
**Staff Analysis of Proposed Amendment to the
Dane County Land Use and Transportation Plan and Dane County Water Quality
Plan, Revising the Northern Urban Service Area Boundary and
Environmental Corridors in the Village of DeForest**

1) Existing Conditions

a) Land Use

The requested amendment area is located southeast of the developed portions of the Village of DeForest and northwest of the commercial and industrial development at the confluence of HWY-51, HWY-19, and I-30/90. The amendment area is bordered north and west by the Village of Windsor. The 40 acre site is surrounded on all four sides by the Northern Urban Service Area as well as the MMSD service territory.

Surrounding Land Uses Include:

- North— Agriculture (Planned use: Single- and Multi-Family)
- South— Commercial (Business Park: Bell Labs, ABC Supply Co., 5N Plus, Event Essentials, Neesvig's)
- West— Single-Family Residential
- East— Commercial (A+ Storage DeForest, AG Systems, Circle B Mulch Inc., Royal Recycling, GCR Tires & Service)

Land Use	Existing (Acres)	Env. Corridor (Acres)	Proposed (Acres)
Agriculture	37.2		
Single-Family Residential			6.0
Two-Family Residential			1.0
Multi-Family Residential			1.8
Commercial			17.9
Parks		0.8	
Right-of-Way	3.6		9.8
Stormwater Management		3.4	
TOTAL	40.8	4.2	36.6 (net dev.)

b) Cultural and Historic Sites

There are no recorded archaeological sites or cemeteries recorded within the amendment area. Large portions of the parcel were surveyed in association with improvements along USH 51 in 2002 and 2009, with negative results.

c) Transportation System

The major roadways serving the amendment area are North Towne Road, Windsor Road, State Trunk Highway (STH) 19, and U.S. Highway (USH) 51. North Towne Road, when completed, will run through the amendment area and provide the main access to it. It is a two to four lane north-south collector that parallels U.S. Highway (USH) 51. North Towne Road connects to State Trunk Highway (STH) 19, a two to four lane east-west principal

arterial located three-fourths of a mile to the south and Windsor Road, a two-lane east-west minor arterial located one-half mile to the north. USH 51 is located on the eastern boundary of the amendment area and is accessible via STH 19 and Windsor Road.

Public transportation is not available within the Village of DeForest. There is currently one state vanpool route that transports DeForest area commuters to downtown Madison and the UW-Madison campus. The Madison Area Transportation Planning Board's (MATPB) Rideshare Etc. program provides ride-matching services for individuals interested in car- or vanpooling. Dane County provides limited specialized group-ride services for seniors and people with disabilities to nutrition sites, senior center activities, adult day care, and shopping.

The conversion of USH 51 (STH 19 to CTH V) to a freeway was completed in 2014. The section of North Towne Road within the Windsor Crossing development, located north of the amendment area, was completed in 2015. The section of North Towne Road within North Towne Corporate Park, located to the south, is largely constructed. The completed sections of North Towne Road have an urban cross section with curb and gutter, a multi-use path on the east side, and sidewalk on the west side. The residential neighborhood located northwest of the amendment area was developed with sidewalks on both sides of the local streets.

d) Natural Resources

The proposed amendment area is located in the Yahara River and Lake Mendota Basin (see Map 5). Wastewater from the Village of DeForest is treated at the Madison Metropolitan Sewerage District Wastewater Treatment Facility and the treated effluent is discharged to Badfish Creek. There are no wetlands, waterbodies, hydric soils, or floodplains located within the amendment area.

Yahara River Upstream from Lake Mendota

The northwest third of the amendment area currently drains to a 2.3 mile intermittent stream that flows through about 54 acres of wetlands before emptying into Lake Windsor. The remaining two-thirds of the amendment area drains to a constructed drainage channel west of North Towne Road before emptying into the 2,000-plus acre Cherokee Marsh and Lake Mendota. Lake Windsor is tributary to the Yahara River upstream of Lake Mendota, which continues downstream through the Yahara Chain of Lakes to join the Rock River in Rock County. The tributary stream, known by the Department of Natural Resources (DNR) as the Yahara River-Windsor Channel, drains an area of intensively cultivated land and, more recently, increased urban development. It is classified as a Fish and Aquatic Life (FAL) waterbody. FAL waters do not have a specific use designation but are considered fishable and swimmable. Its current condition has not been determined by the DNR water monitoring program.

Lake Windsor is a 9 acre, shallow (6 foot maximum depth) impoundment at the downstream end of the Yahara River-Windsor Channel. It is classified as an FAL waterbody. Lake Windsor was created as part of a residential subdivision. The shoreline is entirely developed. Lake water quality is considered poor but not impaired. The water is turbid and fertile and algae blooms occur. The lake was once managed for trout under a private fish hatchery license though trout survival was marginal. The turbidity of the water indicates that carp may be present. Access is limited to residents of the adjoining subdivision. It is managed for fishing and swimming. A Lake Windsor Area Inland Lake and Rehabilitation District was formed in 1989.

The amendment area ultimately drains to the section of the Yahara River below Lake Windsor. This section originates in the marshy areas of Columbia County and flows as a small meandering creek through extensively farmed land and some urban development where it empties into Cherokee Marsh and Lake Mendota. This 16 mile section of the river from its headwaters to its confluence with Token Creek in Cherokee Marsh (and beyond) is categorized as a Warm Water Sport Fishery (WWSF) by the DNR. Its condition is considered poor. This section of the river is listed as a 303(d) Impaired Water due to chronic aquatic toxicity from unknown sources. Identified pollutants include total phosphorus and chloride. A Total Maximum Daily Load (TMDL) has been established for this segment along with the other waters associated with the greater Rock River TMDL project. In addition, the Yahara Chain of Lakes has a long history of lake levels that frequently exceed the DNR lake level limits. This is because of the limited capacity of the system to convey large amounts of water combined with the historic agricultural ditching of wetlands and the runoff from urban development in the watershed prior to current stormwater management requirements.

Groundwater modeling, using the regional groundwater model developed by the Wisconsin Geological and Natural History Survey, shows that baseflow in the Yahara River downstream of the amendment area (see Map 9) has decreased from 21.9 cfs during pre-development conditions (no well pumping) to 20.4 cfs in 2010 due to the cumulative effects of well water withdrawals in the groundwatershed.

Token Creek

Token Creek is a spring-fed tributary to the Yahara River that originates in north central Dane County near Sun Prairie. It is 10 miles long with a 25.3 square mile drainage area. The creek provides nearly half of the baseflow for the Yahara River and Lake Mendota. Token Creek has a diverse fishery containing warmwater, coldwater, forage fish, and rough fish species. Its condition is generally fair. The DNR has identified the first three miles upstream from the Yahara River as supporting a WWSF, with the potential of becoming a Class III trout stream. The next 3.5 mile segment is identified as supporting a Class III fishery with the potential of becoming a Class II trout stream. The remaining reach of about 3.3 miles upstream is identified as being a WWSF with the potential of supporting a coldwater fishery. Token Creek is one of the few trout streams in the glaciated part of Dane County. Token Creek was placed on the state's 303(d) Impaired Waters list in 1998. It was listed because of water quality impairments due to excessive sediment and suspended solids loading and the partially failed Token Creek millpond dam formed an obstruction to fish passage. The dam was removed in 2005. The section of Token Creek above the former millpond was assessed during the 2016 303(d) listing cycle and is proposed to be added to the 303(d) list due to total phosphorus pollution. While total phosphorus sample data exceed 2016 WisCALM listing criteria for the FAL use, the available biological data do not currently indicate impairment.

In 2003, the EPA approved a TMDL plan for Token Creek which include goals for restoring stream morphology and habitat and managing and reducing sediment and other pollutant loading from both agricultural and urban lands. The DNR has since added a goal of restoring a native brook trout fishery in the reach downstream of Culver Springs. Brook trout are very pollution intolerant coldwater sport fish. Token Creek has been the focus of significant public and private expenditures of funding and volunteer efforts directed at protecting and restoring this unique resource.

Groundwater modeling using the regional groundwater model shows that baseflow in Token Creek has decreased 11.6% from pre-development conditions (19.9 cfs) to 2010 conditions (17.6 cfs) at STH 51 and 12.4% from pre-development conditions (8.9 cfs) to 2010

conditions (7.8 cfs) at Portage Road due to the cumulative effects of well water withdrawals in the region.

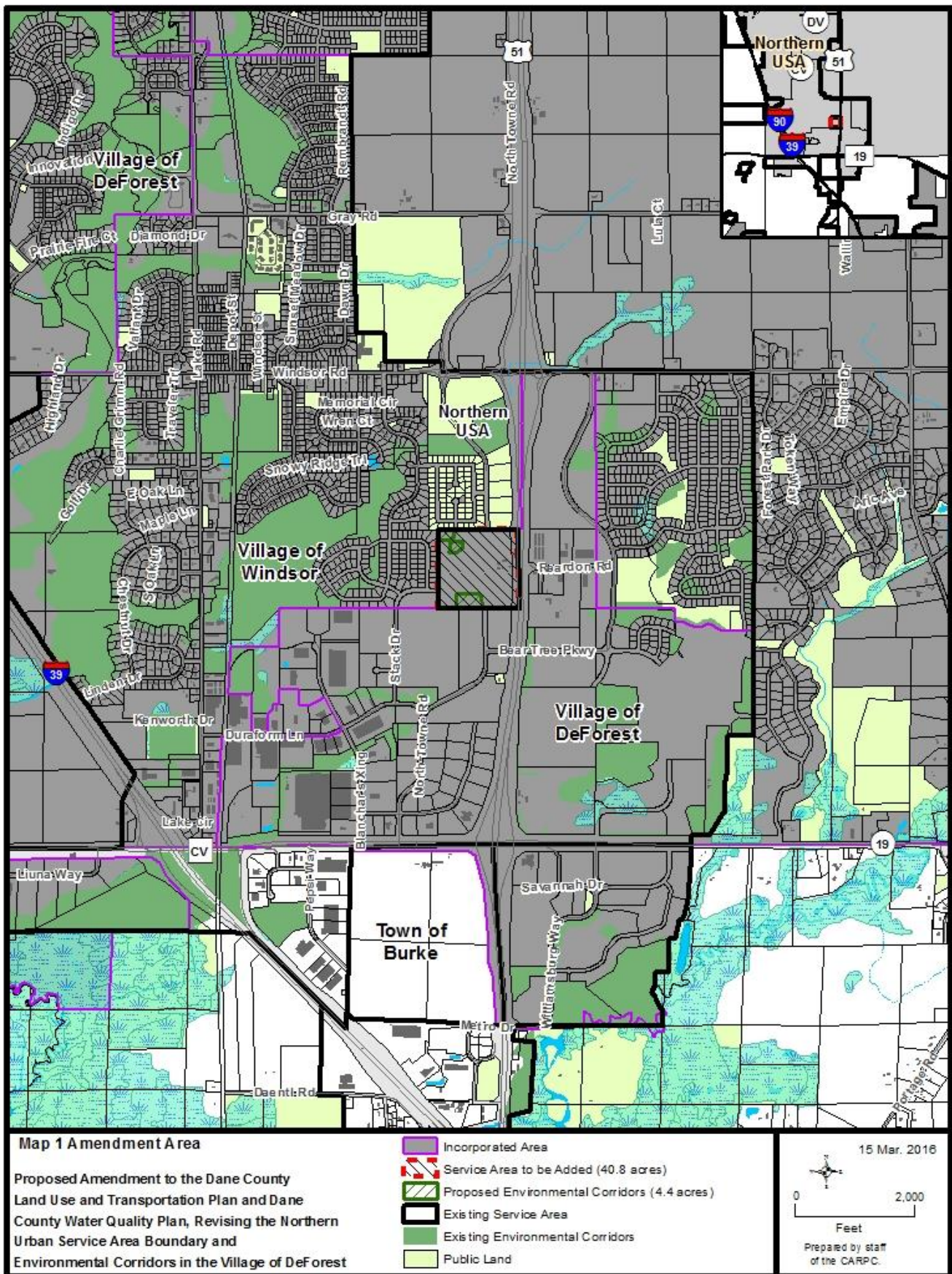
Oregon Branch / Badfish Creek

Treated effluent from the Madison Metropolitan Sewerage District is discharged to a ditch to the Oregon Branch of Badfish Creek. Its designated use is Limited Aquatic Life (LAL) by the DNR and its current use is as a FAL waterbody. The ditch, Oregon Branch, and Badfish Creek are all included on the state 303(d) list of impaired waters for contaminated sediment and contaminated fish tissue due to historical PCB pollution. Badfish Creek is also on the 303(d) list for total phosphorus from nonpoint source pollution.

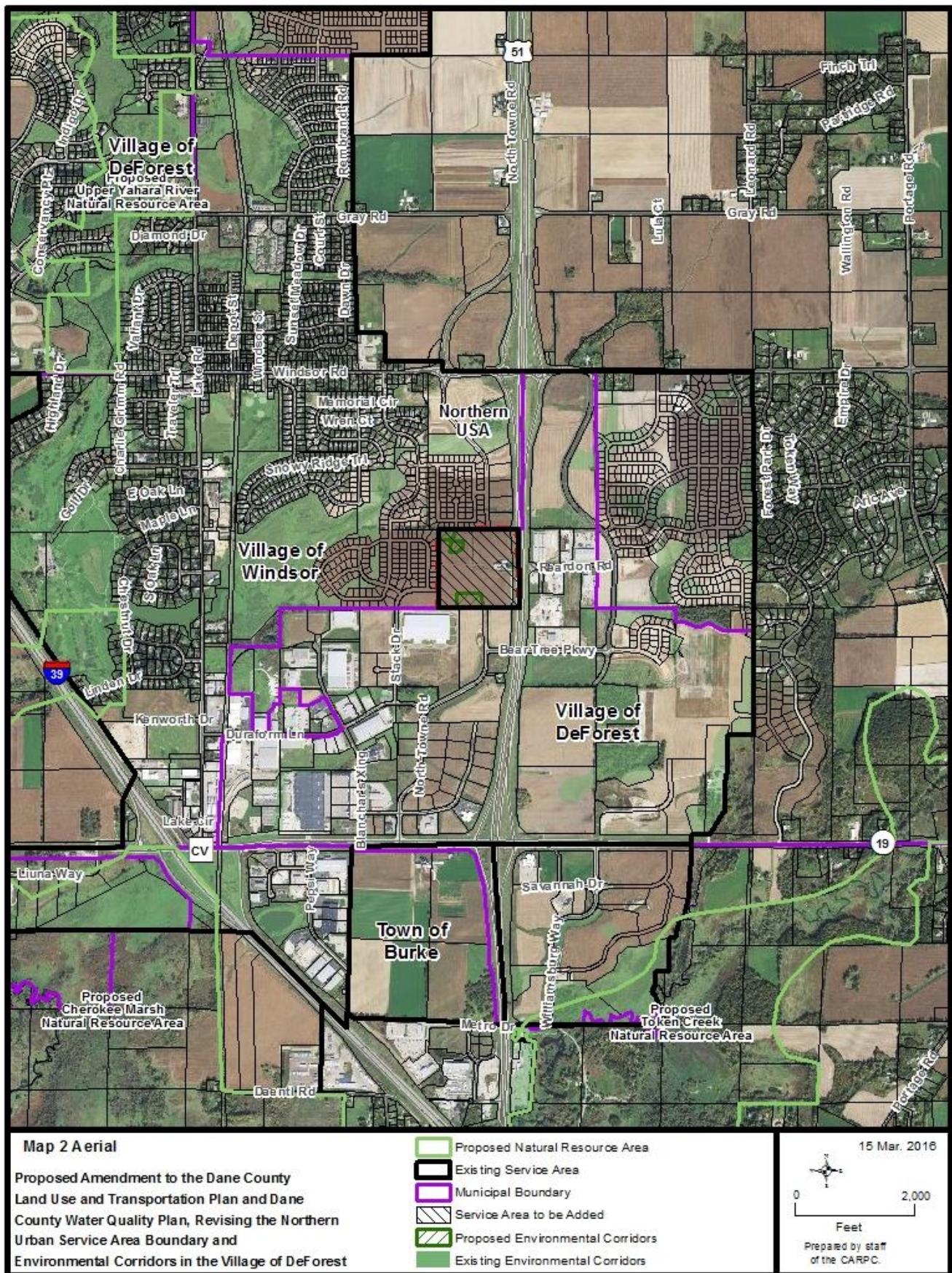
Endangered Resources

The DNR Bureau of Endangered Resources maintains a database representing the known occurrences of rare species and natural communities that have been recorded in the Wisconsin Natural Heritage Inventory (NHI). A screening review of this database conducted by CARPC staff did not identify any Threatened, Endangered, or species of Special Concern that have the potential to occur in the proposed amendment area.

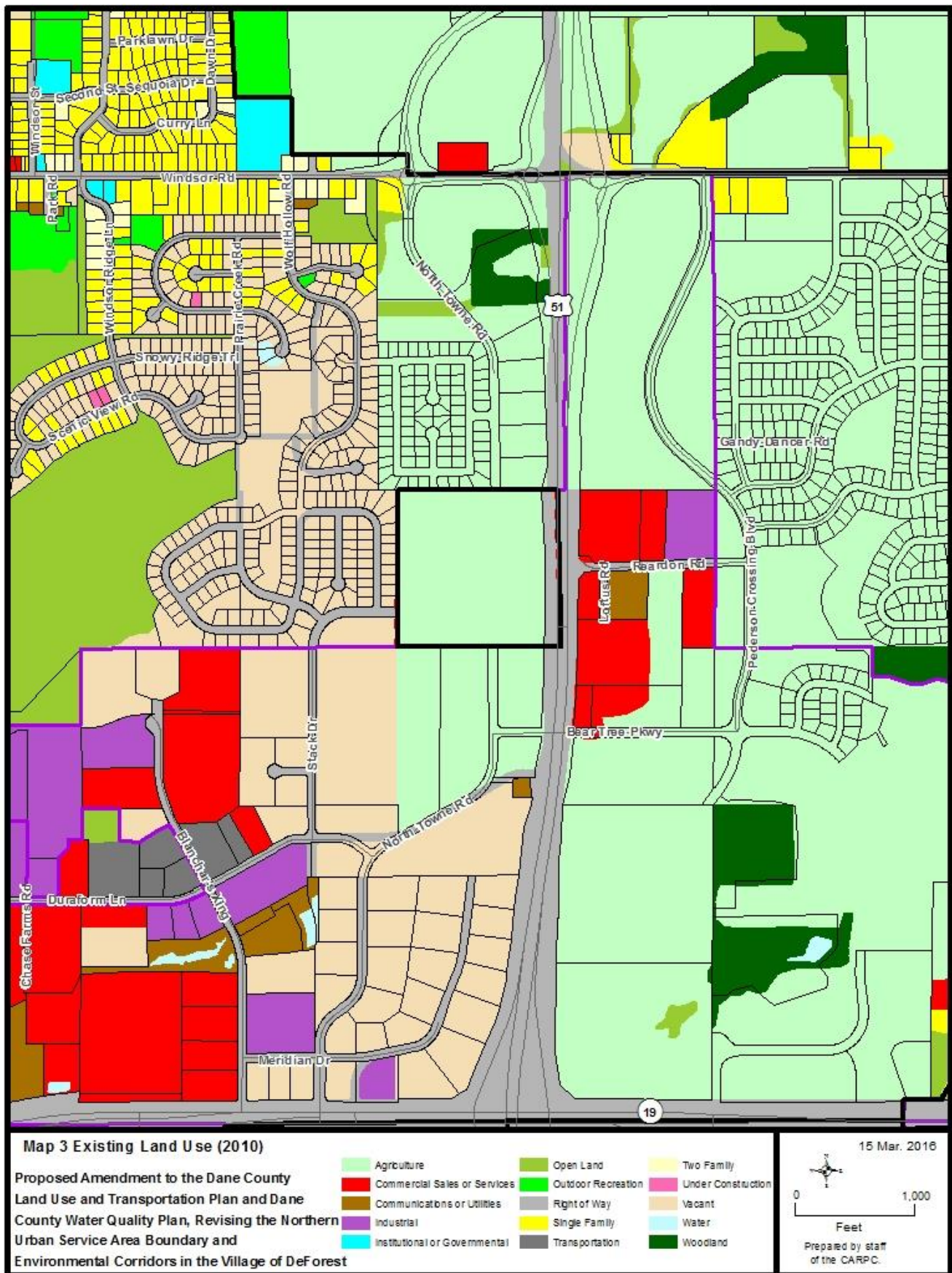
Map 1 - Amendment Area



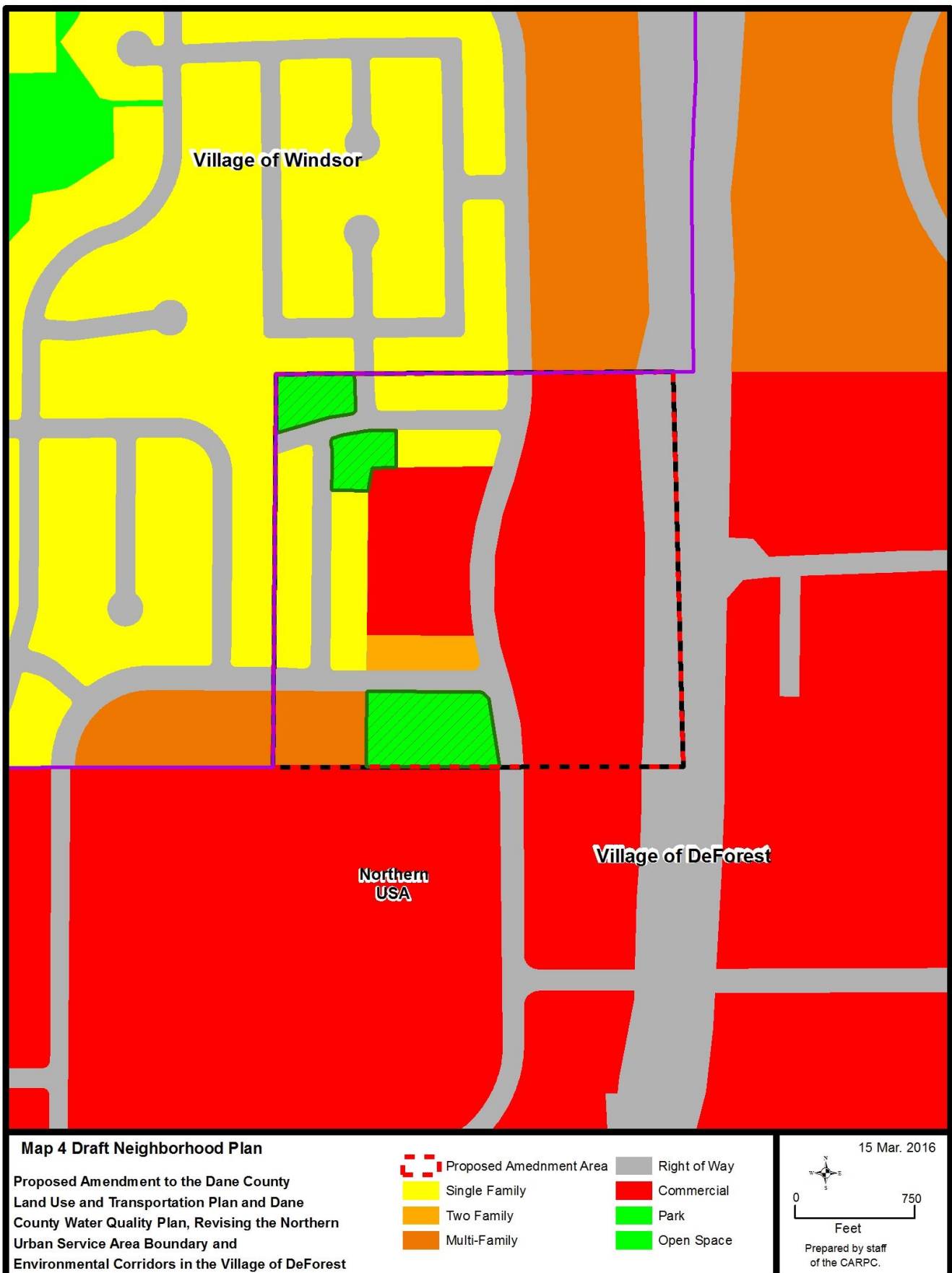
Map 2 – Aerial



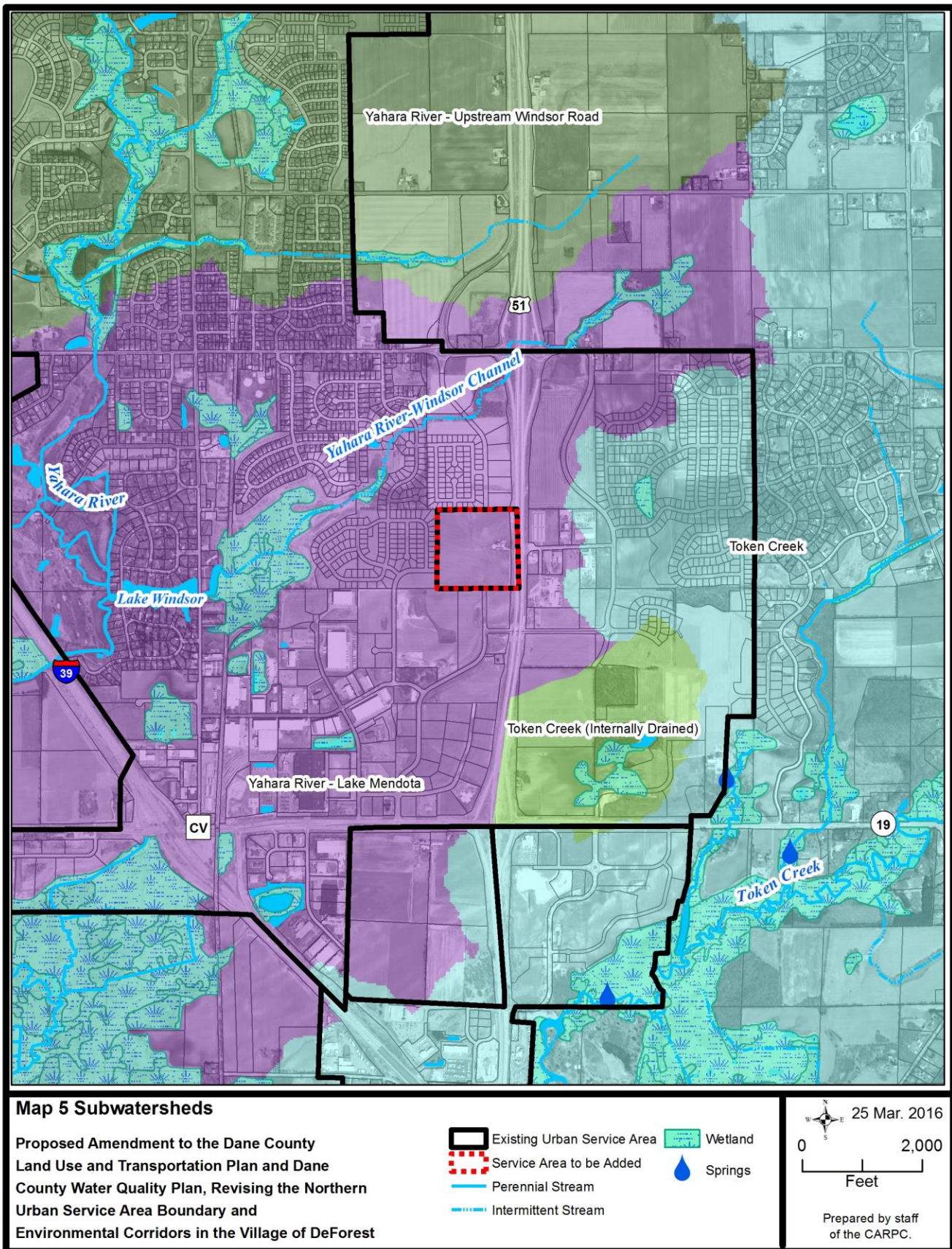
Map 3 – Existing Land Use



Map 4 - Draft Neighborhood Plan



Map 5 - Subwatershed Map



Soils and Geology

The amendment area is located in the Bristol Till Plain. The Land Type Associations of Wisconsin classifies the surficial geology of this area as undulating till plain with low drumlins and scattered wetlands and bedrock knolls. Surface elevations in the amendment area range from around 930 feet to 972 feet. There are no steep slopes in the amendment area (see Map 6).

According to the Natural Resource Conservation Service (NRCS) Soil Survey of Dane County, the soils in the amendment area are in the Plano – Ringwood – Griswold association. These soils are moderately well drained and well drained, deep silt loams and loams. Table 2 shows detailed classification for soils in the amendment area (see Map 7). Table 3 shows important soil characteristics for the amendment area (see Map 7).

According to Wisconsin Geological and Natural History Survey mapping, the bedrock in the majority of the amendment area is in the Ancell Group, which is quartz sandstone, dolomitic siltstone, silty dolomite, and sandy dolomite. It consists of two formations, the Jordan and the underlying St. Lawrence, which were combined as one mapping unit. The thickness is about 75 feet where not eroded. The depth to bedrock is 5 to 50 feet throughout the amendment area.

As is common throughout much of the upper Midwest, karst features such as enlarged bedrock fractures are prevalent in the local dolomite uplands. Karst features such as vertical fractures and conduits provide primary pathways for groundwater movement and can dramatically increase groundwater susceptibility when present. The location of karst features are difficult to predict, and the thickness and type of the overlying soil greatly affects how much water drains into them. Where clay soils are thick, infiltration rates are likely to be very low. However, where bedrock fractures are near the surface infiltration rates can be very high. Based on the WGNHS Karst Potential map the amendment area is within an area where the depth to bedrock over potential karst units is 18 to 55 feet. Therefore karst features are not a concern in this area.

Table 2
Soils Classification

Soil	% of Area	General Characteristics
<i>Plano Silt Loam; PnB, PnC2</i>	44.3	Deep, well drained and moderately well drained, nearly level to sloping soils on glaciated uplands. Soils have high fertility, moderate permeability, and a moderate to severe hazard of erosion. Poses moderate limitations for development due to low bearing capacity.
<i>Griswold Loam; GwC</i>	42.4	Deep, well drained gently sloping to moderate steep soils on glaciated. Soils have medium fertility, moderate permeability, and a severe hazard of erosion. Poses no limitations for development due to low bearing capacity.
<i>Ringwood Silt Loam; RnB</i>	13.3	Deep, well drained, gently sloping and sloping soils on glaciated uplands. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses no limitations for development due to low bearing capacity.
<i>Pecatonica Silt Loam; PeB</i>	<0.1	Deep, well drained, gently sloping and sloping soils on glaciated uplands and high benches in streams. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses no limitations for development due to low bearing capacity.

Source: Soil Survey Geographic data for Dane County developed by the USDA Natural Resources Conservation Service

Table 3
Soils Characteristics

Characteristic	Soil Map Symbols (see Map 7)	% of Area
Prime Agricultural Soils	GwC, PnB, PnC2	86.7
Hydric Soils (Indicates Potential / Restorable Wetlands)	None	0
Soils with Seasonal High Water Table (< 5')	None	0
Soils Associated with Steep Slopes (> 12%)	None	0
Soils Associated with Shallow Bedrock (< 5')	None	0
Poorly Drained Soils	None	0
Best Potential for High Rates of Infiltration in Subsoils	GwC, RnB, PeB, PnB, PnC2	100

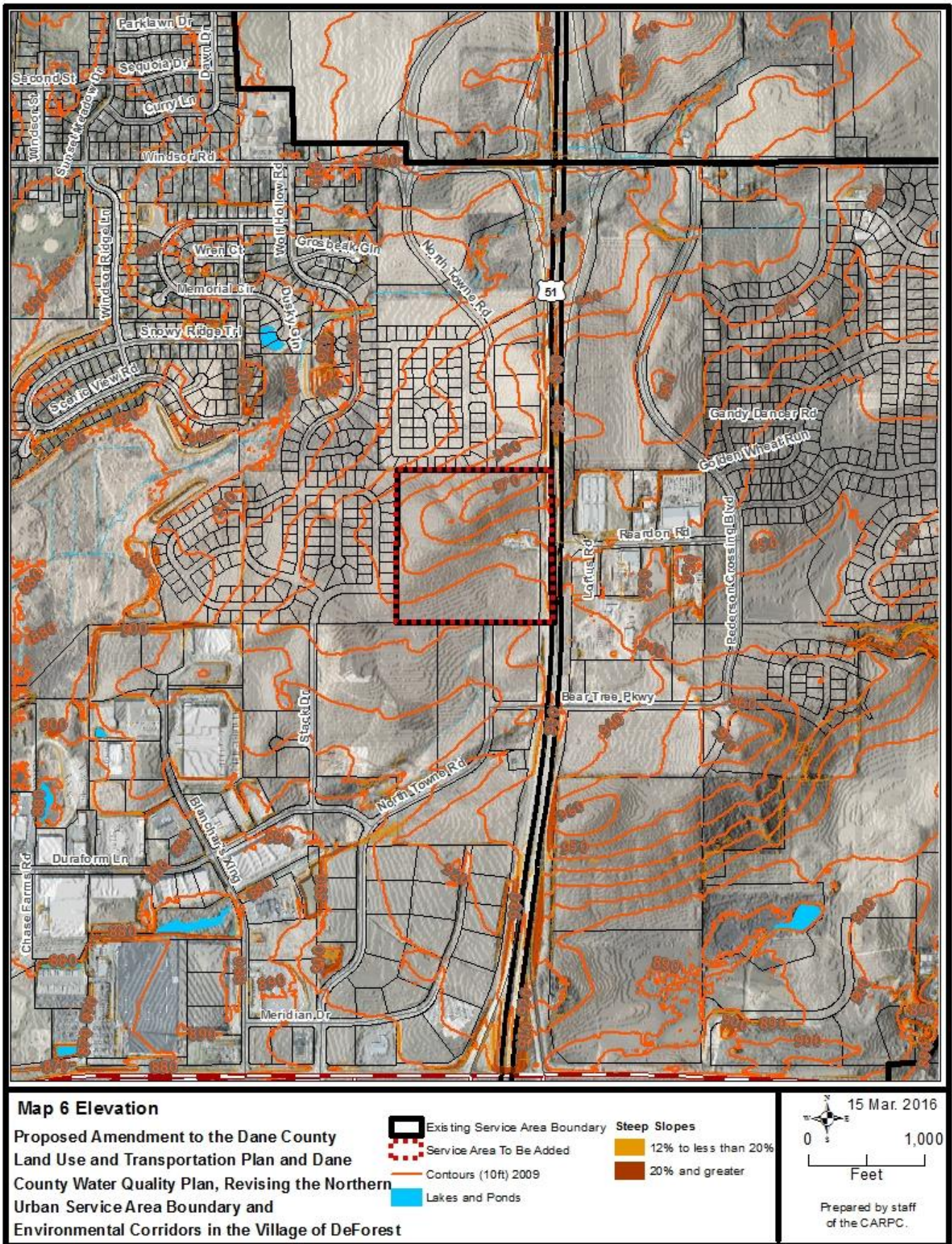
Source: Soil Survey Geographic data for Dane County developed by the USDA Natural Resources Conservation Service

Groundwater Recharge

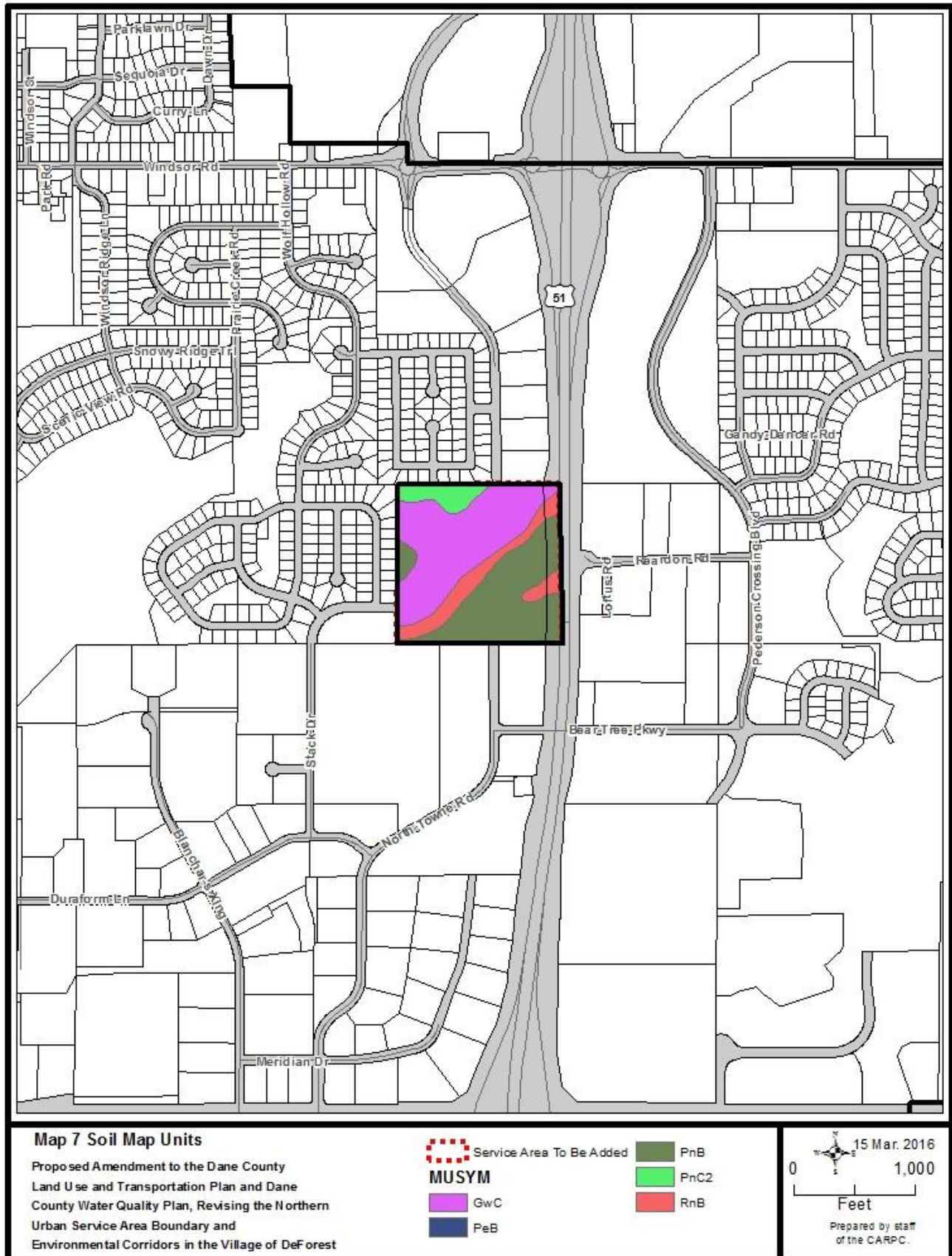
There are no hydric soils or areas with seasonal high water table within 5 feet of the land surface based on NRCS soil survey data. The site does not have the potential for a seasonal high water table within 5 feet of the surface that would limit infiltration in these areas to roof runoff or stormwater management practices using engineered soil with at least 10% fines.

In 2012, the Wisconsin Geological and Natural History Survey published a report estimating the existing groundwater recharge rates in Dane County based on the soil water balance method. The study estimates that the existing groundwater recharge rate in the amendment area ranges from 9.2 to 9.6 inches per year.

Map 6 - Elevations



Map 7 - Soil Type



2) Proposed Urban Services

a) Land Utilization

Residential land uses proposed are an estimated 107 housing units divided between three categories: Single-family, Multi-Family Residential/Commercial Flex, and Senior Housing. An estimated 27 of those units will develop as single-family on 6.3 acres, a density of 4.3 dwelling units per acre. Multi-family unit count and density may vary depending on which of the identified sites. Densities range from 12—16 dwelling units per acre for multi-family uses; senior housing would have a maximum density of 10 units per acre. The overall average residential density within the Northern Urban Service Area in 2010 was 4.1 units per acre.

Commercial land uses would include “neighborhood-compatible” light assembly and contractor uses on around 13 acres. Uses within the “Commercial Flex” area (5.6 acres) would again be those that are “neighborhood-compatible.” This is defined by the applicant as:

Businesses that benefit from that combination of visibility and access—along with a location along a major collector street and among residents—will be attracted to the area. Uses that may be promoted and marketable along this stretch include offices; clinics; indoor plumbing, electrical and other similar contractors; contractor suppliers; vehicle and equipment sales; and light assembly (particularly those with a retail or showroom component and particularly away from residential uses).

b) Phasing

The size of this amendment request does not require a phasing plan, nor was one suggested in the application materials submitted. Adjacent developments are currently under construction; full build-out might reasonably be expected within a 5—10 year period.

c) Public Safety Services and Other City Services.

The full range of public services will be/will continue to be provided to the amendment area. Village services include: residential waste collection (Commercial and industrial users are expected to privately contract for waste and recycling collection.), streets and public works maintenance, in addition to protective services. The Public Safety Building in downtown DeForest houses the DeForest Police Department, the DeForest/Windsor Municipal Court, and the DeForest Area Fire and EMS District. The Public Safety Building is located four miles north of the proposed amendment. The DeForest Police Department provides service 24 hours a day, seven days a week with 17 full time police officers. The DeForest Area Fire and EMS Department serves the communities of DeForest, Windsor, Vienna, Leeds, as well as surrounding communities. The station is staffed between the hours of 6 a.m. and 10 p.m. on weekdays. The Department consists of over 40 professional volunteers and four full-time employees. Most DeForest Area Fire and EMS Department personnel are cross-trained as both Firefighters and Emergency Medical Technicians (EMTs). Average turn-out time (time from dispatch to enroute) for 2012 was 5:40 minutes.

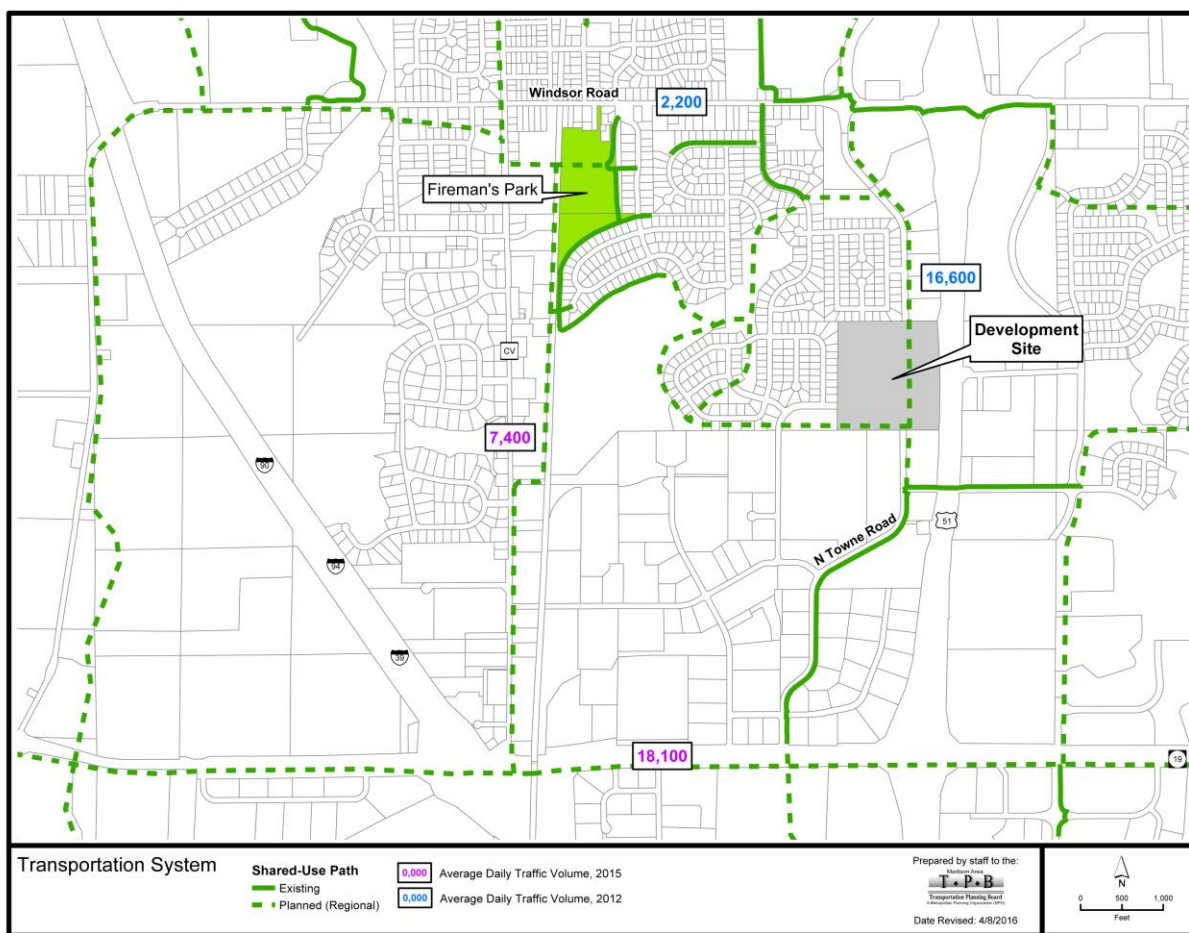
d) Urban Transportation System

The last remaining section of North Towne Road running through the amendment area will be constructed with the proposed development. Local streets will connect with the adjacent single-family residential subdivisions planned to the north and west. Local streets serving the amendment area will have a 66-foot wide right-of-way with sidewalk. North Towne Road will be constructed with a sidewalk on its west side and a shared-use path on its east side, consistent with the cross section of the existing segments of the roadway.

An east-west shared-use path is planned along the southern boundary of the amendment area. The path will connect to the North Towne Road side path and the larger regional path system identified in the MATPB's *Bicycle Transportation Plan for the Madison Metropolitan Area* and the Village's *Comprehensive Plan*. The development plan also provides for a pedestrian easement connecting the Pleasant Hill Estates subdivision to the site and planned park.

The Village's *Comprehensive Plan* identifies a future east-west rail spur just south of the property that will connect the Canadian Pacific rail line with the North Towne Corporate Park.

Public transportation is not currently offered in or near the amendment area. Future transit service may connect DeForest and Windsor to Madison via CTH CV, Windsor Road, and USH 51 with bus stops about a mile from the amendment area and a park-and-ride lot nearby. The service would likely be commuter oriented during the morning and afternoon weekday peak periods.



e) *Parks and Open Space*

The proposal includes a 0.80 acre public mini-park. The mini-park is advised in the shown location by the Future DeForest Parks and Trails map of the Village's *Park and Open Space Plan*. Fireman's Park, Sunset Meadows Park, The Upper Yahara River Trail, and Conservancy Commons Park (NW), Token Creek County Park (SE), Token Creek Preserve Park (E), and Cherokee Marsh (SW) are all within 5 miles driving distance of the proposed amendment area. Upon completion of the road network in the adjoining neighborhoods, Fireman's Park may be within walking distance of the area, currently a one mile radius.

f) *Public Water System*

The Village water utility provides municipal water through two distinct systems. The proposed amendment area will be served by the south water system. The south system includes wells #1 and #5. The average 2014 water use from well #1 (550 feet deep) was 46 gpm and from well #5 (765 feet deep) was 28 gpm, for a combined yield of 74 gpm. Storage for the south water system is provided by an elevated 200,000 gallon tank. The tank, at the middle of its operating capacity, provides static pressures ranging from 35 psi at the highest elevation within the amendment site to 55 psi at the lowest elevation. This range of static pressures falls within the acceptable range of 35 psi to 100 psi per Chapter NR 811 of the Wisconsin Administrative Code.

The Village of DeForest will provide public water to the amendment area through a 722 foot extension of a 12-inch main from North Towne Road and Bear Tree Parkway to the southern boundary of the Pleasant Hill DeForest Land. The main will be extended within the project boundary along North Towne Road to the northern boundary. New water main also will be extended to the east from the proposed twelve inch main in North Towne Road across USH 51 to Reardon Road to connect to an existing water main in Pederson Crossing Boulevard. The water main will be looped within the Pleasant Hill DeForest Land.

The 2014 average demand for the south water system was 47,630 gpd (33 gpm) with a maximum day demand of 243,000 gpd (169 gpm). The estimated average daily water demand for the amendment area will be 25,348 gpd based on 107 residential units with a demand of 124 gpd per unit and 15.1 acres of commercial development with a demand of 800 gal/acre per day. Using a peaking factor of 2, the current estimated peak hourly flow for the South system is 340 gpm and will increase to 410 gpm with the addition of the amendment area. This estimate is reasonably conservative based on the water utility's annual reports to the Public Service Commission.

The 200,000 gallon storage volume is not adequate enough to provide the estimated peak hourly water demand for the Village in addition to 2,000 gallons per minute for 2.5 hours for firefighting purposes with the largest well out of service. The Village Comprehensive Plan, adopted March 3, 2015, provides multiple provisions for improving the reliability of the water system. Included in the short-term planning is an emergency interconnection between the DeForest south water system and the Windsor Utility District # 1 system (2015-2024), a ground reservoir to well #5 (2015-2019), establishing a south water system loop, and establishing a connection between the north and south DeForest water systems along the North Towne Road corridor (2017-2022).

The Village's computer modeling of extending the water distribution system to the Pleasant Hill DeForest Land estimates an available fire flow of 2,200 gpm at a minimum residual pressure of 20 psi. This exceeds the Insurance Services Office (ISO) fire flow guidelines of 750 gpm for single family dwellings where there is at least 31 feet between buildings.

In 2004, the Village of DeForest and the DNR entered into a Memorandum of Understanding (MOU) regarding the use of new and existing wells and their impact on Token Creek. The Village has prepared a plan for conforming the operation of their water system to the terms of the MOU. The plan also lists the specific requirements of the MOU along with a description of how the Village intends to monitor and report on their compliance.

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VISTA VALLEY

Approved Single-Family and Two-Family Residential

Approved Multi-Family Senior Housing Site-B Unit Buildings

Winlock Bike Trail

LOT 1, CSM NO 13651
Bell Laboratories

LOT 2, CSM NO 13651

LOT 1, CSM NO 12988

Collector Road to Future Sanitized Intersection at S.T.H. 19.

2016 SANITARY CONSTRUCTION

2016 WATER MAIN CONSTRUCTION

ACKER-BUHLER USA APPLICATION
FUTURE SANITARY AND WATER SERVICE EXHIBIT
VILLAGE OF DEFOREST

vierebicher
architects | engineers | planners

g) Wastewater

Sanitary sewer service will be provided to the proposed development through a 722 foot extension of an 8-inch gravity main from North Towne Road and Bear Tree Parkway to the southern boundary of the amendment area. Once the connection is made to the public system, wastewater will be conveyed through the Village to MMSD's Northeast Interceptor – Highway 19 Extension. The Village's sewer connects to MH14-416, and the interceptor extends from manhole MH14-416 to MH14-134.

The Village estimates that the amendment area will generate an average of 30,840 gpd, including infiltration and inflow. Using a peaking factor of 4, it is estimated that the amendment area would generate a peak flow of 86 gpm. The estimate is consistent with historical wastewater generation rates in the Village. The Village has determined that there is available capacity in their existing sanitary sewer collection system for the proposed amendment area.

Waste Water Treatment Facility

The Madison Metropolitan Sewerage District (MMSD) will provide wastewater treatment for the amendment area. MMSD Pumping Station 14 serves this area. On behalf of MMSD, Strand Associates completed the Pump Station 14 Infiltration/Inflow Study in 2014. Results indicate the average daily and estimated peak flows are below the interceptor capacity. The Nine Springs Treatment Facility has a design capacity of 50 mgd and received an average of 38.6 mgd in 2014, including infiltration and inflow. It is expected to reach capacity around 2030 based on current growth rate assumptions and water use trends. The MMSD has completed a long-range plan that evaluated various options for expanded treatment capacity to serve its current and future service area. For the 20-year planning period, service to this area is expected to remain through current interceptor routes with expanded capacity of the system as the need is foreseen. MMSD has not had any issues meeting its WPDES permit limits for the quality of effluent discharged to Badfish Creek according to their 2014 Compliance Maintenance Annual Report.

In a letter to the Village of DeForest, dated August 20, 2102, MMSD recommended that the Village work to have the amendment area included in the Northern USA as soon as possible to facilitate sewer service to lands in the Village of Windsor to the north that are already in the Northern USA.

h) Stormwater Management System

The preliminary stormwater management plan for the amendment area includes a system of four stormwater management facilities. These facilities will generally be configured as two-cell systems. The first cell in each system will consist of a wet detention basin which will provide water quality treatment (80% TSS reduction) followed by an infiltration basin which will provide for annual stay-on (100% stay-on). It is anticipated that infiltration performance will further reduce TSS (and other pollutants such as Total Phosphorus) from stormwater discharges. Collectively, the two-cell systems will provide peak discharge rate control to account for storms up to and including the 100-yr rainfall event. The stormwater facilities are proposed to be owned and maintained by the Village of DeForest.

Performance Standards

The Village of DeForest proposes stormwater management performance measures to meet or exceed standards required by the State of Wisconsin (NR 151), Dane County (Chapter 14), and Village of DeForest (Chapter 24) stormwater regulations, as follows:

- 1) Require post-construction sediment control (reduce total suspended solids leaving the site by at least 80%, with a minimum of 60% of that control occurring in a retention pond prior to infiltration) for the 1-year, 24-hour design storm. This is consistent with the standards currently required by Dane County.
- 2) Require post-construction peak runoff rate control for the 1-, 2-, 5-, 10-, 25- and 100-year, 24-hour design storms to “pre-development” peak runoff rates. This is consistent with the range of design storms currently required by Dane County.
- 3) Require post-development stay-on volume of at least 100% of pre-development stay-on volume. This is more protective than the stay-on standard for new development currently required by Dane County regulations.
- 4) Maintain pre-development groundwater annual recharge rate of 9.2 to 9.6 inches per year for this area as estimated by the Wisconsin Geological and Natural History Survey in a 2012 report titled “Groundwater Recharge in Dane County, Wisconsin Estimated by a GIS-Based Water Balance Model.” This is consistent with the standards currently required by Dane County.
- 5) Require post-construction oil and grease control for commercial developments. Storm water management facilities shall be designed to treat the first 0.5 inches of runoff using the best oil and grease removal technology available. This is consistent with the standards currently required by Dane County.

i) Environmental Corridors

The proposed amendment area does not include any waterbodies, wetlands, hydric soils, or floodplains that are unsuitable for development because of physical or environmental constraints and require preservation in environmental corridors. Approximately 4.4 acres of environmental corridors are proposed for this amendment for park (1 acre) and stormwater management areas (3.4 acres).

3) Impacts and Effects of Proposal

a) Meeting Projected Demand

CARPC's 2040 land demand projections estimate a total of 790 additional acres of residential and 267 acres of non-residential i.e. industrial, commercial, etc. Rights-of-way serving all projected land uses come to a total of 167 acres. At the time of the 2010 Land Use Inventory, there were 589 acres of vacant, subdivided land and 986 acres of land under agricultural uses within the Northern Urban Service Area. A quick visual inspection of these areas indicates that around 175 acres of industrial or commercial lots may yet be undeveloped. With the addition of the proposed 18 acres of commercial, the Northern USA would contain roughly three-quarters of the estimated commercial/industrial demand for the year 2040. At the time of the Land Use Inventory, roughly 1,000 residential lots (275 acres) were identified as being "under construction" or "vacant, subdivided" land. Visual inspection suggests around 700 of those future lots (194 acres) are still undeveloped. Building permit data would seem to corroborate this estimate. Between 2010 and 2015 DeForest added 166 single-family units. Windsor may have contributed as many as 30. At a rate of 30 houses added per year, the Northern USA would fully utilize all available and proposed residential lots by approximately 2040. In terms of meeting specific subsets of residential demand, the development proposed for the amendment area includes a variety of housing types, potentially serving families, singles, seniors, and persons with disabilities. An estimated 2,800 units will be needed to house 5,800 more residents in the Northern USA by 2040. The proposed addition would provide roughly 107 housing units, under a third of which are single-family.

b) School System Impacts

Planned residential development on the Land could generate roughly 35 new students assuming 0.4 students per household and excluding senior housing units. The Land is within the DeForest Area School District. The District maintains seven facilities: Holum Education Center (4 miles north), Eagle Point Elementary (4 miles north), Yahara Elementary (4.5 miles northwest), Morrisonville Elementary (7 miles northwest), Windsor Elementary (1 mile northwest and the elementary school serving the Land), DeForest Middle School (3 miles north), and DeForest High School (3.5 miles north). The District also utilizes the DeForest Area Public Library (3.5 miles northwest) for its alternative education program. Younger students within the expansion area would likely attend Windsor Elementary School. Following a successful 2014 referendum, the DASD will in 2016 begin a major addition and remodel to Windsor Elementary School to increase student enrollment capacity for grades K-4 in this attendance area. The students from this neighborhood would attend both the DeForest Middle School and High School. Both have or will receive STEM addition/remodeling as a result of the same referendum.

c) Transportation System Impacts

The proposal recommends a combination of single-family residential, multi-family residential, office, light industrial, and commercial uses. The mix of commercial uses is uncertain. When developed and fully occupied, the development could generate around 2,500 vehicle trips (inbound and outbound total) on an average weekday, depending upon the mix of uses. In 2012, the AADT volume on USH 51 prior to the expansion and freeway conversion was 16,600 approximately one-quarter mile south of Windsor Road, and the AADT volume on Windsor Road between Windsor Ridge Land and Wolf Hollow Road was 2,200. In 2015, the AADT volume on STH 19 between Pepsi Way and Blanchar's Crossing was 18,100, and the AADT volume on CTH CV between Pine Crest Lane and Cedar Lane was 7,400. There is sufficient capacity on the area roadways to accommodate the traffic from the site.

d) *Surface Water Impacts*

Development typically creates impervious surfaces (i.e., streets, parking areas, and roofs) and has the potential to alter the natural drainage system (e.g., natural swales are replaced by storm sewers) resulting in increased stormwater runoff rates and volumes, as well as reduced infiltration. Development can also cause substantial short-term soil erosion and off-site siltation from construction activities. Scientific research has well documented that without effective mitigation measures, the potential impacts of development on receiving water bodies can include the following:

- Flashier stream flows (i.e., sudden higher peaks)
- Increased frequency and duration of bankfull flows
- Reduced groundwater recharge and stream base flow
- Greater fluctuations in water levels in wetlands
- Increased frequency, level (i.e., elevation), and duration of flooding
- Additional nutrients and urban contaminants entering the receiving water bodies
- Geomorphic changes in receiving streams and wetlands

Natural drainage systems attempt to adapt to the dominant flow conditions. In the absence of mitigation measures, the frequency of bank-full events often increases with urbanization, and the stream attempts to enlarge its cross section to reach a new equilibrium with the increased channel forming flows. Higher flow velocities and volumes increase the erosive force in a channel, which alters streambed and bank stability. This can result in channel incision, bank undercutting, increased bank erosion, and increased sediment transport. The results are often wider, straighter, sediment laden streams, greater water level fluctuations, loss of riparian cover, and degradation of shoreland and aquatic habitat.

If left unmanaged, these changes in hydrology combined with increased urban pollutant loading, can have a dramatic effect on the aquatic ecosystem of streams. It is important to realize that flow is a major determinant of the physical habitat in a stream, which in turn determines the biotic composition of stream communities. A growing body of literature documents that channel geomorphology, habitat structure, and complexity are determined by prevailing flow conditions, which in turn determine the biota that can inhabit the area. This is true for the fish as well as the aquatic insects upon which they feed. Studies of streams affected by urbanization have shown that fish populations either disappear or become dominated by rough fish that can tolerate the associated lower water quality levels.

The Village proposes to mitigate the urban nonpoint source impacts of the proposed development by implementing various stormwater best management practices that are designed and constructed to meet or exceed current standards for pollutant reduction, runoff volumes, peak flows, and groundwater recharge. This will reduce the likely impacts of the proposed development on the receiving waters.

e) *Groundwater Impacts*

Without effective mitigation practices, as natural areas are converted to urban development the ground/surface water balance in streams and wetlands shifts from a groundwater-dominated system to one dominated more and more by surface water runoff. This results in subsequent reductions in stream quality and transitions to more tolerant biological communities.

Table 4. All Municipal Wells

Modeled baseflow results due to current and anticipated future municipal well water withdrawals (cfs)			
Stream	Pre-Development	2010	2040¹
Upper Yahara River	21.9	20.4	19.7
Token Creek @ STH 51	19.9	17.6	16.4
Token Creek @ Portage Rd	8.9	7.8	7.3

Table 5. DeForest Wells Only

Modeled baseflow results due to current and anticipated future municipal well water withdrawals (cfs)			
Stream	Pre-Development	2010	2040¹
Upper Yahara River	21.9	21.5	21.1
Token Creek @ STH 51	19.9	19.7	19.7
Token Creek @ Portage Rd	8.9	8.9	8.9

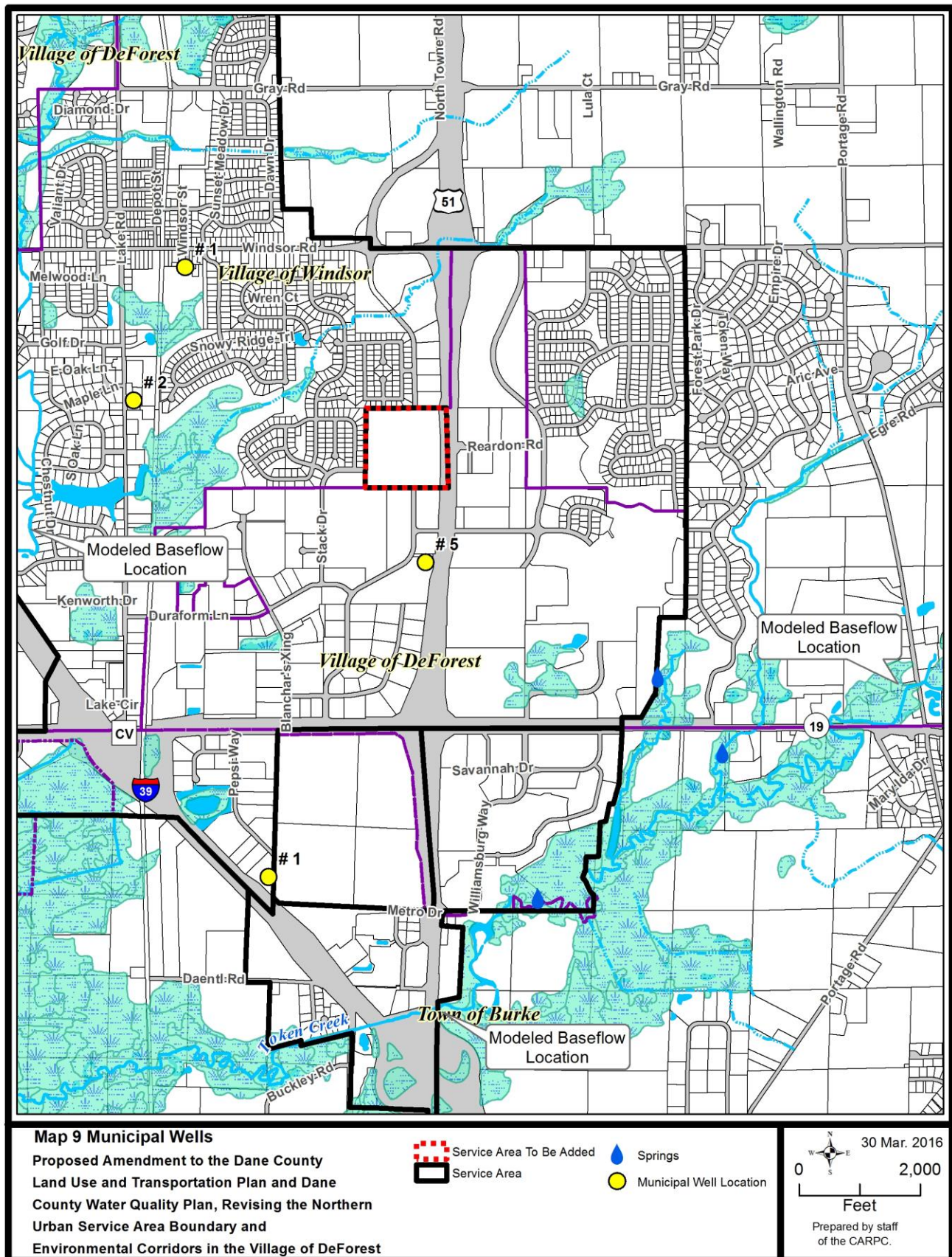
Groundwater modeling indicates that the cumulative effects of year 2010 water well withdrawals from all municipalities have resulted in a 1.5 cfs (6.8%) decline in baseflow in the Yahara River immediately below the confluence with the Yahara River-Windsor Channel (see Map 9 and Table 4) compared to the pre-development (no pumping) baseflow of 21.9 cfs. An additional 0.7 cfs (3%) decline is anticipated by the year 2040, according to modeling, reducing the baseflow to 19.7 cfs. The modeling also indicates that the cumulative effects of year 2010 water well withdrawals have resulted in a 2.3 cfs (11.6%) decline in baseflow in Token Creek just upstream of US Highway 51 (see Map 9) compared to the pre-development (no pumping) baseflow of 19.9 cfs. An additional 1.2 cfs (6.8%) decline is anticipated by the year 2040, according to modeling, reducing the baseflow to 16.4 cfs. Token Creek at Portage Road has experienced a 1.1 cfs (12.4%) decline in 2010 compared to pre-development conditions. An additional 0.5 cfs (6.4%) decline is anticipated by 2040, reducing the baseflow to 7.3 cfs. According to the 2014 DNR report *Ecological Limits of Hydrologic Alteration in Dane County Streams*, significant change in the fish community status from 2010 conditions is not expected to occur as a result of the projected 2040 reduction in baseflow in these sections of the Yahara River or Token Creek.

The loss of baseflow from the cumulative effects of well water pumping is a regional issue, beyond the boundaries of a single Urban Service Area Amendment or even a single municipality. This is illustrated by the comparatively lower baseflow reductions due to just Village of DeForest municipal water well withdrawals shown in Table 5. This issue will be discussed along with potential management options in the update to the *Dane County Groundwater Protection Plan* (Technical Appendix G of the Water Quality Plan) in 2016.

Maintaining pre-development groundwater recharge also helps to maintain baseflow and mitigate this impact. The Village of DeForest proposes to maintain the pre-development annual recharge rate (estimated as 9.2 to 9.6 inches per year for this according to the Wisconsin Geological and Natural History Survey study). Experience has shown that this criterion is generally met when pre-development runoff volume is maintained for the development area through infiltration measures. The Village of DeForest has also adopted a 100% pre-development volume control standard for stormwater runoff to help address the issue of groundwater withdrawals.

¹ Assumes DeForest water system is operated in accordance with their 2004 MOU with DNR.

Map 9 – Municipal Wells and Modeled Baseflow Locations



4) Conclusions and Recommendations

There is sufficient wastewater collection and treatment plant system capacity to serve the proposed amendment area.

In 2004, the Village of DeForest entered into a MOU with the DNR regarding the use of new and existing wells and their impact on Token Creek and other area surface waters. In the MOU, the Village agrees that it will take all reasonable management steps to limit the impacts of their well system on Token Creek, as detailed in the MOU, including the connection of their north and south to allow greater pumping from wells furthest away from Token Creek. This will reduce the likely groundwater withdrawal impacts on the baseflow of area surface waters.

The Village proposes to mitigate the urban nonpoint source impacts of the proposed development by implementing various stormwater best management practices that are designed and constructed to meet or exceed current standards for pollutant reduction, runoff volumes, peak flows, and groundwater recharge. This will reduce the likely urban nonpoint runoff impacts of the proposed development on the receiving waters.

a) Conditions

CARPC staff recommends approval of this amendment, based on the land uses and services proposed, and conditioned on the Village of DeForest's commitment to pursuing the following:

1. Submit a detailed stormwater management plan for CARPC and DCL&WCD staff review and approval prior to any land disturbing activities in the amendment area. The stormwater management plan shall include the following:
 - a. Install stormwater and erosion control practices prior to other land disturbing activities. Protect infiltration practices from compaction and sedimentation during land disturbing activities.
 - b. Control peak rates of runoff for the 1-, 2-, 10-, and 100-year 24-hour design storms to pre-development levels, in accordance with the Dane County Stormwater Ordinance.
 - c. Maintain the post development stay-on volume to at least 100% of the pre-development stay-on volume for the one-year average annual rainfall period, in accordance with the Village of DeForest Stormwater Ordinance.
 - d. Maintain pre-development groundwater recharge rates from the Wisconsin Geological and Natural History Survey's 2012 report, *Groundwater Recharge in Dane County, Wisconsin, Estimated by a GIS-Based Water-Balance Model* (an average of 9.2 to 9.6 inches/year for the amendment area) or by a site specific analysis, in accordance with the Village of DeForest Stormwater Ordinance.
 - e. Provide at least 80% sediment control for the amendment area based on the average annual rainfall record, with a minimum of 60% of that control occurring in a retention pond prior to infiltration, in accordance with the Village of DeForest Stormwater Ordinance.
 - f. Treat the first 0.5 inch of runoff from parking lots to control oil and grease, in accordance with the Village of DeForest Stormwater Ordinance.

2. Stormwater management facilities shall be placed in public outlots whenever feasible and designated as environmental corridor. Easements and perpetual legal maintenance agreements with the Village, to allow the Village to maintain stormwater management facilities if owners fail to do so, shall be provided for any facilities located on private property.
3. Continue to operate the municipal water system in compliance with the 2004 MOU between the Village of DeForest and the DNR regarding the use of new and existing wells and their potential impact on Token Creek.

b) Recommendations

It is also recommended that the Village of DeForest pursue the following:

1. Implement the water system improvements identified in the 2011 Joint Water Utility System Study and the Village's Comprehensive Plan.
2. Work with CARPC staff to update the Village's Long Term Water Supply Plan using the Regional Groundwater Model.
3. Contact the Wisconsin Historical Society *immediately* if Native American burial mounds, unmarked burials or human bone are unearthed during any phase of the project.

5) Review of Advisory CARPC Goals

a) **Consistency with Adopted Plans and Policies.**

The Village of DeForest Planning Commission has found the proposal consistent with its relevant planning documents. Additionally, the proposed amendment is consistent with the 2012 *North Yahara FUDA Study*, *DeForest Comprehensive Plan*, and the *DeForest-Windsor Cooperative Plan*.

b) **Support of Advisory Goals**

The application appears to support, to varying degree, 12 of the 14 advisory elements outlined in the *Dane County Land Use and Transportation Plan*. The remaining two goals do not directly relate to the requested amendment area.

1. Promote the development of balanced communities throughout the county with sufficient commercial, industrial, residential, and open space land to meet the needs of existing and future residents.

For an amendment request that is under 40 acres, the Acker/it includes a very thorough list of land uses. This is due, in part, to the nature of this small infill parcel. The site must transition from and to existing or planned development on its four sides. Developable residential land area within the Northern Urban Service Area (including this proposal) appears adequate to meet the projected population increase. Open space is provided in the plan at a ratio that the Village feels is sufficient for the number of housing units.

2. Promote compact urban development in new areas adjacent to existing urban areas and in the redevelopment or infill development of existing neighborhoods.

n/a

3. Promote the development of functionally and visually distinct communities encouraging compact, mixed-use neighborhoods and the efficient provision of a full range of public services.

While a full range of services are planned and a mixture of uses is proposed, the development in the Villages of DeForest and Windsor is *by design* neither functionally nor visually distinct. Natural areas neighboring DeForest and Windsor are meant to serve as functional separation from Madison, Sun Prairie, and Waunakee.

4. Provide a full range of safe and affordable housing opportunities and choices for all residents throughout the county.

It is presumed that the proposed housing will be built to all current safety standards. Sale prices of the residential units is not available. However, given the mixture of types, a range of price points could reasonably be assumed.

5. Provide an integrated, all-mode transportation system which offers the efficient, effective and safe movement of people and goods, and provides mode choice wherever possible while enhancing and, where relevant, preserving the character and livability of the neighborhoods and residential areas where transportation facilities are located.

Efforts are made in the design of the neighborhood to include space for bicyclists and pedestrians.

6. Encourage concentration of employment and activity centers at nodes and along transit corridors to maximize the efficiency of the existing and future transportation system.

The proposed development is adjacent existing commercial/industrial development at the confluence of some of the area's major highways with I-39/I-90.

7. Support and maintain the central urban core as the region's major activity center and seek greater diversity and vitality in that area.

n/a

8. Promote an economic development strategy that will provide suitable employment opportunities and a stable and diversified economic base.

Given the tenants of adjacent development, the proposal appears to have potential for a wide range of employment opportunities.

9. Protect agricultural lands and limit non-farm developments in order to maintain the county as one of the nation's most productive agricultural areas.

While the development itself will convert farmland, there is a large quantity of agricultural lands which are identified as exclusive agricultural districts along the major transportation corridors in the Town of Vienna to the northwest. These areas are mapped over most of the DeForest ETZ. There are approximately seven sections (4,480 acres) of land within DeForest's ETZ.

10. Promote planning and design that preserves and restores environmental functions and protects important environmental, cultural and historic resources.

(See #14 below)

11. Develop and promote a county-wide system of open space corridors as a framework to protect the natural environment and scenic values, and provide outdoor recreation opportunities.

Open space (park) within the amendment request serve a more local population and is not directly linked to a larger system. A proposed multi-use trail to the east of North Towne Road, however, does connect to the DeForest-Windsor Bike Trail. Potential connection to a commuter path along Highway 151 is also cited in the application.

12. Promote, conserve and restore all water resources in the region as to both quality and quantity.

(See #14 below)

13. Promote a sustainable capital area region. A sustainable region is one that is far-seeing enough, flexible enough, and wise enough to maintain and enhance its physical, environmental, and social systems of support.

The concept of “sustainability” and related terminology is not directly used or cited as a guiding principle in the application. However, the concept of flexibility with regards to land use mixtures is discussed. The application states that the development plan must be flexible due to the transitional nature of the site, uncertainty about the residential market, and potential tenants’ needs.

14. The CARPC shall work with communities to update the Dane County Water Quality Plan. In addition to the elements required by NR 121 of the Wisconsin Administrative Code, the Water Quality Plan shall also define areas that should be protected from development based on provisions to protect water quality as contained in NR 121 of the Wisconsin Administrative Code. The Plan shall also define areas that can be developed with measures to protect, restore or minimize degradation of water quality.

The proposed amendment defines areas that are suitable for development with measures to protect areas of concern from adverse impacts on water quality. Areas unsuitable for development due to physical or environmental constraints have been designated for preservation within environmental corridors.

c) *Comments Received and Unresolved Issues*

No comments have been received in response to this amendment request as of the publication of this staff analysis.

d) *Advisory Recommendations.*

1. Continue working with the Village of Windsor and the Towns of Westport, Vienna, and Burke to identify and discuss issues of mutual concern, including cooperative planning and possible boundary agreements. *CARPC staff and commissioners are available to assist in this endeavor.*
2. Consider working with CARPC staff at the appropriate point to update the Environmental Conditions Report (ECR) and Future Urban Development Area (FUDA) plan for the area as a complement to future Comprehensive Plan updates.
3. Also consider drafting a neighborhood plan for the amendment area and other future development areas.
4. It is recommended that sidewalk be constructed on both sides of all planned streets.
5. It is recommended that the easement shown connecting Vista Valley to the planned interior Road B and park be 30-feet wide and a 10-foot path provided to accommodate both bicyclists and pedestrians.