,860
5	OREGON SCHOOL DISTRICT	Public Authority	6,519
6	LL WASH LLC	Commercial	4,314
7	BROGIN INVESTMENTS	Commercial-Multifamily	4,026
8	CURLESS, GREG	Commercial	2,682
9	DSI	Commercial	2,678
10	DSI	Commercial	2,624
11	VILLAGE APARTMENTS	Commercial-Multifamily	2,491
12	LEVILLETTE DE BERGAMONT	Commercial-Multifamily	2,481
13	OREGON - POOL	Public Authority	2,280

Total Water Sales to Large Customers	**86,288**
Total Water Sales to Remaining Non-Residential Customers	130,928
Total Water Sales to All Non-Residential Customers	***217,216***
Total Sales attributed to Large Non-Residential Customers	*39.7%*



NON-REVENUE AND UNACCOUNTED-FOR WATER

There is generally a close relationship between the total gallons of water pumped and the gallons of water metered and sold to water utility customers. Total metered water sales are always less than the amount of pumpage due to several factors, including:

1. Unmetered water usage for maintenance purposes such as hydrant flushing and water main repairs
2. Unmetered water usage for fire fighting
3. Inaccuracies in water metering devices
4. Unaccounted-for public water usage
5. Leakage within the distribution system

The difference between total pumpage and total water sales is termed "nonrevenue water" and is often expressed as a percentage. That portion of nonrevenue water attributed to leakage, meter inaccuracies, and other unknown losses is often termed "unaccounted-for water" and can be an indicator of the condition of the water system. When a distribution system is very old or poorly maintained, the amount of unaccounted-for water often increases dramatically.

Table 4-1 provides a historical summary of the percentage of total pumpage metered over the past 21 years. The percentage of total pumpage metered has been reported to be as low as 78 percent (1998 and 2014) and as high as 89 percent (2011) over the last 21years. This degree of fluctuation is common for public water utilities and can be influenced by the factors summarized above. For example, the percentage of total pumpage metered would be expected to decrease in years when unusual problems with leakage or meter stoppage occurred, or when unusually high water demands for fire protection occurred. As a general rule, the percentage of total pumpage metered should be maintained above 90 percent, which would correspond to unaccounted-for water amounting to less than 10 percent.

Historically, the level of "unaccounted-for" water for the Oregon Water Utility remained relatively constant averaging approximately 15 percent since 1996. Even in more recent years (2003 to present) the average has been approximately 15 percent unaccounted-for water. For this study, it was assumed that the percentage of total pumpage metered in future years will be maintained at the more recent long term historical value of 15 percent.

It is important to note that quantifying unaccounted-for water simply as a percent of pumped water to billed water, while widely used and accepted, is limited in its ability to accurately indicate an appropriate or acceptable level of water loss. For example, if water conservation measures are implemented causing total consumption to decrease, if leakage and other unaccounted-for water uses remain that same (as volume) then the percent of unaccounted-for water actually increases as a percent. This would mistakenly indicate that the level of water loss has gotten worse, while in actuality it has remained the same. Currently, the water industry is moving to new ways of estimating and reporting leakage and unaccounted-for water that are more comparative of the system conditions and provide benchmarks for acceptable levels of leakage.

VARIATIONS IN CUSTOMER DEMANDS AND PUMPAGE

Seasonal fluctuations in water usage are important factors in the design and sizing of water supply and storage facilities. The seasonal nature of water consumption in the Village of Oregon can be demonstrated by an analysis of monthly pumpage variations. The utility's monthly pumpage variations in 2016 are presented in Table 4-6. As is typical in northern climates, the maximum monthly pumpage occurred during the warmer summer months (July), while the minimum monthly pumpage occurred in the cooler months.

Maximum daily water demands usually occur during the summer months on hot days when additional water is used for watering lawns, gardening, bathing, and industrial cooling. Historically, residents have not had lawn irrigation systems, however the trend for newer homes is to install these systems. This will have an impact on annual demand, seasonal variations, and peaking factors when more residential customers utilize irrigation systems. The maximum day demand is simply the amount of water pumped during a single day of the year with the highest water usage, and is often expressed as a ratio of the annual average day pumpage. The maximum day pumpage is of particular importance to water system planning, because water supply facilities are sized to meet this demand.

Table 4-6

Seasonal Pumpage Variations
Village of Oregon
Dane County, Wisconsin

Month	2016 Monthly Pumpage (MG)	Percentage of Total Pumpage	Percentage of Average Pumpage
January	22.040	7.8%	93.3%
February	20.758	7.3%	87.9%
March	21.310	7.5%	90.2%
April	21.465	7.6%	90.9%
May	25.974	9.2%	109.9%
June	29.614	10.4%	125.3%
July	30.265	10.7%	128.1%
August	26.291	9.3%	111.3%
September	22.865	8.1%	96.8%
October	21.440	7.6%	90.7%
November	20.103	7.1%	85.1%
December	21.386	7.5%	90.5%
Total	**283.511**	**100.0%**	

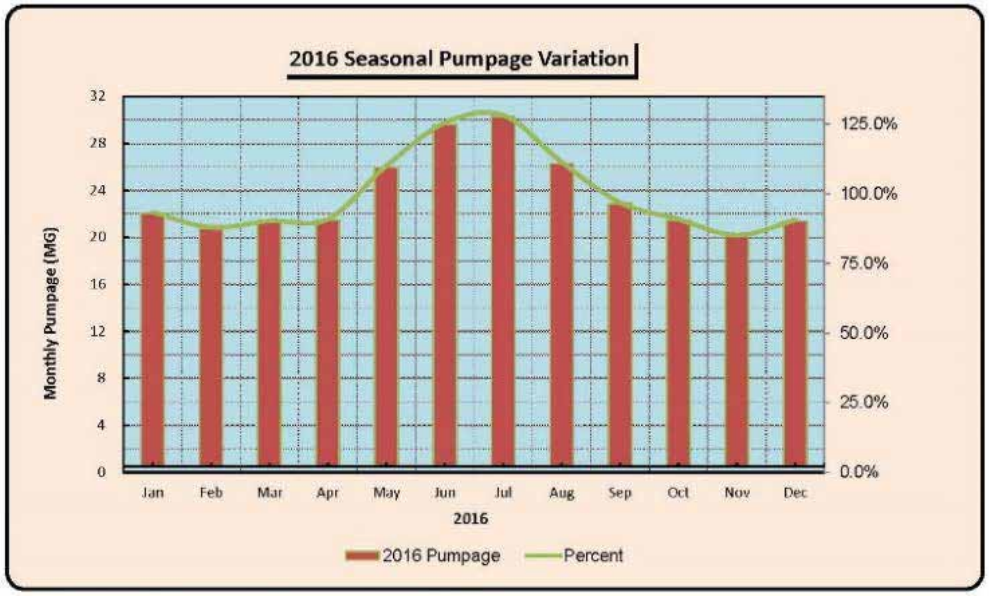


Table 4-7 presents the average and maximum day pumpage recorded from 1997 to 2016. The maximum day pumpage usually occurs during the summer and correlates, as stated above, with an increase in water usage by utility customers. Conversely, the minimum day pumpage typically occurs during winter or early spring. Occasionally a community's maximum day pumpage will be attributed to an artificial increase in water demand as a result of hydrant flushing or a water main break. In 2004 the Village's maximum day pumpage occurred in February and was attributed to a water main break.

Table 4-7

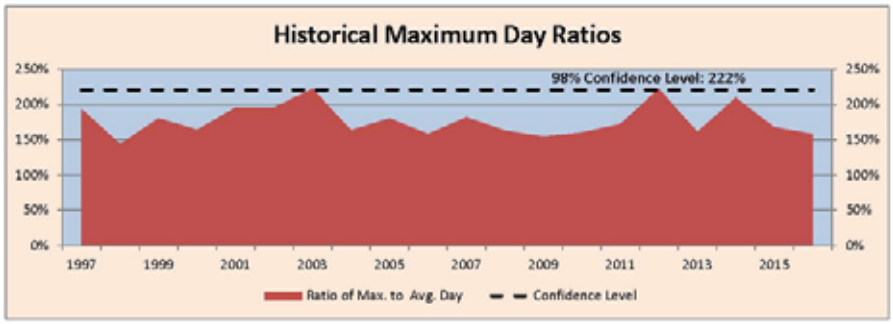
Daily Pumpage Variations
Village of Oregon
Dane County, Wisconsin

Year	Avg. Day Pumpage (MGD)	Max. Day Pumpage (MGD)	Date of Maximum Day	Ratio of Max. to Avg. Day	Year	Avg. Day Pumpage (MGD)	Max. Day Pumpage (MGD)	Date of Maximum Day	Ratio of Max. to Avg. Day
1997	0.606	1.169	Sept. 1	1.93	2007	0.749	1.360	June 15	1.81
1998	0.670	0.957	Aug. 14	1.43	2008	0.753	1.224	Sept. 2	1.62
1999	0.681	1.227	July 15	1.80	2009	0.754	1.161	Sept. 14	1.54
2000	0.687	1.125	July 25	1.64	2010	0.741	1.183	June 1	1.60
2001	0.696	1.36	July 9	1.95	2011	0.748	1.286	July 12	1.72
2002	0.754	1.474	July 15	1.96	2012	0.829	1.836	July 16	2.21
2003	0.748	1.656	Sept. 8	2.22	2013	0.758	1.217	7 Aug 19	1.61
2004	0.685	1.118	Feb. 2	1.63	2014	0.827	1.730	June 12	2.09
2005	0.773	1.394	ept. 12	1.80	2015	0.772	1.292	2 June 6	1.67
2006	0.730	1.149	ept. 17	1.57	2016	0.777	1.223	June 20	1.57

Statistical Analysis

	2012 - 2016	1997 - 2016
Number of years of Data	5	20
Maximum Ratio - Max. to Avg. Day Pumpage	221%	222%
Minimum Ratio - Max. to Avg. Day Pumpage	157%	143%
Average Ratio Max. to Avg. Day Pumpage	183%	177%
Standard Deviation	27%	22%

Confidence Level (%)	Ratio of Max. to Avg. Day Pumpage 2012 - 2016	1997 - 2016
80%	206%	195%
85%	211%	200%
90%	217%	205%
95%	227%	213%
98%	238%	222%
99%	245%	228%



Over the last 20 years, the maximum day pumpage ratio (ratio of maximum to average day pumpage) has varied from a low of approximately 143 percent in 1998 to a high of 222 percent in 2003.

To gain a better understanding of expected fluctuations in customer demands for the Village of Oregon, a statistical analysis was performed of historical maximum day pumpage ratios. Table 4-7 summarizes the results of this analysis. Two periods of analysis were examined; a 20-year period from 1997 to 2016, and the most recent 5-year period from 2012 to 2016.

For the years 1997 to 2016, the average maximum day demand ratio was 177 percent, with a standard deviation of 22 percent. In comparison, over the period of 2012 to 2016, the average ratio was 183 percent, with a standard deviation of 22 percent. For this study, it was projected that future demand variations will resemble the variations observed over the entire period.

Table 4-7 also includes an analysis of expected maximum day pumpage ratios for various confidence levels. The confidence level represents the probability (%) that in any given year, the actual ratio of maximum to average day pumpage will be less than or equal to a given ratio. The ratios in the Table 4-7 were determined based on a statistical analysis of historical ratios over each period of analysis, assuming a normal distribution.

To evaluate future water supply and storage needs, a conservative maximum day pumpage ratio of 222 percent was used for this study. This ratio provides a confidence level of approximately 98 percent based on maximum day pumpage ratios over the past two decades. This means there is about a 98 percent chance that the actual maximum day pumpage ratio will be less than or equal to 222 percent and about a 2 percent chance the actual ratio will exceed 222 percent.

HOURLY DEMAND FLUCTUATIONS

The hour-to-hour variation of customer demands is also an important characteristic used to evaluate water supply and storage requirements. As with maximum day demands, peak hour demand is often expressed as a ratio of average day demand for the year. The peak hour demand is simply the hour of most demand that occurs on the maximum day.

The peak hourly rate for Oregon was estimated to be approximately 160 percent of the maximum day rate. This estimate is based on hourly demand fluctuations for communities similar to Oregon. This analysis would indicate a peak hour demand to average day pumpage ratio of approximately 3.55 which is within expected range for similar communities.

WATER CONSUMPTION AND PUMPAGE PROJECTIONS

Future sales and pumpage projections are based on assumptions of water demand, coupled with estimates of future population and community growth. A detailed summary of the individual components of projected water sales and pumpage requirements is provided in Table 4-8. An illustration of historical annual water sales and future projections is also presented in Table 4-8.

Residential Sales

Residential sales were projected based on current trends and assumptions regarding future population served and per capita water consumption. By the year 2035, it is estimated that the residential consumption rate will remain 50 gpcd, resulting in total residential sales of 280 mgy. The projected 2035 residential consumption will be about 71 percent of total annual sales.

Public Sales

Future per capita sales to public customers were projected as 4.1 gpcd throughout the planning period. By the year 2035, it is estimated that public sales will be 20 mgy, or nearly 5 percent of total annual sales.

Commercial and Multifamily Sales

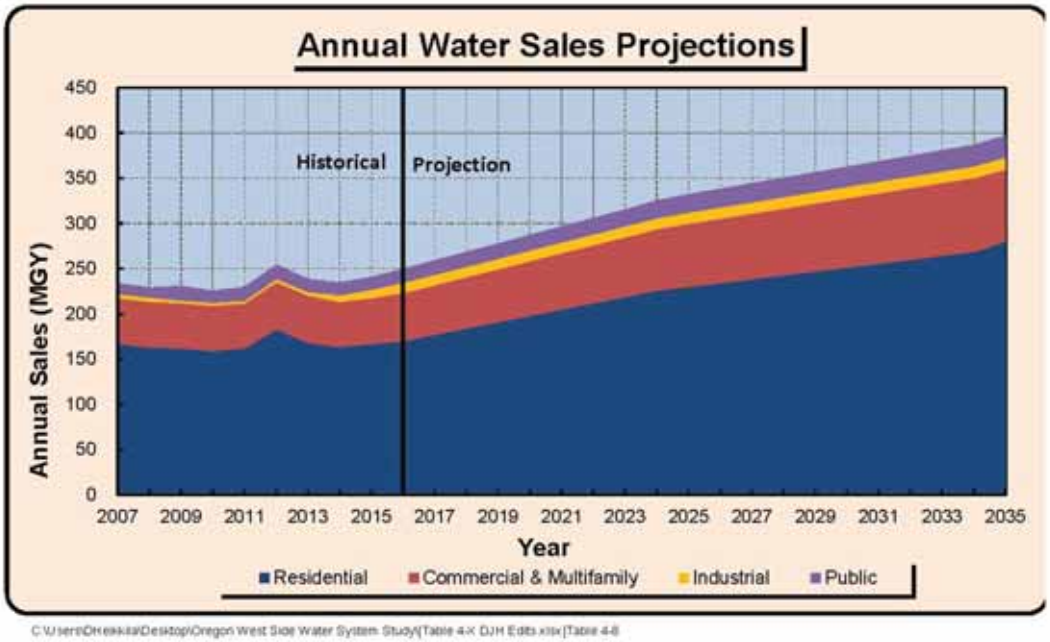
Future per capita consumption by commercial and multifamily customers was projected to be 15.2 gpcd over the planning period. Total annual sales to commercial customers are expected to reach 80 mgy by 2035, or approximately 20 percent of total annual sales.

Table 4-8

Water Sales & Pumpage Projections
Village of Oregon
Dane County, Wisconsin

Customer Classification	Actual 2016	Projected 2025	Projected 2035
Population Served	9,797	12,765	15,121
Per Capita Sales (gpcd)			
Residential Sales	47.6	50	50
Public Sales	4.2	4.1	4.1
Commercial & Multifamily Sales	14.9	15.2	15.2
Industrial Sales	3.1	1.0	1.0
Annual Sales (MGY)			
Residential Sales	170	230	280
Public Sales	15	20	20
Commercial & Multifamily Sales	53	70	80
Industrial Sales[1]	11	12	13
TOTAL METERED SALES (MGY)	249	**332**	**393**
Unaccounted-For Water[2] (MGY)	35	59	69
TOTAL PUMPAGE (MGY)	284	***390***	***460***

Notes
1 Projections include a base demand of 7.5 MGY plus 1.0 gpcd
2 Unaccounted-for water was projected at 15% of total pumpage for future years.



C:\Users\DHeikkila\Desktop\Oregon West Side Water System Study\[Table 4-X DJH Edits.xlsx]Table 4-8

Industrial Sales

Future per capita consumption by industrial customers was projected to be 1 gpcd over the planning period added to a base industrial sales rate of 7.5 mgy. Total annual sales to industrial customers are expected to reach 13 mgy by 2035, or approximately 3 percent of total annual sales.

SUMMARY OF TOTAL DEMANDS AND PUMPAGE REQUIREMENTS

The total annual metered sales projections previously summarized in Table 4-8 were based on a summation of sales projections for each major customer classification. An allowance of 15 percent was made for unmetered miscellaneous water usage and losses (unaccounted-for water) to arrive at total pumpage projections.

Table 4-9 summarizes projections of future water needs. Future annual sales are projected to increase from approximately 249 mgy to approximately 393 mgy in 2035. Total annual pumpage is projected to increase to approximately 460 mgy by 2035.

Estimates of daily demand fluctuations have also been made based on projections of future annual sales. By the year 2035, average day pumpage is projected to increase to 1.26 mgd, and maximum day pumpage is projected to increase to 2.80 mgd. Future projections of maximum day pumpage are based on a ratio of maximum day to average day of 222 percent.

Peak hour demand was projected in a similar fashion. Peak hour demand was projected by assuming a ratio of peak hour demand to maximum day demand of 160 percent. Peak hour demand is projected to increase to a rate of approximately 3,100 gpm by 2035.

FUTURE WATER SALES BY PRESSURE ZONES

While the overall demand and pumpage requirements are important in determining supply and storage for the Village of Oregon, water requirements by pressure zone ensure that adequate supply and storage are available where they are needed. Table 4-10 summarizes the projected water sales by pressure zone based upon anticipated growth and development within each pressure zone during the planning period as presented in Chapter 3.

WATER NEEDS FOR FIRE PROTECTION

In addition to the water supply requirements for residential, public, commercial, and industrial consumption, water system planning for fire protection is an important consideration. In most instances, water main sizes are designed specifically to supply needed fire flow requirements.

Guidelines for determining fire flow requirements are developed based on recommendations offered by the Insurance Services Office (ISO), which is responsible for evaluating and classifying municipalities for fire insurance rating purposes. When a community evaluation is conducted by ISO, the water system is evaluated for its capacity to provide needed fire flow at a specific location. Required fire flow depends on land use characteristics and the types of properties to be protected. In high value districts, fire flow requirements up to 3,500 gpm can be expected; therefore, for the purposes this study, a basic fire flow requirement of 3,500 gpm for three hours was used for establishing water supply and storage requirements. Based on current insurance classification guidelines, this basic fire flow requirement is not expected to change over the planning period.

Table 4-9

Future Pumpage Projections
Village of Oregon
Dane County, Wisconsin

	Actual 2016	Projected 2025	Projected 2035
Total Annual Sales (MGY)	249	332	393
Total Annual Pumpage (MGY)	284	390	460
Average Day Pumpage (MGD)	0.777	1.07	1.26
Design Maximum Day Pumpage (MGD)	1.72	2.37	2.80
Design Peak Hour Demand (gpm)	1,900	2,600	3,100

Notes

1. Year 2025 and 2035 design maximum day pumpage projections were estimated using a ratio of maximum to average day pumpage of 222 percent.
2. Year 2016, 2025, and 2035 design peak hour demand projections were estimated using a ratio of peak hour demand to maximum day pumpage of 160 percent.

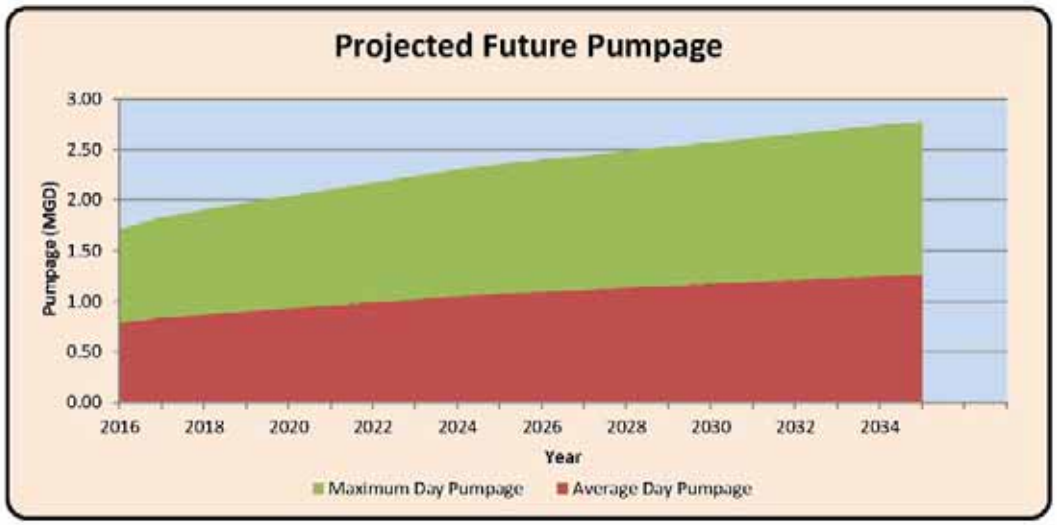


TABLE 4-10

Projected Water Sales by Pressure Zone

Village of Oregon

Dane County, Wisconsin

	Actual 2016	Projected 2025	Projected 2035
Population Served	9,797	12,765	15,121
Incremental Population Increase	------	2,968	2,356
Residential and Public Demand (MGY)	185	**250**	**300**
Commercial Demand (MGY)	53	**70**	**80**
Industrial Demand (MGY)	11	**12**	**13**
Primary Pressure Zone			
Water Sales to Existing Customers (MGD)	0.46	0.46	0.60
Population Increase	-------	1,599	1,414
Percent Commercial Development	-------	97%	82%
Percent Industrial Development	-------	100%	100%
Water Sales Increases			
Resulting from Population Increase (MGD)	-	0.10	0.08
Resulting from Com/Ind Growth (MGD)	-	0.05	0.02
Total Water Sales for Zone (MGD)	**0.46**	**0.60**	**0.71**
High Level Pressure Zone			
Water Sales to Existing Customers (MGD)	0.22	0.22	0.30
Population Increase	-------	1,301	942
Percent Commercial Development	-------	3%	18%
Percent Industrial Development	-------	0%	0%
Water Sales Increases			
Resulting from Population Increase (MGD)	-	0.08	0.05
Resulting from Com/Ind Growth (MGD)	-	0.00	0.00
Total Water Sales for Zone (MGD)	**0.22**	**0.30**	**0.36**
Future High Pressure Zone			
Water Sales to Existing Customers (MGD)	0.00	0	0.01
Population Increase	-------	113	-
Percent Commercial Development	-------	0%	0%
Percent Industrial Development	-------	0%	0%
Water Sales Increases			
Resulting from Population Increase (MGD)	-	0.01	0.00
Resulting from Com/Ind Growth (MGD)	-	0.00	0.00
Total Water Sales for Zone (MGD)	**0.00**	**0.01**	**0.01**
TOTAL METERED SALES (MGD)	**0.68**	**0.91**	**1.08**

CHAPTER 5

WEST SIDE SERVICE EVALUATION

Land in the vicinity of the previously identified location of a future groundwater well is currently being considered for development. A large portion of the proposed development may be served by the existing primary pressure zone. A portion of the area that is currently being considered for development is at an elevation greater than 1,000 feet. The Water System Master Plan Update completed in 2015 identified that a new high pressure zone would need to be created to serve future development at or above 1,000 feet. The following sections will describe the level of service, service area, water needs for the future development in the west side area, and alternative plans to serve the potential development.

LEVEL OF SERVICE

Minimum requirements for the level of service are established by the USEPA and Wisconsin Department of Natural Resources. The quality of water must be delivered to meet primary, secondary, and aesthetic drinking water standards. The existing water supply and distribution system currently meets water quality criteria. The pressure at which water is delivered to customers must meet minimum criteria established by the WDNR. The WDNR requires a minimum service pressure of 35 psi, and a maximum service pressure of 100 psi, at ground level, be provided for the water distribution system under normal operating conditions. A minimum pressure of 20 psi, at ground level, must be maintained in the water distribution system under fire flow conditions. The WDNR requires that water systems be designed to provide a minimum flow of 500 gpm at a residual pressure of 20 psi at ground level. The Insurance Service Office recommends a minimum available fire flow of 750 gpm for one and two family dwellings with distance between buildings ranging from 31-100 feet, 1,000 gpm for one and two family dwellings with distance between buildings ranging from 11 to 30 feet, and 1,400 gpm for one and two family dwellings with distance between buildings less than 11 feet.

The Village of Oregon desires to provide a minimum service pressure of 40 to 45 psi to all areas of the distribution system under normal operating conditions. New areas to be served with a new high pressure zone should be designed to provide a minimum pressure of 45 psi to improve the level of service. The Village of Oregon desires to provide a fire flow of not less than 750 gpm for new residential development and not less than 1,500 gpm for new multifamily development.

SERVICE AREA

The area being considered for the proposed development is currently undeveloped land west of North Bergamont Boulevard, and is bordered on the north and south by Netherwood Road and County Highway CC respectively. The total land area being considered for development is approximately 76.5 acres. The area to be served by the future high pressure zone in the Water System Master Plan Update is illustrated in Figure 5-1. The primary pressure zone can serve development that occurs up to an elevation of 1,000 feet. The future high pressure zone would be developed to serve development that occurs at elevations greater than 1,000 feet.

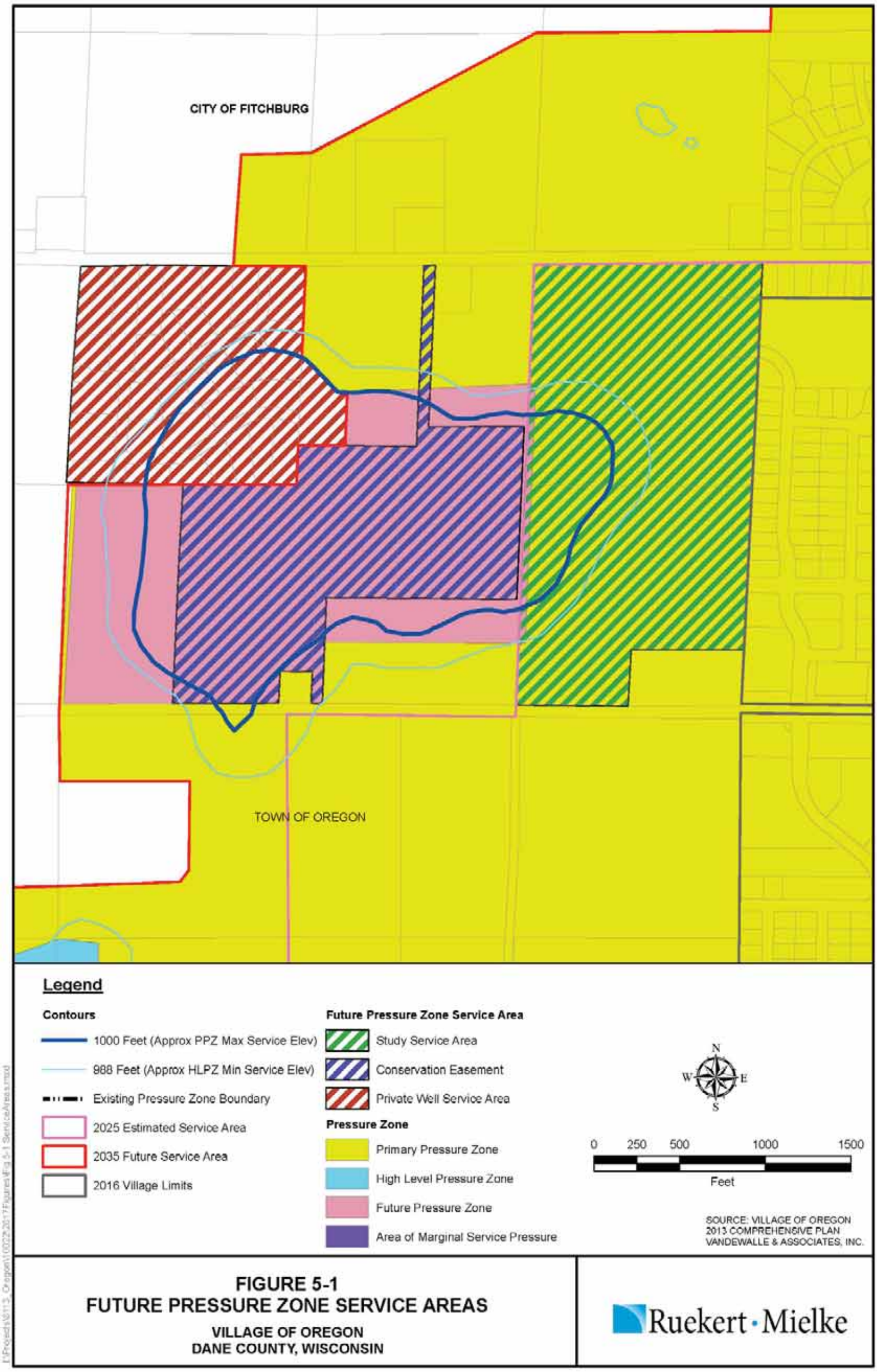


FIGURE 5-1
FUTURE PRESSURE ZONE SERVICE AREAS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

Ruekert · Mielke

The land being considered for development is identified in Figure 5-1 as the Study Service Area. The west central portion of the study service area has been designated to be served by a future high pressure zone. A large portion of the previously identified future pressure zone is planned for a conservation easement where no development is planned to occur. The exiting development in the north western portion of the future pressure zone presently receives water service through private wells. For this study, future municipal water supply will not be planned for the areas identified as conservation easement or private well service area.

Water system planning for this study will include land currently planned for proposed development. Preliminary drawings prepared by the developer indicate approximately 124 single family residential units, 14 attached townhomes, and 25 single family detached townhomes. The northern portion of the proposed development would include space for a park and a future well. Storm water treatment detention basins would be constructed in the northwest, southeast, and southwest corners of the proposed development. The preliminary grading plan indicates approximately 23 single family residential dwelling units would be constructed on lots with an elevation of 1,000 feet to 1020 feet. The remaining proposed single family and multifamily dwelling units would be constructed on lots with elevations ranging from 960 feet to 999 feet.

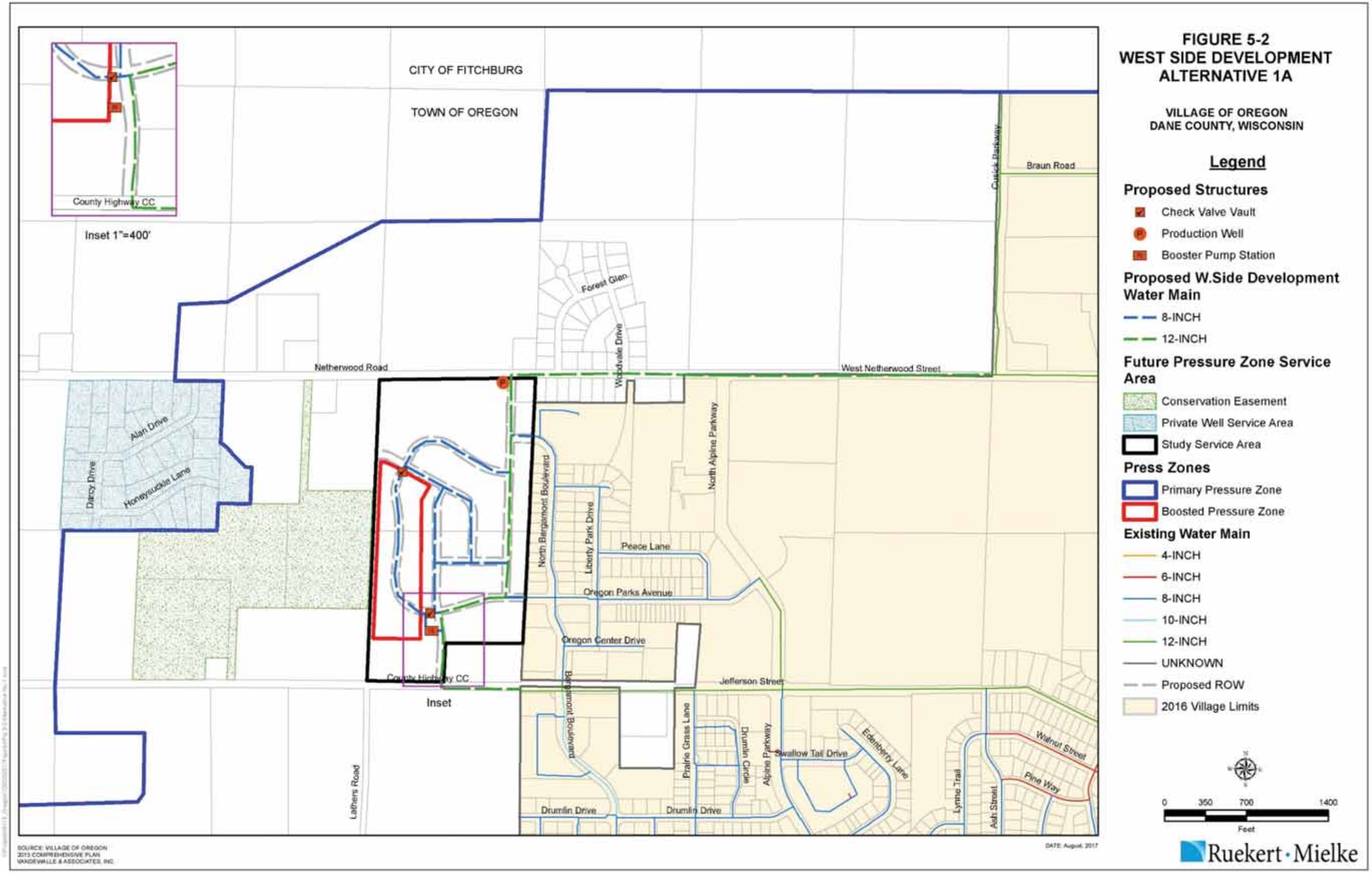
WATER SUPPLY ALTERNATIVES

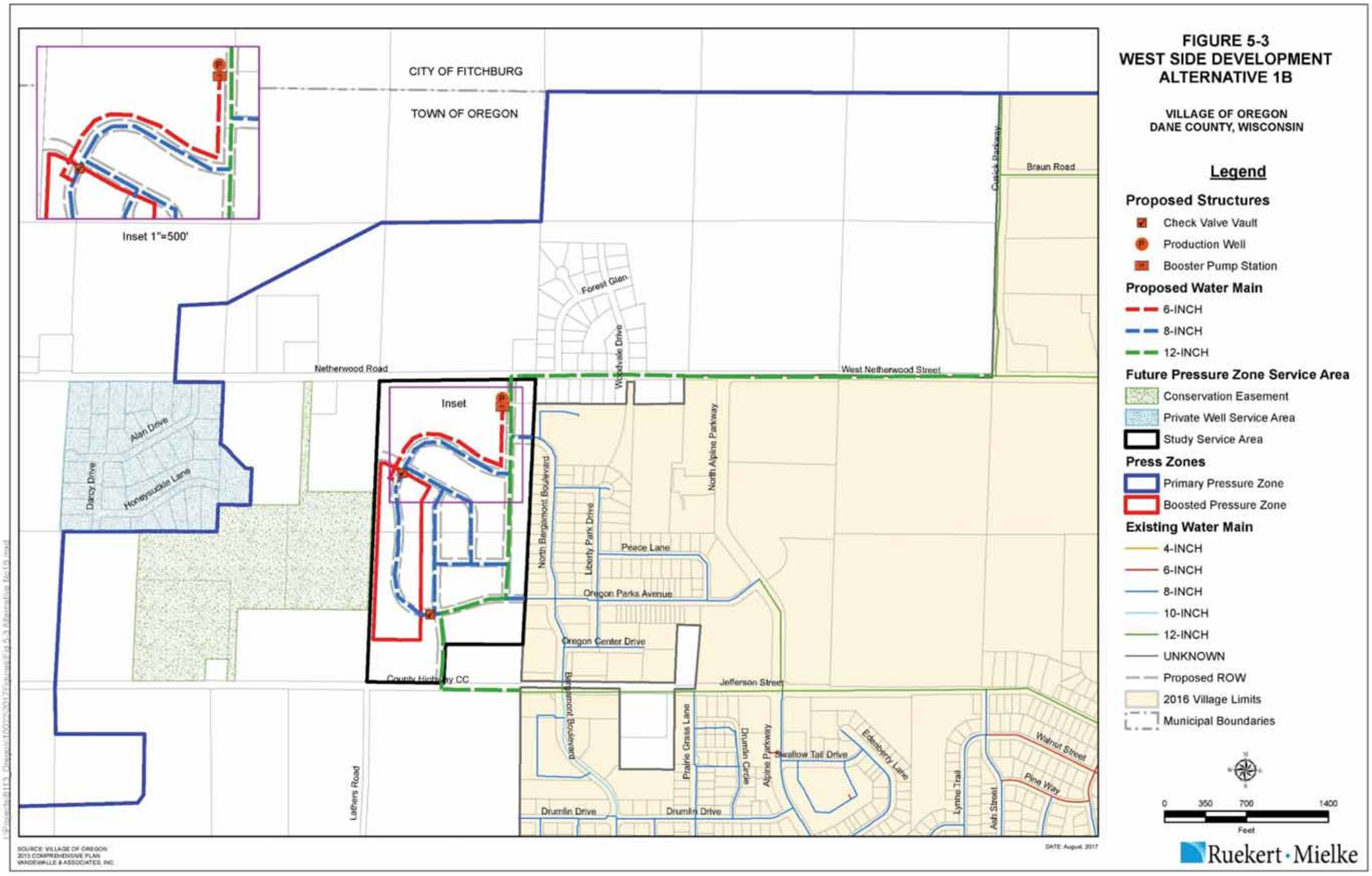
Water supply alternatives were developed following the recommendations of the Water System Master Plan Update completed in 2015. Four water supply alternatives were evaluated. Each alternative plan includes extending the 12-inch water main on West Netherwood Street to the proposed development right-of-way intersection with Netherwood Road, and extending the 12-inch water main on Jefferson Street/County Highway CC to the proposed development right-of-way intersection with County Highway CC. The four alternative plans are described below and illustrated in Figures 5-2 through 5-5.

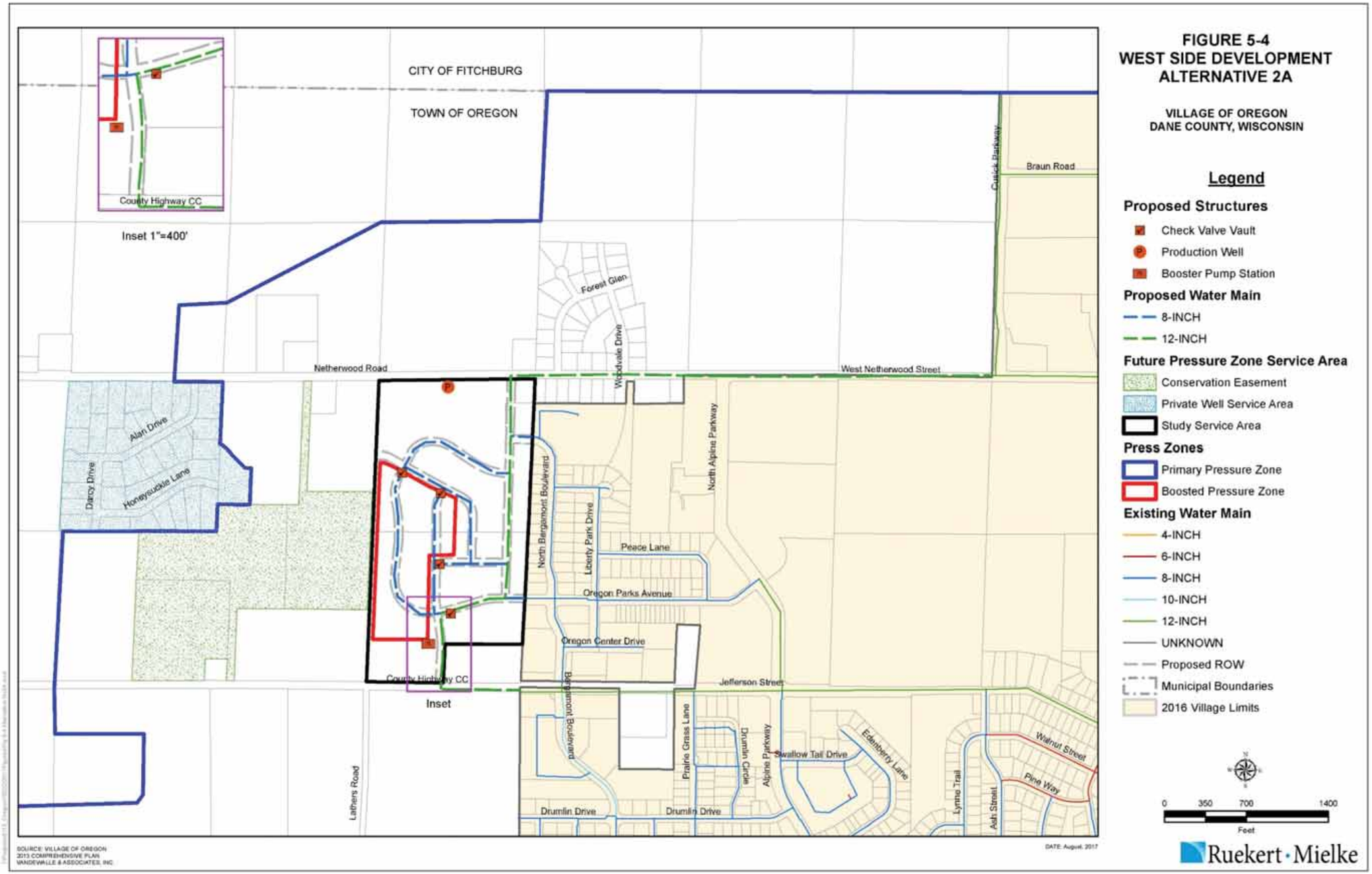
1. Alternative 1a- Future High Pressure Zone to serve western lots in proposed development, remainder of lots in development served by the existing Primary Pressure Zone, booster pump station in the southcentral portion of the proposed development, check valve stations to isolate the Future High Pressure Zone from the Primary Pressure Zone and provide emergency connections to the Primary Pressure Zone, all water main in development, and 12-inch water main extensions in Village.

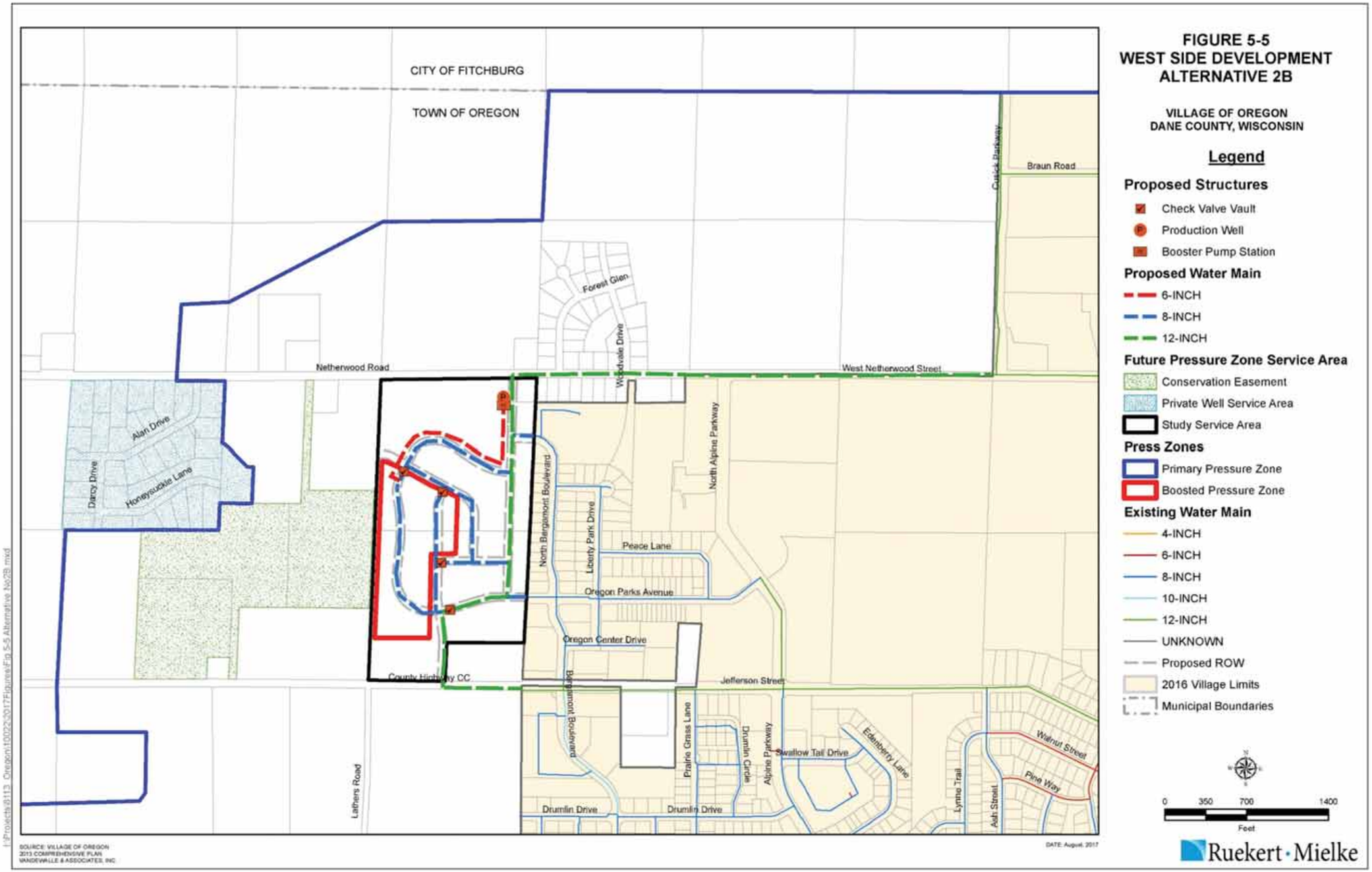
2. Alternative 1b- Future High Pressure Zone to serve western lots in proposed development, remainder of lots in development served by the existing Primary Pressure Zone, booster pump station at the site of the future Well Station, the addition of a parallel pipe to serve the Future High Pressure Zone, check valve stations to isolate the Future High Pressure Zone from the Primary Pressure Zone and provide emergency connections to the Primary Pressure Zone, all water main in development, and 12-inch water main extensions in Village.

3. Alternative 2a- Future High Pressure Zone to serve west central lots in the proposed development, remainder of lots in development served by the existing Primary Pressure Zone, booster pump station in the southcentral portion of the proposed development, check valve stations to isolate the Future High Pressure Zone from the Primary Pressure Zone and provide emergency connections to the Primary Pressure Zone, all water main in development, and 12-inch water main extensions in Village.


CITY OF FITCHBURG
TOWN OF OREGON
County Highway CC
Inset 1"=400'
Braun Road
Cuneck Parkway
Forest Glen
Woodvale Drive
Netherwood Road
West Netherwood Street
Alan Drive
Darcy Drive
Honeysuckle Lane
North Alpine Parkway
North Bergamont Boulevard
Liberty Park Drive
Peace Lane
Oregon Parks Avenue
Oregon Center Drive
County Highway CC
Inset
Jefferson Street
Bergamont Boulevard
Prairie Grass Lane
Drumlin Circle
Alpine Parkway
Swallow Tail Drive
Edenberry Lane
Lynne Trail
Ash Street
Walnut Street
Pine Way
Lathers Road
Drumlin Drive
Drumlin Drive
SOURCE: VILLAGE OF OREGON
2013 COMPREHENSIVE PLAN
VANDEWALLE & ASSOCIATES, INC.
DATE: August, 2017
FIGURE 5-2
WEST SIDE DEVELOPMENT
ALTERNATIVE 1A
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN
Legend
Proposed Structures
Check Valve Vault
Production Well
Booster Pump Station
Proposed W.Side Development Water Main
8-INCH
12-INCH
Future Pressure Zone Service Area
Conservation Easement
Private Well Service Area
Study Service Area
Press Zones
Primary Pressure Zone
Boosted Pressure Zone
Existing Water Main
4-INCH
6-INCH
8-INCH
10-INCH
12-INCH
UNKNOWN
Proposed ROW
2016 Village Limits
0
350
700
1400
Feet
Ruekert · Mielke


CITY OF FITCHBURG
TOWN OF OREGON
Inset 1"=500'
Inset
Braun Road
Clark Parkway
Forest Glen
Woodvale Drive
Netherwood Road
West Netherwood Street
Alan Drive
Darcy Drive
Honeysuckle Lane
North Alpine Parkway
North Bergamont Boulevard
Liberty Park Drive
Peace Lane
Oregon Parks Avenue
Oregon Center Drive
County Highway CC
Jefferson Street
Bergamont Boulevard
Prairie Grass Lane
Drumlin Circle
Alpine Parkway
Swallow Tail Drive
Edenberry Lane
Lynne Trail
Ash Street
Walnut Street
Pine Way
Lathers Road
Drumlin Drive
Drumlin Drive
SOURCE: VILLAGE OF OREGON
2013 COMPREHENSIVE PLAN
VANDEWALLE & ASSOCIATES, INC.
DATE: August, 2017
FIGURE 5-3
WEST SIDE DEVELOPMENT
ALTERNATIVE 1B
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN
Legend
Proposed Structures
Check Valve Vault
Production Well
Booster Pump Station
Proposed Water Main
6-INCH
8-INCH
12-INCH
Future Pressure Zone Service Area
Conservation Easement
Private Well Service Area
Study Service Area
Press Zones
Primary Pressure Zone
Boosted Pressure Zone
Existing Water Main
4-INCH
6-INCH
8-INCH
10-INCH
12-INCH
UNKNOWN
Proposed ROW
2016 Village Limits
Municipal Boundaries
0
350
700
1400
Feet
Ruekert · Mielke


CITY OF FITCHBURG
TOWN OF OREGON
County Highway CC
Inset 1"=400'
Braun Road
Cuttek Parkway
Forest Glen
Woodvale Drive
Netherwood Road
West Netherwood Street
Alan Drive
Darcy Drive
Honeysuckle Lane
North Alpine Parkway
North Bergamont Boulevard
Liberty Park Drive
Peace Lane
Oregon Parks Avenue
Oregon Center Drive
County Highway CC
Inset
Jefferson Street
Bergamont Boulevard
Prairie Grass Lane
Drumlin Circle
Alpine Parkway
Swallow Tail Drive
Edenberry Lane
Lynne Trail
Ash Street
Walnut Street
Pine Way
Drumlin Drive
Drumlin Drive
Lathers Road
SOURCE: VILLAGE OF OREGON
2013 COMPREHENSIVE PLAN
VANDEWALLE & ASSOCIATES, INC
DATE: August, 2017
FIGURE 5-4
WEST SIDE DEVELOPMENT
ALTERNATIVE 2A
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN
Legend
Proposed Structures
Check Valve Vault
Production Well
Booster Pump Station
Proposed Water Main
8-INCH
12-INCH
Future Pressure Zone Service Area
Conservation Easement
Private Well Service Area
Study Service Area
Press Zones
Primary Pressure Zone
Boosted Pressure Zone
Existing Water Main
4-INCH
6-INCH
8-INCH
10-INCH
12-INCH
UNKNOWN
Proposed ROW
Municipal Boundaries
2016 Village Limits
0
350
700
1400
Feet
Ruekert · Mielke


CITY OF FITCHBURG
TOWN OF OREGON
Braun Road
Cusick Parkway
Forest Glen
Woodvale Drive
Netherwood Road
West Netherwood Street
Alan Drive
Darcy Drive
Honeysuckle Lane
North Alpine Parkway
North Bergamont Boulevard
Liberty Park Drive
Peace Lane
Oregon Parks Avenue
Oregon Center Drive
County Highway CC
Jefferson Street
Bergamont Boulevard
Prairie Grass Lane
Drumlin Circle
Alpine Parkway
Swallow Tail Drive
Edenberry Lane
Lynne Trail
Ash Street
Walnut Street
Pine Way
Drumlin Drive
Drumlin Drive
Lathers Road
SOURCE: VILLAGE OF OREGON
2013 COMPREHENSIVE PLAN
VANDEWALLE & ASSOCIATES, INC
DATE: August, 2017
I:\Projects\8113_Oregon\10022\2017\Figures\Fig 5-5 Alternative No2B.mxd
FIGURE 5-5
WEST SIDE DEVELOPMENT
ALTERNATIVE 2B
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN
Legend
Proposed Structures
Check Valve Vault
Production Well
Booster Pump Station
Proposed Water Main
6-INCH
8-INCH
12-INCH
Future Pressure Zone Service Area
Conservation Easement
Private Well Service Area
Study Service Area
Press Zones
Primary Pressure Zone
Boosted Pressure Zone
Existing Water Main
4-INCH
6-INCH
8-INCH
10-INCH
12-INCH
UNKNOWN
Proposed ROW
2016 Village Limits
Municipal Boundaries
0
350
700
1400
Feet
Ruekert • Mielke

4. Alternative 2b- Future High Pressure Zone to serve west central lots in the proposed development, remainder of lots in development served by the existing Primary Pressure Zone, booster pump station at the site of the future Well Station, the addition of a parallel pipe to serve the Future High Pressure Zone, check valve stations to isolate the Future High Pressure Zone from the Primary Pressure Zone and provide emergency connections to the Primary Pressure Zone, all water main in development, and 12-inch water main extensions in Village.

An alternative to increase service pressure at lots where the ground elevation is greater than 1,000 feet with the use of individual booster pumps at each water service was found to be unsuitable. Section NR810.10 of the Wisconsin Administrative Code limits the use of pressure boosting systems on individual service lines to a maximum of 10 individual units per service area. Approximately 23 units would be required in Alternative 1a and 1b, and approximately 40 individual units would be required in Alternative 2a and 2b. This alternative would be costly for residents and require significant maintenance effort from the Village water utility staff.

The existing water system model was updated to analyze the alternative plans. The water system model was used to analyze each alternative under existing and future 2025 demand estimates to determine the service pressure available at average and peak hour demands, and the available fire flow under maximum day demand. A comparison of the level of service for each of the alternatives evaluated for the proposed development is summarized in Table 5-1. The water system modeling results indicated that the service pressure at the higher elevation lots in the central portion of the proposed development served by the Primary Pressure Zone, under Alternatives 1a and 1b, would be less than desired at average and peak hour demands. Alternatives 2a and 2b provide the highest level of service in terms of supply pressure to the potential water system customers in the proposed development.

Table 5-1

Proposed Development Level of Service Comparison
Village of Oregon
Dane County, Wisconsin

	Service Pressure, psi				Available Fire Flow, gpm at 20 psi residual			
	2016 Demand[1]		2025 Demand[1]		2016 Demand[2]		2025 Demand[2]	
Altenative	PPZ	FPZ	PPZ	FPZ	PPZ	FPZ	PPZ	FPZ
1A	37-58	55-62	42-64	56-63	1,880	1,553	3,098	2,462
1B	37-58	55-62	42-64	56-63	1,880	1,553	3,098	2,462
2A	40-58	55-63	45-64	56-64	1,883	1,516	2,667	2,449
2B	40-58	55-63	45-64	56-64	1,883	1,516	2,667	2,449

Notes
1. Minimum to maximum pressure model results the at estimated Peak Hour demand
2. Minimum available fire flow without well pumps in service

Modeling results indicate that the Primary Pressure Zone can provide suitable fire flows to all areas of the proposed development. The check valve stations allow water from the Primary Pressure Zone to flow to the Future High Pressure Zone under fire flow demand conditions. The proposed booster pump station is only needed to increase the service pressure under normal operating conditions (average, maximum day, and peak hour demands) in Alternatives 1a, 1b, 2a, and 2b. This is advantageous for the alternatives since the service area is relatively small, pumping capacity can be provided to meet peak hour demand, and the need for separate equalizing, operating and fire protection storage for the Future High Pressure Zone is

eliminated. A comparison of estimated construction costs for the alternative plans are summarized in Table 5-2.

Table 5-2

Alternative Plan Construction Cost Evaluation
Village of Oregon
Dane County, Wisconsin

Alternative Plan 1a	**Estimated Construction Cost**
Distribution Improvements	
Approximately 3,150 feet of 12-inch diameter water main in development	$441,000
Approlximately 5,300 feet of 12-inch diameter water main on Netherwood	$845,157
Approximatley 750 feet of 12-iinch diamter water main on CTH CC	$134,750
Approximately 5,700 feet of 8-inch diameter water main	$769,500
2 Check valve manholes	$18,000
Booster Pump Station for Future High Pressure Zone	$650,000
Subtotal	**$2,858,407**

Alternative Plan 1b	**Estimated Construction Cost**
Distribution Improvements	
Approximately 3,150 feet of 12-inch diameter water main in development	$441,000
Approlximately 5,300 feet of 12-inch diameter water main on Netherwood	$845,157
Approximatley 750 feet of 12-iinch diamter water main on CTH CC	$134,750
Approximately 5,700 feet of 8-inch diameter water main	$769,500
Approximately 1,100 feet of 6-inch diameter discharge main	$104,500
2 Check valve manholes	$18,000
Booster Pump Station for Future High Pressure Zone	$650,000
Subtotal	**$2,962,907**

Alternative Plan 2a	**Estimated Construction Cost**
Distribution Improvements	
Approximately 3,150 feet of 12-inch diameter water main in development	$441,000
Approlximately 5,300 feet of 12-inch diameter water main on Netherwood	$845,157
Approximatley 750 feet of 12-iinch diamter water main on CTH CC	$134,750
Approximately 5,700 feet of 8-inch diameter water main	$769,500
4 Check valve manholes	$36,000
Booster Pump Station for Future High Pressure Zone	$650,000
Subtotal	**$2,876,407**

Alternative Plan 2b	**Estimated Construction Cost**
Distribution Improvements	
Approximately 3,150 feet of 12-inch diameter water main in development	$441,000
Approlximately 5,300 feet of 12-inch diameter water main on Netherwood	$845,157
Approximatley 750 feet of 12-iinch diamter water main on CTH CC	$134,750
Approximately 5,700 feet of 8-inch diameter water main	$769,500
Approximately 1,100 feet of 6-inch diameter discharge main	$104,500
4 Check valve manholes	$36,000
Booster Pump Station for Future High Pressure Zone	$650,000
Subtotal	**$2,980,907**

The fire flow to the proposed development can be increased with the operation of the future well pump. If the well pump is placed in service, the available fire flow increases by the capacity of the well pump. This method of analysis is not recommended to evaluate available fire flow in a small service area, as the well pump may be out of service in the event of a fire.

SUPPLY AND STORAGE ANALYSIS

A critical step in the water system evaluation for the Village of Oregon is an assessment of water supply and storage requirements. Water supply and storage needs are closely related. The primary criteria used in determining required supply rates and storage volumes include maximum day and peak hour demands, operational characteristics, and fire protection needs.

Water Supply Needs

It is frequently necessary to take a well and/or booster pump out of service for periods of several days to several weeks for maintenance or repair. As this is a common or expected situation it is necessary to properly plan to ensure that demand requirements can be met even when a pumping unit may be out of service. It is then necessary to determine a reliable supply (and pumping) capacity that accounts for the uncertainty that all pumping units will be available. By excluding one pumping unit (for planning purposes the largest capacity unit is used) the reliable system capacity is then determined. Therefore, reliable supply (or pumping) capacity is defined as the total available delivery rate with the largest pumping unit out of service. For evaluating a municipal water system, reliable system capacity should at least equal maximum day pumpage requirements, assuming adequate storage is available. If this criterion is met, supply facilities will have adequate capacity to replenish storage during off-peak hours, while depletion of available storage occurs during peak demand hours.

For the Oregon Water Utility, reliable system capacity needs to be evaluated for the following two specific requirements:

1. Water supply capacity
2. Booster pumping capacity

Reliable water supply capacity is the capacity of the existing supply sources (well and booster pumps as a unit of operation) to reliably supply maximum day demands to the system. Reliable booster pumping capacity is the capacity of the booster pumps to deliver water to the appropriate pressure zones as required. Table 5-3 summarizes the well and booster pump capacities used for the reliable water supply and booster pumping capacity evaluations. The following two sections discuss reliable water supply capacity and reliable booster pumping capacity in further detail for the existing water system.

Reliable Water Supply Capacity

Based on the reliable water supply capacities of the existing wells (summarized in Table 5-2), reliable supply capacity evaluations were performed on the existing water system. As mentioned in Chapter 2, supply sources are located only in the Primary Pressure Zone. The High Level Pressure Zone relies upon booster pumping capacity to transfer water from the Primary Pressure Zone. However, the Primary Pressure Zone is also served by booster pumps as the well pumps discharge to ground reservoirs. The Primary Pressure Zone must therefore have adequate reliable water supply and booster pumping capacity to meet the needs of both the Primary and High Level Pressure Zones. The following section discusses the reliable booster pumping capacity for evaluating the ability to deliver water to the individual pressure zones.

TABLE 5-3

EXISTING RELIABLE PUMPING CAPACITY
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

	Combined Capacity		Primary Pressure Zone Capacity		High Level Pressure Zone Capacity	
SUPPLY SOURCE	**(gpm)**	**(MGD)**	**(gpm)**	**(MGD)**	**(gpm)**	**(MGD)**
Wells						
Well 3	800	1.15				
Well 4	1,000	1.44				
Well 5	850	1.22				
Booster Pumps						
Well 3-1			400	0.58		
Well 3-2			400	0.58		
Well 4 Primary			1,000	1.44		
Well 5 Primary			850	1.22		
Well 4-1					50	0.07
Well 4-2					150	0.22
Well 4-3					150	0.22
Well 4-4					1,000	1.44
Well 5-1					50	0.07
Well 5-2					150	0.22
Well 5-3					150	0.22
Well 5-4					1,000	1.44
Total Pumping Supply Capacity	2,650	3.82	2,650	3.82	2,700	3.89
Less: Largest Supply Unit	1,000	1.44	1,000	1.44	1,000	1.44
Reliable Supply	**1,650**	**2.38**	**1,650**	**2.38**	**1,700**	**2.45**

Notes
1. The High Level Pressure Zone does not have supply sources and relies upon booster pump capacity from the Primary Pressure Zone.
2. Pump capacities are nameplate values with the exception of the Well 3 pumps which is the field rated capacities provided by staff.

The reliable supply capacity evaluation for the current design maximum day is summarized in Table 5-4. The table summarizes the maximum day demand requirement and the available reliable water supply capacity for the entire system and each pressure zone individually. As shown in Table 5-4, the reliable supply capacity for the entire system from the wells is currently adequate to meet maximum day demands. Based upon this evaluation there is adequate total reliable supply capacity available for the combined water system.

TABLE 5-4

EXISTING RECOMMENDED RELIABLE SUPPLY CAPACITY
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

	Combined System	Primary Pressure Zone	High Level Pressure Zone
Total Average Annual Pumpage (MGY)	284	284	93
Average Day Pumpage (MGD)	0.78	0.78	0.25
Design Maximum Day Pumpage (MGD)	1.71	1.71	0.56
Reliable Supply Capacity (MGD)	2.38	2.38	2.45
Additional Supply Capacity Required (MGD)	***None***	***None***	***None***
Additional Supply Capacity Required (gpm)	***None***	***None***	***None***

Notes

1. Design Maximum Day Pumpage is based upon a Maximum Day Demand Factor of 2.20.
2. Supply capacity for Combined System refers to well pump capacity.
3. Supply capacity for the PPZ and HLPZ refers to booster pump capacity.
4. The pumpage requirement for the PPZ booster pumps must meet the needs of both the PPZ and HLPZ.

Reliable Booster Pumping Capacity

The High Level Pressure Zone has no supply sources and relies upon the transfer of water from the Primary Pressure Zone via booster pumps located at Wells 4 and 5. The total amount of recommended reliable pumping capacity is determined the same way as reliable supply capacity described above. Based on the reliable booster pumping capacities of the existing booster pumps (summarized in Table 5-3), a reliable booster pumping capacity evaluation was performed for the High Level Pressure Zone.

The reliable booster pumping capacity evaluation for the current design maximum day is summarized in Table 5-3. The table summarizes the maximum day demand requirement and the required reliable pumping (supply or booster) capacity for each pressure zone. The table also illustrates the current available reliable pumping capacity and identifies the deficiency in reliable pumping capacity if one exists.

As summarized in the table, there is currently adequate reliable booster pumping capacity to serve the needs of both the Primary Pressure Zone and High Level Pressure Zone to meet current requirements when looked at individually.

Supply Reliability

For any water utility to serve its customers and protect the public welfare, water system facilities, equipment, and distribution systems must be reliable under all operating conditions. Reliability of utility service comprises a large part of the investment in plant and equipment.

Wisconsin Administrative Code, Section NR 811.27, requires all pumping stations to have a standby, auxiliary power source dedicated to water supply use. As a general rule, the Village of Oregon should be able to reliably supply average day customer demands and maintain adequate fire protection using auxiliary power sources.

The Village of Oregon has standby power available at both Wells 4 and 5. The system can supply approximately 1,850 gpm (2.66 MGD) using dedicated standby power sources in the event of an emergency or other power interruption.

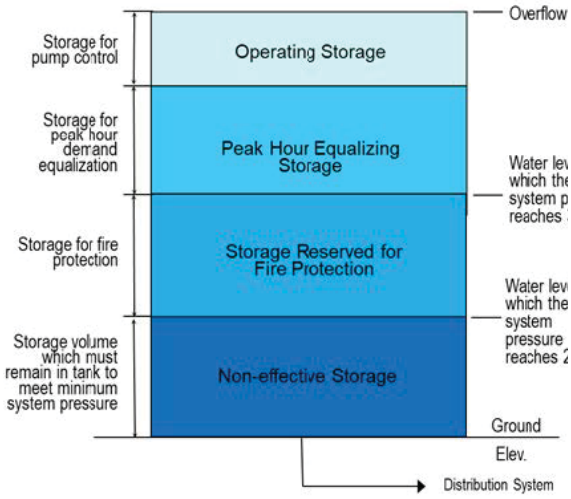
Reliably there is 850 gpm (1.22 MGD) of supply capacity available with dedicated standby power sources; therefore, the system has sufficient auxiliary power to meet current average day pumpage requirements. As the standby power at both wells is sufficient to power the booster pumping equipment, there is also adequate dedicated auxiliary power to serve the High Level Pressure Zone.

Water Storage Needs

In addition to providing water for fire protection, system storage is used as a "cushion" to equalize fluctuations in customer demands, establish and maintain water system pressures, provide operational flexibility for water supply facilities, and improve water supply reliability. The primary criteria used in this study for evaluating storage volume needs include average and peak demands, water supply capacities, and fire protection needs.

In general, storage facilities should be adequately sized to provide sufficient quantities of water for fire protection on days of maximum customer demands. Although storage requirements for fire protection are not anticipated to change over the planning period of this study, peak hour demands and reliable supply capacities will change as the community grows and improvements are implemented.

The illustration to the right shows the general categories of system storage. As customer demands exceed supply capacities during peak hour conditions, the excess demands must be met by depleting available storage. The amount of storage depleted is referred to as peak hour equalizing storage.



EFFECTIVE STORAGE

Storage should also be available for fire protection purposes. To assure a reliable supply for fire protection, this portion of storage should be reserved for emergency use only and should not be utilized to meet peak hour requirements.

In most instances, it is desirable to provide additional "operational" storage for other purposes. Operational storage may be needed as a safety factor in emergencies or where customer demands are unpredictable and fluctuate widely. Operational storage may also be desired to take advantage of off-peak electrical rates for pumping. An additional storage volume of approximately 15 percent of the total required storage volume is usually included for an operational cushion.

Effective Storage Volumes

The effective storage volume of a water storage facility is the amount of available water that can be utilized while meeting regulatory requirements for system pressure. The Wisconsin Department of Natural Resources (WDNR) requires that water system pressures under normal operating conditions are above 35 pounds per square inch (psi) and under emergency conditions, such as during a fire, system pressures must be maintained at a minimum pressure of 20 psi. To meet these requirements the water surface in the storage facility must be approximately 81 feet above the highest elevation area in the service area to maintain 35 psi and at least 46 feet to maintain 20 psi. These water column heights are based upon static conditions (assuming no head losses due to friction) so actual water column heights could be higher if friction losses are included. Based upon this evaluation, the effective volume of each existing storage facility is summarized in Table 5-5. As can be seen in the table, approximately 760,000 gallons of the Village's total storage (1.1 million gallons) is effective; however, only about 340,000 gallons is effective for peak hour equalizing storage with less than 50,000 gallons available in the Primary Pressure Zone.

Recommended Water Storage Requirements

The recommendations of the Water System Master Plan update in 2015 included limiting the service area of the Primary Pressure Zone to a maximum elevation of 1,000 feet. This optimizes the effective storage volume of the existing facilities. The effective storage volume of each existing storage facility with a maximum Primary Pressure Zone service elevation of 1,000 feet is summarized in Table 5-6.

The primary criteria used to develop a relationship between supply capacities and optimum storage volumes were:

1. Reliable supply capacity should at least equal projected maximum day supply requirements.

2. Total available storage should be capable of meeting fire protection needs, assuming reliable supply capacity is adequate to meet maximum day requirements.

Based upon the above criteria Table 5-7 summarizes the storage requirements for the Village of Oregon. The table includes calculations for the system as a whole and for each individual pressure zone. As can be seen in the table, while there may be sufficient total storage, based upon effective storage volumes there is currently a need for additional usable storage.

When excess supply capacity exists or the hydraulic capabilities of the water system allow the transfer of water from one pressure zone to another it is possible to reduce storage requirements. Table 5-8 summarizes the storage requirements when the following additional criterion is considered.

TABLE 5-5

EFFECTIVE STORAGE VOLUMES
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

	North Standpipe	South Standpipe	Lincoln Road Tower
Pressure Zone	Primary	Primary	High Level
Design Volume (gallons)	400,000	400,000	300,000
Diameter (feet)	30.50	34.0	Varies
Head Range (feet)	75.00	61.0	32.5
Storage Volume per foot (gallons)	5,333	6,557	Varies
Overflow elevation (feet USGS)	1,101.00	1,101.0	1,218.0
Approximate Highest Elevation Served in Pressure Zone (feet USGS)	1,016	1,016	1,109
Approximate Hydraulic Grade Elevation needed to provide minimum 35 psi to all areas	1,097	1,097	1,190
Maximum Effective Peak Hour Storage Volume (gallons) [1]	*22,000*	*27,000*	*288,600*
Approximate Hydraulic Grade Elevation needed to provide minimum 20 psi to all areas	1,062	1,062	1,155
Additional Effective Fire Protection and Emergency Storage Volume (gallons) [2]	*180,000*	*230,000*	*11,400*
Total Effective Storage Volume (gallons)	**202,000**	**257,000**	**300,000**

Notes

1. Effective peak hour storage is considered the volume available which will continue to maintain adequate pressures in the distribution system at a minimum of 35 psi (under static conditions.) Volumes derived from storage tank volume gauging tables.
2. Effective fire protection and emergency storage is considered the volume available which will continue to maintain pressures in the distribution system at a minimum of 20 psi (under static conditions.) Volumes derived from storage tank volume gauging tables.

TABLE 5-6

EFFECTIVE STORAGE VOLUMES WITH REDUCED PPZ SERVICE ELEVATIONS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

	North Standpipe	South Standpipe	Lincoln Road Tower
Pressure Zone	Primary	Primary	High Level
Design Volume (gallons)	400,000	400,000	300,000
Diameter (feet)	30.50	34.0	Varies
Head Range (feet)	75.00	61.0	32.5
Storage Volume per foot (gallons)	5,333	6,557	Varies
Overflow elevation (feet USGS)	1,101.00	1,101.0	1,218.0
Approximate Highest Elevation Served in Pressure Zone (feet USGS)	**1,000**	**1,000**	1,109
Approximate Hydraulic Grade Elevation needed to provide minimum 35 psi to all areas	1,081	1,081	1,190
Maximum Effective Peak Hour Storage Volume (gallons) [1]	*107,000*	*132,000*	*288,600*
Approximate Hydraulic Grade Elevation needed to provide minimum 20 psi to all areas	1,046	1,046	1,155
Additional Effective Fire Protection and Emergency Storage Volume (gallons) [2]	*190,000*	*230,000*	*11,400*
Total Effective Storage Volume (gallons)	**297,000**	**362,000**	**300,000**

Notes

1. Effective peak hour storage is considered the volume available which will continue to maintain adequate pressures in the distribution system at a minimum of 35 psi (under static conditions.) Volumes derived from storage tank volume gauging tables.
2. Effective fire protection and emergency storage is considered the volume available which will continue to maintain pressures in the distribution system at a minimum of 20 psi (under static conditions.) Volumes derived from storage tank volume gauging tables.

TABLE 5-7

EXISTING SUPPLY AND STORAGE REQUIREMENTS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

SUPPLY REQUIREMENTS	Combined System	Primary Pressure Zone[6]	High Level Pressure Zone
Design Average Day Demand (gpm)	540	540	180
Design Maximum Day Demand (gpm)	1,190	1,190	390
Design Peak Hour Demand (gpm)	1,900	1,670	620
Present Reliable Supply Capacity (gpm)[1]	1,650	1,650	1,700
Reliable Supply Capacity Excess or (Deficiency) (gpm)	460	460	1,310

STORAGE REQUIREMENTS	Combined System	Primary Pressure Zone[7]	High Level Pressure Zone
Peak Hour Equalizing Requirements (gallons)[2]	217,000	148,000	72,000
Optimum Fire Protection Needs (gallons)[3]	630,000	630,000	450,000
Reserve Storage (gallons; 15% of Total)[4]	150,000	138,000	93,000
Total Optimum Storage Requirements (gallons)	997,000	916,000	615,000
Available Effective Storage Capacity (gallons):			
North Standpipe (107,000 gallons peak hour; 190,000 gallons fire flow)	297,000	297,000	
South Standpipe (132,000 gallons peak hour; 230,000 gallons fire flow)	362,000	362,000	
Lincoln Road Tower (288,600 gallons peak hour; 11,400 gallons fire flow)	300,000		300,000
Total Effective Storage Capacity (gallons)[5]	959,000	659,000	300,000
Additional Storage Capacity Required (gallons)	38,000	257,000	315,000
Existing Excess Available Storage Capacity (gallons)	None	None	None

Notes

1. Reliable Supply Capacities taken from Table 5-2.
2. Peak hour storage is storage required to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes for the PPZ and 2,500 gpm for 180 minutes for the HLPZ.
4. Reserve storage is storage required to provide a start/stop range for pump operation and an emergency reserve storage supply.
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage as calculated from Table 5-4.
6. Average and maximum day demands includes both PPZ and HLPZ. Peak hour demand is for PPZ only.
7. Storage requirements for the PPZ are calculated only for the needs of the PPZ

TABLE 5-8

ALTERNATIVE EXISTING SUPPLY AND STORAGE REQUIREMENTS

VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

SUPPLY REQUIREMENTS	Combined System	Primary Pressure Zone[6]	High Level Pressure Zone
Design Average Day Demand (gpm)	540	540	180
Design Maximum Day Demand (gpm)	1,190	1,190	390
Design Peak Hour Demand (gpm)	1,900	1,670	620
Present Reliable Supply Capacity (gpm)[1]	1,650	1,650	1,700
Reliable Supply Capacity Excess or (Deficiency) (gpm)	460	460	1,310

STORAGE REQUIREMENTS	Combined System	Primary Pressure Zone[7]	High Level Pressure Zone
Peak Hour Equalizing Requirements (gallons) [2]	217,000	148,000	72,000
Optimum Fire Protection Needs (gallons) [3]	630,000	630,000	450,000
Reserve Storage (gallons; 15% of Total) [4]	150,000	138,000	93,000
Total Optimum Storage Requirements (gallons)	997,000	916,000	615,000
Available Effective Storage Capacity (gallons):			
North Standpipe (107,000 gallons peak hour; 190,000 gallons fire flow)	297,000	297,000	
South Standpipe (132,000 gallons peak hour; 230,000 gallons fire flow)	362,000	362,000	
Lincoln Road Tower (288,600 gallons peak hour; 11,400 gallons fire flow)	300,000		300,000
Total Effective Storage Capacity (gallons)[5]	959,000	659,000	300,000
Subtotal Capacity Required (gallons)	38,000	257,000	315,000
Less Excess Available Reliable System Supply Capacity for Peak Hour[8]	199,000	146,000	72,000
Less Excess Available Reliable System Supply Capacity for Fire Protection[9]	None	None	194,400
Total Additional Capacity Required (gallons)	None	111,000	48,600

Notes

1. Reliable Supply Capacities taken from Table 5-2.
2. Peak hour storage is storage required to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes for the PPZ and 2,500 gpm for 180 minutes for the HLPZ.
4. Reserve storage is storage required to provide a start/stop range for pump operation and an emergency reserve storage supply.
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Need plus peak hour available storage as calculated from Table 5-4.
6. Average and maximum day demands includes both PPZ and HLPZ. Peak hour demand includes PPZ peak hour demand plus HLPZ maximum day demand.
7. Storage requirements for the PPZ are calculated only for the needs of the PPZ.
8. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and current supply capacity.
9. Supply Capacity Credit cannot exceed Fire Protection Needs and is calculated as the reliable supply capacity in excess of Peak Hour Demand times the fire flow duration (180 minutes).

3. Where reliable system capacity exceeds maximum day demands, the excess reliable system capacity may offset total storage requirements in the following ways:

    a. Peak Hour Equalization Storage: If reliable system capacity is greater than maximum day demand requirements.

    b. Fire Protection Storage: Equal to the excess reliable system capacity which exceeds the peak hour demand requirements for the duration of the maximum fire flow requirement for the pressure zone.

Combined Water System

A global review of available storage capacity for the entire Oregon water system does not provide a completely adequate evaluation of available storage capacity, since the system is currently divided into two pressure zones. The following sections evaluate the optimal storage requirements for each pressure zone. As defined above the optimum storage is determined assuming that reliable pumping capacity is equal to the maximum day demand. Tables 5-7, 5-9, and 5-10 summarize the existing and projected optimum storage needs for the combined water system and each pressure zone.

Primary Pressure Zone

The total storage for the Primary Pressure Zone is 0.8 MG with only 0.6 MG effective for meeting peak hour and fire protection needs. The estimated existing optimum water storage requirement for the Primary Pressure Zone, assuming a fire flow requirement of 3,500 gpm for three hours, is nearly 0.9 MG. Therefore, there is currently a storage shortfall of approximately 0.26 MG in the Primary Pressure Zone.

For the projected planning years of 2025 and 2035 the estimated optimum water storage requirement is approximately 1.0 MG which corresponds to a shortfall of over 0.36 MG by the year 2035.

High Level Pressure Zone

The total storage for the High Level Pressure Zone is 0.3 MG and is all considered effective. The estimated existing optimum water storage requirement for the High Level Pressure Zone, assuming a fire flow requirement of 2,500 gpm for three hours, is approximately 0.6 MG. Therefore, there is currently a shortfall of storage in the High Level Pressure Zone of approximately 0.315 MG.

For the projected planning years of 2025 and 2035 the estimated optimum water storage requirements are approximately 0.65 MG and 0.67 MG, respectively which corresponds to a shortfall of 0.37 MG by the year 2035.

Future High Pressure Zone

As identified in Chapter 3, there is an area of higher elevation within the future service area of the Primary Pressure Zone that is unserviceable at the hydraulic grade line of the Primary Pressure Zone. A new pressure zone will be required within the Primary Pressure Zone to adequately serve this area. Table 5-9 summarizes the supply and storage requirements of this anticipated future pressure zone.

TABLE 5-9

2025 SUPPLY AND STORAGE REQUIREMENTS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

SUPPLY REQUIREMENTS	Combined System	Primary Pressure Zone[6]	High Level Pressure Zone	Future Pressure Zone
Design Average Day Demand (gpm)	730	730	250	10
Design Maximum Day Demand (gpm)	1,620	1,620	560	50
Design Peak Hour Demand (gpm)	2,590	2,260	900	90
Present Reliable Supply Capacity (gpm)[1]	1,650	1,650	1,700	0
Reliable Supply Capacity Excess or (Deficiency) (gpm)	30	30	1,140	(50)

STORAGE REQUIREMENTS	Combined System	Primary Pressure Zone[7]	High Level Pressure Zone	Future Pressure Zone
Peak Hour Equalizing Requirements (gallons)[2]	297,000	203,000	98,000	4,000
Optimum Fire Protection Needs (gallons)[3]	630,000	630,000	450,000	180,000
Reserve Storage (gallons; 15% of Total)[4]	164,000	147,000	97,000	33,000
Total Optimum Storage Requirements (gallons)	1,091,000	980,000	645,000	217,000
Available Effective Storage Capacity (gallons):				
North Standpipe (107,000 gallons peak hour; 190,000 gallons fire flow)	297,000	297,000		
South Standpipe (132,000 gallons peak hour; 230,000 gallons fire flow)	362,000	362,000		
Lincoln Road Tower (288,600 gallons peak hour; 11,400 gallons fire flow)	300,000		300,000	
Total Effective Storage Capacity (gallons)[5]	949,000	659,000	300,000	0
Additional Storage Capacity Required (gallons)	142,000	321,000	345,000	217,000
Existing Excess Available Storage Capacity (gallons)	None	None	None	None

Notes

1. Reliable Supply Capacities taken from Table 5-2.
2. Peak hour storage is storage required to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes for the PPZ, 2,500 gpm for 180 minutes for the HLPZ, and 1,500 gpm for the future pressure zone.
4. Reserve storage is storage required to provide a start/stop range for pump operation and an emergency reserve storage supply.
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage as calculated from Table 5-6.
6. Average and maximum day demands includes PPZ, HLPZ and Future Pressure Zone. Peak hour demand is for PPZ only.
7. Storage requirements for the PPZ are calculated only for the needs of the PPZ and future pressure zone.

TABLE 5-10

2035 SUPPLY AND STORAGE REQUIREMENTS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

SUPPLY REQUIREMENTS	Combined System	Primary Pressure Zone[6]	High Level Pressure Zone	Future Pressure Zone
Design Average Day Demand (gpm)	850	850	290	10
Design Maximum Day Demand (gpm)	1,890	1,890	640	50
Design Peak Hour Demand (gpm)	3,020	2,640	1,020	90
Present Reliable Supply Capacity (gpm)[1]	1,650	1,650	1,700	0
Reliable Supply Capacity Excess or (Deficiency) (gpm)	(240)	(240)	1,060	(50)

STORAGE REQUIREMENTS	Combined System	Primary Pressure Zone[7]	High Level Pressure Zone	Future Pressure Zone
Peak Hour Equalizing Requirements (gallons)[2]	345,000	232,000	118,000	4,000
Optimum Fire Protection Needs (gallons) 3	630,000	630,000	450,000	180,000
Reserve Storage (gallons; 15% of Total)[4]	173,000	153,000	101,000	33,000
Total Optimum Storage Requirements (gallons)	1,148,000	1,015,000	669,000	217,000
Available Effective Storage Capacity (gallons):				
North Standpipe (107,000 gallons peak hour; 190,000 gallons fire flow)	297,000	297,000		
South Standpipe (132,000 gallons peak hour; 230,000 gallons fire flow)	362,000	362,000		
Lincoln Road Tower (288,600 gallons peak hour; 11,400 gallons fire flow)	300,000		300,000	
Total Effective Storage Capacity (gallons)5	959,000	659,000	300,000	0
Additional Storage Capacity Required (gallons)	189,000	356,000	369,000	217,000
Existing Excess Available Storage Capacity (gallons)	None	None	None	None

Notes

1. Reliable Supply Capacities taken from Table 5-2.
2. Peak hour storage is storage required to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes for the PPZ, 2,500 gpm for 180 minutes for the HLPZ and 1,500 gpm for 120 minutes for the future pressure zone.
4. Reserve storage is storage required to provide a start/stop range for pump operation and an emergency reserve storage supply.
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage as calculated from Table 5-6.
6. Average and maximum day demands includes PPZ, HLPZ and future pressure zone. Peak hour demand is for PPZ only.
7. Storage requirements for the PPZ are calculated only for the needs of the PPZ and future pressure zone.

CHAPTER 6

RECOMMENDED WATER SYSTEM IMPROVEMENTS

Based on projected growth planned for the Oregon Water Utility service area, the water system will require improvements to accommodate future service needs and address deficiencies identified in the 2015 Water System Master Plan. The following categories of improvements are discussed:

1. Water supply improvements
2. Water storage improvements
3. Existing distribution system improvements
4. Distribution system expansion

The following sections summarize the recommended water system improvement plans.

WATER SUPPLY IMPROVEMENTS

As summarized in Chapter 5, the Village will need additional reliable supply capacity to meet future water demands. While it is anticipated that current reliable supply may be adequate to approximately 2025, to meet projected water demands by 2035, the Village will need an additional 240 gpm of reliable supply capacity. These requirements are based on the population growth discussed in Chapter 3 and the water needs described in Chapter 4.

To reliably supply future water demands, an additional well (Well 6) is needed. Assuming the minimum capacity of Well 6 will be similar to the rated capacities of existing wells (~800 gpm), this additional well will be sufficient to meet the water demands projected by 2035. Table 6-1 presents the future reliable supply analysis with an additional well in service. The actual reliable supply will depend on well performance which will be determined after well construction. The reliable supply capacities presented in Table 6-1 assume that the capacities of existing wells will remain in service at their current operating capacities. Should the capacity of any wells change, the need for Well 6 may occur earlier than anticipated.

A preliminary well site screening study was completed for the 2015 Water System Master Plan to identify a suitable location for Well 6. The site location reviewed in 2015 was on existing agricultural land in the Town of Oregon. The Village purchased and annexed the land in 2016. The parcel lies just west of the First Presbyterian Church of Oregon at the north end of Bergamont Boulevard. The screening study evaluated the suitability of the site based upon the following factors:

1. Location of known potential and existing contamination sources
2. Minimum recommended separation distances to potential contamination sources
3. Proximity to existing surface waters

Based upon the results of the well screening study, the site appears suitable for well site development.

The analysis of alternatives in Chapter 5 identified the Primary Pressure Zone is suitable to meet the fire protection needs of the future high pressure zone. A booster pump station would be needed to provide the adequate service pressure under normal operating conditions. Alternative 2a was selected as the most suitable alternative based on the level of service and estimated construction cost. When fully developed, the proposed development would include approximately 40 single family dwelling units in the future high

pressure zone. Figure 1 in NR 811 can be used to determine the pumping capacity required to serve a given number of homes.

Based on 40 homes and using Figure 1 from NR 811, a minimum pumping capacity of approximately 170 gpm is required. The recommended booster pump station would be equipped with a 30 gpm pump, and a 50 gpm pump to accommodate estimated average day and maximum day demands. Two 180 gpm pumps would be provided to accommodate the minimum pumping capacity requirement of NR 811 and to meet peak demands during dry summer conditions when residents are irrigating private lawns. The booster pumps would be equipped with variable speed drives to control the output flow rate to match a desired output pressure, and to minimize the size of a pressure tank.

TABLE 6-1

2035 RELIABLE SUPPLY CAPACITY WITH RECOMMENDED SUPPLY IMPROVEMENTS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

	Combined Capacity		Primary Pressure Zone Capacity		High Level Pressure Zone Capacity		Future Pressure Zone Capacity	
SUPPLY SOURCE	**(gpm)**	**(MGD)**	**(gpm)**	**(MGD)**	**(gpm)**	**(MGD)**	**(gpm)**	**(MGD)**
Wells								
Well 3	800	1.15						
Well 4	1,000	1.44						
Well 5	850	1.22						
Well 6	800	1.15						
Booster Pumps								
Well 3-1			400	0.58				
Well 3-2			400	0.58				
Well 4 Primary			1,000	1.44				
Well 5 Primary			850	1.22				
Well 6 Primary			800	1.15				
Well 4-1					50	0.07		
Well 4-2					150	0.22		
Well 4-3					150	0.22		
Well 4-4					1,000	1.44		
Well 5-1					50	0.07		
Well 5-2					150	0.22		
Well 5-3					150	0.22		
Well 5-4					1,000	1.44		
BP FPZ-1							30	0.04
BP FPZ-2							50	0.07
BP FPZ-2							180	0.26
BP FPZ-2							180	0.26
Total Pumping Supply Capacity	3,450	4.97	3,450	4.97	2,700	3.89	440	0.63
Less: Largest Supply Unit	1,000	1.44	1,000	1.44	1,000	1.44	180	0.26
Reliable Supply	**2,450**	**3.53**	**2,450**	**3.53**	**1,700**	**2.45**	**260**	**0.37**
Design Maximum Day Pumpage	**1,890**	**2.72**	**1,910**	**2.75**	**640**	**0.92**	**50**	**0.07**

Notes
1. The High Level Pressure Zone does not have supply sources and relies upon booster pump capacity from the Primary Pressure Zone.
2. Pump capacities are nameplate values with the exception of the Well 3 pumps which is the field rated capacities provided by staff.
3. Future well pump capacity is estimated based upon existing well capacities for the purpose of determining future needs.

WATER STORAGE IMPROVEMENTS

As summarized in the supply and storage analysis in Chapter 5, under current operational conditions there are existing storage deficiencies in the Oregon water system. Additional storage will also be necessary as the Village continues to develop and grow.

Table 6-2 summarizes the 2035 supply and storage requirements for the Village with the addition of Well 6 (Table 6-1) to increase total effective storage. To meet the projected 2035 water storage needs, approximately 0.35 MG of elevated storage is recommended for each of the existing pressure zones. Additional storage would provide each pressure zone with sufficient capacity to meet peak hour equalizing needs as well as provide fire protection without the interdependency of inter-zonal water transfer and operational considerations. While this approach offers the most reliability and simplest operation, the cost to construct and maintain elevated storage can be considerable.

The Water System Master Plan update recommended the construction of a 0.4 MG elevated tank in the Primary Pressure Zone and an inter-zone transfer station to pump the stored water between zones to meet the needs of the High Level Pressure Zone. The pump station would have multiple pumps to increase station reliability should one pump be out of service. The booster station can be programmed to operate in the same manner as the existing booster pumps at Wells 4 and 5 and will provide additional redundancy to meet the needs of the High Level Pressure Zone. When considered in place of High Level Pressure Zone storage, a booster station can not only utilize the storage available in the Primary Pressure Zone, but also the excess supply capacity that is located in that zone. A booster station can potentially delay the need for High Level Pressure Zone storage indefinitely. Different pumps can be installed as system hydraulics change to ensure that the station remains effective. The combination of the 0.4 MG elevated tank in the Primary Pressure Zone and the inter-zone booster pump station would utilize the volume of water stored in the Primary Pressure Zone for fire protection (630,000 gallons) to meet the fire protection requirements of the High Level Pressure Zone (450,000 gallons).

It is recommended that a tower siting study be completed in the Primary Pressure Zone to locate a new elevated tank. Similar to choosing a well site, there are several factors to consider when choosing a location for an elevated storage tank:

1. Land elevation
2. Transmission main requirements
3. Apparent land availability
4. Proximity to areas with higher fire flows
5. Future development beyond the 2035 service area

In addition to the new water tower, it is recommended that a booster station be constructed to transfer water from the Primary Pressure Zone to the High Level Pressure Zone. This booster station will in effect utilize the stored water in the Primary Pressure Zone to meet the storage requirements of the High Level Pressure Zone. Since the High Level Pressure Zone will be relying upon water storage in the Primary Pressure Zone the booster station not only needs to be located in close proximity of the pressure zone boundary, it will also be necessary to ensure that adequate transmission mains are in place to allow for an efficient and effective transfer of water. A summary of recommended supply and booster pump capacities is found in Table 6-3.

Table 6-4 summarizes the supply and storage analysis with the recommended improvements.

TABLE 6-2

2035 SUPPLY AND STORAGE WITH RECOMMENDED SUPPLY IMPROVEMENTS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

SUPPLY REQUIREMENTS	Combined System	Primary Pressure Zone[6]	High Level Pressure Zone	Future Pressure Zone
Design Average Day Demand (gpm)	850	860	290	10
Design Maximum Day Demand (gpm)	1,890	1,910	640	50
Design Peak Hour Demand (gpm)	3,020	2,670	1,020	90
Anticipated Reliable Supply Capacity (gpm)[1]	2,450	2,450	1,700	180
Reliable Supply Capacity Excess or (Deficiency) (gpm)	560	540	1,060	130

STORAGE REQUIREMENTS	Combined System	Primary Pressure Zone[7]	High Level Pressure Zone	Future Pressure Zone
Peak Hour Equalizing Requirements (gallons)[2]	342,000	232,000	118,000	4,000
Optimum Fire Protection Needs (gallons)[3]	630,000	630,000	450,000	180,000
Reserve Storage (gallons: 15% of Total)[4]	172,000	153,000	101,000	None
Total Optimum Storage Requirements (gallons)	1,144,000	1,015,000	669,000	184,000
Available Effective Storage Capacity (gallons):				
North Standpipe (107,000 gallons peak hour; 190,000 gallons fire flow)	297,000	297,000		
South Standpipe (132,000 gallons peak hour; 230,000 gallons fire flow)	362,000	362,000		
Lincoln Road Tower (288,600 gallons peak hour; 11,400 gallons fire flow)	300,000		300,000	
Total Effective Storage Capacity (gallons)[5]	959,000	659,000	300,000	0
Additional Optimum Storage Capacity Required (gallons)	185,000	356,000	369,000	None
Less Excess Available Reliable System Supply Capacity for Peak Hour[8]	296,000	219,000	118,000	4,000
Less Excess Available Reliable System Supply Capacity for Fire Protection[9]	None	None	122,400	180,000
Minumum Additional Storage Capacity Required (gallons)[10]	None	137,000	128,600	None

Notes

1. Reliable Supply Capacities taken from Table 6-1.
2. Peak hour storage is storage required to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes for the PPZ, 2,500 gpm for 180 minutes for the HLPZ, and 1,500 gpm for 120 minutes for the future pressure zone.
4. Reserve storage is storage required to provide a start/stop range for pump operation and an emergency reserve storage supply.
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage as calculated from Table 6-2.
6. Average and maximum day demands includes both PPZ, HLPZ, and future PZ. Peak hour demand includes PPZ and future PZ peak hour demand plus HLPZ maximum day demand.
7. Storage requirements for the PPZ are calculated only for the needs of the PPZ and Future PZ and do not include peak hour needs for the HLPZ.
8. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and anticipated future reliable supply capacity.
9. Supply Capacity Credit cannot exceed Fire Protection Needs and is calculated as the future anticipated reliable supply capacity in excess of Peak Hour Demand times the fire flow duration (120 or 180 minutes).
10. Future Pressure Zone "Reserve Storage" is not required for a pumped system. Therefore a Minimum Additional Storage Capacity Required less than the Reserve Storage volume is sufficient and does not require additional storage capacity.

TABLE 6-3

2035 RELIABLE SUPPLY CAPACITY WITH RECOMMENDED SUPPLY AND STORAGE IMPROVEMENTS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

	Combined Capacity		Primary Pressure Zone Capacity		High Level Pressure Zone Capacity		Future Pressure Zone Capacity	
SUPPLY SOURCE	**(gpm)**	**(MGD)**	**(gpm)**	**(MGD)**	**(gpm)**	**(MGD)**	**(gpm)**	**(MGD)**
Wells								
Well 3	800	1.15						
Well 4	1,000	1.44						
Well 5	850	1.22						
Well 6	800	1.15						
Booster Pumps								
Well 3-1			400	0.58				
Well 3-2			400	0.58				
Well 4 Primary			1,000	1.44				
Well 5 Primary			850	1.22				
Well 6 Primary			800	1.15				
Well 4-1					50	0.07		
Well 4-2					150	0.22		
Well 4-3					150	0.22		
Well 4-4					1,000	1.44		
Well 5-1					50	0.07		
Well 5-2					150	0.22		
Well 5-3					150	0.22		
Well 5-4					1,000	1.44		
BP FPZ-1							30	0.04
BP FPZ-2							50	0.07
BP FPZ-2							180	0.26
BP FPZ-3							180	0.26
Booster Station 1					1,000	1.44		
Booster Station 2					1,000	1.44		
Total Pumping Supply Capacity	3,450	4.97	3,450	4.97	4,700	6.77	440	0.63
Less: Largest Supply Unit	1,000	1.44	1,000	1.44	1,000	1.44	180	0.26
Reliable Supply	**2,450**	**3.53**	**2,450**	**3.53**	**3,700**	**5.33**	**260**	**0.37**
Design Maximum Day Pumpage	**1,890**	**2.72**	**1,910**	**2.75**	**640**	**0.92**	**50**	**0.07**

Notes

1. The High Level Pressure Zone does not have supply sources and relies upon booster pump capacity from the Primary Pressure Zone.
2. Pump capacities are nameplate values with the exception of the Well 3 pumps which is the field rated capacities provided by staff.
3. Future well pump capacity is estimated based upon existing well capacities for the purpose of determining future needs.

TABLE 6-4

2035 SUPPLY AND STORAGE WITH RECOMMENDED SUPPLY AND STORAGE IMPROVEMENTS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

SUPPLY REQUIREMENTS	Combined System	Primary Pressure Zone[6]	High Level Pressure Zone	Future Pressure Zone
Design Average Day Demand (gpm)	850	850	290	10
Design Maximum Day Demand (gpm)	1,870	1,870	640	20
Design Peak Hour Demand (gpm)	2,990	2,610	1,020	30
Anticipated Reliable Supply Capacity (gpm)[1]	2,450	2,450	3,700	180
Reliable Supply Capacity Excess or (Deficiency) (gpm)	580	580	3,060	160

STORAGE REQUIREMENTS	Combined System	Primary Pressure Zone[7]	High Level Pressure Zone	Future Pressure Zone[7]
Peak Hour Equalizing Requirements (gallons)[2]	342,000	232,000	118,000	4,000
Optimum Fire Protection Needs (gallons)[3]	630,000	630,000	450,000	180,000
Reserve Storage (gallons; 15% of Total)[4]	172,000	153,000	101,000	None
Total Optimum Storage Requirements (gallons)	1,144,000	1,015,000	669,000	184,000
Available Effective Storage Capacity (gallons):				
North Standpipe (107,000 gallons peak hour; 190,000 gallons fire flow)	297,000	297,000		
South Standpipe (132,000 gallons peak hour; 230,000 gallons fire flow)	362,000	362,000		
Lincoln Road Tower (288,600 gallons peak hour; 11,400 gallons fire flow)	300,000		300,000	
Future PPZ Tower	400,000	400,000		
Total Effective Storage Capacity (gallons)[5]	1,359,000	1,059,000	300,000	0
Additional Optimum Storage Capacity Required (gallons)	None	None	369,000	184,000
Less Excess Available Reliable System Supply Capacity for Peak Hour[8]	296,000	219,000	118,000	4,000
Less Excess Available Reliable System Supply Capacity for Fire Protection[9]	None	None	482,400	180,000
Minumum Additional Storage Capacity Required (gallons)	None	None	None	None

Notes

1. Reliable Supply Capacities taken from Table 6-1.
2. Peak hour storage is storage required to meet demands which exceed the maximum day demand rate assuming the reliable supply capacity is equal to the maximum day demand rate.
3. Optimum fire protection based on 3,500 gpm for 180 minutes for the PPZ, 2,500 gpm for 180 minutes for the HLPZ, and 1,500 gpm for 120 minutes for the future pressure zone.
4. Reserve storage is storage required to provide a start/stop range for pump operation and an emergency reserve storage supply.
5. Total Effective Storage Capacity is limited to a total of the Optimum Fire Protection Needs plus peak hour available storage as calculated from Table 6-2.
6. Average and maximum day demands includes both PPZ, HLPZ, and future PZ. Peak hour demand includes PPZ and future PZ peak hour demand plus HLPZ maximum day demand.
7. Storage requirements for the PPZ are calculated only for the needs of the PPZ and Future PZ and do not include peak hour needs for the HLPZ.
8. Supply Capacity Credit cannot exceed Peak Hour Equalization and is calculated utilizing the time of day demand curve and anticipated future reliable supply capacity.
9. Supply Capacity Credit cannot exceed Fire Protection Needs and is calculated as the future anticipated reliable supply capacity in excess of Peak Hour Demand times the fire flow duration (120 or 180 minutes).
10. Future Pressure Zone "Reserve Storage" is not required for a pumped system. Therefore a Minimum Additional Storage Capacity Required less than the Reserve Storage volume is sufficient and does not require additional storage capacity.

DISTRIBUTION SYSTEM IMPROVEMENTS

This section summarizes distribution system improvements that are recommended to strengthen the existing system, enhance supply reliability, loop major transmission mains, and improve flow capacity and fire protection to various parts of the Village.

As discussed in Chapter 5, the distribution system would need to be expanded to serve the proposed development. Improvements identified in the Water System Master Plan Update were reviewed and evaluated to determine compatibility with the proposed development, recent additions, and revised demand projections.

The Water System Master Plan Update in 2015 included recommendations for distribution system improvements to correct existing deficiencies, improve the distribution system to support future development, and expand the distribution system. Figure 6-1 illustrates the water system improvements recommended to serve the proposed development on the west side of the village along with incorporating the recommendations of the Water System Master Plan Update. All major transmission mains identified in Figure 6-1 have been sized to meet projected future water system demands, and support system supply sources and storage facilities to serve outlying area land uses. Mains were sized to provide at least 3,500 gpm of flow capacity in industrial areas and 1,500 gpm in commercial areas at a residual pressure of 20 psi.

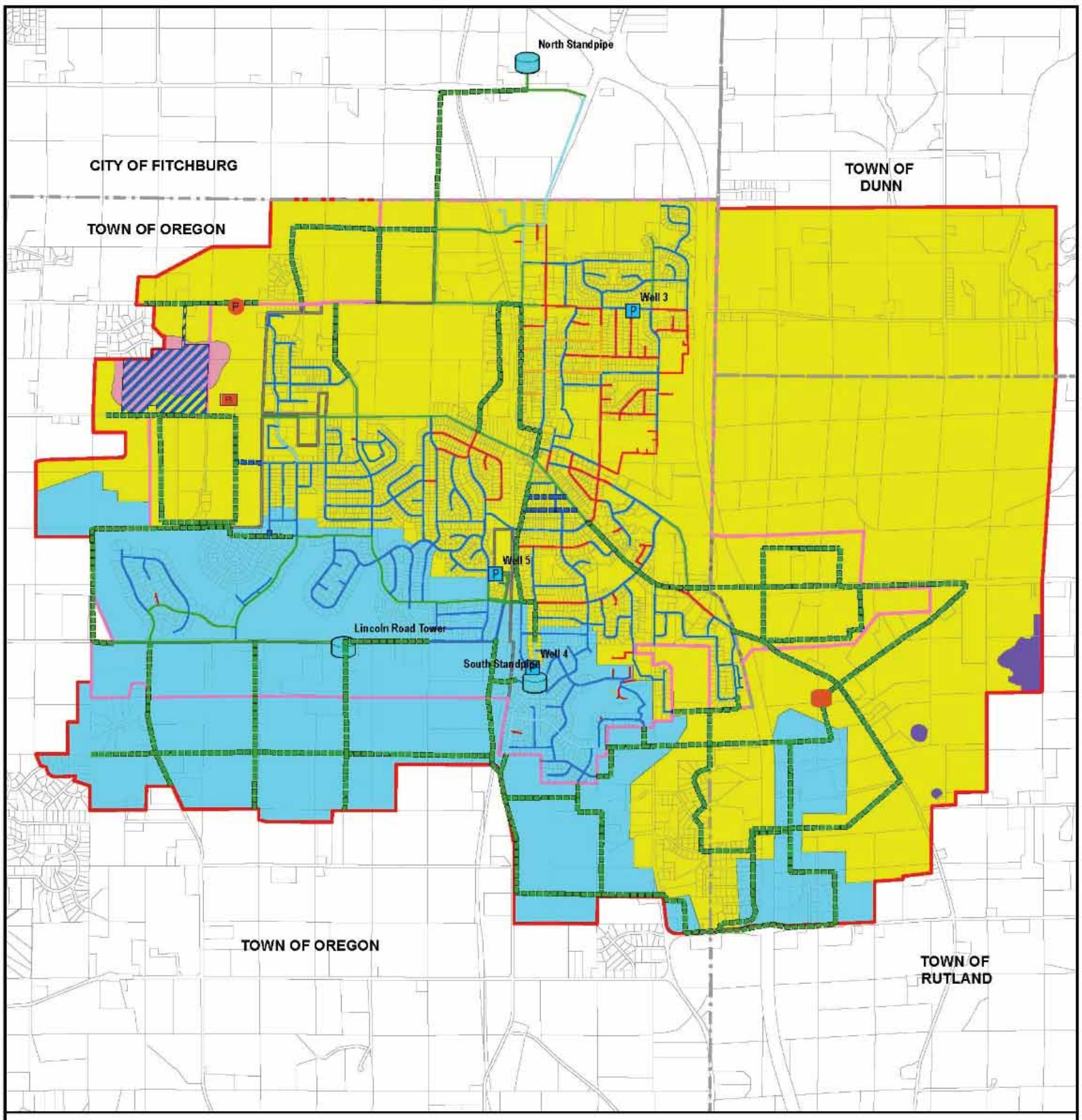
The mains shown in Figure 6-1 are only the recommended transmission mains. Smaller local service mains have not been shown. The transmission mains shown follow known or presumed locations for major streets or roads in the future urban service area. Adjustments in the actual location of these mains can be expected at the time the mains are required or as local needs dictate.

Figure 6-2 illustrates the anticipated peak hour pressures with the recommended improvements under projected 2035 demand conditions. Figures 6-3 and 6-4 illustrate the recommended fire flow and calculated available fire flows under projected 2035 maximum day demand conditions. Figure 6-5 shows the proposed Water System Master Plan to serve the needs of the Village through 2035. A schematic representation of the future water system is shown in Figure 6-6.

SUMMARY

The recommended improvement plan to serve the future service area has been developed as a tool to guide the Utility in the siting and sizing of future system improvements. While the plan may represent the current planned expansion of the Oregon system, future changes in land use, water demands, or customer characteristics could substantially alter the implementation of the plan. For this reason, it is recommended that the plan be periodically reviewed and updated using Village planning information to reflect the most current projections of Oregon area growth and development.

The improvement plan is a guidance document that details existing conditions and recommendations for the future. The plan is based on future conditions as perceived in 2017. As time progresses, additional information will become available and events will shape the development of the Oregon area. The plan must be dynamic in response; it should be studied and used but also adjusted to conform to the changes and knowledge that will come with time. Updates should be made on a regular basis, probably every five to ten years.



Legend

Proposed Expansion Water Main
- 8-Inch
- 12-Inch

Proposed Structures
- Production Well
- Booster Pump Station
- Storage Tank
- 2025 Estimated Service
- 2035 Future Service

Existing Water Main
- 4-Inch
- 6-Inch
- 8-Inch
- 10-Inch
- 12-Inch
- Unknown
- Conservation Easement
- Well
- Storage Tank

Pressure Zone
- Primary Pressure Zone
- High Level Pressure Zone
- Future Pressure Zone
- Area of Marginal Service Pressure
- 2016 Village Limits
- Municipal Boundaries

0 1,250 2,500 5,000 7,500
Feet

N W E S

SOURCES: VILLAGE OF OREGON, DANE COUNTY LAND INFORMATION OFFICE, AND RUEKERT & MIELKE, INC.

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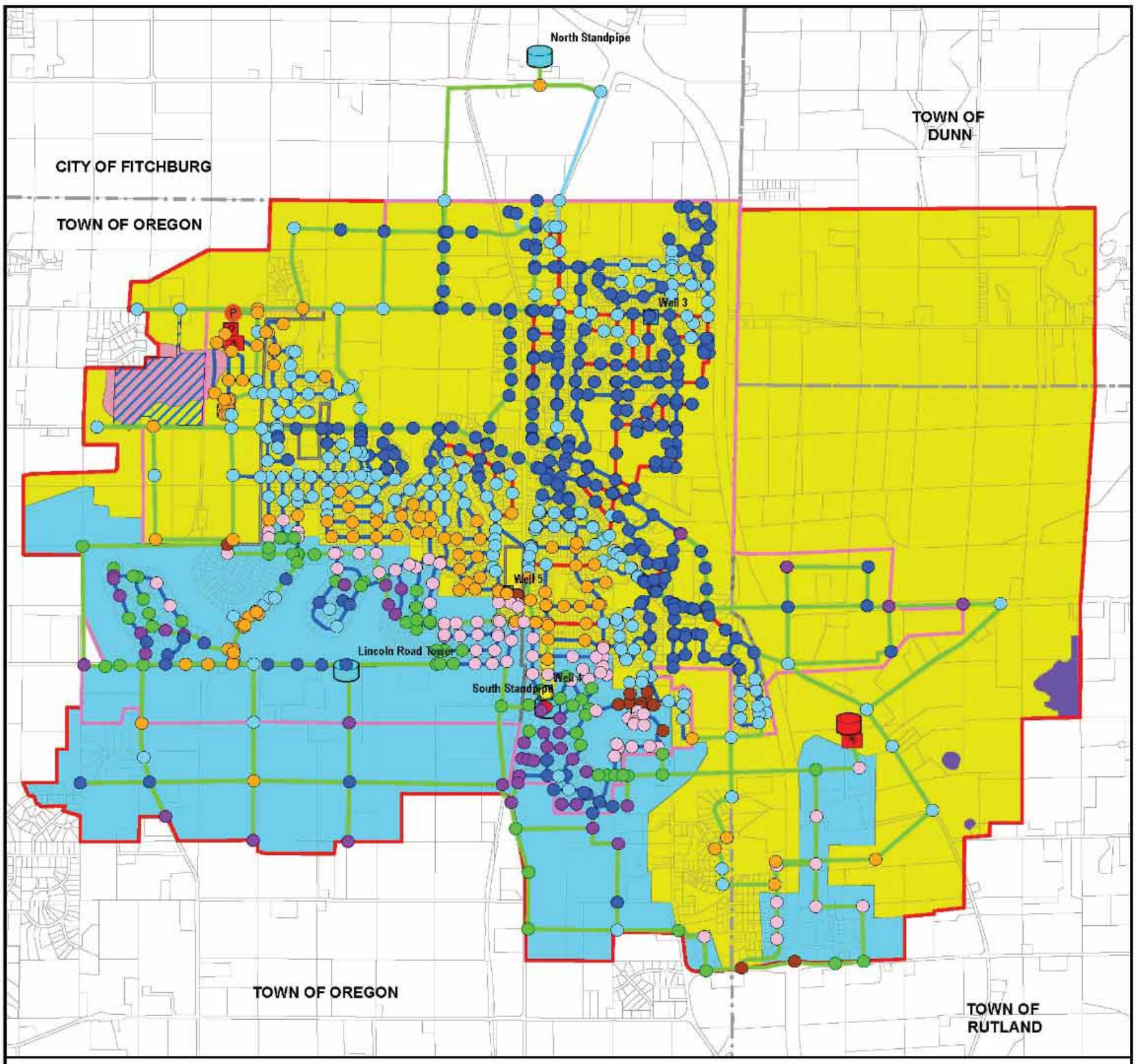
FIGURE 6-1
PROPOSED WATER MAIN EXPANSION IMPROVEMENTS
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

Ruekert · Mielke



Legend

PROPOSED FACILITIES
- Elevated Storage
- Production Well
- Booster Pump Station
- Well
- Storage Tank
- Well

PRESSURE
- LESS THAN 35 PSI
- 35 PSI - 39 PSI
- 40 PSI - 49 PSI
- 50 PSI - 59 PSI
- 60 PSI - 69 PSI
- 70 PSI - 79 PSI
- 80 PSI - 89 PSI
- 90 PSI - 99 PSI
- 100 PSI AND

WATER MAIN
- 4-inch or Less
- 6-inch
- 8-inch
- 10-inch
- 12-inch
- Conservancy Easement
- 2025 Estimated Service
- 2035 Future Service
- Municipal Boundaries
- 2016 Village Limits

PRESSURE ZONE
- PRIMARY PRESSURE ZONE
- HIGH LEVEL PRESSURE ZONE
- FUTURE PRESSURE ZONE
- AREA OF POTENTIAL MARGINAL SERVICE PRESSURE

0 1,250 2,500 5,000 7,500
Feet

N W E S

SOURCES: VILLAGE OF OREGON, DANE COUNTY LAND INFORMATION OFFICE, AND RUEKERT & MIELKE, INC.

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FIGURE 6-2
2035 PEAK HOUR DEMAND PRESSURE
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

Ruekert • Mielke

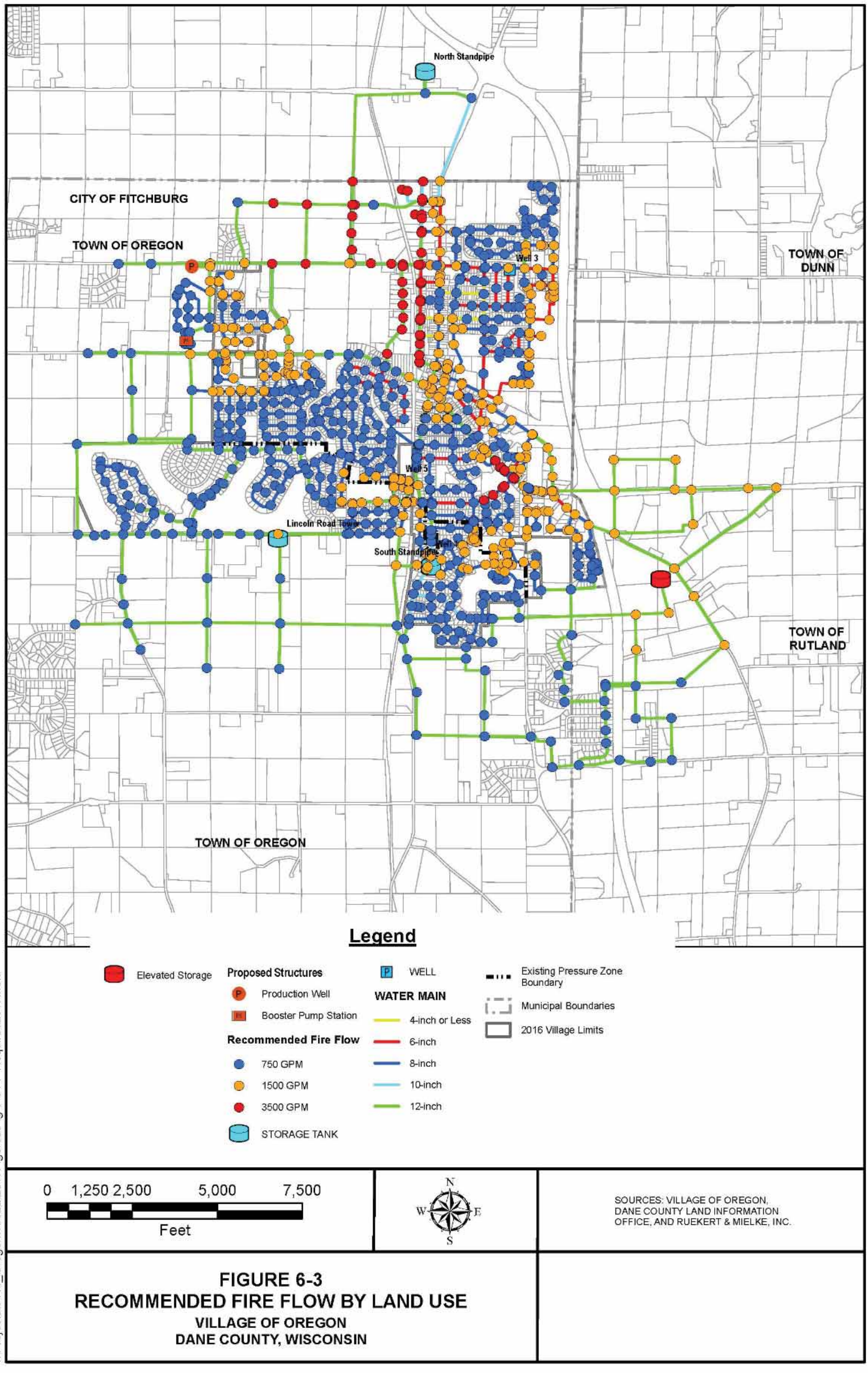
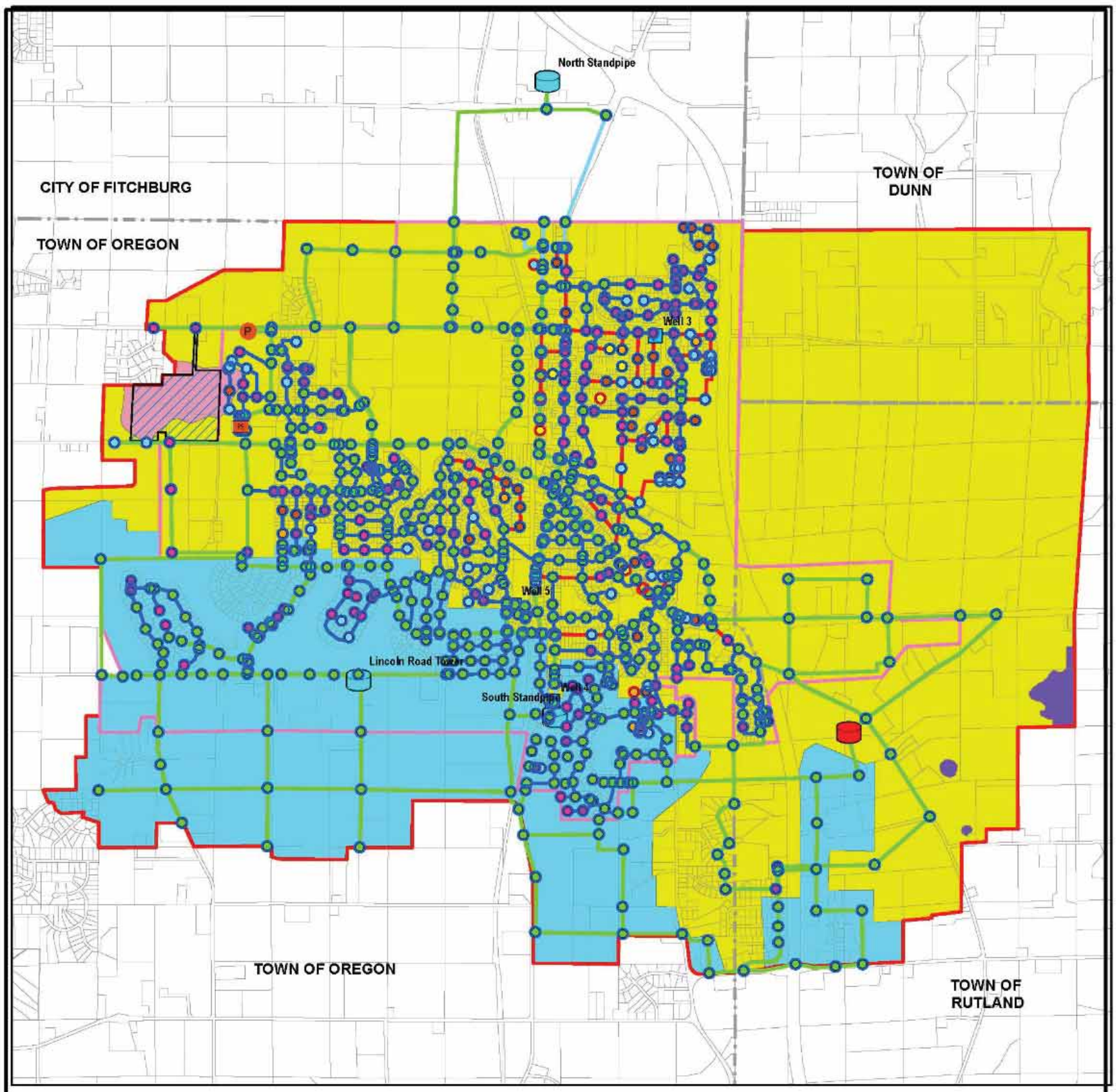


FIGURE 6-3
RECOMMENDED FIRE FLOW BY LAND USE
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN



Legend

Proposed Facilities
- Production Well
- Booster Pump Station

Fire Flow Adequacy
- Less Than Recommended
- Meets Recommended

AVAILFF
- Less Than 1,000 GPM
- 1,000 GPM - 1,499 GPM
- 1,500 GPM - 2,000 GPM
- 2,000 GPM - 2,499 GPM
- 2,500 GPM - 2,999 GPM
- 3,000 GPM - 2,499 GPM
- 3,500 GPM AND GREATER

- Elevated Storage

Existing Facilities
- WELL
- STORAGE TANK

WATER MAIN
- 4-inch or Less
- 6-inch
- 8-inch
- 10-inch
- 12-inch

- Conservation Easement

0 1,250 2,500 5,000 7,500
Feet

N W E S

SOURCES: VILLAGE OF OREGON, DANE COUNTY LAND INFORMATION OFFICE, AND RUEKERT & MIELKE, INC.

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FIGURE 6-4
2035 MAXIMUM DAY DEMAND AVAILABLE FIRE FLOW
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

Ruekert · Mielke

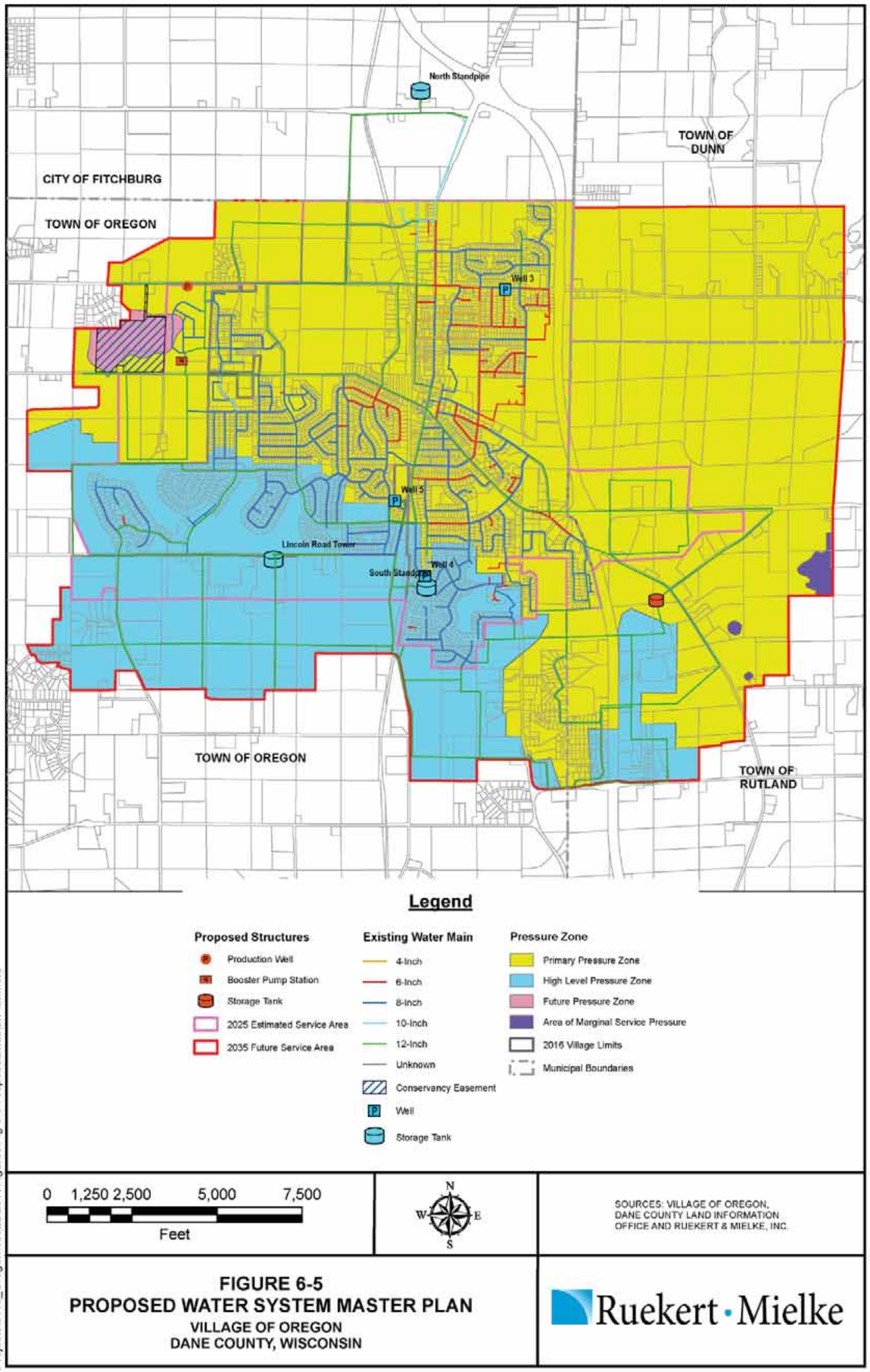
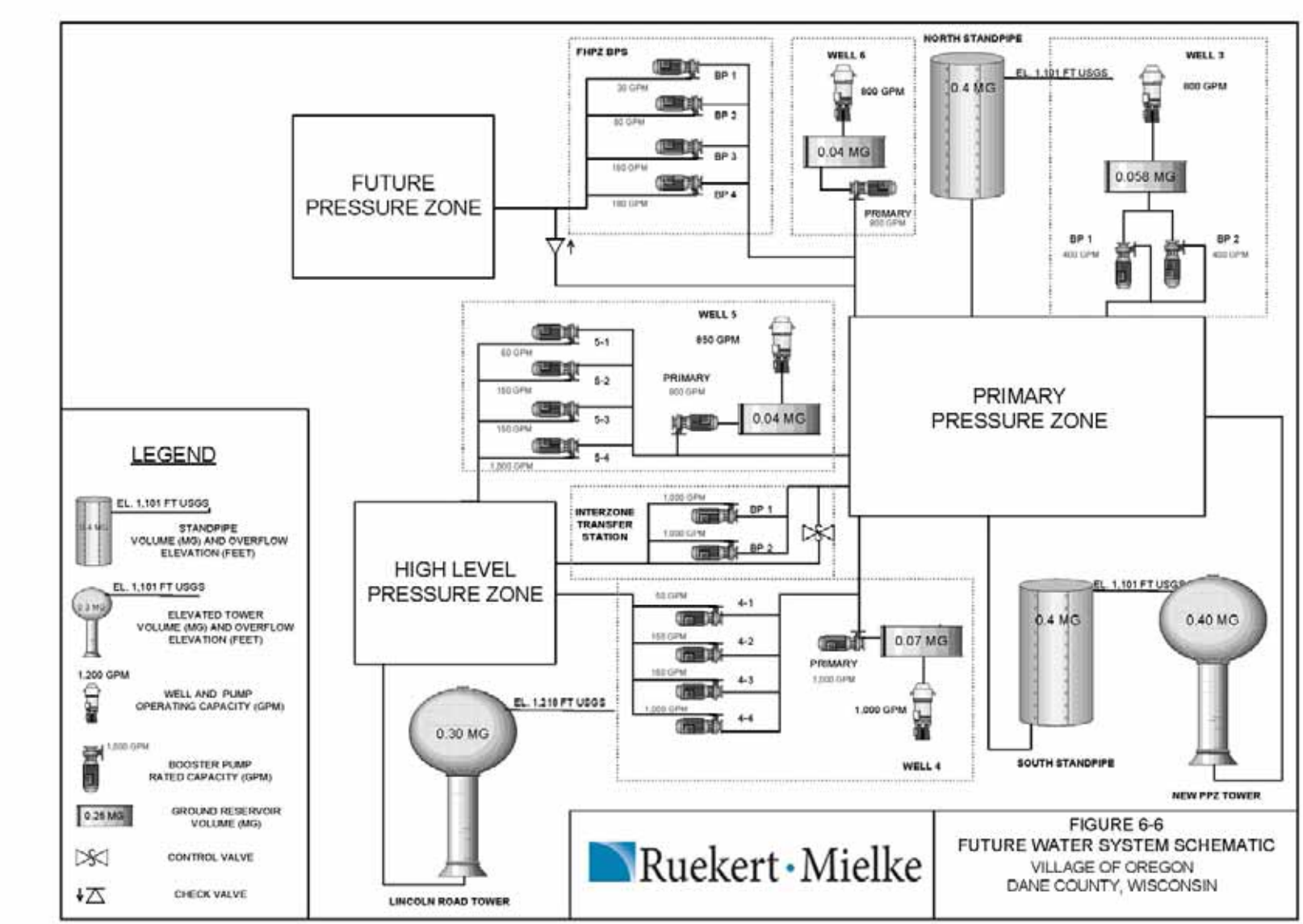


FIGURE 6-5
PROPOSED WATER SYSTEM MASTER PLAN
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

Ruekert · Mielke


FUTURE PRESSURE ZONE
FHPZ BPS
BP 1
BP 2
BP 3
BP 4
WELL 6
800 GPM
0.04 MG
PRIMARY
NORTH STANDPIPE
0.4 MG
EL. 1,101 FT USGS
WELL 3
800 GPM
0.058 MG
BP 1
BP 2
WELL 5
850 GPM
PRIMARY
0.04 MG
5-1
5-2
5-3
5-4
PRIMARY PRESSURE ZONE
INTERZONE TRANSFER STATION
BP 1
BP 2
HIGH LEVEL PRESSURE ZONE
4-1
4-2
4-3
4-4
PRIMARY
0.07 MG
1,000 GPM
WELL 4
0.30 MG
EL. 1,210 FT USGS
LINCOLN ROAD TOWER
0.4 MG
0.40 MG
SOUTH STANDPIPE
NEW PPZ TOWER
LEGEND
EL. 1,101 FT USGS
STANDPIPE VOLUME (MG) AND OVERFLOW ELEVATION (FEET)
ELEVATED TOWER VOLUME (MG) AND OVERFLOW ELEVATION (FEET)
1,200 GPM
WELL AND PUMP OPERATING CAPACITY (GPM)
BOOSTER PUMP RATED CAPACITY (GPM)
0.25 MG
GROUND RESERVOIR VOLUME (MG)
CONTROL VALVE
CHECK VALVE
Ruekert · Mielke
FIGURE 6-6
FUTURE WATER SYSTEM SCHEMATIC
VILLAGE OF OREGON
DANE COUNTY, WISCONSIN

CHAPTER 7

CAPITAL IMPROVEMENTS PLAN

Chapter 6 summarizes the recommended water system improvements anticipated throughout the planning period. This chapter summarizes the recommended water system improvements and presents a proposed Water Utility capital improvements program. The recommended Capital Improvements Plan prioritizes system improvements and provides a schedule for the timing of construction. Budget cost estimates for each improvement are also summarized.

RECOMMENDED CAPITAL IMPROVEMENTS

Supply

Based upon the current and projected water system needs, an additional well will be required to provide reliable supply capacity for future water demands. An additional 240 gpm of reliable supply capacity will be needed before 2035. While it is anticipated that a future well may yield similarly to the existing wells, it is recommended that the minimum capacity of Well 6 be at least 500 gpm to ensure adequate supply through and beyond the current planning period.

Storage

The Utility currently has inadequate water storage capacity available to meet present storage needs, both as an aggregate of the entire water system and individually by pressure zones. A minimum additional 400,000 gallons of storage should be constructed in the Primary Pressure Zone to meet current and projected peak hour equalizing requirements, fire storage, and operating/reserve storage.

Booster Pumps

A development in the future high pressure zone is anticipated to be constructed. To meet the needs of this pressure zone, a booster station will be required to provide adequate and desired service pressure under normal operating conditions.

To reduce the overall water storage volume of the Utility it is recommended that an additional booster station be constructed between the Primary Pressure Zone and High Level Pressure Zone to utilize the storage in the Primary Pressure Zone to meet the peak hour and fire protection needs of the High Level Pressure Zone. The station should have a minimum of two pumping units with a minimum reliable capacity of 1,000 gpm. The station should also be equipped with a control valve to return water to the Primary Pressure Zone.

Distribution System

Figure 6-5 is the proposed year 2035 Master Plan. The figure illustrates recommended improvements to the existing distribution system and the recommended transmission mains required to serve the future service area. The improvements have been recommended to strengthen and expand the existing transmission main network, and support system expansion into future service areas.

To address existing deficiencies and provide water to developing areas in the Village, approximately 95,500 feet (approximately 18.1 miles) of new water main are recommended in the next 10 years (short and intermediate term). An additional 94,200 feet (approximately 17.8 miles) are recommended in the long-term improvements plan to provide adequate service as the Village continues to develop.

CAPITAL IMPROVEMENTS PLAN

The proposed Capital Improvements Plan is presented in Table 7-1. The plan presents budget cost estimates and a proposed schedule for the recommended system-wide improvements that should be implemented over the planning period.

TABLE 7-1
CAPITAL IMPROVEMENTS PLAN

Short-Term Improvements (2018 – 2020)	Estimated Cost[2,3,4]
Distribution System Improvements	
Replace water main along North Burr Oak Avenue from Jefferson Street to Netherwood Road (approximately 3,000 feet of 12-inch diameter pipe)	$480,000
Install water main along Lincoln Road from water tower east to existing 8-inch water main. (approximately 2,100 feet of 12-inch diameter pipe)	$336,000
Replace water main along Washington and State Streets from Main Street to Janesville Street. (approximately 2,300 feet of 8-inch diameter pipe)	$276,000
Replace new water along Main Street between State Street and Kierstead Lane. (approximately 400 feet of 12-inch diameter pipe)	$64,000
Replace water main along Netherwood Road from North Burr Oak Avenue to the existing 12-inch water main on Main Street. (approximately 500 feet of 12-inch diameter pipe)	$80,000
Replace water main along Janesville Street from Kierstead Lane to Park Street. (approximately 3,200 feet of 12-inch diameter pipe)	$512,000
Booster Station to Future Pressure Zone	$650,000
Distribution System Expansion (approximately 9,200 feet of 12-inch and 5,700 feet of 8-inch diameter pipe)	$2,336,908
Annual Water Main Replacement[6] (assumes 3,200 feet of 12-inch and 2,000 feet of 8-inch diameter pipe)	$752,000
Subtotal	$5,486,908
Engineering and Contingencies[1]	$1,269,500
Total	$6,756,408
Intermediate-Term Improvements (2020 – 2025)	
Distribution System Expansion (approximately 59,300 feet of 12-inch diameter pipe and 2,800 of 8-inch diameter)	$9,836,000
New Well No. 6[5]	$1,500,000
New 0.4 MG PPZ Elevated Tank	$1,400,000
New Inter-zonal Booster Station	$800,000
Annual Water Main Replacement[6] (assumes 4,800 feet of 12-inch and 5,000 feet of 8-inch diameter pipe)	$1,368,000
Subtotal	$14,904,000
Engineering and Contingencies[1]	*$2,916,000*
Total	$17,820,000
Long-Term Improvements (2026 – 2035)	
Distribution System Expansion (approximately 84,400 feet of 12-inch diameter pipe)	$13,504,000
Annual Water Main Replacement[6] (assumes 4,800 feet of 12-inch and 5,000 feet of 8-inch diameter pipe)	1,368,000
Subtotal	$14,872,000
Engineering and Contingencies[1]	*$4,944,000*
Total	$19,816,000

Footnotes:
[1] Assumes 30 percent for engineering, administrative, legal, and contingencies.
[2] Costs were calculated based on an assumption of $160 per foot for 12-inch diameter pipe and $120 per foot for 8-inch diameter pipe.
[3] Estimates do not include land purchase, if necessary.
[4] All costs are presented in 2017 dollars.
[5] Assumes test well construction, permanent well construction, power, facility, sanitary sewer and site restoration.
[6] Annual water main replacement was estimated based upon replacement of all existing 4-inch diameter water main and implementation of "Vision" improvements. A KANEW analysis and prioritization study should be completed to confirm actual replacement need.

The proposed Capital Improvements Plan has been formulated based on all the information presented in this study. All the improvements have been developed and prioritized based on deficiencies identified in the existing water system, and the needs of the Utility's future service area. Improvements have been broken down into three categories:

- Short-term improvements (2018 – 2020)
- Intermediate-term improvements (2020-2025)
- Long-term improvements (2026 – 2035)

The actual construction cost for the recommended improvements may vary from the costs outlined in this report, depending on the year facilities are constructed, the rate of increase in future construction costs, and unforeseen conditions which could be encountered during design of the improvements.

In establishing priorities for these improvements, it will be necessary to take into consideration the availability of Utility financial resources and local Village needs to assure that the recommended improvements are implemented in an orderly, coordinated, and economical fashion.

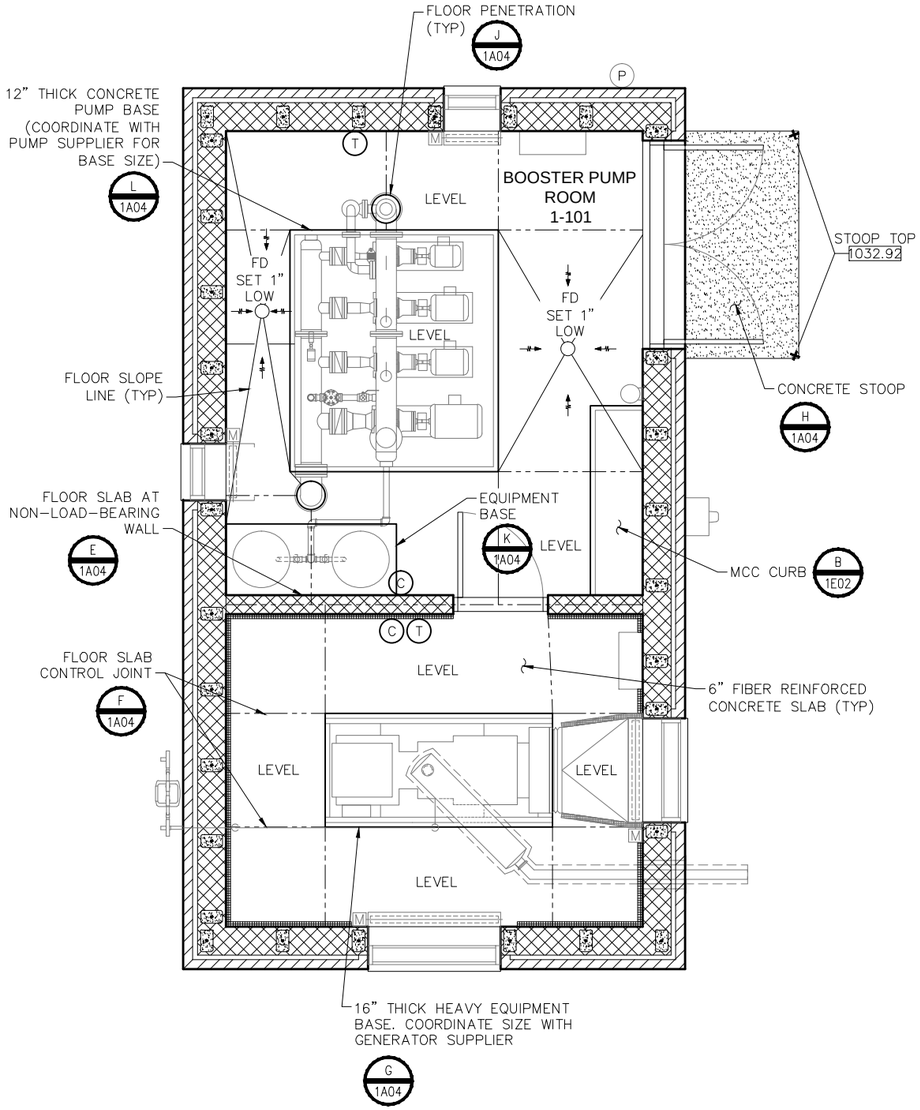
RECOMMENDED STUDIES AND EVALUATIONS

Table 7-2 summarizes the recommended studies and evaluations that the Utility should conduct over the short-term planning period (next 5 years).

TABLE 7-2
RECOMMENDED STUDIES AND EVALUATIONS

Study	Purpose
Well Siting Study	Evaluate the potential for siting a new well to identify land requirements (location and size) so that land acquisitions can be made.
Tower Siting Study	Evaluate the potential for siting an elevated storage facility so that land acquisitions can be made.
KANEW Analysis	Determine the rate of renewal for annual water main replacement program.
Water Main Replacement Prioritization Analysis	Prioritize the water main replacement segments for the annual water main replacement program.

Attachment N: Example Booster Station

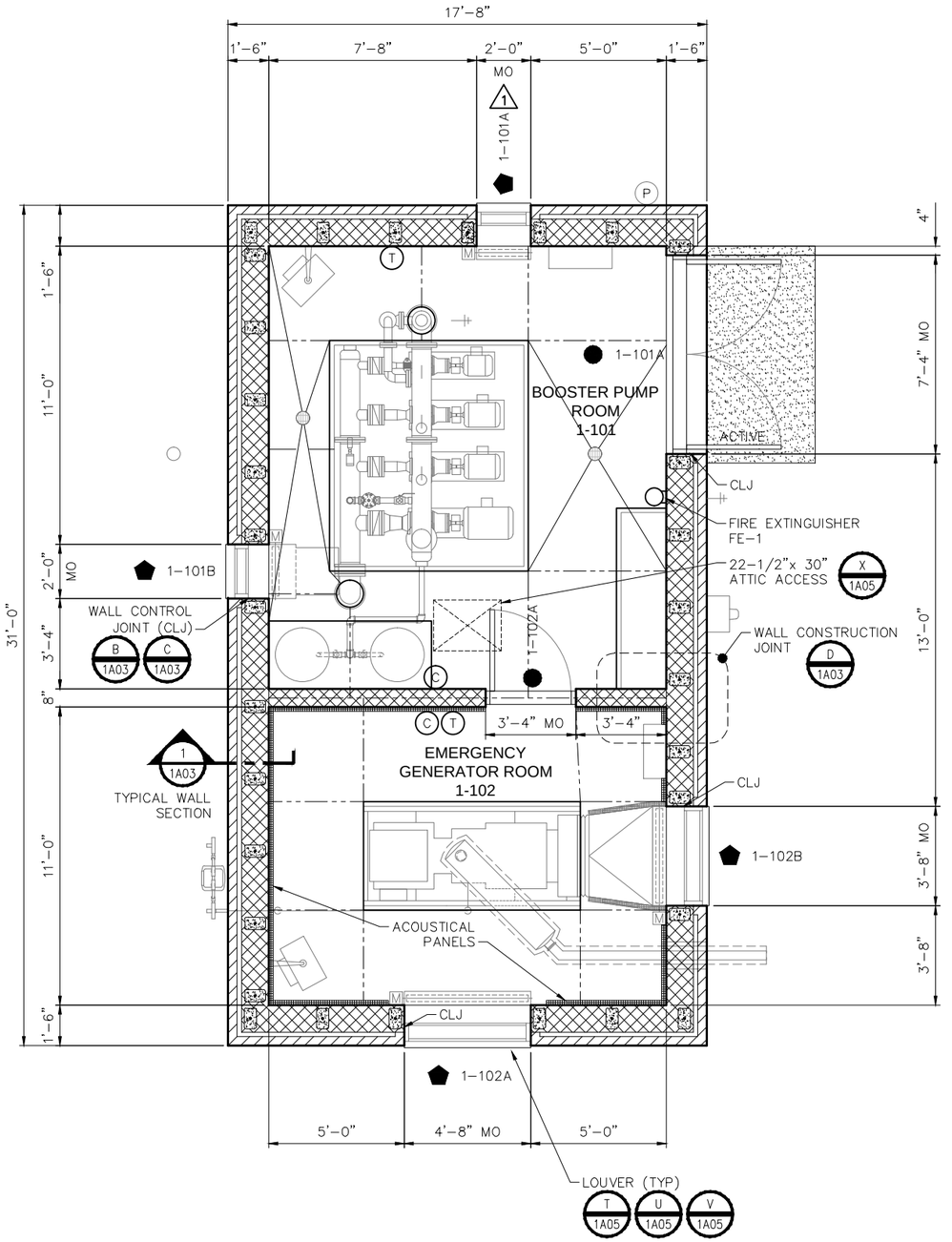


FINISH FLOOR ELEVATION = 1033.00

FLOOR SLAB PLAN

ZA02 32

0 1 2 3 4 FT



ARCHITECTURAL FLOOR PLAN

ZA02 32

0 1 2 3 4 FT

7								
6								
5								
4								
3								
2							MOVE LOUVER 32" TO WEST	
1						06-04-2015		
REVISIONS							TOWN:	RANGE: SECTION(s):

Ruekert•Mielke
engineering solutions for a working world
W233 N2080 Ridgeview Parkway ♦ Waukesha, WI 53188-1020
(262) 542-5733 ♦ Fax: (262) 542-5631 ♦ www.ruekert-mielke.com

WINDRUSH BOOSTER STATIONS AND ARLENE DR. LIFT STATION UPGRADE
ARCHITECTURAL FLOOR AND FLOOR SLAB PLANS
VILLAGE OF HARTLAND WAUKESHA COUNTY, WISCONSIN

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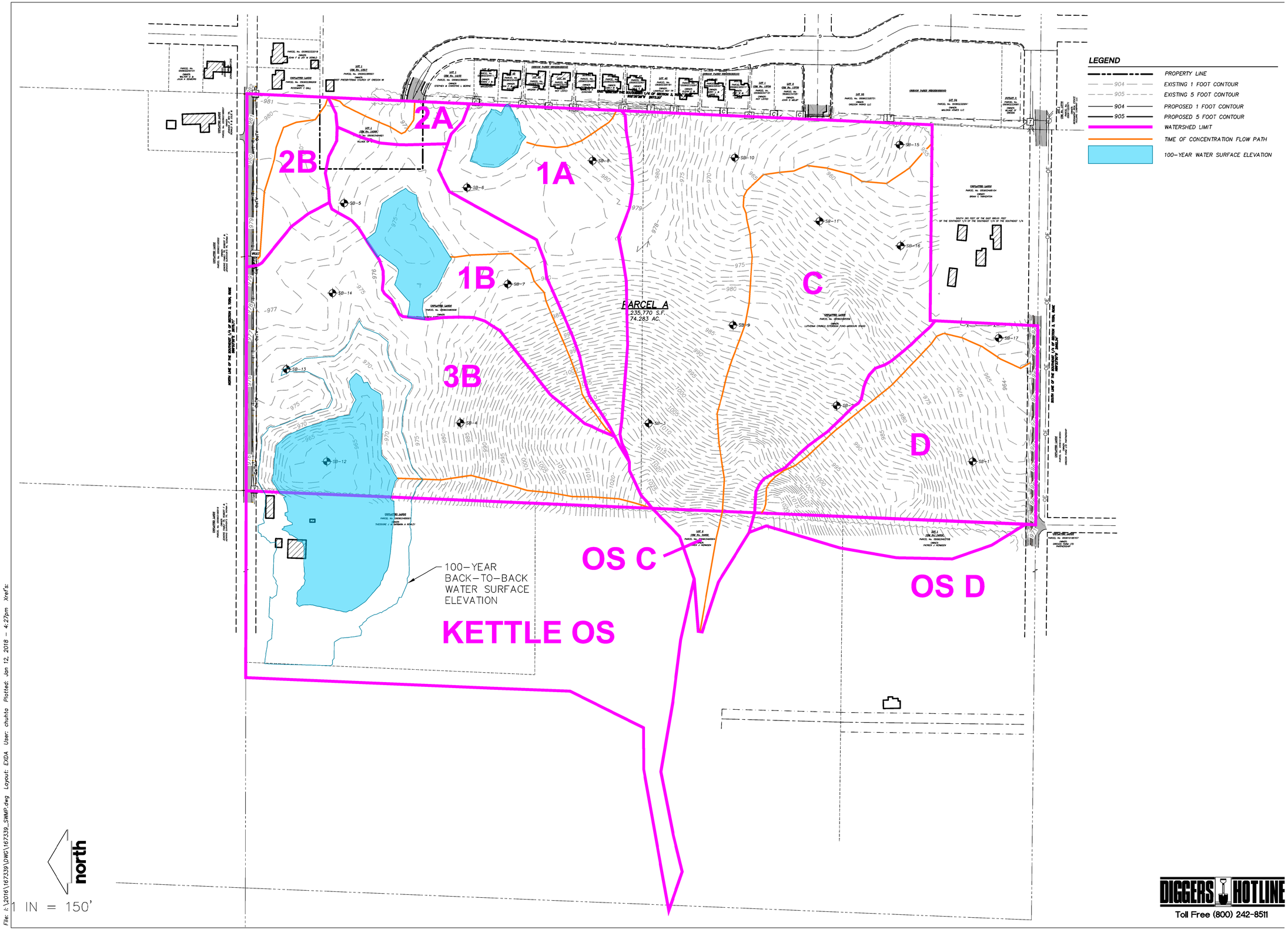
DESIGNED BY: DRB
DRAFTED BY: JMC
CHECKED BY:
DATE: JAN., 2015
FILE NO. 09-10009

SHEET NO. 1A02-R

Aug 18, 2015 3:24pm PLOTTED BY: jcieslak SAVED BY: jcieslak
G:\C3D\09_Hartland\10009\dwg\ZA02 - Arch and Floor Slab Plan.dwg Arch and Floor Slab Plan
IMAGES: G:\SHT\RMGrphic.jpg; G:\SHT\RMGrphic.jpg; C:\Documents and Settings\ph.VAL-MATIC\Desktop\water[1].tif;
XREFS: ..\SHT\Rm2234c.dwg; G:\C3D\09_Hartland\10009\dwg\APLFL01.dwg; G:\C3D\09_Hartland\10009\dwg\HPLFL01.dwg; G:\C3D\09_Hartland\10009\dwg\PPLFL01.dwg; G:\C3D\09_Hartland\10009\dwg\MPLFL01.dwg

Attachment O: Existing Drainage Area Map



DIGGERS HOTLINE
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File: I:\2016\167339\DWG\167339_SWMP.dwg Layout: EXDA User: chuhta Plotted: Jan 12, 2018 - 4:27pm Xref's:

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VERONA, WISCONSIN 53593
P. 608.848.5060

CLIENT:

FDG

CLIENT ADDRESS:
161 HORIZON DRIVE
VERONA, WI, 53593

PROJECT:
THE HIGHLANDS AT NETHERWOOD

PROJECT LOCATION:
OREGON, WI
DANE COUNTY

PLAN MODIFICATIONS:

#	Date:	Description:
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15		

Design/Drawn: CLH
Approved: PMP

SHEET TITLE:
EXISTING DRAINAGE AREA MAP

SHEET NUMBER:
EX1.0

JSD PROJECT NO: 16-7339

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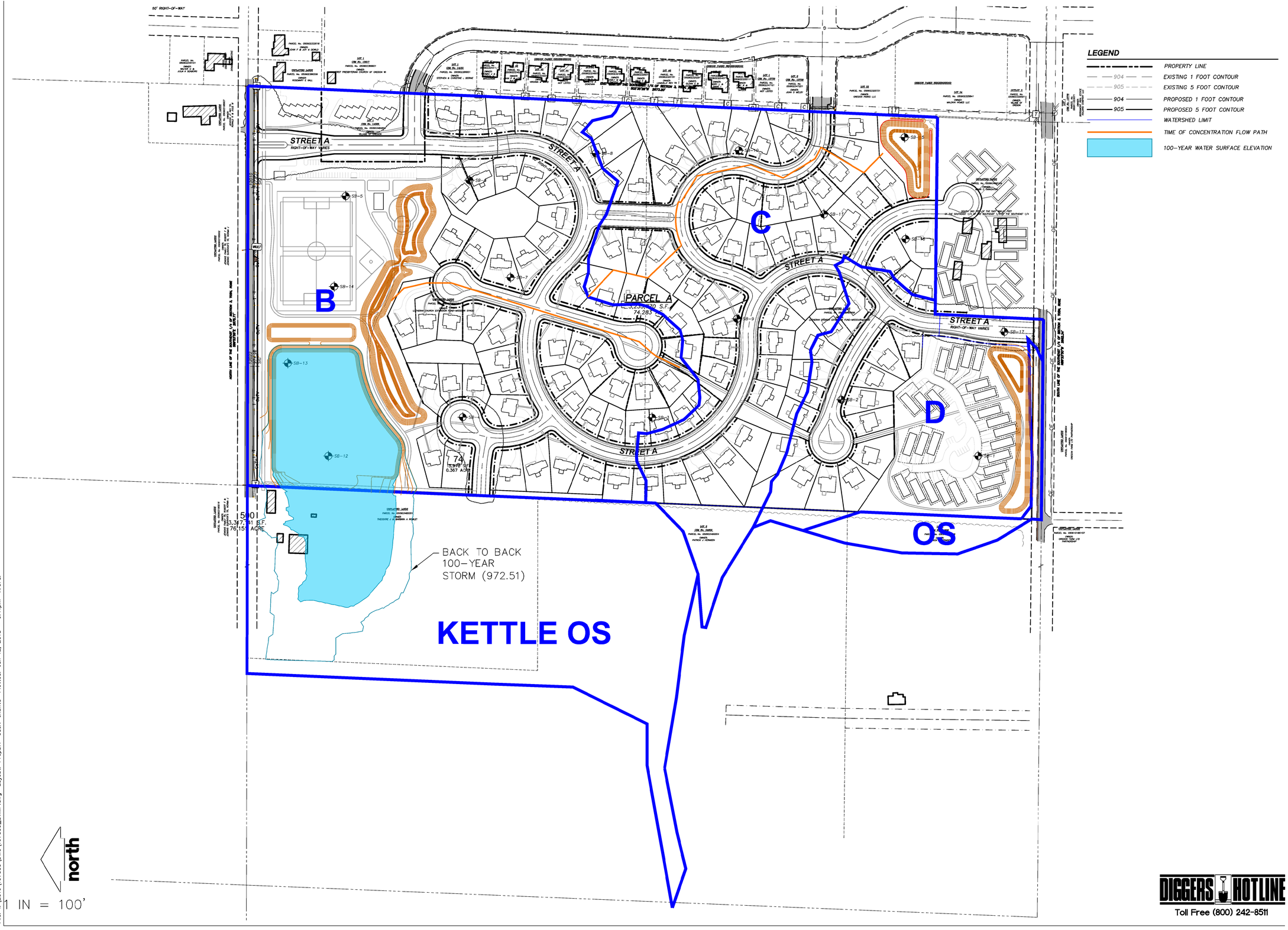
Attachment P: Proposed Drainage Area Map



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File: I:\2016\167339\DWG\167339_SWMP.dwg Layout: PropDA User: chuhta Plotted: Jan 12, 2018 - 6:11pm Xref's:

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DANE COUNTY

PLAN MODIFICATIONS:

#	Date:	Description:
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Design/Drawn:
Approved:

SHEET TITLE:
PROPOSED DRAINAGE AREA MAP

SHEET NUMBER:
EX2.0

JSD PROJECT NO: 16-7339

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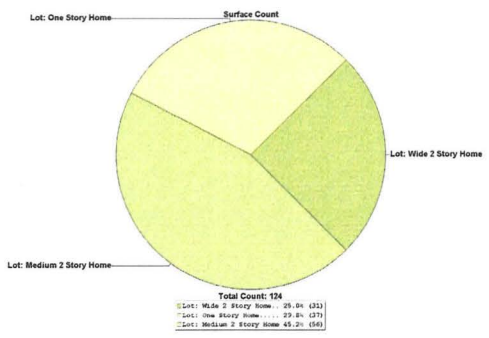
Attachment Q: Site Design

handed out at 10/23/17 mtg

3.(b)

Park Structure	0.1%	2,781 ft²	(0.0638 acres)	TownHome Building	0.3%	11,200 ft²	(0.2571 acres)
Pedestrian: 6' Wide Main Trail	0.4%	11,678 ft²	(0.2681 acres)	Vehicular: BayHome Driveway	0.4%	13,378 ft²	(0.3071 acres)
Rear Yard Patio (Typ)	0.5%	16,164 ft²	(0.3711 acres)	Front Porch (Typical)	0.5%	16,547 ft²	(0.3799 acres)
Street Leading to Park	0.6%	18,800 ft²	(0.4316 acres)	Vehicular: TownHome Drive	0.6%	21,452 ft²	(0.4925 acres)
Park Area Public Parking	0.8%	25,364 ft²	(0.5823 acres)	Vehicular: 24' Wide Private Dr	0.8%	25,683 ft²	(0.5896 acres)
Walks in the park	1.3%	42,339 ft²	(0.9720 acres)	BayHome Pad	1.5%	48,693 ft²	(1.1178 acres)
Pedestrian: 5' Wide Sidewalk	1.6%	52,308 ft²	(1.2008 acres)	Vehicular: 30' Street Pavement	3.6%	120,805 ft²	(2.7733 acres)
Vehicular: 36' Street Pavement	4.6%	151,068 ft²	(3.4680 acres)	Vehicular: Driveways	4.9%	161,052 ft²	(3.6972 acres)
Single Family Home (Typ)	8.5%	281,950 ft²	(6.4727 acres)	Pervious	69.2%	2,295,880 ft²	(52.7062 acres)

1" = 80 feet



Modified 10_5_2017 minor walks

FDG

Forward Development Group, LLC
161 Horizon Drive, Suite 101A, Verona, WI 53593
1.608.848.9050

Highlands of Netherwood
Oregon, Wisconsin

Rick Harrison Site Design Studio

LandMentor

Total Number of attached townhomes	14
Total Number of Single Family Detached Townhomes (lots 36' wide)	25
Total Number of Single Family Lots (Average 13,181 sq.ft. – 9,000 sq.ft. min.)	124
Total Residential Units	163
Overall Area (Gross – to street centerlines)	76.15107 acres
Total Area of City Park Land	14.33178 acres
Net Residential Area (including all street right-of-way)	61.81929 acres
Density (163/61.82) 2.63 units/acre	
Linear feet of street	7,865'

Notes:
Streets: All streets shown have a 60' wide right-of-way. An additional utility easement is added to equal a 82' wide path – same as a standard 66' wide street. Cypress Way is 36' wide pavement, all other streets are 30' wide except North Bergamont Blvd.

Side Yard Setbacks: Because most homes are at extreme angles to each other, on average the separation is well over the 20' minimum between buildings. Homes that are 15 degrees or greater thus have a minimum 'pad' separation of 15', and less than 15 degrees have a minimum 'pad' separation of 20'. Homes rarely extend the full limits of the pad, so actual separation will be greater. Home pad width allows for the bump-out of the 3rd car garage stall.

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