Staff Analysis of a Proposed Amendment to the *Dane County Water Quality Plan* Revising the Sewer Service Area Boundary and Environmental Corridors in the Oregon Urban Service Area

1) Existing Conditions

a) Land Use

The requested amendment area is located between West Netherwood Road and County Highway CC at the northwest corner of the Village of Oregon in the Town of Oregon. (see Map 1). The majority of the requested amendment area is within the Village's Extra Territorial Jurisdiction in the Town of Oregon. The Village of Oregon Comprehensive Plan designates the requested amendment area as "Planned Development." However, no adopted neighborhood plans exist for the area. The 81 acre site is contiguous along its eastern edge with the Oregon Urban Service Area.

Surrounding Land Uses Include:

- North: Agriculture
- South: Agriculture
- West: Agriculture, Rural Residential (Future proposed use: conservation park)
- East: Residential (partially under construction), Institutional (church)

Existing Land Use	Acres
Agriculture	73.6
Residential	5.0
Transportation, Communication, Utilities	2.4
TOTAL	**81.0**

Proposed Land Use	Proposed Acres	Env. Corridor Acres
High-Density Residential	11.2	
Low-Density Residential	40.5	
Parks / Natural Area / Stormwater Management	17.8	16.9
Transportation	11.5	
TOTAL	**81.0**	**16.9**

b) Cultural and Historic Sites

The Wisconsin Historical Society (WHS) has been contacted regarding the presence of any known archaeological sites or cemeteries within the amendment area. Their review letter is included as Attachment 1. No previously identified sites are recorded within the amendment area. In addition, no wetlands, drainages or other landscape features indicative of settlement exist on site.

c) Natural Resources

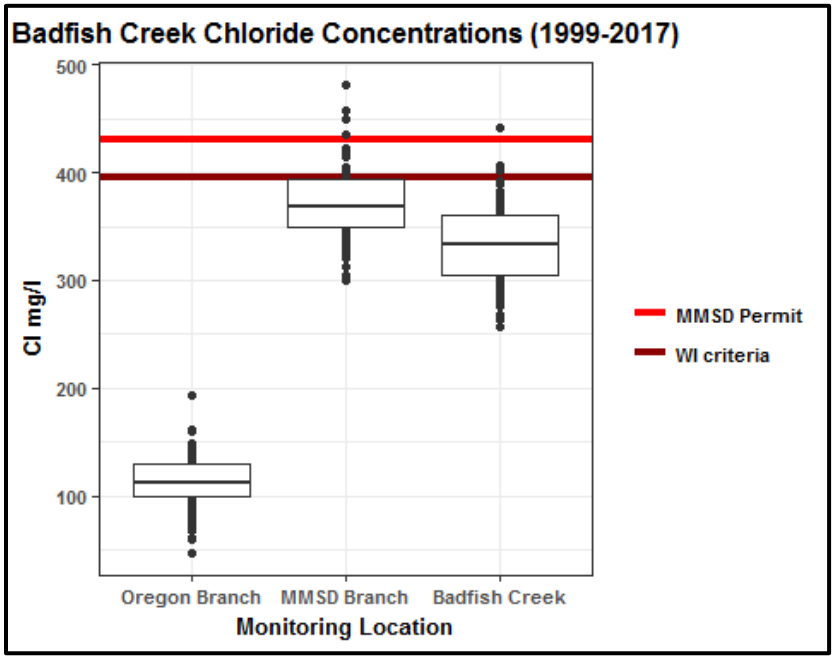
The proposed amendment area is located within the Oregon Branch portion of the Badfish Creek watershed (Map 5), a tributary of the Yahara River. Twenty acres in the northwest portion of the site drains to a kettle pond (Map 5), an internally drained area within the Oregon Branch sub-watershed (Map 11). The remaining 61 acres drain towards Oregon Branch. Within the amendment area, no Environmentally Sensitive Areas, such as wetlands, waterbodies, or floodplains, are present. There are small, isolated, areas of steep slopes (>12%) but they are not along a waterbody (Map 6). The Wisconsin Department of Natural Resources (WDNR) has concurred with a 2017 wetland delineation report that concluded there are no wetlands within the project area. The southern half of the amendment area's western edge borders the future Hermsen Conservation Area (Map 4).

Oregon Branch

The Oregon Branch sub-watershed is approximately 22.1 square miles. The amendment area comprises about 0.6 percent of the watershed. Oregon Branch originates within the Village of Oregon and flows southeast approximately ten miles to the confluence with Rutland Branch to form Badfish Creek. Land use in the Oregon Branch sub-watershed is predominantly agricultural. The creek has a low gradient of 8.2 feet/mile. Historically, Oregon Branch was considered a marginal trout water; however, the entire stream has been ditched for agricultural drainage since the 1920s. Since the 1940s, the Village of Oregon has discharged municipal treated wastewater to the stream (Map 5). In 1958, the Madison Metropolitan Sewerage District (MMSD) started to discharge treated effluent at Badfish Creek to divert the point source discharge of phosphorus around the Yahara lakes. The combined historic effects of stream channelization, urban and agricultural nonpoint source pollution, and wastewater discharges have greatly modified the original stream characteristics.

Upstream of the Oregon wastewater treatment facility located on the east side of the Village, stream flow is intermittent. For the first mile below Oregon the treatment plant effluent sustains most of the flow with an average discharge of 1.0 cfs. At the confluence with the MMSD effluent ditch, the flow increases from about 2 cfs to nearly 62 cfs, largely because of the MMSD effluent discharge (~57 cfs) and partly due to baseflow contributions (~5 cfs). During storms and periods of snow-melt, surface runoff increases flow substantially. Surface runoff from adjoining urban and agricultural lands has historically caused heavy depositions of silt over gravel and clay substrates.

According to the WDNR, even though the Village of Oregon and MMSD provide effective wastewater treatment, the combined historical/cultural impacts to the Oregon Branch (e.g., channelization, nonpoint source pollution, natural low flow and flows sustained largely by municipal wastewater) limit its potential uses. The stream is classified by WDNR as a limited aquatic life (LAL) stream from its headwaters to the confluence with the MMSD effluent ditch. From this point downstream to the confluence with the Rutland Branch, the stream is classified as a limited forage fishery (LFF). MMSD monitors chloride concentrations at three locations around where the effluent from Oregon and MMSD combine (Map 5). This boxplot, using data collected a few times a year since 1999, shows low chloride concentrations in the Oregon discharge. The MMSD effluent contributes high concentrations of chloride to Badfish Creek, occasionally exceeding the Wisconsin criteria for chloride. Since monitoring began, chlorides levels have been relatively stable, but more frequent sampling since 2012 has shown some increased levels.



The box shows the first and third quartiles (25th and 75th percentiles). Center line is median. All other points are plotted as outliers.

Since effluent from the wastewater treatment plant comprises Oregon Branch's primary flow, the stream is unlikely to be impacted by baseflow reductions from water well withdrawals in the near future. Groundwater modeling has estimated streamflow to remain relatively constant through 2040.

Kettle Pond / Internally Drained Area

The northwest corner of the site drains to an excavated kettle pond just to the west. The kettle pond is an internally drained area of approximately 120 acres surrounded by the Oregon Branch subwatershed. The watershed is composed of agriculture, open land, and a few residences. The permanent pond has a size of 0.3 acres and is on private property. WDNR has not collected data for this site. The WI Wetland Inventory indicates the site is an excavated pond, but not a wetland. Soil data indicates hydric inclusions, but not hydric soils, which would be indicative of a wetland.

Springs

Springs represent groundwater discharge visible to the casual observer. The Wisconsin Geological and Natural History Survey (WGNHS) maintains an inventory of springs in Dane County and throughout the state. There are no known springs in the proposed amendment area. The closest spring (WGNHS ID 130133) is two miles to the southwest, located close to an intermittent tributary of the Oregon Branch (Map 5).

Groundwater

Groundwater discharge generally occurs along the entire length of perennial streams and is the source of stream baseflow. The regional groundwater model has been used to evaluate the possible effects of current and future municipal groundwater well withdrawals on these stream systems. Groundwater modeling, using the 2016 Groundwater Flow Model for Dane County developed by the WGNHS, simulated regional changes in streamflow from predevelopment to 2010 conditions. Because of the added discharge from the Oregon and MMSD treatment plants, flows in Oregon Branch and Badfish Creek are not particularly susceptible to baseflow reductions. The groundwater model showed predevelopment baseflows just below Oregon's effluent discharge as 0.22 cfs (Map 5). For the year 2010, flows were modeled to have increased to 1.87 cfs.

In 2012, the WGNHS published a report, *Groundwater Recharge in Dane County, Wisconsin, Estimated by a GIS-Based Water-Balance Model*, 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 9.5 to 10 inches per year. 2.6 acres surrounding the kettle pond has been designated as a groundwater recharge area by the Village of Oregon and placed in environmental corridor. Portions of the amendment area have the potential for seasonally high groundwater within five feet of the surface (Table 3 and Map 7).

Endangered Resources

The WDNR Bureau of Endangered Resources maintains a database representing the known occurrences of rare plants, animals, and natural communities that have been recorded in the Wisconsin Natural Heritage Inventory. A screening review of this database conducted by Regional Planning Commission staff for species designated as endangered, threatened, or of special concern identified several species of special concern (plants, reptiles, bird) within a one-mile radius of the amendment area. At the request of the developer , the WDNR completed an Endangered Resources Review for potential impacts to endangered resources like rare plants, animals and natural communities in the amendment area. The WDNR Endangered Resources Review Verification is included in the USA amendment application. The WDNR staff determined the proposed project is covered under the Broad Incidental Take Permit/Authorization for No/Low Impact Activities and therefore Endangered Resources requirements have been met.

Soils and Geology

The amendment area is located within the Dane-Jefferson Drumlins and Lakes. The Land Type Associations of Wisconsin classifies the surficial geology of this area as undulating complex of till plains with drumlins, outwash plains, lake plains and muck deposits common. Soils are predominantly well drained silt and loam over calcareous sandy loam till, loamy lacustrine, or gravelly sandy outwash.

Surface elevations in the amendment area range from around 964 feet to 1026 feet. The amendment area includes some very small, isolated, areas of steep (>12%) slopes in the amendment area (see Map 6). There are no steep slopes adjacent to riparian areas.

According to the Natural Resource Conservation Service (NRCS) Soil Survey of Dane County, the soils in the amendment area are primarily in the Batavia-Houghton-Dresden association. These soils are well drained and poorly drained; deep and moderately deep silt loams and mucks that are underlain by silt, sand, and gravel. 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).

There are no hydric soils within the amendment area. Hydric soils are good indicators of existing and former (drained) wetlands. According to the Soil Survey Geographic data for Dane County developed by the USDA NRCS, the Elburn, Radford and Troxel soils (the EgA, RaA and TrB map units) are not hydric, but they can have a seasonal (April to June) zone of water saturation within 5 feet of the ground surface. The Troxel soils (TrB) are classified as either well drained or moderately well drained Soils with seasonal high water tables that are also classified as well drained or moderately well drained generally do not pose limitations for buildings with basements.

The amendment area includes small areas of Elburn and Radford soils, which are somewhat poorly drained and may have limited suitability for buildings with basements due to their seasonal high water table (zone of soil saturation), which can cause problems with groundwater induced flooding. These areas are not proposed for development.

Table 2
Soils Classification

Soil	% of Area	General Characteristics
Plano Silt Loam; PoB	26.4	Deep, well drained and moderately well drained, nearly level to sloping soils on glaciated uplands. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses moderate limitations for development due low bearing capacity and erodibility.
Dresden Silt Loam; DsC2	25.2	Moderately deep, well drained, gently sloping to steep soils on benches in stream valleys. Soils have medium fertility, moderate permeability, and a moderate to severe hazard of erosion. Poses slight to moderate limitations for development due to steep slopes and erosion potential.
Batavia Silt Loam; BbB	15.7	Deep, well drained, nearly level to sloping soils on high benches. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses moderate limitations for development due to shrink/swell potential.
Dodge Silt Loam; DnB	6.7	Deep, well drained, gently sloping and 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 slope and shrink/swell potential.
Kidder Loam; KdC2	6.7	Deep, well drained, gently sloping to very steep soils on glaciated uplands. Soils have medium fertility, moderate permeability, and a severe hazard of erosion. Poses moderate limitations for development due to steep slopes.
Dodge Silt Loam; DnC2	4.5	Deep, well drained, gently sloping and 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 slope, shrink/swell potential and low bearing capacity.
Troxel Silt Loam; TrB	3.9	Deep, well drained and moderately well drained, gently sloping soils in draws, on fans, and in drainageways. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses moderate limitations for development due to shrink/swell potential and depth to saturated zone.
Kidder Loam; KdD2	3.6	Deep, well drained, gently sloping to very steep soils on glaciated uplands. Soils have medium fertility, moderate permeability, and a very severe hazard of erosion and are moderately droughty. Poses severe limitations for development due to steep slopes.
Batavia Silt Loam; BbA	2.5	Deep, well drained, nearly level to sloping soils on high benches. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses moderate limitations for development due to shrink/swell potential.
Warsaw Silt Loam; WrB	1.9	Gently sloping and sloping, well-drained soils on benches in stream valleys. Soils have medium fertility, moderate permeability, and slight to moderate hazard of erosion. Poses slight to moderate limitation for development due to moderate bearing capacity and shrink/swell potential.
Kegonsa Silt Loam; KeB	1.5	Moderately deep, well drained, nearly level and gently sloping soils on benches on outwash plains. Soils have medium fertility, moderate permeability, and a moderate hazard of erosion. Poses no limitations for development.
Radford Silt Loam; RaA	1.0	Deep, somewhat poorly drained, nearly level and gently undulating alluvial soils in low drainageways and stream channels. Soils have high fertility, moderate permeability, and a low hazard of erosion. Poses very severe limitations for development due to flooding, seasonal high water table, and very low bearing capacity.
Elburn Silt Loam; EgA	0.3	Deep, somewhat poorly drained, nearly level and gently sloping's soils in glaciated stream valleys. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses severe limitations for development due to moderate bearing capacity, seasonal high water table, and shrink/swell potential.

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	*BbA, BbB, DnB, EgA, KeB, PoB, TrB, WrB*	*59.0*
Hydric Soils (Indicates Potential / Restorable Wetlands)	*None*	*0*
Soils with Seasonal High Water Table (< 5')	*EgA, RaA, TrB*	*5.3*
Soils Associated with Steep Slopes (> 12%)	*KdD2*	*3.6*
Soils Associated with Shallow Bedrock (< 5')	*None*	*0*
Poorly Drained Soils	*EgA, RaA*	*1.4*
Best Potential for High Rates of Infiltration in Subsoils	*BbA, BbB, DsC2, EgA, KdC2, KeB, PoB, TrB, WrB*	*87.5*

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

According to WGNHS data, bedrock within the amendment area is split between a small area of the Tunnel City Group in the northeast corner, the Trempealeau Group in the northwest and northeast, a small area of Sinnipee Group in the west-central region, and the Ancell Group representing the largest group in the central and southern area of the amendment area. Bedrock within the Ancell Group 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. Bedrock within the Sinnipee Group bedrock is dolomite with some limestone and shale, and consists of three formations including the Galena, Decorah and Platteville Formations. Bedrock within the Trempealeau Group is quartz sandstone, dolomitic siltstone, silty dolomite, and sandy dolomite, consists of two formations including the Jordan and underlying St. Lawrence Formations, which were combined as one mapping unit. Thickness is about 75 feet, where not eroded. Bedrock within the Tunnel City Group is medium to very fine-grained quartz sandstone, locally very glauconitic, consists of two formations including the Lone Rock and Mazomanie Formations. Thickness is up to 150 feet thick. According to WGNHS data, the depth to bedrock ranges from less than 5 feet in the west-central region to greater than 150 feet in the northeast portion of the amendment area (see Map 8).

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 data, karst features may be encountered in the north and west-central portions of the amendment area (see Map 8). The depths to potential karst units in the north range from 75 to 120 feet while depths in the west-central range from 2 to 45 feet. The WDNR Conservation Practice Standard 1002 - Site Evaluation for Stormwater Infiltration requires field verification for areas of the development site considered suitable for infiltration. This includes a site assessment for karst features in this area.

According to the NRCS soils map data, the amendment area has the potential for a seasonal high water table or karst features within five feet of the surface. There is no minimum separation distance for roofs draining to surface infiltration practices. However, the Dane County ordinance requires infiltration practices to be located so that the separation distance between the bottom of the infiltration system and the elevation of seasonal high groundwater or the top of bedrock is at least 5 feet for residential arterial roads and 3 feet for other impervious surfaces.

2) Proposed Urban Services

a) Parks and Open Space

Current plans for the amendment area include 17.8 acres of parks or open space, including stormwater management areas. A large park containing a stormwater management area and recreational sport fields is proposed in the northwest portion of the amendment area. There will also be park areas containing trails connecting to the village trail network (Map 4).

b) Public Water System

The Village of Oregon proposes to provide public water service to the amendment area by installing a new main looped through the amendment area and connecting with existing mains at North Bergamont Boulevard and Oregon Parks Avenue. The Village of Oregon Water Utility will also extend an existing 12-inch water main to the west along County Highway CC/Jefferson Street to the amendment area. Mains will also be stubbed at Netherwood Road, County Highway CC and Street C for future connections. A 2017 report titled "West Side Water System Study," completed by the Village's consulting engineer, evaluating existing and potential water supply for the western half of the Village. The report indicates that portions of the amendment area above 1,000 feet in elevation are within a future high pressure zone in the Village, requiring a booster pump to be potentially located in the Street F cul-de-sac.

The Village water utility currently operates three high capacity groundwater wells for water supply. Well #3, yielding 1,000 gallons per minute (gpm), is 953 feet deep. Well #4, yielding 850 gpm, is 843 feet deep. Well #5, yielding 850 gpm, is 890 feet deep. The current pumping capacity with all three wells operating simultaneously is 2,700 gpm, with a firm capacity (with the largest well out of service) of 1,700 gpm and the current reported average peak hourly water demand is 1,900 gpm. A planned future Well #6, is proposed to be located within the amendment area and will be constructed when necessary to meet water demands.

The Village currently operates six reservoirs for water storage: #3 Well Reservoir (58,000 gallons), #4 Well Reservoir (70,000 gallons), #5 Well Reservoir (70,000 gallons) Fitchburg Standpipe (400,000 gallons), Lincoln Road Elevated Tank (300,000 gallons, and South Main Street Standpipe (400,000 gallons) with a maximum storage capacity of 1,268,000 gallons. The current average daily water demand is approximately 775,000 gallons. Therefore, the system has more than adequate storage capacity to meet the current average daily demand.

The estimated average daily water demand for the amendment area will be 72,853 gallons per day (gpd) based on 181 housing units with an associated population of 634 individuals, a per capita demand of 100 gpd and an assumed loss of 15%. The peak demand for the amendment area is estimated to be 291,410 gpd. This estimate is reasonable based on building use and the water utility's annual reports to the Public Service Commission. With the addition of the amendment area demand, the combined daily water demand will be 848,000 gpd. Therefore, the additional demand associated with the amendment area can be accommodated based on the current pumping capacity.

Water losses in the Village's distribution system peaked at a level of 21% of net water supplied in 2014. The Village responded by implementing a 5-year plan to systematically replace a large portion of its aging mains. As a result, water loses have dropped to 14% in 2015 and 12% in 2016. The Wisconsin Administrative Code PSC 185.85(4)(b) requires a utility with more than 1,000 customer to submit a water loss control plan to the Public Service Commission if the utility reports its percentage of water losses exceed 15%.

c) Wastewater

Sanitary Sewer Service

The Village of Oregon proposes to extend an existing 15-inch sanitary sewer interceptor along County Highway CC/Jefferson to the western edge of the amendment area and provide a new 8-inch main connection at Cypress Street/Street A to serve the amendment area. Two additional connections to the existing sanitary sewer network will be made at existing manholes located at the West end of Oregon Parks Avenue and the existing end of North Bergamont Avenue.

The Village estimates that the amendment area will generate an average of 63,350 gpd, or 44 gpm. Using a peaking factor of 4.0, it is estimated that the amendment area will generate a peak flow of 253,400 gpd, or 176 gpm. The estimated flow assumes 181 planned or existing households contributing 350 gpd each.

Wastewater Treatment Facility

The Village of Oregon operates a wastewater treatment facility (WWTF) that consists of an activated sludge treatment system with grit removal and automated fine screens as preliminary treatment. Wastewater passes through four final clarifiers for final settling before discharge to the Oregon Branch. Biological phosphorus removal is used and chemical phosphorus treatment backup is available primarily to treat side streams from sludge processing as necessary. Sludge is aerobically digested, thickened with a gravity belt thickener, and stored in a sludge storage tank during months when land spreading is not allowed by law or is impractical due to weather conditions or land availability. Biosolids are ultimately landspread on WDNR approved agricultural fields.

The WWTF has a rated average daily capacity of 1.80 million gallons per day (MGD). In 2016, the plant received an average of about 1.25 MGD. The present reserve capacity is 0.55 MGD, approximately 31% of the total plant capacity. Therefore, the wastewater facilities have adequate capacity to serve the proposed amendment. The rated capacity is based on the result of WDNR concurrence with a Capacity Study completed by the Village Engineer in June 2000. In 2003, the Village modified the existing aerobic digesters to provide the necessary aerobic capacity to match the capacity of the liquid process train. Based on a 5-year average incoming flow centered around 2010, it is expected that the WWTF will reach 90% of current hydraulic design capacity around 2023 based on current projected growth rate assumptions. A consultant for the Village is currently working on a facilities plan update. The Village plans to have an evaluation of its treatment plant capacity conducted within the next 2-5 years. This evaluation may include an assessment of future wastewater treatment service being provided by the Madison Metropolitan Sewerage District.

The Oregon WWTF has not had any issues meeting its WPDES permit limits for the quality of effluent discharged to the Oregon Branch of Badfish Creek according to their 2016 Compliance Maintenance Annual Report. In 2016, the effluent monthly average (C)BOD ranged from 3 to 6 mg/L, well below the 20 mg/L permit limit. The effluent monthly average Total Suspended Solids ranged from 4 to 11 mg/L, well below the 20 mg/L permit limit. The effluent monthly average phosphorus ranged from 0.3 to 1.0 mg/L, below the current 1.1 mg/L permit limit. In addition, a Total Maximum Daily Load (TMDL) was developed for the Rock River Basin to determine the maximum amounts of phosphorus and sediment that can be discharged to protect and improve water quality. As the plant discharges to a tributary to the Rock River, the TSS and phosphorus mass limits were

calculated to comply with the TMDL. The 2014 permit includes a TMDL derived monthly average TSS effluent limit of 166 to 305 lbs/day and a monthly average Total Phosphorous Effluent Limit of 1.95 to 2.43 lbs/day. The Village of Oregon is participating in MMSD's Watershed Adaptive Management program, called Yahara WINs, to implement phosphorus reducing practices in the watershed to achieve the TMDL requirements in their permit.

d) Stormwater Management System

The Village of Oregon completed a comprehensive stormwater management study, titled "West Side Drainage Area," in response to a 2007 significant rain event, with resulted in flooding and other drainage related issues throughout the Village. The study concluded that while recent development did not contribute to the observed flooding, it was clear that additional stormwater storage is necessary to reduce flooding. The Village has since removed all homes located in the Florida Avenue floodplain and replaced downstream portions of a 72-inch culvert through the downtown area that ultimately discharges into the Oregon Branch of the Badfish Creek.

The existing topography of the amendment area shows three internally drained areas. Two areas, located in northeast portion of the amendment area, are 0.5 and 1.5 acres in area with a potential inundation depth of 2 feet prior to overflowing. These internally drained areas will be filled through proposed grading activities but existing storage potential of these to depressions will need to be accounted for when determining existing hydrologic conditions. The third area is located in the northwest portion of the amendment area and is split by the amendment area and the adjacent property. This internally drained area has no overland flow path during storms up to and including back-to-back 24-hour, 100-year storms, which results in an inundation area of nearly 10 acres. The Village has addressed how stormwater will be managed so as to not have adverse effects on the adjacent property owner.

The proposed development intends to provide three separate stormwater management facilities, two wet ponds to the south and a wet detention pond, infiltration basin and expansion of the exiting internally drained basin to remain in the north. These facilities will generally be located to adequately provide water quality treatment (80% TSS reduction) followed by volume reduction facilities, which will provide for annual stay-on (90% stay-on of the average annual storm). It is anticipated that infiltration performance will further reduce TSS (and other pollutants such as Total Phosphorus) from stormwater discharges. Collectively, the stormwater facilities will provide peak discharge rate control to account for storms up to and including the 100-year rainfall event. All stormwater facilities are anticipated to be dedicated to the public upon completion. In addition to these requirements, the Village intends to provide an additional 60 percent runoff volume storage over existing conditions in the exiting internally drained basin to remain while maintaining the post-development inundation elevation to that of the pre-developed elevation.

<u>Performance Standards</u>
The Village of Oregon 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 Oregon (Chapter 22) 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-, 10-, 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) In addition to meeting the Dane County peak rate, the Village of Oregon stormwater ordinance requires over-detention of the 10-year, 24-hour design storm to the 2-year, 24-hour pre-development rate and of the 100-year, 24-hour design storm to the 10-year, 24-hour pre-development rate.

4) Require post-development stay-on volume of at least 90% of pre-development stay-on volume. This is consistent with the stay-on standard for new development currently required by Dane County regulations.

5) Maintain pre-development groundwater annual recharge rate of 9.5 to 10 inches per year for this area as estimated by the WGNHS 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.

6) In addition for the internally drained area, the Village of Oregon has agreed to follow the Recommendations of the Stormwater TAC for closed basins, namely:
   i. Require 100% on-site control of the average pre-development runoff volume based on average annual rainfall.
   ii. Require provision of adequate storage within the internally drained area for the runoff volume from back-to-back 100-year 24-hr storms to define a flood protection elevation, and so that there is no increase in downstream flood risk during a 100-year event due to discharges from the internally drained area.
   iii. Require development of an emergency drawdown (pumping) plan where necessary to mitigate unanticipated local flooding.

e) Environmental Corridors

Within this amendment area, there are no Environmentally Sensitive Areas (i.e. wetlands, waterbodies, floodplains, riparian steep (> 12%) slopes, etc.) requiring placement in environmental corridors according to the adopted policies and criteria of the *Dane County Water Quality Plan*. The Village has proposed the northern portion of the amendment area as an environmental corridor, totaling 13.3 acres, to include the park, the stormwater management area, and the groundwater recharge area. Stormwater management areas along the southern edge of the amendment area will also be designated as environmental corridors, for a total of 16.9 acres.

3) Impacts and Effects of Proposal

a) Meeting Projected Demand

Current projections suggest that an additional 3,350 residents and 1,600 housing units can be expected in the Oregon Sewer Service Area between 2010 and 2040. Land demand projections in 2014 estimated that a total of 450 additional residential acres would be needed by 2040 to accommodate that growth. Department of Administration population estimates for 2017 indicate that 9,917 residents call the Village of Oregon home, an increase of 686 since the 2010 Census. Population growth in Oregon has followed the DOA projected trend.

b) Phasing

The requested amendment area is under 100 developable acres and does not require a phasing plan. However, development is anticipated to occur in multiple phases:

- *Phase 1 will involve development in the north and south portion of the site to include grading, construction of public utilities and roadways, and construction of two stormwater management facilities.*

- *Phase 2 will involve development in the southeast section including site grading and construction of public utilities and public roadways including the connection to Oregon Parks Avenue, and construction of one stormwater management facility.*
- *Phase 3 will involve development in the southern section of the project and will include site grading and construction of public utilities and roadways.*
- *Phase 4 will involve development on the west section of the property and involve site grading and construction of public utilities and roadways.*

c) Surface Water Impacts

Development creates impervious surfaces (i.e., streets, parking areas, and roofs) and typically alters the natural drainage system (e.g., natural swales are replaced by storm sewers). Without structural best management practices (i.e., detention basins and infiltration basins) this would result in increased stormwater runoff rates and volumes, as well as reduced infiltration. Without structural best management practices for erosion control, development would 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.

Since 2002, there have been stormwater management standards in effect at the state, county, and local level to require stormwater management and erosion control plans and structural best management practices to address the impacts of development on water quality, runoff volumes, peak flows, water temperature, and groundwater recharge.

The Village proposes to mitigate the urban nonpoint source impacts of the proposed development by requiring the implementation of various stormwater best management practices that are designed and constructed to meet or exceed current standards for pollutant reduction, runoff volumes, peak flows, water temperature, and groundwater recharge. To its credit, the Village has proposed to exceed minimum stormwater standards by requiring over detention of the 10-year and 100-year 24-hour storm events and by follow the recommendations of the Stormwater TAC for closed basins. This will address the potential water quality impacts of stormwater runoff from the proposed development on the receiving waters and adjacent property owners.

While they are still well below the WI chronic and acute toxicity levels are 395 mg/L and 797 mg/L, respectively chlorides levels in Oregon branch are showing impacts from wastewater treatment plant discharge and non-point source pollution. New development is not expected to exacerbate effluent chloride concentrations since the new high efficiency water softeners currently required by Wisconsin's plumbing code are substantially more

efficient[1] than the old timer based softeners still found in many homes. Many municipalities in the region are participating to varying degrees in the Wisconsin Salt Wise Partnership, a regional effort to reduce chlorides in our water resources by encourage the responsible use of deicers and water softeners. The Village of Oregon is currently evaluating ways to reduce salt usage, including reducing road salt and water softener salt. It is recommended that the Village of Oregon take advantage of the resources available from the Wisconsin Salt Wise Partnership by formally participating in that program.

Another regional water quality effort is the Green Tier Clear Waters Initiative, which aims to reduce the sediment and nutrient delivery to Dane County's lakes and streams from construction activities, beyond the current state and local requirements. Green Tier is a Wisconsin Department of Natural Resources program that rewards businesses who demonstrate superior environmental performance with streamlined permitting and other benefits. Their mission is also to develop alternative approaches and practices that will result in better erosion control and improved long-term stormwater management. Site inspections have demonstrated that Green Tier program participants have superior erosion control performance compared to non-participants. The charter (contract) is a partnership effort between the participating units of government (currently Dane County, the City of Madison, the City of Sun Prairie, and the Department of Natural Resources) and the participating home building and construction companies (currently Veridian Homes LLC and Homburg Contractors). It is recommended that the Village of Oregon also consider participating in this program.

d) Groundwater Impacts

Without effective mitigation practices, as natural areas are converted to urban development, the ground/surface water balance in streams and wetlands shifts. Groundwater-dominated systems can become more dominated by surface water runoff, with subsequent reductions in stream quality and transitions to more tolerant biological communities.

The 2016 Groundwater Flow Model for Dane County, developed by the WGNHS, was used to examine simulated regional changes in streamflow. Predevelopment baseflows for the Oregon Branch were modeled to be 0.22 cfs (Map 5 and Table 4). For the year 2010, flows were modeled to have increased to 1.86 cfs because of the addition of Oregon effluent discharge. For 2040, the model showed baseflows conditions similar to 2010, 1.85 cfs.

The Village of Oregon has a future well planned in the northeast corner of the amendment area (Map 11). The northern portion of the amendment area will contribute groundwater to the well once it is operational. The Village of Oregon proposes to maintain the groundwater recharge area in the northwest corner as a park in an Environmental Corridor. The well will also likely be located within the Environmental Corridor.

The Village of Oregon has zoning requirements (Section 17-514 Well Head Protection Overlay Zoning District) for areas within the five year zone of contribution or within 1,200 feet of established wells. The zoning specifies permitted, conditional and prohibited land uses within the Groundwater Protection Area. A Protection Area should also be established for the proposed well as a way to protect future drinking water sources. Before the well can become operational, the Village must also establish a well head protection plan that would identify potential contamination sources within 0.5 miles of the well (NR811.12(6)). In accordance with Wisconsin Code NR811.12(5)(d)6, the well would also need to be 400 feet away from stormwater retention or detention ponds.

[1] The Reduction of Influent Chloride to Wastewater Treatment Plants by the Optimization of Residential Water Softeners, Madison Metropolitan Sewerage District.

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 issue is discussed along with potential management options in the recently updated Dane County Groundwater Protection Planning Framework (Technical Appendix G of the Water Quality Plan). Maintaining pre-development groundwater recharge also helps to maintain baseflow and mitigate this impact. CARPC staff recommends maintaining the pre-development annual recharge rate of 9.5 to 10 inches per year for this area as estimated by the Wisconsin Geological and Natural History Survey. Experience has shown that this criterion is generally met when the volume control standard is achieved by infiltration practices.

Table 4
Modeled Baseflow Results
Due to Current and Anticipated Future Municipal Well Water Withdrawals
(All Municipal Wells)

Stream	No Pumping	2010	2040
Oregon Branch	*0.22 cfs*	*1.85 cfs*	*1.86 cfs*

4) Comments Received and Unresolved Issues

A public hearing was held on the proposed amendment at the March 8, 2018 meeting of the Capital Area Regional Planning Commission. Representatives of the Village of Oregon spoke in favor of the amendment. Mr. Slavney stated that past flooding issues in the Village have been addressed. There was no public comment registered in opposition to the proposed amendment. Key comments and questions from Commissioners at the public hearing were related to directing the emergency outlet for the closed basin to the Village storm sewer and encouraging the use of porous pavement or other pervious surface for the proposed paths. Actions have been recommended to the Village to further improve water quality and environmental resource management in response to the water quality issues raised.

5) Conclusions and Staff Water Quality Recommendations

There is sufficient existing treatment plant system capacity at MMSD to serve the proposed amendment area. There is also sufficient existing wastewater collection system capacity to serve the proposed amendment area.

Since 2002, there have been stormwater management standards in effect at the state, county, and local level to require stormwater management and erosion control plans and structural best management practices to address the impacts of development on water quality, runoff volumes, peak flows, water temperature, and groundwater recharge.

The Village proposes to mitigate the urban nonpoint source impacts of the proposed development by requiring the implementation of stormwater best management practices that are designed and constructed to meet or exceed current standards for pollutant reduction, runoff volumes, peak flows, water temperature, and groundwater recharge. To its credit, the Village has proposed to exceed minimum stormwater standards by requiring over detention of the 10-year and 100-year 24-hour storm events and by follow the recommendations of the Stormwater TAC for closed basins. This will address the potential urban nonpoint source impacts of the proposed development on the receiving waters and adjacent property owners.

While chloride levels in Oregon branch are still well below the WI chronic and acute toxicity levels are 395 mg/L and 797 mg/L, they are showing impacts from wastewater treatment plant discharge and non-point source pollution. The Village of Oregon is currently evaluating ways to reduce salt usage, including reducing road salt and water softener salt. It is recommended that the Village of Oregon take advantage of the resources available from the Wisconsin Salt Wise Partnership by formally participating in that program.

It is the Regional Planning Commission staff's opinion that the proposed amendment is consistent with water quality standards under Wis. Stat. § 281.15, with the conditions of approval identified below. Additional actions have also been recommended below to further improve water quality and environmental resource management.

a) Conditions

Regional Planning Commission staff recommends approval of this amendment, based on the land uses and services proposed, and conditioned on the continued commitment of the Village of Oregon to pursue the following:

1. Submit a detailed stormwater management plan for Regional Planning Commission staff review and approval (in conjunction with DCL&WCD staff) 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 to the more protective of the following:

        i. For the 1-, 2-, 10-, and 100-year 24-hour design storms to pre-development rates, in accordance with the Dane County Stormwater Ordinance.

        ii. For the 10-year, 24-hour design storm to the 2-year, 24-hour pre-development rate, in accordance with the Village of Oregon Stormwater Ordinance.

        iii. For the 100-year, 24-hour design storm to the 10-year, 24-hour pre-development rate, in accordance with the Village of Oregon Stormwater Ordinance.

    c. Provide at least 80% sediment control for the amendment area based on the for the 1-year, 24-hour design storm, with a minimum of 60% of that control occurring prior to infiltration, in accordance with the Dane County Stormwater Ordinance.

    d. Maintain the post development stay-on volume to at least 90% of the pre-development stay-on volume for the average annual rainfall period, in accordance with the Dane County Stormwater Ordinance.

    e. 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* (a range of 9.5 to 10 inches/year for the amendment area) or by a site specific analysis, in accordance with the Dane County Stormwater Ordinance.

    f. Follow the recommendations of the Stormwater TAC for closed basins:

        i. Require 100% on-site control of the average pre-development runoff volume based on average annual rainfall.

        ii. Require provision of adequate storage within the internally drained area for the runoff volume from back-to-back 100-year 24-hr storms to define a flood protection elevation, and so that there is no increase in downstream flood risk during a 100-year event due to discharges from the internally drained area.

iii. Require development of an emergency drawdown (pumping) plan where necessary to mitigate unanticipated local flooding.

g. Where the Village does not have the right, such as an easement or ownership, to increase flows downstream, infiltration shall be required such that the runoff-volume pre-development to post-development is matched up to and including a 10-year design event.

2. Conduct a field verification for areas of the development site considered suitable for infiltration including a site assessment for karst features as required by the WDNR Conservation Practice Standard 1002 - Site Evaluation for Stormwater Infiltration.

3. 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.

4. Delineate environmental corridors to include parks, stormwater management, and groundwater recharge areas to meet the Environmental Corridor Policies and Criteria adopted in the *Dane County Water Quality Plan*. Submit plats showing environmental corridors for Regional Planning Commission staff review and approval prior to recording.

5. Conduct a capacity evaluation and needs assessment for the wastewater treatment plant before reaching 90% of capacity to either reduce source contributions (i.e. per capita use and reduced I/I) or increase plant flow capacity.

b) Recommendations

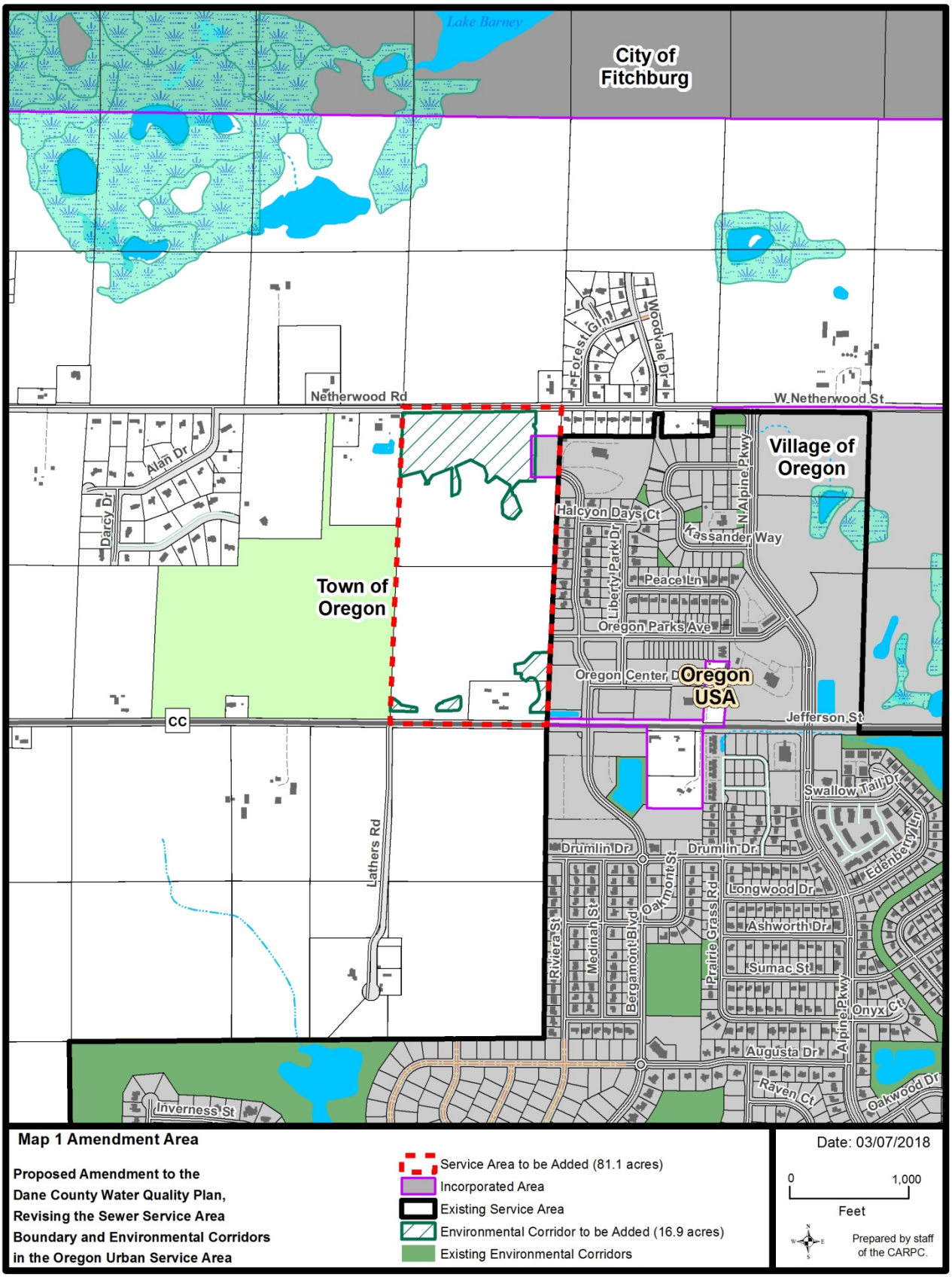
It is also recommended that the Village of Oregon pursue the following:

1. Encourage the responsible use of deicers and water softeners as an active participant in the Wisconsin Salt Wise Partnership.

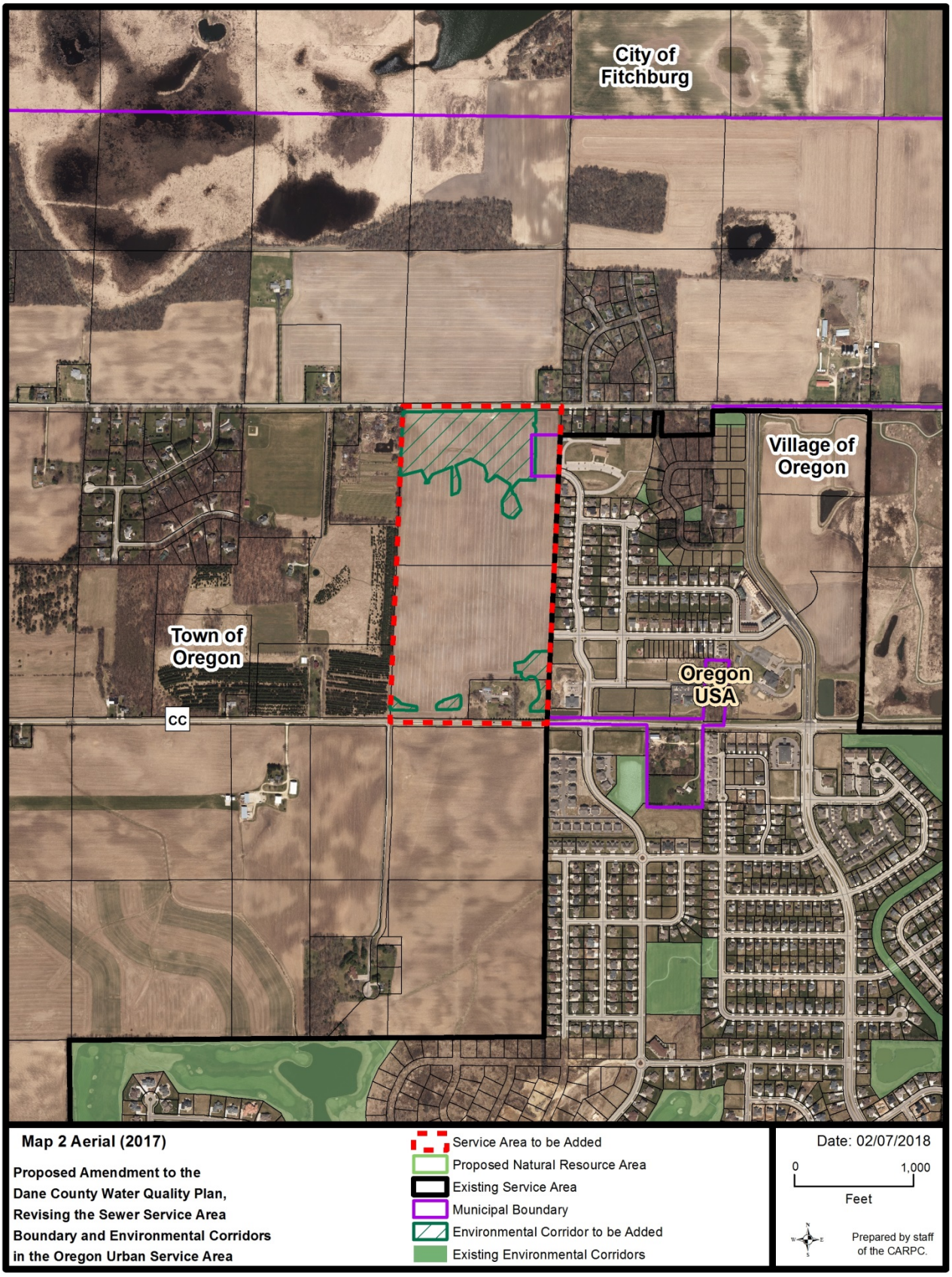
2. Participate in the Green Tier Clear Waters Initiative, which aims to reduce the sediment and nutrient delivery to Dane County's lakes and streams from construction activities, beyond the current state and local requirements.

3. Consider using permeable pavement or other pervious surfaces for the proposed trails where appropriate based on site conditions and planned uses.

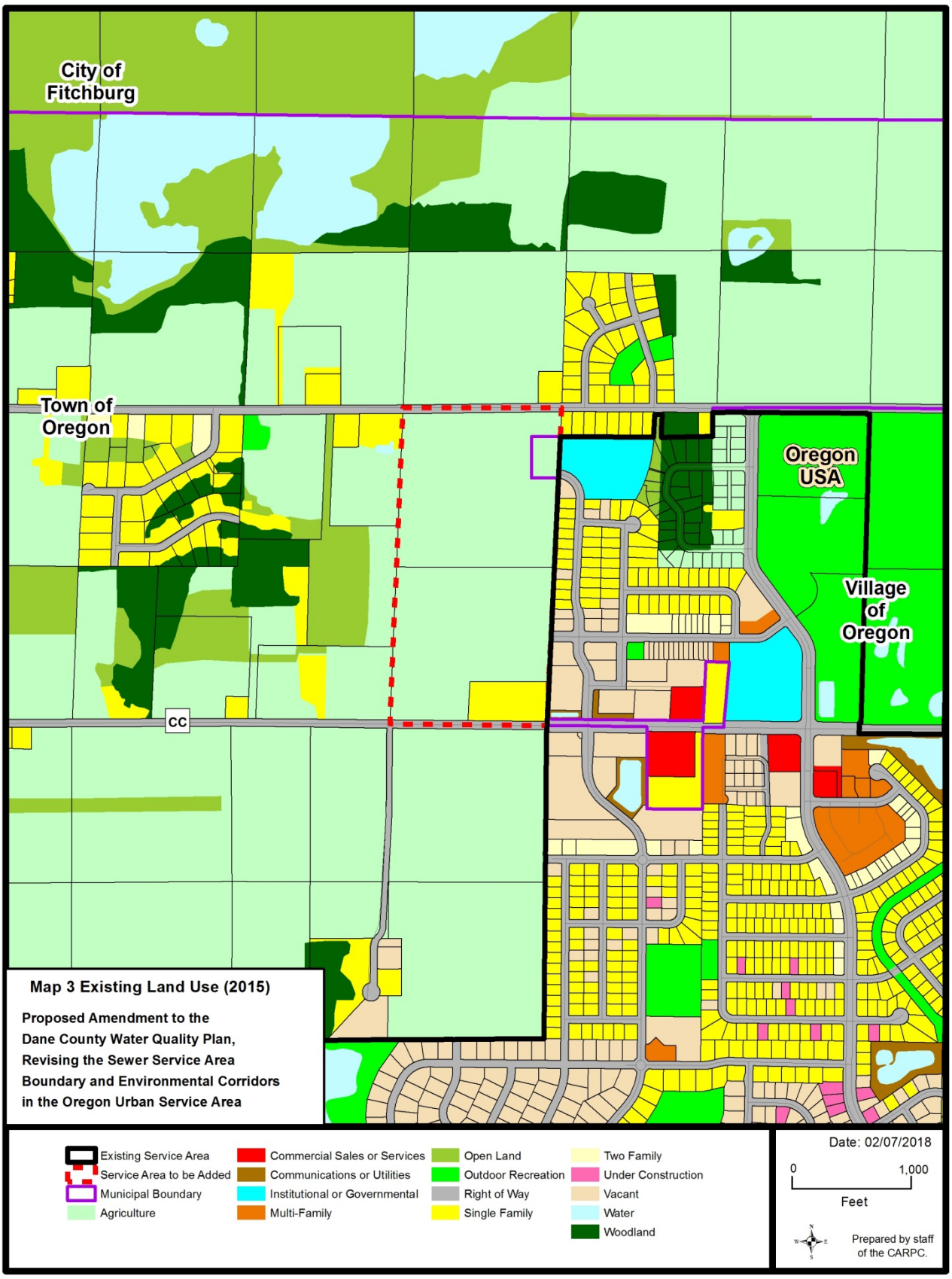
Map 1 - Amendment Area



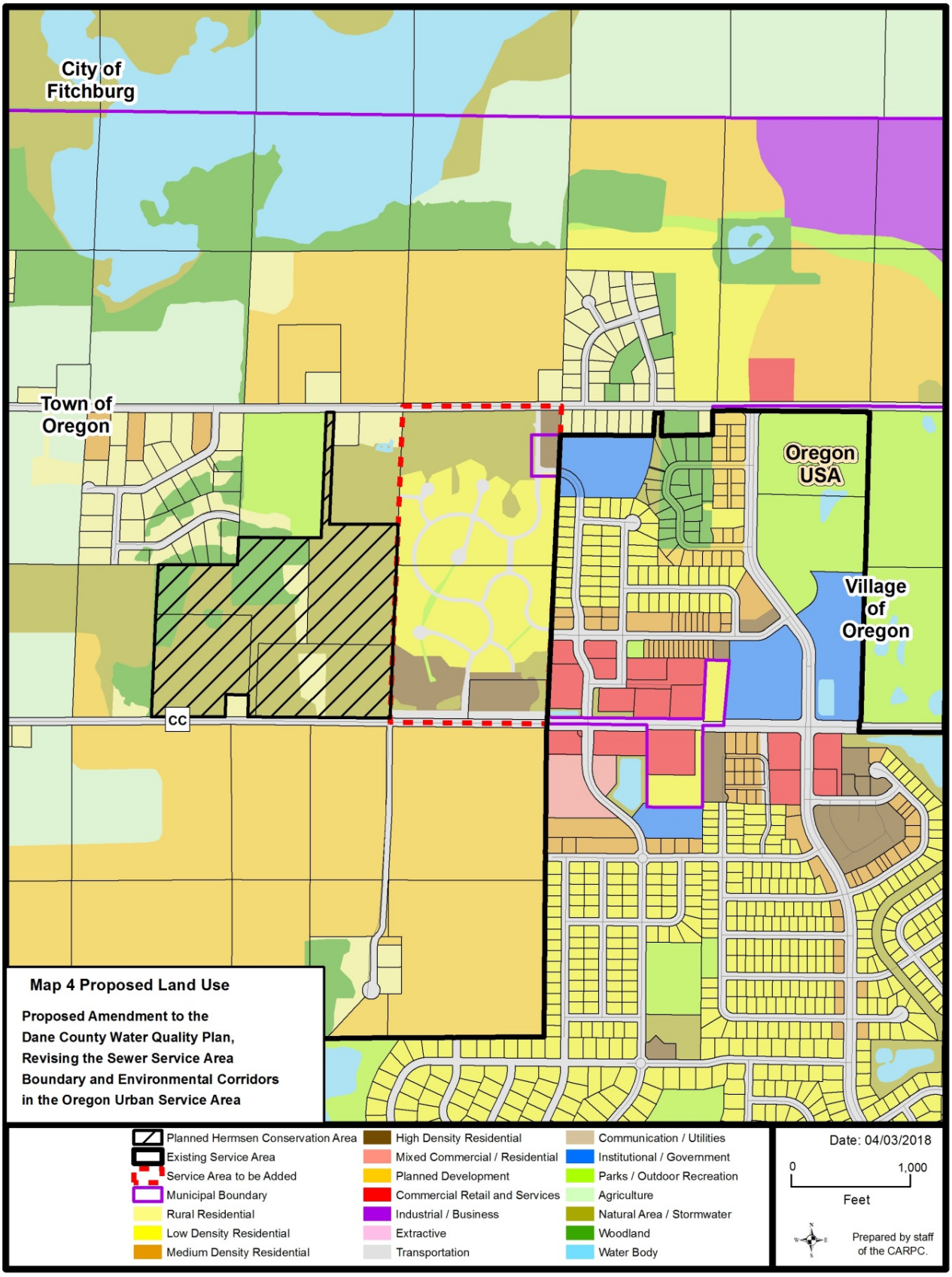
Map 2 – Aerial


City of Fitchburg
Village of Oregon
Town of Oregon
Oregon USA
CC
Map 2 Aerial (2017)
Proposed Amendment to the Dane County Water Quality Plan, Revising the Sewer Service Area Boundary and Environmental Corridors in the Oregon Urban Service Area
Service Area to be Added
Proposed Natural Resource Area
Existing Service Area
Municipal Boundary
Environmental Corridor to be Added
Existing Environmental Corridors
Date: 02/07/2018
0
1,000
Feet
Prepared by staff of the CARPC.

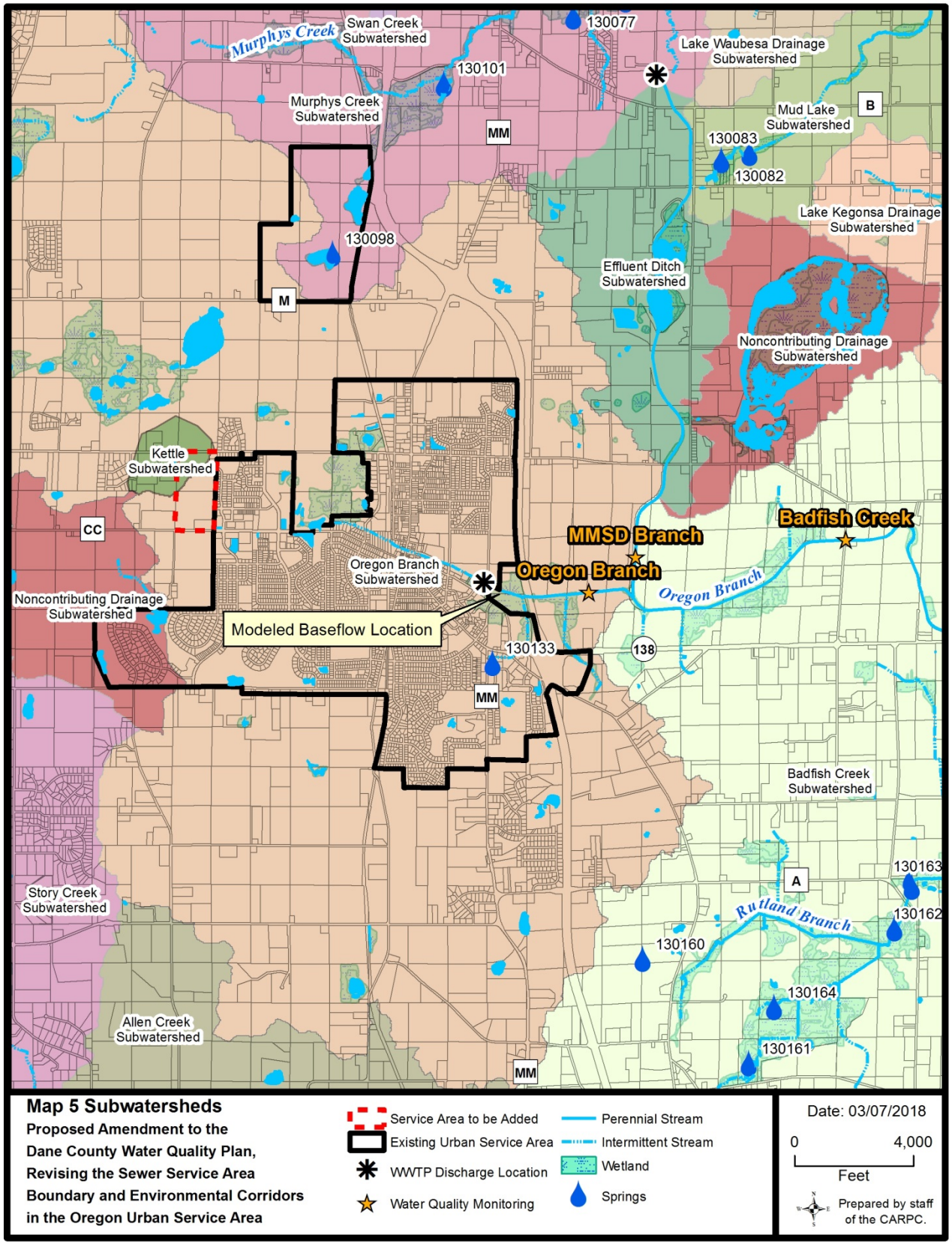
Map 3 – Existing Land Use



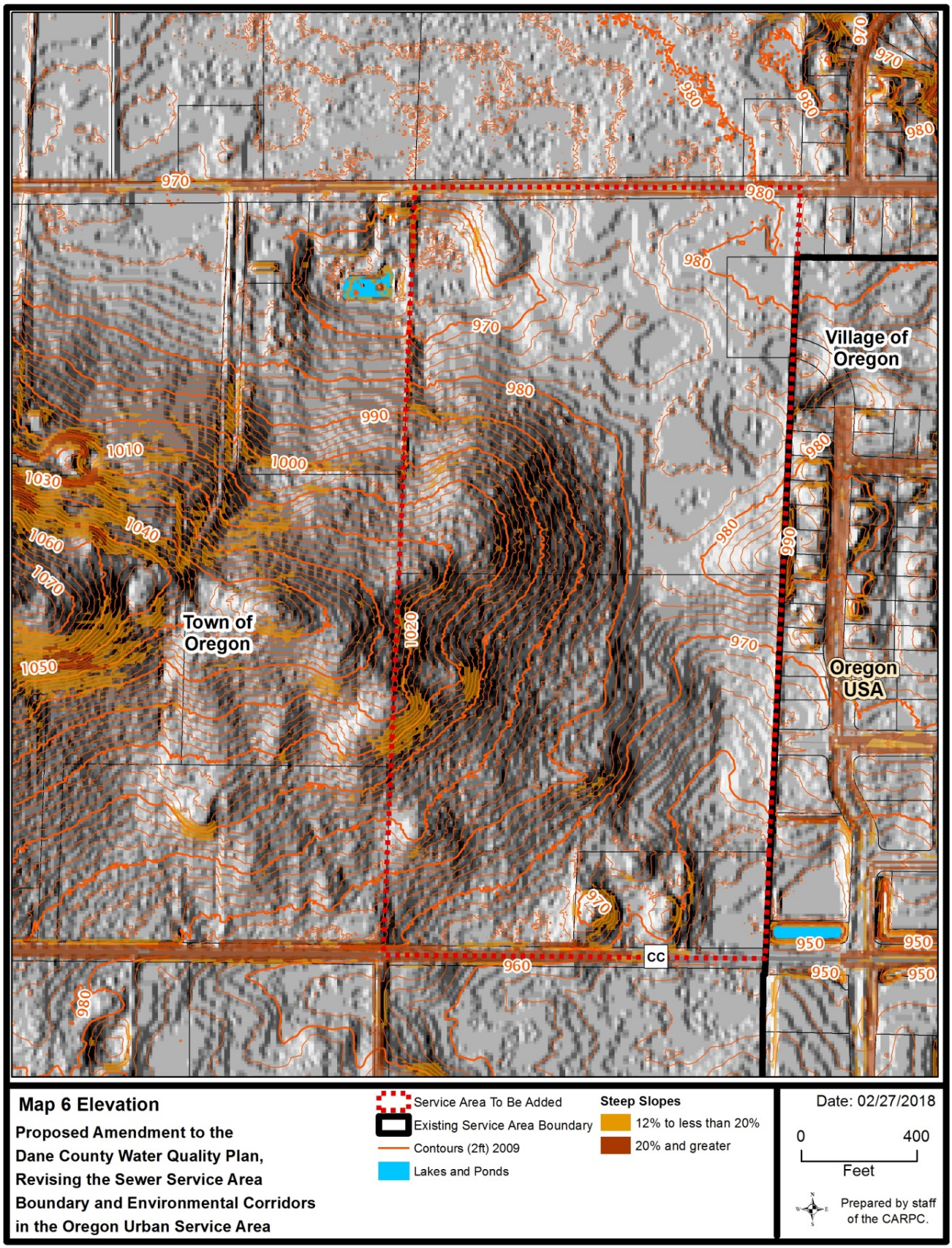
Map 4 – Planned Land Use



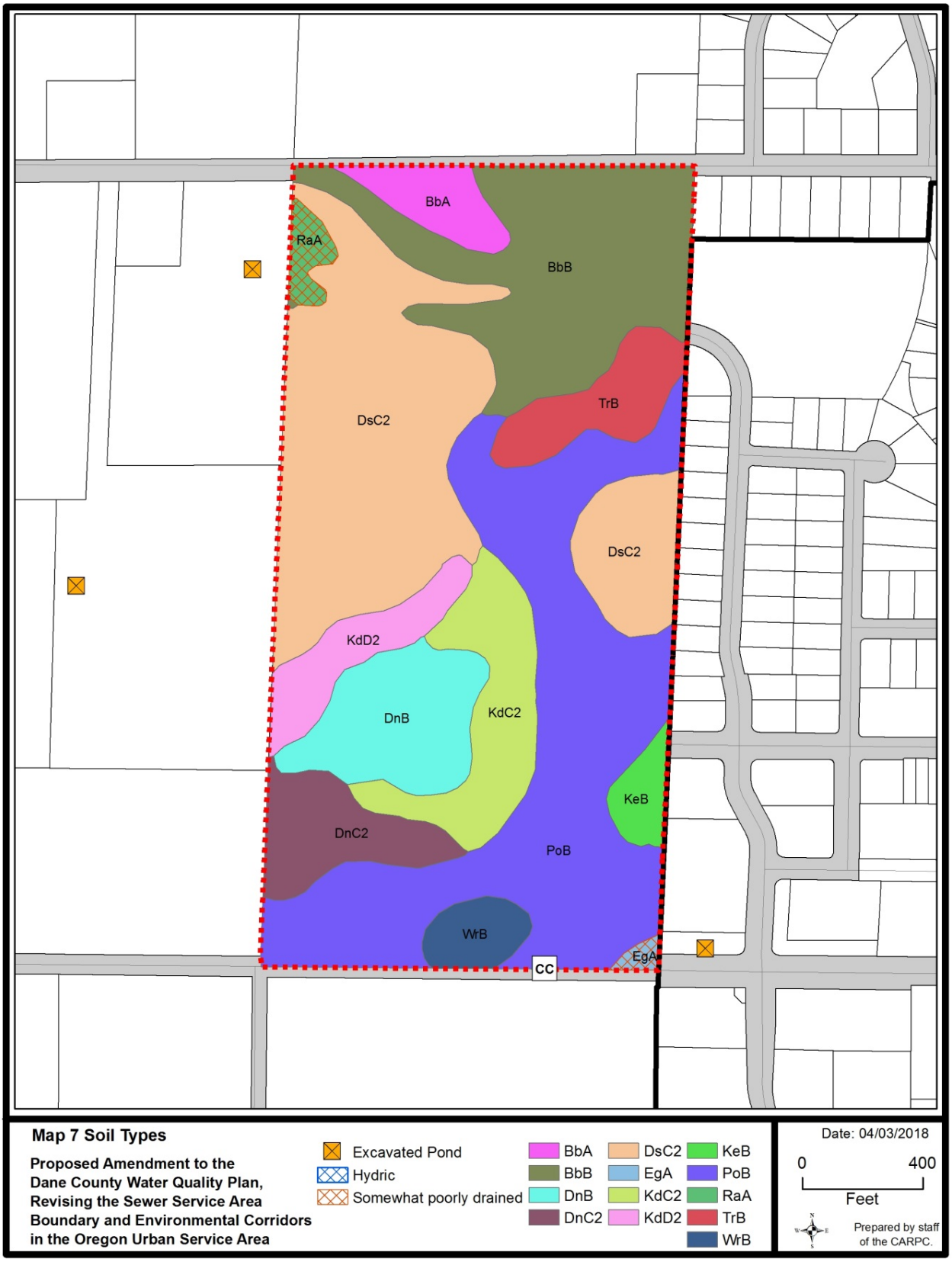
Map 5 - Subwatersheds



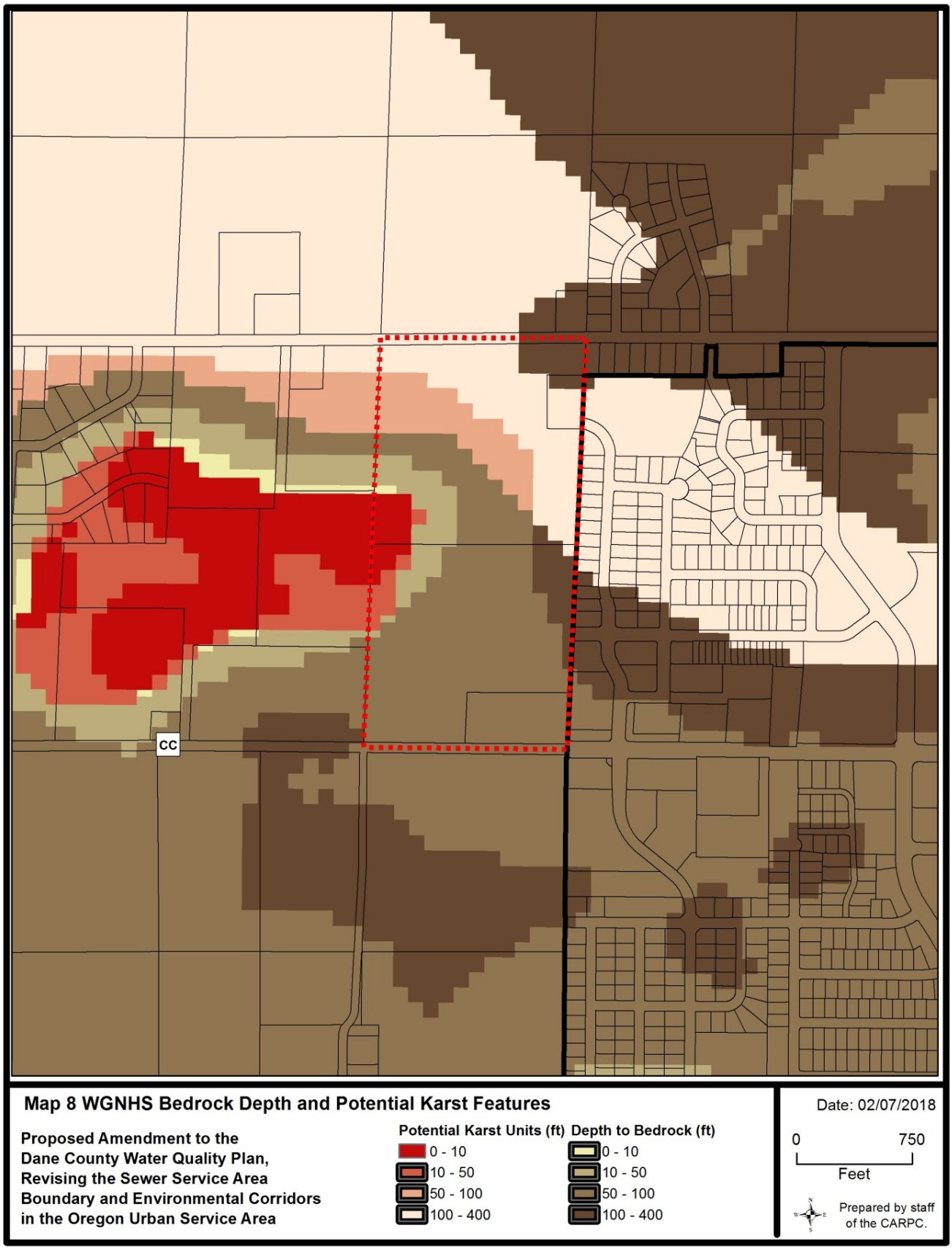
Map 6 - Elevations



Map 7 - Soil Type



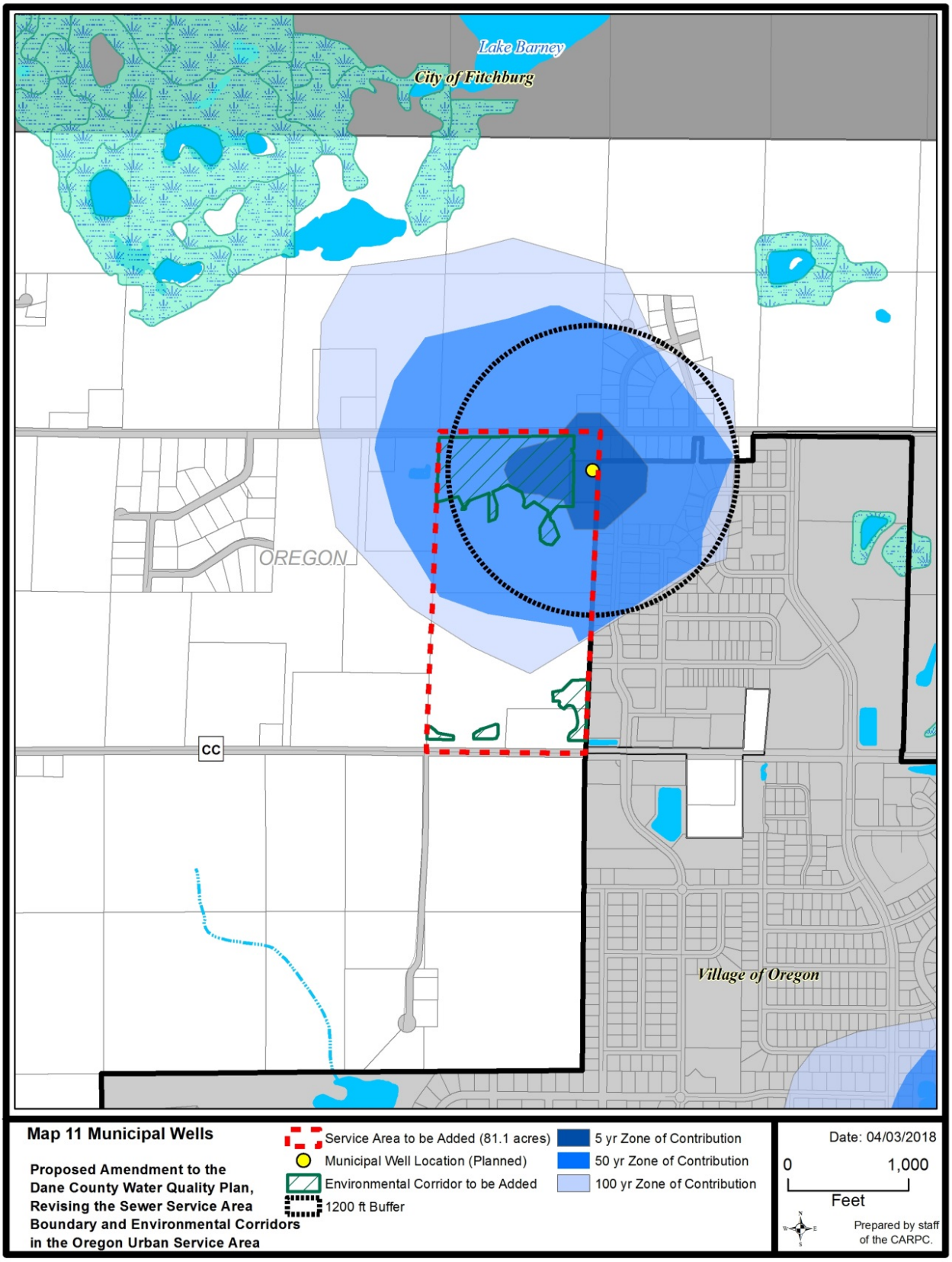
Map 8 – WGNHS Bedrock Depth and Potential Karst Features



Map 9 – Planned Sanitary Sewer and Water Service

Map 10 – Proposed Stormwater Management System

Map 11 – Municipal Wells



Attachment 1 – Wisconsin Historical Society Letter

WISCONSIN HISTORICAL SOCIETY

14 February 2018

Mr. Sean Higgins
Capital Area Regional Planning Commission
City-County Building, Room 362
210 Martin Luther King Jr. Boulevard
Madison, WI 53703-2558

RE: Village of Oregon Sewer Service Area Amendment (Oregon_1704_Map2-Aerial), Dane County, Wisconsin

Dear Mr. Higgins:

No previously recorded archaeological sites have been recorded in, or adjacent to the parcel delineated in the amendment. A review of available evidence indicates that no wetlands, drainages, or other landscape features that are typical indicators of American Indian settlement are present. Therefore, we have no concerns and recommend that the project proceed as currently designed.

Under Wisconsin law, Native American burial mounds, unmarked burials, and all marked and unmarked cemeteries are protected from intentional disturbance. If anyone suspects that a Native American burial mound or an unmarked or marked burial is present in an area, the Wisconsin Historical Society should be notified.

If human bone is unearthed during any phase of a project, **all work must cease**, and the **local authorities must be contacted**. The police or sheriff will determine if the burial is a criminal matter or if it should be referred to the Wisconsin Historical Society at 1-800-342-7834 to be in compliance with Wis. Stat. § 157.70 which provides for the protection of all human burial sites. If we are contacted, **work cannot resume until the Wisconsin Historical Society gives permission**. If you have any questions concerning the law, please contact the Wisconsin Historical Society at 1-800-342-7834.

If you have any questions, or if you need additional information, please feel free to contact me.

Sincerely;

John H. Broihahn
State Archaeologist
State Archaeology and Maritime Preservation
608-264-6496, john.broihahn@wisconsinhistory.org