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Staff Analysis of Proposed Amendment to the  
*Dane County Water Quality Plan*  
**Revising the Sewer Service Area Boundary and Environmental  
Corridors in the Verona Urban Service Area**  
*“Epic Campus 6 and 7 Expansion”*

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## **History of the Verona Urban Service Area**

The Verona Urban Service Area was established in 1971. The first amendment to the Verona Urban Service Area occurred in 1986. There have been 19 amendments to this service area since its creation totaling roughly 2,800 acres of developable land and 728 acres of Environmental Corridor. The most recent amendment of the service area by the City was recommended by the Capital Area Regional Planning Commission (CARPC) and approved by the Wisconsin DNR (WDNR) in 2022.

## **Planning in Verona**

The City of Verona reconfirmed their comprehensive plan in 2019. The document was originally adopted in 2010 and the City wished to wait until the release of 2020 Census data to conduct a substantial update or rewrite to their guiding document. The Comprehensive Plan is substantially consistent with the adopted [2050 Regional Development Framework](#) (Framework). The amendment areas being requested for addition to the Verona Urban Service Area are designated as Business Growth Areas in the Framework.

## **Existing Conditions**

### ***Land Use***

The City of Verona is requesting an amendment to the Verona USA in two nearby parts. The western part of the amendment is bounded on its western edge by Country View Road and extends eastward to existing Epic Systems development on its campus. The eastern part of the amendment request is located northeast of the existing Epic campus and bounded on its eastern edge by Northern Lights Road and to the north by CTH PD. Existing land uses in the vicinity are agricultural, low-density residential, commercial, solar array, stormwater management, and open land or natural areas. The proposed land use is commercial offices, agricultural or open lands, stormwater management, and a solar array. The requested amendment area is approximately 264 acres. The surrounding planned land uses can generally be described as follows (refer to Table 1 for detailed breakdown of existing and planned land uses):

### **Surrounding Planned Land Uses:**

- **North:** Low-density residential and rural residential
- **West:** Natural Area and rural residential
- **South:** Commercial offices and natural area
- **East:** Commercial offices, parks and recreation, and low-density residential

**Table 1**  
**Existing and Planned Land Use**

<b>Land Use Category</b>	<b>Existing Land Use Acres (see Map 3)</b>	<b>Proposed Land Use Acres (see Map 4)</b>
Agriculture	59.6	14.1
Commercial	6.3	196.7
Communication/Utilities	15.5	
Mineral Extraction	56.2	
Natural Areas		7.7
Open Land	87.3	
Rural Residential	9.8	20.3
Transportation	7.7	7.2
Water	21.5	18
Woodlands	0.1	
	264.0	264.0

### ***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. The western portion of the request contains a cultural resource site in poor condition. A prior survey concluded that this area was not eligible for listing on the National Register. In addition, a segment of the Nine Mound mound group overlaps the western expansion area. Epic and WSHS have been in communication about this feature. The eastern expansion area is unlikely to contain any intact sites. It has been heavily disturbed through quarrying and other activities. No survey is recommended.

### ***Natural Resources***

The proposed amendment area is in the Headwaters Sugar River (HUC 12: 070900040202) and Badger Mill Creek (HUC 12: 070900040201) subwatersheds (see Map 5). Delineated wetlands and floodplains are present within the amendment area.

Wastewater from the amendment area will be treated at the Madison Metropolitan Sewerage District (MMSD) Wastewater Treatment Facility (see Map 5). The treated effluent is currently discharged to Badfish Creek and Badger Mill Creek, bypassing the Yahara chain of lakes.

## **Wetlands**

WDNR's Wisconsin Wetland Inventory (WWI) shows one wetland too small to delineate within the amendment area. A wetland delineation ([link to report](#)) was conducted by AECOM in August 2023 within the amendment area. The site investigation and field delineation determined that there were two wetlands within the study area (see Map 11a). Wetland 1 is in the southwestern portion of the amendment area and is described as freshwater emergent with vegetation dominated by two invasive species: reed canary grass (*Phalaris arundinacea*) and narrow-leaved cattail (*Typha angustifolia*). This wetland is associated with an intermittent tributary to Sugar River. According to the Minnesota Stormwater Manual ([link to webpage](#)) fresh (wet) meadows are slightly to moderately susceptible to degradation by stormwater input. Wetland 2 is in the northwestern portion of the amendment area and is described as shrub/scrub with vegetation dominated by eastern cottonwood (*Populus deltoides*), sandbar willow (*Salix interior*), Canada thistle (*Cirsium arvense*), reed canary grass, and wild parsnip (*Pastinaca sativa*). The herbaceous plant layer of this wetland was dense with the three invasive species: Canada thistle, reed canary grass, and wild parsnip. According to the Minnesota Stormwater Manual, shrub-carrs are moderately susceptible to degradation. This wetland is associated with a man-made stormwater pond. A future relocation of the stormwater pond will require an artificial wetland exemption from the WDNR.

The delineated wetlands, with a minimum 75' vegetated buffer, is required to be designated as Environmental Corridor per the adopted Policies and Criteria for Environmental Corridors ([link to document](#)), as part of the *Dane County Water Quality Plan*. The quarry area received an artificial wetland exemption from WDNR in August 2023 (WIC-SC-2023-13-02714).

In addition to the wetlands within the amendment area, there are also other wetlands near the amendment area. According to the WWI, the wetlands directly to the west and southwest are part of a large wetland complex associated with Sugar River and classified as palustrine persistent emergent/wet meadow, persistent narrow-leaved emergent/wet meadow, broad-leaved deciduous scrub/shrub, and broad-leaved deciduous forest. A wetland delineation conducted by AECOM in June 2023 for an area directly southwest of the amendment area describes portions of this complex as fresh wet meadow, shrub scrub, and floodplain forest. According to the Minnesota Stormwater Manual, shrub-carrs are moderately susceptible to degradation by stormwater input, fresh (wet) meadows are slightly to moderately susceptible, and floodplain forests are slightly susceptible.

## **Floodplains**

The southwestern portion of the amendment area includes a small area of 1% annual chance (i.e., 100-year) floodplains associated with the intermittent tributary to Sugar River and the eastern amendment area includes more extensive areas of 1% annual chance associated with the internally drained areas and the Dry Tributary to Badger Mill Creek. All the 1% annual chance floodplain is included in Environmental Corridors as required by the adopted Policies and Criteria for Environmental Corridors.

## **Headwaters Sugar River**

Most of the runoff from the western portion of the amendment area drains to the southwest, then downstream a ¼ mile to a culvert under Country View Road and is within the Headwaters Sugar River subwatershed. The culvert empties to an intermittent stream that flows another 0.6 miles before reaching the Sugar River (WBIC [875300](#) / WATERSID 1520990), an Exceptional Resource Water (ERW)

under the state's anti-degradation rules, NR 102 and NR 207. ERWs are not significantly impacted by human activities and provide valuable fisheries or unique habitat features. The Sugar River is also designated a Class II trout cold water community. Much of the headwaters subwatershed remains undeveloped with agriculture (52%) and open/woodland (32%) occupying the most area. The headwaters of the Sugar River are located on the outskirts of the expanding Madison metropolitan service area. Though historically and predominantly agricultural, this portion of the watershed is experiencing a gradual change in land use. Changes in land use, hydrology, and sediment transport within the watershed will have long-term impacts on all areas downstream.

There has been a citizen-based stream monitoring location on Sugar River at Bobcat Lane ([Station 10044597](#)) since 2015. Field measurements from 2022 indicated dissolved oxygen levels of 13 mg/L, transparency of 78.2 to 83.5 cm, and a macroinvertebrate index score of 2.57. There are no active USGS baseflow monitoring stations in this watershed.

The Sugar River section downstream of amendment area (miles 56.14 – 82.33) was added to the WDNR's list of impaired waters in 2020 for total phosphorus. This addition was prompted by high phosphorus concentrations which pose a risk for the river's biological community. This was an increase from 2017 phosphorus concentrations which did not warrant an impaired listing. Even though phosphorus concentrations are high, the river's biological community is not degraded (macroinvertebrates received a "Fair" score; fish scored as "Excellent"). However, continued high phosphorus concentrations will likely lead to lower quality biological communities over time. Decreasing phosphorus contributions to the river would help sustain current biological communities. As a cold water system fed by groundwater, warm runoff poses an issue for the Sugar River. Occasionally, the river exceeds ideal temperatures which is also expected to decrease the quality of the fish community. Proper thermal controls in runoff management are required within the watershed. The Sugar River is an important regional resource and maintaining its exceptional qualities requires responsible management of both agricultural and urban land uses.

#### **Dry Tributary to Badger Mill Creek**

An unnamed intermittent stream, often referred to as the Dry Tributary to Badger Mill Creek, runs just west of the eastern portion of the amendment area and is within the Badger Mill Creek subwatershed. The stream channel is approximately 6 miles long, from its mouth at Badger Mill Creek, near the south edge of the City of Verona, upstream to Valley View Road. Dry Tributary to Badger Mill Creek is classified as an intermittent stream, meaning it flows only after rainfall or snowmelt, and as a result is dry most of the year. Water quality and biotic index data are not collected for Dry Tributary to Badger Mill Creek because of these flow conditions.

#### **Badger Mill Creek**

Badger Mill Creek (WBIC [888100](#) / WATERSID 13654) is 5 miles long and flows through the southwest side of the City of Madison and bisects the City of Verona. The Badger Mill Creek subwatershed is approximately 34 square miles and encompasses predominantly residential and agricultural land uses until its confluence with the Upper Sugar River in the Town of Verona. Badger Mill Creek is included on the state 303d list of impaired waters for total phosphorus due to high phosphorus levels.

There has been a citizen-based stream monitoring location on Badger Mill Creek at State Highway 69 ([Station ID 10011966](#)) since 2006. Field measurements from 2023 indicated dissolved oxygen levels of 9.72 to 16.6 mg/L and transparency of 120 cm. Field measurements from 2022 indicated a macroinvertebrate index score of 4.39. The active USGS baseflow monitoring station ([USGS 05435943](#)) in this watershed collects data on discharge rates, dissolved oxygen, specific conductance, water level, and temperature; but does not collect chloride data.

The main branch of Badger Mill Creek is designated as a Class II trout stream by the WDNR for fish management purposes, in accordance with NR 1.02(7). Badger Mill Creek is also classified as a Variance Stream for Uses and Designated Standards per NR 104.05(2), which allows the WDNR to relax certain water quality standards for this stream to allow discharge of treated municipal wastewater. These stream use standards are state water quality standards established to guide water quality planning under NR 121.

Since 1998 MMSD has been discharging approximately 3.3 million gallons per day (MGD), or 5 cubic feet per second (cfs), of highly treated effluent back to Badger Mill Creek as a means of maintaining baseflow in the creek to compensate for groundwater being taken out of the Sugar River basin by municipal water wells. Prior to 1998, Verona had its own wastewater treatment plant which discharged to Badger Mill Creek, while wastewater from MMSD's treatment plant was all discharged to Badfish Creek in the adjacent Rock River basin. Previous groundwater modeling, of conditions prior to the treated effluent return, indicated that well water withdrawals had reduced baseflow in Badger Mill Creek in the Sugar River, compared to pre-development or no pumping conditions. Current modeling indicates that Badger Mill Creek would have had no flow in drought conditions experienced in 2010, without the treated effluent return. The treated effluent return has effectively restored the water balance between these two basins and has improved aquatic habitat in Badger Mill Creek by removing low baseflow as a limiting condition caused by the well water withdrawals. In May 2023, the MMSD Commission voted to discontinue its effluent flow to Badger Mill Creek to meet new phosphorus requirements.

### **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. From 2014 to 2017, the WGNHS surveyed springs statewide that were expected to have flow rates of at least 0.25 cubic feet per second (cfs). The Headwaters Sugar River subwatershed contains one inventoried spring, Dane County Spring #20. Dane County Spring #20 is on private land, south of Military Ridge State Trail and east of County Highway J. It was surveyed in 2014 with a discharge rate 0.29 cfs, specific conductance of 572  $\mu\text{S}/\text{cm}$ , temperature of 51° F, and a pH of 6.74. There are no known springs in the Badger Mill Creek subwatershed.

### **Groundwater**

In 2012, the WGNHS published a report, *Groundwater Recharge in Dane County, Wisconsin, Estimated by a GIS-Based Water-Balance Model* ([link to 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 proposed amendment area ranges from approximately 9 to 13 inches per year (varies by specific area).

Generally, groundwater discharge occurs along the entire length of perennial streams and is the source of stream baseflow. Groundwater modeling using the 2016 Groundwater Flow Model for Dane County, developed by the WGNHS ([link to website](#)), has been used to model estimated baseflows in many streams throughout Dane County. Two locations were analyzed for the proposed amendment, including: Sugar River at USH 151, which the western portion of the amendment area flows to; and Badger Mill Creek at the confluence with Dry Tributary to Badger Mill Creek, which the eastern portion of the amendment area flows to (see locations on Map 5). The modeling shows a decline in baseflow within Sugar River from predevelopment (i.e., no pumping) conditions to 2010 modeled conditions, and further decline to 2040 modeled conditions. These reductions are primarily due to the cumulative effects of well water withdrawals from multiple municipalities in the ground-watershed to support increasing development. The modeling shows an *increase* in baseflow within Badger Mill Creek from predevelopment to 2010 modeled conditions, which is primarily due to the MMSD treated effluent return discharge into Badger Mill Creek upstream of this confluence. However, a decline in baseflow is again anticipated from 2010 conditions to 2040 modeled conditions due to the effects of well water withdrawals.

### **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 ([link to website](#)). A screening review of this database conducted by CARPC staff for species designated as endangered, threatened, or of special concern identified several special concern species: four plant and one reptile species; one threatened mammal and one threatened plant species; one endangered insect; two natural communities; and one bat hibernaculum within a 1 to 2-mile radius of the amendment area. Two state lands were identified with a 1-mile radius of the amendment area: Military Ridge State Trail and Sugar River Wetlands State Natural Area. An Endangered Resources Review was completed on September 25, 2023, by the WDNR Bureau of Natural Heritage Conservation. Actions are recommended for five species identified in the Review (see Attachment F of application).

The entire amendment area is within the High Potential Zone (species likely present) for the federally endangered Rusty Patched Bumble Bee ([link to web map](#)). Section 7 of the Endangered Species Act requires consultation with the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service when any action that is carried out, funded, or permitted by a federal agency may affect a federally listed endangered or threatened species. The WDNR typically recommends that projects within the High Potential Zone include native trees, shrubs, and flowering plants; plants that bloom spring through fall; and the removal and control of invasive species in any habitat used for foraging, nesting, and overwintering. The USFWS developed a list of plants favored by Rusty Patched Bumble Bee ([link to list](#)). Implementing these conservation measures should be coordinated with the WDNR Endangered Resources Review Program as needed.

### **Soils and Geology**

The western portion of the amendment area is located within the Hills & Valleys – Wisconsin River Drainage Land Type Association of Wisconsin. The Association classifies the surficial geology of this area well drained and moderately well drained silty and loamy soils with a silt loam or sandy loam surface over non-calcareous clayey or loamy residuum or cover silty loess. The eastern portion of the

amendment area is located within the West Johnstown-Milton Moraines Land Type Association of Wisconsin. The Association classifies the surficial geology of this area as rolling hummocky moraine and outwash plain complex with scattered bedrock knolls.

Surface elevations within the amendment area range from around 933 feet to 1069 feet. There are areas of steep (>12%) and very steep (>20%) slopes associated with the stormwater ponds and solar field in the western portion, and the quarry in the eastern portion of the amendment area (see Map 6). These areas of steep slopes are not riparian and do not require inclusion in Environmental Corridors.

According to the Natural Resource Conservation Service (NRCS) Soil Survey of Dane County, the soils in the western edge of the amendment area are in the Batavia-Houghton-Dresden association. These soils are well to poorly drained, deep to moderately deep silt loams and mucks that are underlain by silt, sand, and gravel. The soils in the remainder of the amendment area are in the Dodge-St. Charles-McHenry association. These soils are well to moderately well drained deep silt loams. Table 2 shows detailed classifications for soils in the amendment area (see Map 7) while Table 3 shows important soil characteristics for the amendment area.

There is one hydric soil within the amendment area, the Otter soil (the Ot map unit) (see Map 7). Hydric soils are good indicators of existing and former (drained) wetlands. Hydric soils are considered Stewardship areas and are recommended for inclusion in Environmental Corridor.

According to the Soil Survey Geographic data for Dane County developed by the NRCS ([link to web soil survey](#)), the Troxel and Port Byron soils (the TrB and PrC map units) are not hydric, but they do have a seasonal (April to June) zone of water saturation within 5 feet of the ground surface. Both soils are classified as moderately well drained, and therefore do not pose a limitation for buildings with basements.

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**Table 2**  
**Soils Classification**

Soil	% of Area	General Characteristics
Gravel Pit (GP)	25.7	Poorly graded gravels and sandy gravel mixtures with little or no fines. Soils are stable and pervious. Not rated for limitations for development.
Edmund Silt Loam; EdC2	17.1	Shallow, well drained gently sloping to moderately steep soils on uplands. Soils have low fertility, moderately slow permeability, and a very severe hazard of erosion. Poses severe limitations for development due to depth to bedrock.
Edmund Silt Loam; EdD2	9.4	Shallow, well drained gently sloping to moderately steep soils on uplands. Soils have low fertility, moderately slow permeability, and a very severe hazard of erosion. Poses severe limitations for development due to depth to bedrock

Dodgeville Silt Loam; DpC	9.3	Moderately deep, well-drained, gently sloping to moderately steep soils on the tops of ridges and on upper side slopes on uplands. Soils have medium fertility, moderate permeability, and a severe hazard of erosion. Poses severe limitations for development due to slope and depth to bedrock.
Troxel Silt Loam; TrB	8.2	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 severe limitations for development due to low bearing capacity.
Gale Silt Loam; GaC2	7.0	Moderately deep, well-drained, gently sloping to moderately steep soils on uplands. Soils have medium fertility, moderate permeability, and a severe hazard of erosion. Poses moderate limitations for development due to slope.
Edmund Silt loam; EdB2	6.8	Shallow, well drained gently sloping to moderately steep soils on uplands. Soils have low fertility, moderately slow permeability, and no hazard of erosion. Poses severe limitations for development due to depth to bedrock.
Richwood Silt Loam; 305B	3.6	Deep, well drained, on outwash plains and stream terraces. Soils have high fertility, moderate permeability, and a moderate hazard of erosion. Poses moderate limitations for development due to shrink/swell potential.
Batavia Silt Loam; BbA	3.1	Deep, well drained, nearly level to sloping soils on high benches. Soils have high fertility, moderate permeability, and no hazard of erosion. Poses moderate limitations for development due to shrink/swell potential.
Gale Silt Loam; GaD2	2.7	Moderately deep, well-drained, gently sloping to moderately steep soils on uplands. Soils have medium fertility, moderate permeability, and a severe hazard of erosion. Poses very severe limitations for development due to slope.
Dodgeville Silt Loam; DpB	1.5	Moderately deep, well-drained, gently sloping to moderately steep soils on the tops of ridges and on upper side slopes on uplands. Soils have medium fertility, moderate permeability, and a moderate hazard of erosion. Poses moderate to severe limitations for development due to depth to bedrock.
Port Byron Silt Loam; PrC	1.5	Deep, moderately well drained, gently sloping and sloping soils on colluvial valley foot slopes. Soils have high fertility, moderate permeability, and a moderate to severe hazard of erosion. Poses moderate limitations for development due to low bearing capacity.



Otter Silt Loam; Ot	1.3	Deep, poorly drained, nearly level soils on stream bottoms. Soils have high fertility, moderately slow permeability, and no hazard of erosion. Poses very severe limitations for development due to shrink/swell potential and low bearing capacity.
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*Source: Soil Survey Geographic data for Dane County developed by the USDA Natural Resources Conservation Service*

**Table 3**  
**Soils Characteristics**

<b>Characteristic</b>	<b>Soil Map Symbols (see Map 7)</b>	<b>% of Area</b>
Prime Agricultural Soils	TrB, 305B, BbA, DpB, BbB, PoB	47.0
Hydric Soils (Indicates Potential / Restorable Wetlands)	Ot	1.3
Poorly Drained Soils with Seasonal High Water Table (< 5')	None	0
Soils Associated with Steep Slopes (> 12%)	EdD2, GaD2, HbD2	12.7
Soils Associated with Shallow Bedrock (< 5')	None	0
Best Potential for Infiltration in Subsoils	GaC2, 305B, BbA, GaD2, BbB, BaC2, HdD2, PoB, BaB2	19.2

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

According to WGNHS data, bedrock within a small portion of the western edge of the amendment area is in the Prairie du Chien Group. Bedrock in the Prairie du Chien Group is dolomite, minor sandstone, cherty dolomite, vuggy, sandy, and oolitic, and consists of two formations including the Shakopee and Oneota Formations. Thickness is up to 145 feet in eastern Dane County. The bedrock in the remainder of the amendment area is in the Ancell Group. Bedrock in the Ancell Group is medium-grained, mature quartz sandstone and consists of two formations including the Glenwood and St. Peter Formations. Thickness is about 100 feet. According to WGNHS data, the depth to bedrock in the amendment area ranges from 0-140 feet, with the shallowest depths being in several areas in the western portion of the amendment area and deepest depths being in the south end of the eastern portion.

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 is 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. Karst features may be encountered in the amendment area at depths ranging from 0 to 136, with the shallowest depths coinciding with the shallow bedrock in the western portion of the amendment area. This can pose a concern for potential groundwater contamination if improperly managed. Existing stormwater management practices in the amendment area could be affected by the potentially shallow karst.

The *WDNR Conservation Practice Standard 1001 – Wet Detention Pond* (2007) and *WDNR Conservation Practice Standard 1002 – Site Evaluation for Stormwater Infiltration* (2017) requires field verification for areas of the development site considered suitable for stormwater management. This includes a site assessment for karst features in this area. If shallow karst features are found, adequate protection measures are required to address any potential for groundwater contamination.

Per Dane County ordinance, infiltration practices receiving runoff from source areas that contain impervious surfaces must be located to allow a separation distance of at least 5 feet between the bottom of the infiltration system and the elevation of seasonal high groundwater, or the top of bedrock, along with certain soil filtering characteristics. There is no minimum separation distance for roofs draining to surface infiltration practices. Soil test pits are required as part of the stormwater management plan to assure that infiltration practices are sited in locations that will not adversely affect groundwater quality.

## **Proposed Urban Services**

### ***Parks and Open Space***

The proposed development includes one 1.6-acre stormwater management area within the amendment area (see Map 2). Open space, totaling 19.9 acres within the amendment area, is also proposed. No parkland is proposed. All stormwater and open space areas are proposed for placement in Environmental Corridors.

### ***Wastewater***

Sanitary sewer service will be provided to the amendment area by connection to the City of Verona sanitary sewer collection and treatment system. To serve the western area, sanitary sewer will be extended north along Country View Road from the existing City of Verona Country View Lift Station (Country View LS). The lift station pumps flow east via forcemain and discharges to City-owned gravity sewer which connects to the Lower Badger Mill Creek (LBMC) Interceptor near the intersection of W Verona Avenue and N Nine Mound Road. To serve the eastern area, connection will be made directly to the LBMC Interceptor which runs along the southwest edge of this area. The LBMC Interceptor is owned by the Madison Metropolitan Sewerage District (MMSD) and was extended north past the amendment area to Shady Oak Lane in 2023, and will be extended an additional 5,500 feet to Midtown Road in 2024, as part of MMSD's 2022 Capital Improvements Plan ([link to Plan](#)). Wastewater flow from both areas will flow via the LBMC Interceptor to Pump Station 17 within the MMSD system, and eventually to the Nine Springs Treatment Facility.

The proposed development within the western amendment area consists of approximately 30 acres of commercial land uses contributing to wastewater flows; the eastern area includes an existing utility building which may connect to the public sewer system in the future (currently served by a holding tank)

but which is assumed to contribute a negligible amount of flow. The City estimates that the amendment area will generate an annual average of approximately 184,400 gallons per day (gpd) of wastewater, or 128 gallons per minute (gpm). This assumes 8,400 persons occupying the commercial spaces and an average wastewater generation rate of 22 gallons per person, per day (gpcd), based on the City's application using their previous flow studies and Epic projections. The City estimates that the amendment area will generate a peak daily flow rate of approximately 371,000 gpd (0.37 MGD), or 258 gpm, utilizing a peaking factor of 2.01 based on flow monitoring data at PS 17 from 2017. Utilizing a more conservative peaking factor of 2.5 typical to commercial areas, the daily peak flow rate is estimated to be 461,000 gpd (0.46 MGD), or 320 gpm.

Proposed sewers to serve the amendment area have not been designed but will be sized based on specific sub-sewersheds. The existing Country View LS was designed with the ability to be reconfigured to handle future growth at the Epic Campus. Currently, the lift station receives a peak daily flow of approximately 179,700 gpd. According to the City's application, the lift station has hydraulic capacity to handle the flows from the proposed amendment area but will need upgrades to the pump and motor components, consistent with the original design. The receiving local sewers from the Country View LS discharge currently receive a peak daily flow of approximately 182,900 gpd at the furthest downstream section, which represents three percent of its design capacity.

The *2018 MMSD Collection System Evaluation*, prepared by CARPC staff in collaboration with MMSD staff, conducted on the receiving MMSD interceptor sewers shows that the LBMC Interceptor sewers have sufficient capacity to serve the amendment area. The LBMC Interceptor has a design capacity of greater than 16.0 MGD downstream of the amendment area. The City estimates a discharge of 1.15 MGD at PS 17 currently, indicating sufficient capacity within the LBMC Interceptor to handle the additional flow from the amendment area.

Based on the estimated wastewater loading and capacity of the existing sewers, and with the planned improvements to the Country View LS, the City has shown that there is sufficient existing or planned wastewater collection system capacity to serve the proposed amendment area.

### **Wastewater Treatment Facility**

Madison Metropolitan Sewerage District (MMSD) will provide wastewater treatment for the amendment area. The amendment area will need to be annexed into the MMSD service boundary. The Nine Springs Wastewater Treatment Facility (WWTF) is located on Moorland Road, Madison, and currently discharges treated effluent to Badfish Creek within the Badfish Creek Watershed (Lower Rock River Basin) and Badger Mill Creek within the Upper Sugar River Watershed (Sugar-Pecatonica Basin). The rated monthly design flow capacity of the facility is 56.0 million gallons per day (MGD) and the maximum daily design flow capacity is 68.6 MGD. In the year 2022, the facility received an average monthly influent hydraulic loading of 36.3 MGD (65% of the 56.0 MGD design capacity), including infiltration and inflow, according to the 2022 Compliance Maintenance Annual Report (CMAR) ([link to 2022 CMAR](#)). It is expected to reach 90% of current hydraulic design capacity around 2026 based on current projected growth rate assumptions. This already occurs on occasion, although average flows did not exceed 70% design capacity for any month in 2022. MMSD completed a facility plan in 2017, titled [Liquid Processing Facilities Plan](#), that recommended improvements to the liquid treatment processes at the plant, including the addition of hydraulic capacity. These improvements are being implemented in

multiple phases between 2018 and 2030. For the 20-year planning period, treatment for this area is expected to remain at the existing wastewater treatment facility location with expanded capacity of the system as the need is foreseen. MMSD staff were contacted regarding this amendment and provided comments but did not have concerns with serving this additional area.

MMSD did not have issues meeting its WPDES permit limits for the quality of effluent discharged to Badfish Creek and Badger Mill Creek, according to their 2022 CMAR. Permit limits are specific to each outfall; however, effluent sampling is performed upstream of the flow split to each outfall. Effluent quality summarized here refers to Badfish Creek, where approximately 95% of discharge is released. Below is a summary of the major effluents reported on in the 2022 CMAR for the Badfish Creek outfall:

- The biochemical oxygen demand (BOD) effluent quality for 2022 was well below the monthly average limit, with a monthly average of 3.0 mg/L (16% of the limit) and a maximum concentration of 4 mg/L (21% of the limit) for the month of January through April.
- The total suspended solids (TSS) effluent quality for 2022 was below the monthly average limit, with a monthly average of 5.3 mg/L (27% of the limit) and a maximum concentration of 7 mg/L (35% of the limit) for the month of September and November.
- The ammonia (NH<sub>3</sub>) effluent quality for 2022 was below the monthly average limits (limits vary by month), with a monthly average of 0.213 mg/L (3-12% of the limit) and a maximum concentration of 0.452 mg/L (12% of the limit) for the month of March.
- The phosphorus (P) effluent quality for 2022 was below the monthly average limit, with a monthly average of 0.32 mg/L (23-43% of the limit) and a maximum concentration of 0.43 mg/L (43% of the limit) for the month of September.

Badfish Creek is a tributary to the Rock River, and thus the WPDES permit for MMSD includes phosphorus and TSS limits for effluent to Badfish Creek to comply with the Total Maximum Daily Load (TMDL) developed for the Rock River Basin to protect and improve water quality. In addition to the TMDL limits, future water quality-based effluent limits (WQBEL) have been considered in the WPDES permit. The interim limit for phosphorus discharged to Badfish Creek is a 1.0 mg/L monthly average required beginning May 2020 (previous limit was 1.5 mg/L), with a final WQBEL of 0.225 mg/L. Additionally, an interim limit of 0.6 mg/L, expressed as a six-month average (May through October and November through April) is required beginning May 2020, with a final WQBEL of 0.075 mg/L. To meet the WQBEL for phosphorous, MMSD has implemented a Watershed Adaptive Management (WAM) approach, leading a diverse group of partners called Yahara Watershed Improvement Network (Yahara WINs) in implementing phosphorus reducing practices in the Yahara Watershed ([link to Yahara WINs website](#)).

The Nine Springs WWTF does not remove chloride from influent. A 2015 study completed by AECOM determined that while possible, treatment would be cost-prohibitive, energy intensive, and involve other environmental impacts ([link to report](#)). MMSD has been granted a variance from the chronic water quality standard for chloride of 395 mg/L required by NR 105. With this variance, the WPDES permit sets interim (variance) monthly limits above the chronic water quality standard and requires

MMSD to implement chloride source reduction measures. One such source reduction initiative which MMSD participates in is the Wisconsin Salt Wise Partnership ([link to Salt Wise website](#)).

### ***Water System***

Water will be provided to amendment areas by connection to the City's municipal water system. Verona Water Utility provides municipal water through a public water distribution system which includes approximately 450,690 lineal feet of water main and six active high-capacity groundwater wells within the City. The City has one ground-level reservoirs and three elevated tanks, with a combined storage capacity of 1.6 million gallons. The wells are at depths ranging from approximately 770 to 1490 feet with an average capacity of 370 to 2,200 gallons per minute (gpm), according to the 2022 Annual Report to the Public Service Commission of Wisconsin ([link to 2022 Annual Report](#)). In total, the gross capacity of the municipal wells is 7,970 gpm (11.48 million gallons per day, MGD). The firm capacity (with the largest well assumed to be out of service) is approximately 5,770 gpm (8.31 MGD). The City's application reports similar, but slightly higher capacities of the six wells. The City maintains a Water Master Plan which is updated every 10 years, with the last update occurring in 2015. As demand increases, additional capacity will be added to the system.

The City's water system is comprised of three pressure zones. The proposed amendment area is within the Central Pressure Zone, which contains Wells 1-5 with a gross capacity of 6,570 gpm (9.5 MGD) and firm capacity of 4,370 gpm (6.3 MGD).

The City's application reports that the City-wide average daily demand is approximately 1.20 MGD, with a maximum daily demand of 2.60 million gallons, based on 2022 City pumping records. The reported maximum daily demand varies from the 2022 Annual Report, which shows a maximum daily demand of 2.07 million gallons. The maximum daily demand in 2022 represents approximately 25% of its firm pumping capacity.

Water losses in the City's distribution system was an average of 76,145 gallons per day (gpd) (0.08 MGD) in 2022, which accounted for 6% of the net water supplied. Approximately 92% of this was due to unreported and background leakage, with the remaining due to reported leaks. In 2022, there were 2 main breaks and 3 service breaks which were repaired. Water losses in the City's distribution system was 6% in 2021 and 7% in 2020. The Wisconsin Administrative Code PSC 185.85(4)(b) requires a utility with more than 1,000 customers to submit a water loss control plan to the Public Service Commission (PSC) if the utility reports its percentage of water losses exceeds 15%.

Water supply will be provided by connecting to existing 12-inch water main along Epic Lane and extending north along Country View Road to serve the western portion of the amendment area and by connecting to 12-inch eastern main being constructed along CTH PD to serve the eastern portion of the amendment area. Water main will be extended within the amendment area to serve individual buildings and consist primarily of 12-inch main, consistent with the City's 2015 *Water Master Plan*. The system will be looped in the future with a secondary connection from the north to CTH PD.

The proposed development within the amendment area consists of approximately 30 acres of commercial land uses and other open space contributing to water demand. The City anticipates the annual average daily water demand for the amendment area to be approximately 84,000 gpd (0.08

MGD), or 58 gpm. This assumes an average daily demand of 10 gallons per capita per day (gpcd) and assumes 8,400 persons occupying the commercial spaces, based on the City's application. The estimated peak hourly demand is approximately 201 gpm, using a peak hourly demand factor (peak hour to AADV) of 3.44 based on the 2015 *Water Master Plan*. Including the projected demand from the amendment area, the total peak daily demand on the water system is anticipated to be 891 gpm. The peak hourly demand is anticipated to be 1,874 gpm. This represents an increase of approximately 7% in the current demand for the system. The City estimates that static pressures within the amendment area will range between 39 psi (at the northern limits) and 89 psi (at the southern limits). It is anticipated that the existing water supply system will support the additional demand from the proposed amendment areas.

### ***Stormwater Management System***

The northeastern portion of the amendment area is within the Badger Mill Creek subwatershed (HUC 12: 070900040201). This area consists of a decommissioned quarry and related construction operations. It is currently mostly internally drained but historically would have drained to the Dry Tributary to Badger Mill Creek adjacent to the southwest. From there, water flows south through the Epic Campus and City of Verona until the confluence with the Badger Mill Creek at the south side of the city. The western portion of the amendment area is mostly within the Headwaters Sugar River subwatershed (HUC 12: 070900040202) and generally drains west toward the Sugar River and associated wetlands approximately 800-2,700 feet to the southwest, with the northern edge of this area also within the Badger Mill Creek subwatershed and draining east toward the Dry Tributary to Badger Mill Creek. There are multiple ridges within the western amendment area creating multiple subcatchment areas. In each case, the concentrated flow crosses County View Rd and enters into an intermittent stream or constructed drainage ditch tributary to the Sugar River. This amendment area consists of primarily agricultural and open lands and includes two existing stormwater facilities, a large solar array, one farmstead, and several outbuildings.

Within the western area, there are two existing stormwater detention facilities. One basin is located approximately 1,000 south of CTH PD and is assumed to have been used as a temporary sediment basin during construction of nearby infrastructure. The second basin is located south of the solar array and captures and treats water from nearby buildings. According to the application, both basins will be reconfigured to provide additional treatment for proposed development activities in accordance with current performance standards. In both cases, stormwater modeling should account for the current level of peak rate and volume control being achieved in the existing condition.

The quarry area within the eastern area is now internally drained and contains standing water which is closely tied to groundwater levels. There are no plans for development within this area. Should this area ever develop in the future, the City will require that buildings be set two feet above the elevation of a back-to-back 100-year, 24-hour design storm event and that an emergency outlet (either by gravity flow or pumping) be constructed. If this area develops in the future, stormwater modeling should account for the current level of peak rate and volume control being achieved in the existing condition.

A stormwater management plan has not been provided for the amendment area. However, according to the City's application, new development within the amendment area will meet or exceed current stormwater regulations for peak rate control and attenuation, water quality (TSS reduction), volume

control (infiltration), thermal control, and oil/grease control. Where feasible, development within the amendment area will strive to match the predevelopment stay-on volume (i.e., provide 100% stay-on). Pretreatment of stormwater runoff prior to entering the wetlands will be provided in accordance with NR 151 regulations.

Detailed stormwater management plan review and approval is required prior to beginning any development construction. The plan will be required to meet all stormwater management and performance standards of the City of Verona, Dane County, and WDNR current at the time of development.

### **Performance Standards**

The City of Verona stormwater management and performance standards are contained within Chapter 15-2 of the City of Verona Code of Ordinances. Dane County stormwater standards are detailed within the Dane County Code of Ordinances, Chapter 14. WDNR stormwater standards are within Administrative Code Chapters NR 151 and NR 216. Development within the amendment area will be required to follow the more protective requirements contained within the respective standards.

The City proposes stormwater management performance measures for the amendment area to meet, or exceed, applicable stormwater standards currently required by the State of Wisconsin, Dane County, and City of Verona, and include:

1. Peak runoff rate control is required for the 1-, 2-, 10-, 100-, and 200-year, 24-hour design storms to limit post-development runoff to “pre-settlement” levels, in accordance with the City of Verona Stormwater Ordinances. This requirement is equally, or more, protective than those required by the Dane County Ordinance.
2. Sediment control is required to achieve at least 80% sediment control for the amendment area based on the average annual rainfall period, with sediment control pretreatment occurring prior to infiltration for runoff from parking lots and new road construction within commercial, industrial, and institutional land uses, in accordance with the City of Verona and Dane County Stormwater Ordinances.
3. Runoff volume control is required to maintain the post-development infiltration (stay-on) volume to at least 90% of the pre-development infiltration (stay-on) volume for the average annual rainfall period, in accordance with the City of Verona and Dane County Stormwater Ordinances.
4. Maintain predevelopment groundwater recharge rates from the WGNHS 2012 report, “Groundwater Recharge in Dane County, Wisconsin, Estimated by a GIS-Based Water-Balance Model”, for the amendment area (a range of 9 to 13 inches/year) or by a site-specific analysis, when required in lieu of meeting stay-on standards in accordance with the City of Verona and Dane County Stormwater Ordinances.

5. Thermal control is required to reduce the temperature of stormwater runoff from development sites within thermally sensitive watersheds, in accordance with the City of Verona and Dane County Stormwater Ordinance.
6. Oil and grease control are required to treat the first 0.5 inches of runoff using best management practices at commercial and industrial sites and any other uses where the potential for pollution by oil or grease, or both, exists, in accordance with the City of Verona and Dane County Stormwater Ordinances.

## **Impacts and Effects of Proposal**

### ***Environmental Corridors***

The proposed amendment area includes a total of approximately 42 acres of Environmental Corridor (see Map 12). This will include delineated wetlands and intermittent stream with associated buffers, 1% annual chance floodplain, the quarry pond, and proposed stormwater management areas in accordance with the Environmental Corridor Policies and Criteria ([link to document](#)) adopted in the *Dane County Water Quality Plan*. Proposed Environmental Corridors include all areas currently mapped as Protection Areas and some areas which coincide with mapped Stewardship Areas.

Protection Areas are required for inclusion in Environmental Corridors when those areas are added to the urban service area. Protection Areas include natural resource features such as the 1% annual chance floodplain; waterbodies, streams and wetlands, plus their required vegetative buffers; riparian steep slopes; existing public lands, parks, and conservancy areas; and existing stormwater management facilities. Protection areas are mapped based on regionally available information, such as the Wisconsin Wetland Inventory data.

The proposed amendment area includes 56.4 acres mapped as Stewardship Area, including potentially restorable wetlands, hydric soils, and internally drained areas, of which 26 acres are proposed to be designated as Environmental Corridor with this amendment (see Map 12). Stewardship Areas are natural resources that are not legally protected from development, but still provide important benefits to the region, and are advised to be considered for inclusion in Environmental Corridors, above the minimum requirements. This concept is described more in the [2050 Regional Development Framework](#) (Framework) and is aimed at achieving the goal of conserving water resources and natural areas. The Stewardship Area recommendations include natural resource features such as the 0.2% annual chance floodplain, potentially restorable wetlands, internally drained areas, hydric soils, current/potential Ice Age Trail Corridor, and Natural Resource Area boundaries identified in the Dane County Parks and Open Space Plan.

Within the application, a request was made for a minor amendment to the environmental corridor within the adjacent existing Verona urban service area for the removal of 16.1 acres. An October 2023 wetland delineation by Heartland Ecological Group, Inc. confirmed that no wetlands are present in the area requested for removal, and thus this request was granted, and the environmental corridor mapping was amended in November 2023.

### ***Meeting Projected Demand***



Based on projections in the Framework, employment in Verona is expected to grow by at least 7,000 jobs in the next 30 years. Much of this growth was attributed to Epic.

### ***Phasing***

Development of the western amendment area is expected to proceed north to south. The northeastern area around the quarry is not intended to be developed in the future.

### ***Surface Water Impacts***

Development creates impervious surfaces (e.g., 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 (e.g., 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 bank-full 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 designed to address the impacts of development on water quality, runoff volumes, peak flows, water temperature, and groundwater recharge. In 2011, county and local standards for runoff volume control were increased beyond state standards to further address the potential stormwater impacts of development. Since 2010 many communities adopted even higher standards for volume control through their own ordinances or as part of USA amendment agreements. However, in 2017, State statute 281.33(6)(a)(1) was changed to limit the ability of local governments to provide more protective standards for runoff volume through local ordinances. In 2021, Dane County adopted peak rate control

requirements for the 200-year storm event in their ordinance as well as requirements for closed basins, which made these requirements universal to all communities in Dane County.

The City of Verona proposes to mitigate the urban nonpoint source impacts of the proposed development by requiring the implementation of various stormwater best management practices that will be designed and constructed to meet current Dane County standards for pollutant reduction, runoff volumes, peak flows, water temperature, and groundwater recharge. Such practices will help to address the potential water quality impacts of stormwater runoff from the proposed development on the receiving waters.

Regional partners are actively working to address chlorides through the [Wisconsin Salt Wise Partnership](#). WI Salt Wise's chloride reduction trainings are open to all municipal and private winter maintenance professionals in the region. City of Verona staff have attended winter salt certification classes and training for winter road maintenance and are encouraged to stay current on the latest trainings and development.

The City of Verona is also a participant in the Madison Area Municipal Storm Water Partnership (MAMSWaP), which is a coalition of Dane County municipalities and organizations working together to promote practices that reduce and improve stormwater runoff into Dane County lakes, rivers, and streams. The MAMSWaP Information and Education (I&E) Committee works to develop and implement projects and plans through regional outreach and messaging throughout the communities, including maintaining the [www.ripple-effects.com](http://www.ripple-effects.com) website, distributing tools and articles to municipalities, community groups, and neighborhood associations, and providing presentations to focused audiences. Specific goals include promoting proper leaf management, proper lawncare practices, reduction in chlorides pollution from over-use of salt, and rainwater harvesting for beneficial reuse.

### ***Groundwater Impacts***

Without effective mitigation practices, converting natural areas to urban development shifts the ground/surface water balance in streams and wetlands from a groundwater-dominated system to one dominated more and more by surface water runoff. This can result in subsequent reductions in stream quality and changing biological communities.

Groundwater modeling indicating the cumulative effects of well withdrawals in baseflow of the Badger Mill Creek at the confluence with Dry Tributary to Badger Mill Creek and Sugar River at USH 151 (see locations on Map 5) are shown in Table 4. Within Badger Mill Creek, groundwater modeling indicates that the cumulative effects of well withdrawals and effluent discharge from MMSD have resulted in a 0.6 cfs increase in baseflow since predevelopment (i.e., no pumping) conditions; however, a 0.5 cfs decline compared to 2010 conditions is estimated for the year 2040 (this assumes continuation of effluent return to Badger Mill Creek). Within Sugar River, groundwater modeling indicates that the cumulative effects of well withdrawals have resulted in a nearly 2 cfs decline in baseflow since predevelopment (i.e., no pumping) conditions and estimate another 0.4 cfs decline for the year 2040.

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

Stream	No Pumping	2010	2040
Badger Mill Creek (7704)	3.3 cfs	3.9 cfs	3.4 cfs
Sugar River (7549)	10.2 cfs	8.3 cfs	7.9 cfs

*Source: 2016 Groundwater Flow Model for Dane County, developed by the WGNHS ([link to website](#))*

Generally, groundwater discharge occurs along the entire length of perennial streams and is the source of stream baseflow. The loss of baseflow from the cumulative effects of well water pumping and urbanization is a regional issue, beyond the boundaries of a single USA Amendment or even a single municipality. This issue is discussed along with potential management options in the updated *Dane County Groundwater Protection Planning Framework* ([link to report](#)). Maintaining pre-development groundwater recharge by infiltrating stormwater runoff helps to replenish groundwater, maintain baseflow, and mitigate this impact. The regional groundwater model is a useful tool for evaluating different configurations and scenarios of municipal groundwater well withdrawals on these stream systems.

### Comments at the Public Hearing

A public hearing was held on the proposed amendment at the December 14, 2023, meeting of the Capital Area Regional Planning Commission. Representatives from the City of Verona spoke in favor of the amendment. There were no registrants opposed to the amendment. Commissioner McKeever sought clarification on the map related to environmental corridors, to which representatives for the City addressed during the meeting.

### Conclusions and Staff Water Quality Recommendations

There is sufficient existing treatment plant system capacity at MMSD's Nine Springs Wastewater Treatment Facility and sufficient existing or planned wastewater collection system capacity to serve the proposed amendment area.

The City of Verona proposes to mitigate the potential urban nonpoint source impacts of the proposed development on the receiving waters by requiring the implementation of stormwater best management practices that are designed and constructed to meet current standards for pollutant reduction, runoff volumes, peak flow rates, water temperature, and groundwater recharge. Additionally, the City is proposing to exceed current runoff volume control (stay-on) standards, where feasible.

It is CARPC staff's opinion that the proposed amendment is consistent with water quality standards under Wis. Stat. § 281.15, and the adopted Policies and Criteria for the Review of Sewer Service Area

Amendments to the *Dane County Water Quality Plan*, with the existing state and local requirements identified below. In addition to the existing state and local requirements, the City of Verona and development team have agreed to pursue additional water resource management measures for the amendment area, identified below. Additional actions have also been recommended below to further improve water quality and environmental resource management.

### ***State and Local Requirements***

CARPC staff recommend approval of this amendment in recognition of the state and local requirements for the following:

1. State and local review and approval of stormwater management plan(s) is required, including Regional Planning Commission staff review and approval as part of the sewer extension review process.
  - a. Stormwater and erosion control practices are required to be installed prior to other land disturbing activities. Infiltration practices are required to be protected from compaction and sedimentation during land disturbing activities.
  - b. Peak runoff rate control is required for the 1-, 2-, 10-, 100-, and 200-year, 24-hour design storms to limit post-development runoff to “pre-settlement” levels, in accordance with the City of Verona Stormwater Ordinances. This requirement is equally, or more, protective than those required by the Dane County Ordinance.
  - c. Sediment control is required to achieve at least 80% sediment control for the amendment area based on the average annual rainfall period, with sediment control pretreatment occurring prior to infiltration for runoff from parking lots and new road construction within commercial, industrial, and institutional land uses, in accordance with the City of Verona and Dane County Stormwater Ordinances.
  - d. Runoff volume control is required to maintain the post-development infiltration (stay-on) volume to at least 90% of the pre-development infiltration (stay-on) volume for the average annual rainfall period, in accordance with the City of Verona and Dane County Stormwater Ordinances.
  - e. Maintain predevelopment groundwater recharge rates from the WGNHS 2012 report, *“Groundwater Recharge in Dane County, Wisconsin, Estimated by a GIS-Based Water-Balance Model”*, for the amendment area (a range of 9 to 13 inches/year) or by a site-specific analysis, when required in lieu of meeting stay-on standards in accordance with the City of Verona and Dane County Stormwater Ordinances.
  - f. Thermal control is required to reduce the temperature of stormwater runoff from development sites within thermally sensitive watersheds, in accordance with the City of Verona and Dane County Stormwater Ordinance.
  - g. Oil and grease control are required to treat the first 0.5 inches of runoff using best management practices at commercial and industrial sites and any other uses where the

potential for pollution by oil or grease, or both, exists, in accordance with the City of Verona and Dane County Stormwater Ordinances.

2. Easements and perpetual legal maintenance agreements with the City, to allow the City to maintain stormwater management facilities if owners fail to do so, are required for any facilities located on private property.
3. Environmental Corridors are required to be delineated to meet the Environmental Corridor Policies and Criteria adopted in the Dane County Water Quality Plan.

### ***Additional Agreements for the Amendment Area***

In addition to the existing state and local requirements, the City of Verona and the development team have agreed to pursue the following water resource management measures for the amendment area:

1. Seek to provide volume control to maintain post-development infiltration (stay-on) volume to 100% of the pre-development infiltration (stay-on) volume, which accounts for existing areas of retention, for the average annual rainfall period, where feasible.
2. If the northeastern amendment area (area of the former quarry) develops in the future, require that the lowest opening elevation of buildings be set a minimum of two feet above the water level for back-to-back 100-year, 24-hour design, storm events and that an emergency outlet (gravity or pumping) be provided to the Dry Tributary to Badger Mill Creek.

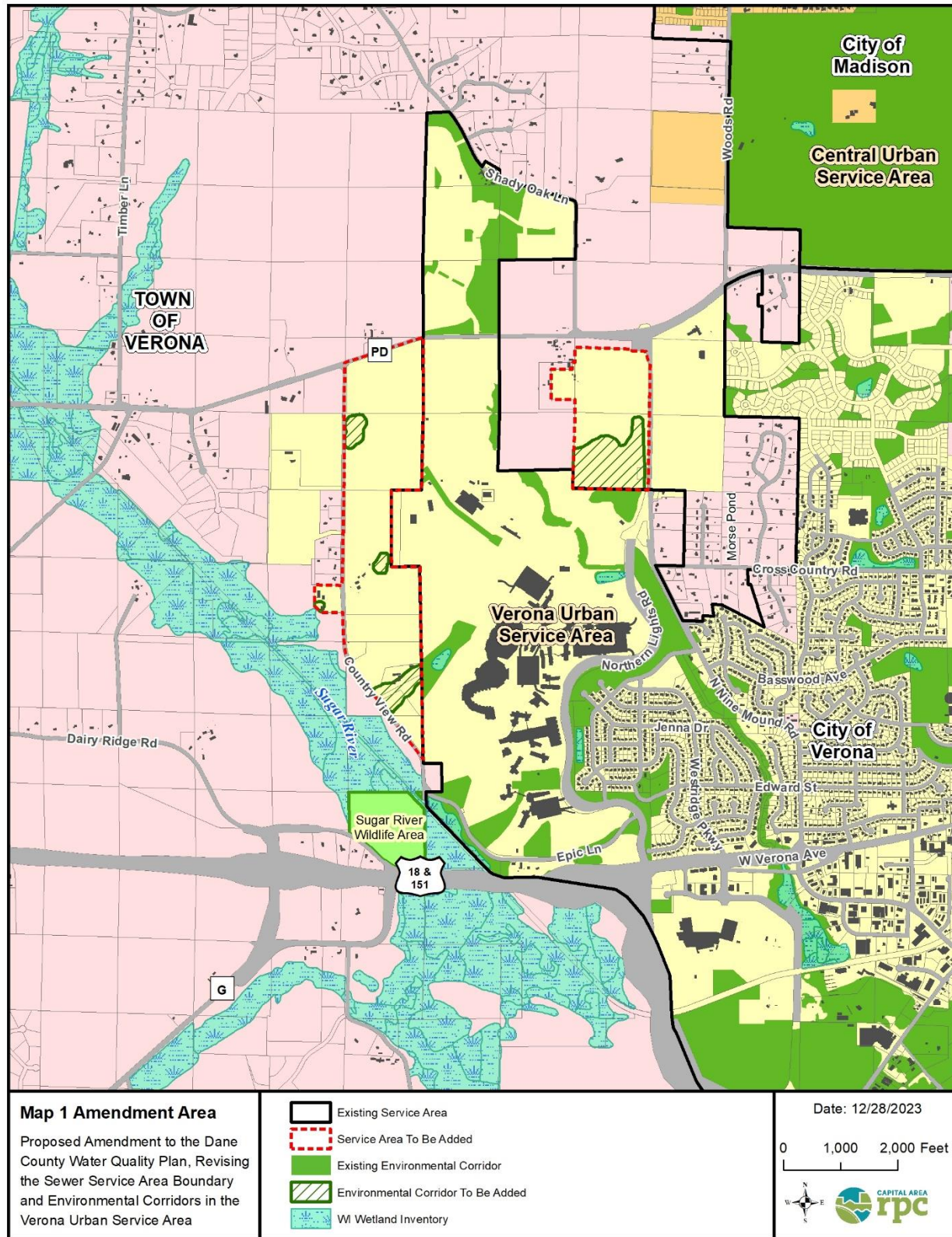
### ***Recommendations***

It is recommended that the City of Verona pursue the following to further improve water quality and environmental resource management:

1. Continue to participate in regional water quality initiatives including Wisconsin Salt Wise, the Madison Area Municipal Storm Water Partnership (MAMSWaP), and Yahara WINs.
2. Continue using best management practices for salt application on all private drives, parking lots, and sidewalks within the Epic Campus. If not already doing so, the Developer is encouraged to collaborate with Wisconsin Salt Wise and encourage any contracted private winter maintenance professionals to attend the winter salt certification classes offered by Wisconsin Salt Wise.
3. Pursue restoration or improvement of the wetlands which are associated with an intermittent tributary to Sugar River (located in the southwestern edge of amendment area) to create an amenity for the surrounding development.
4. Encourage the removal and control of invasives and the use of native flora favored by the Rusty Patched Bumble Bee in landscaping to provide suitable habitat for this pollinator, where appropriate, for the entire amendment area within the High Potential Zone for the federally endangered Rusty Patched Bumble Bee.

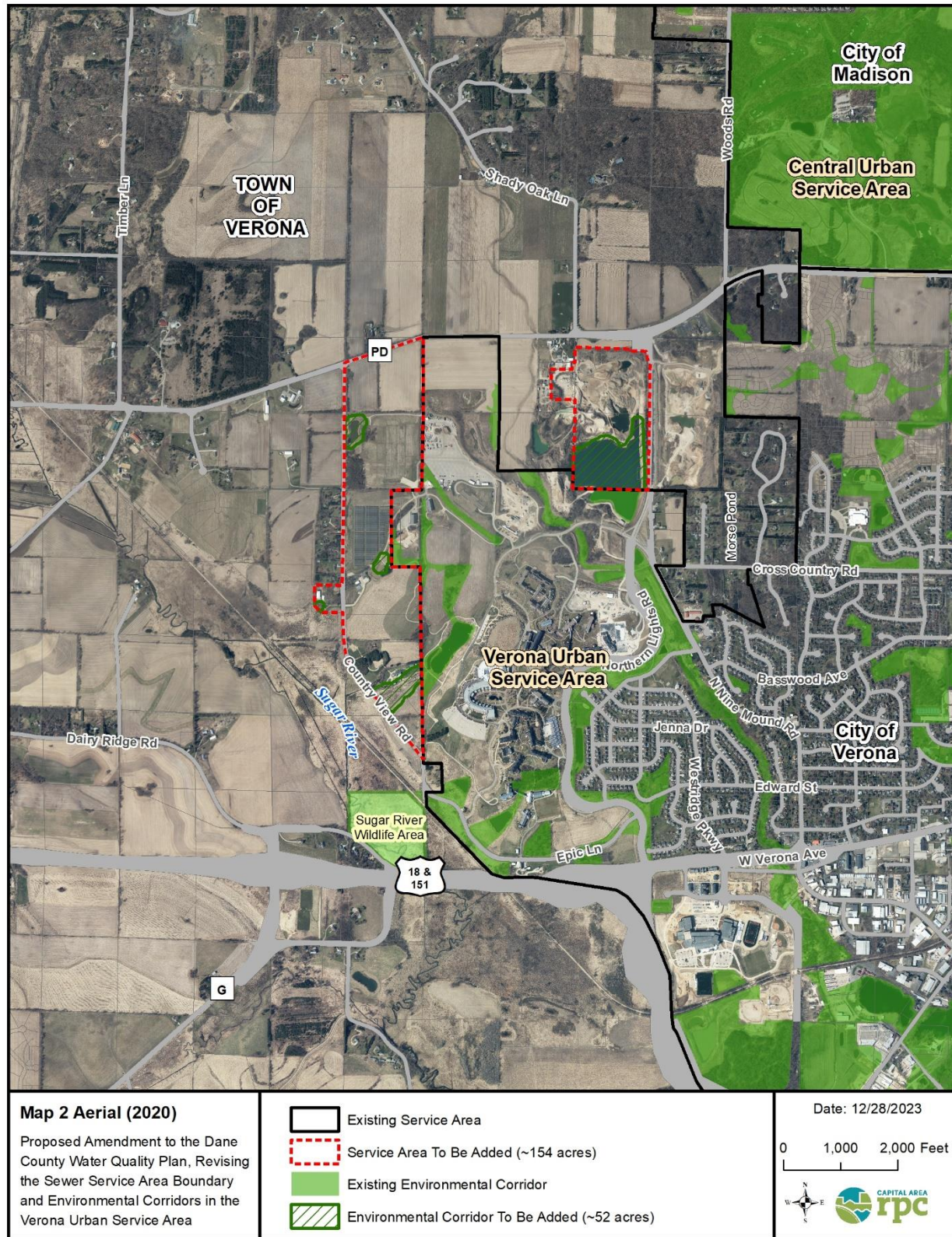
5. Based on the Endangered Resources Review conducted on September 25, 2023, by the WDNR (ERR Log # 23-660), take necessary protection and mitigation measures identified for the 5 species with recommended actions.

## Map 1 - Amendment Area



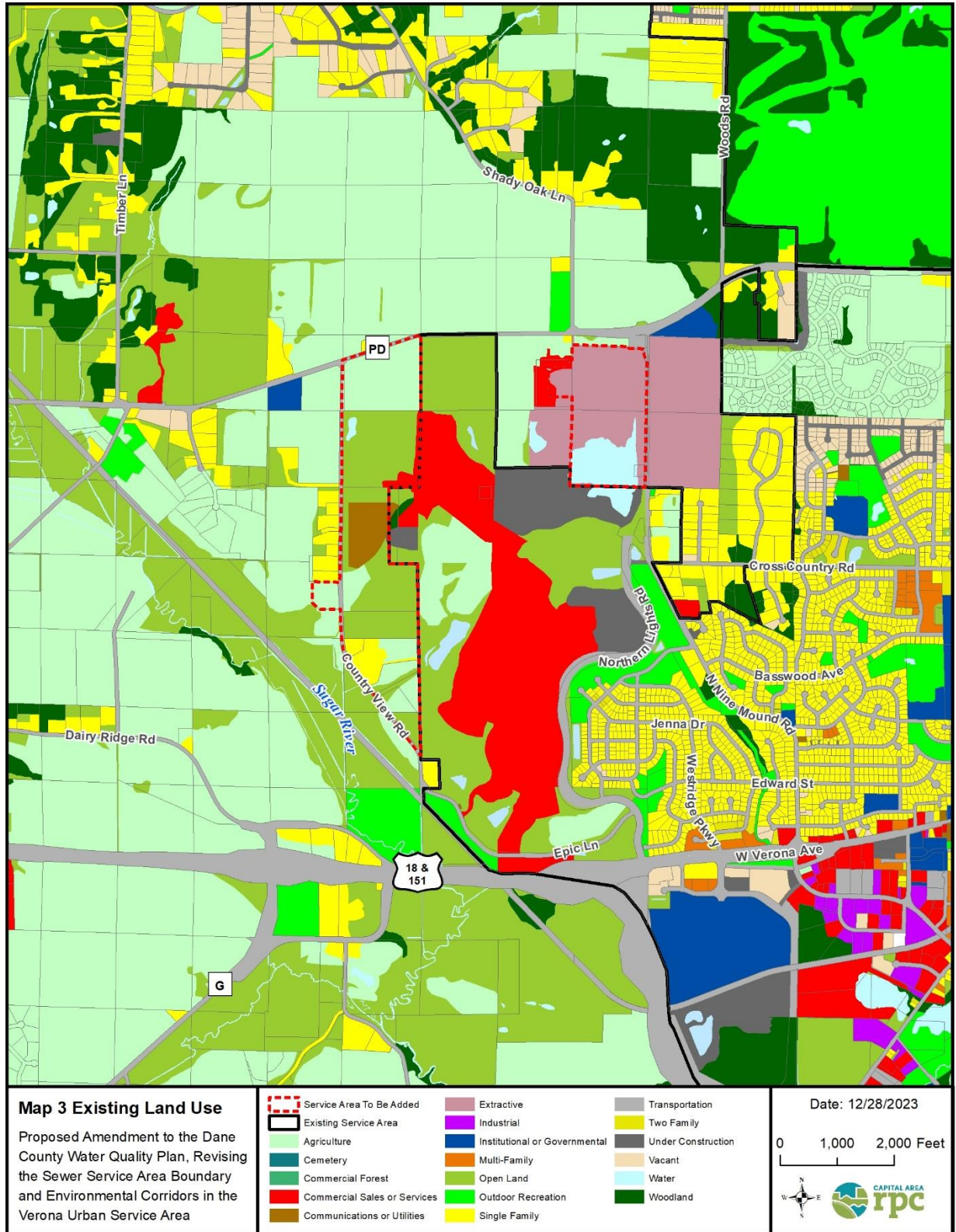


## Map 2 – Aerial



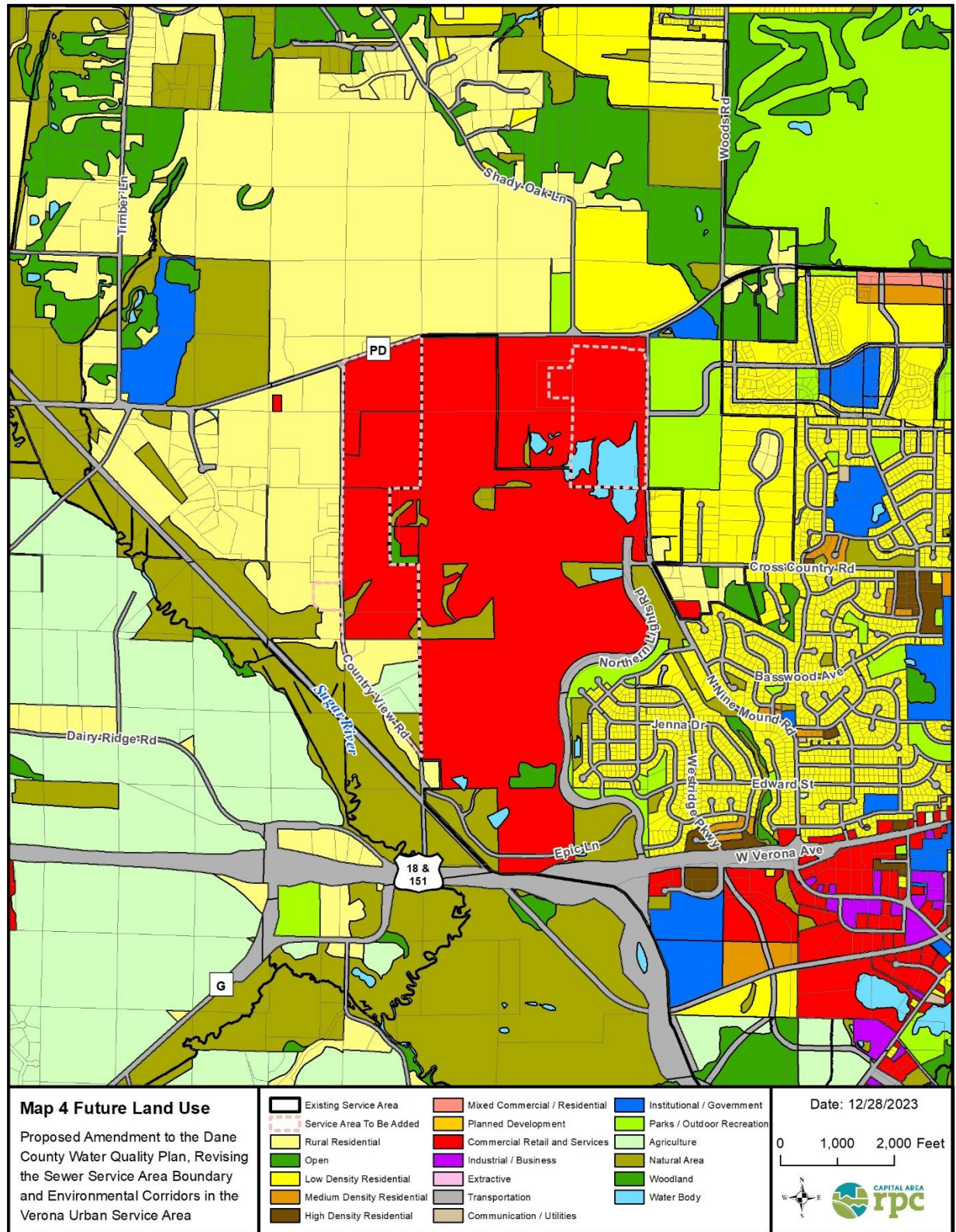


### Map 3 – Existing Land Use



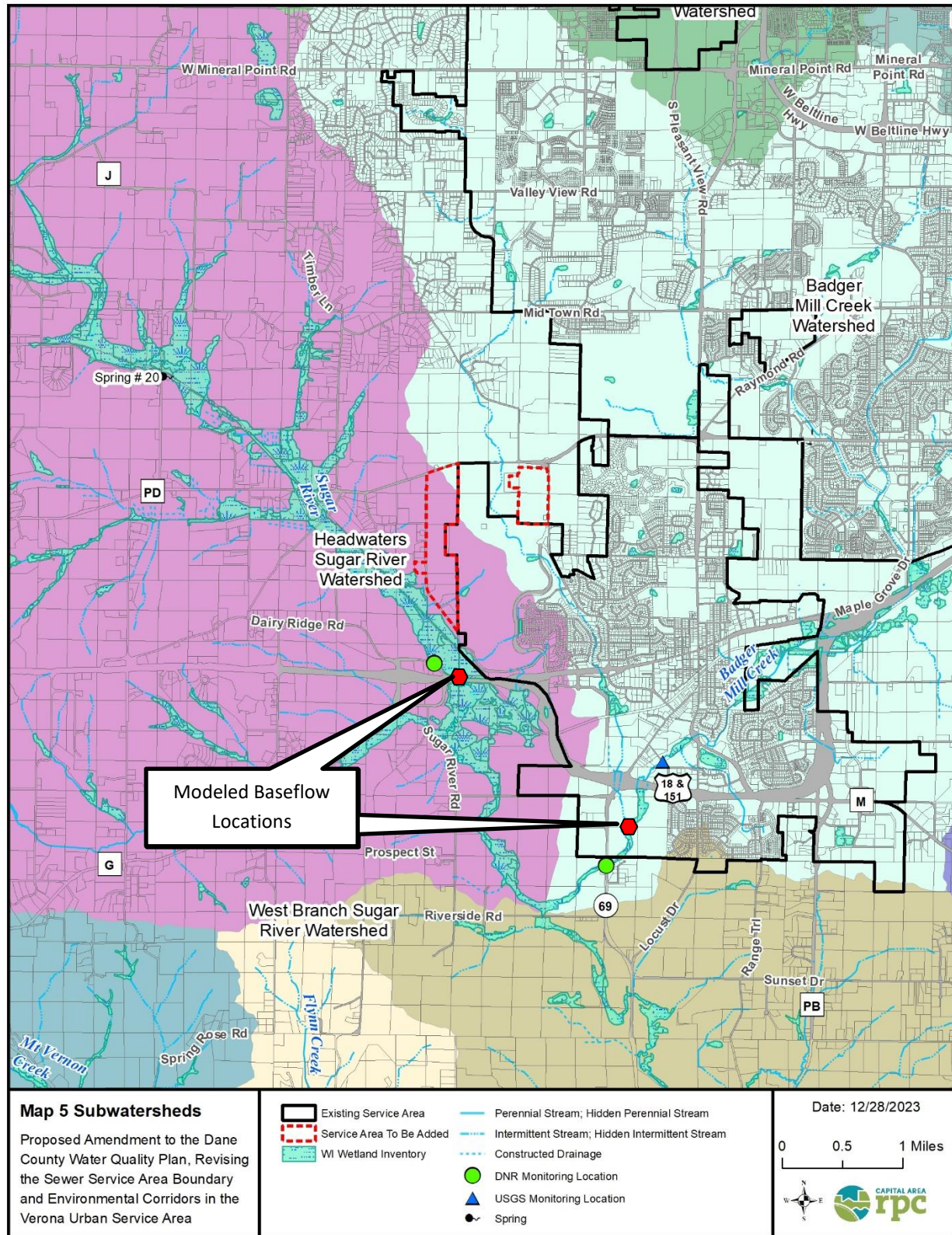


## Map 4 – Planned Land Use



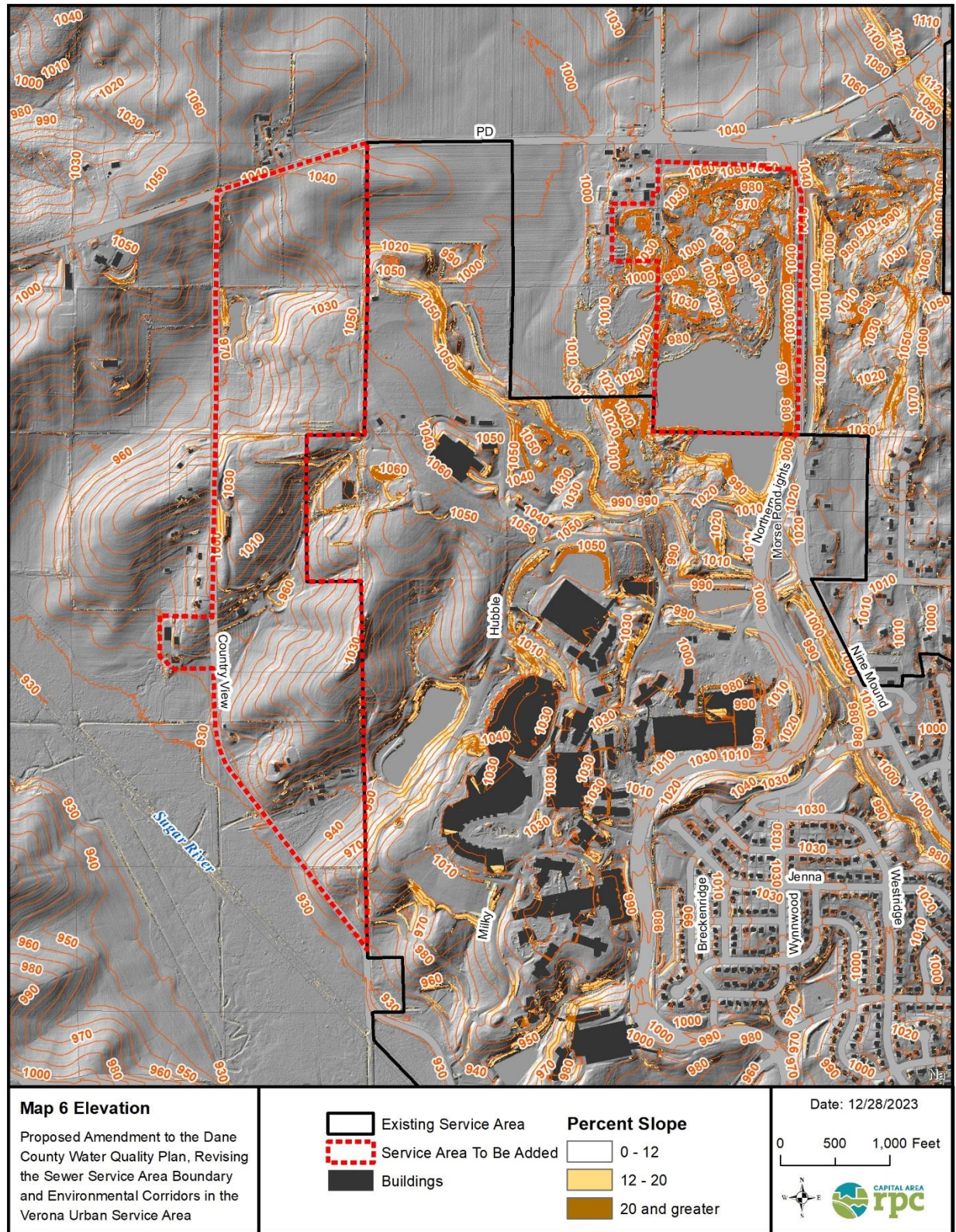


## Map 5 – Subwatersheds



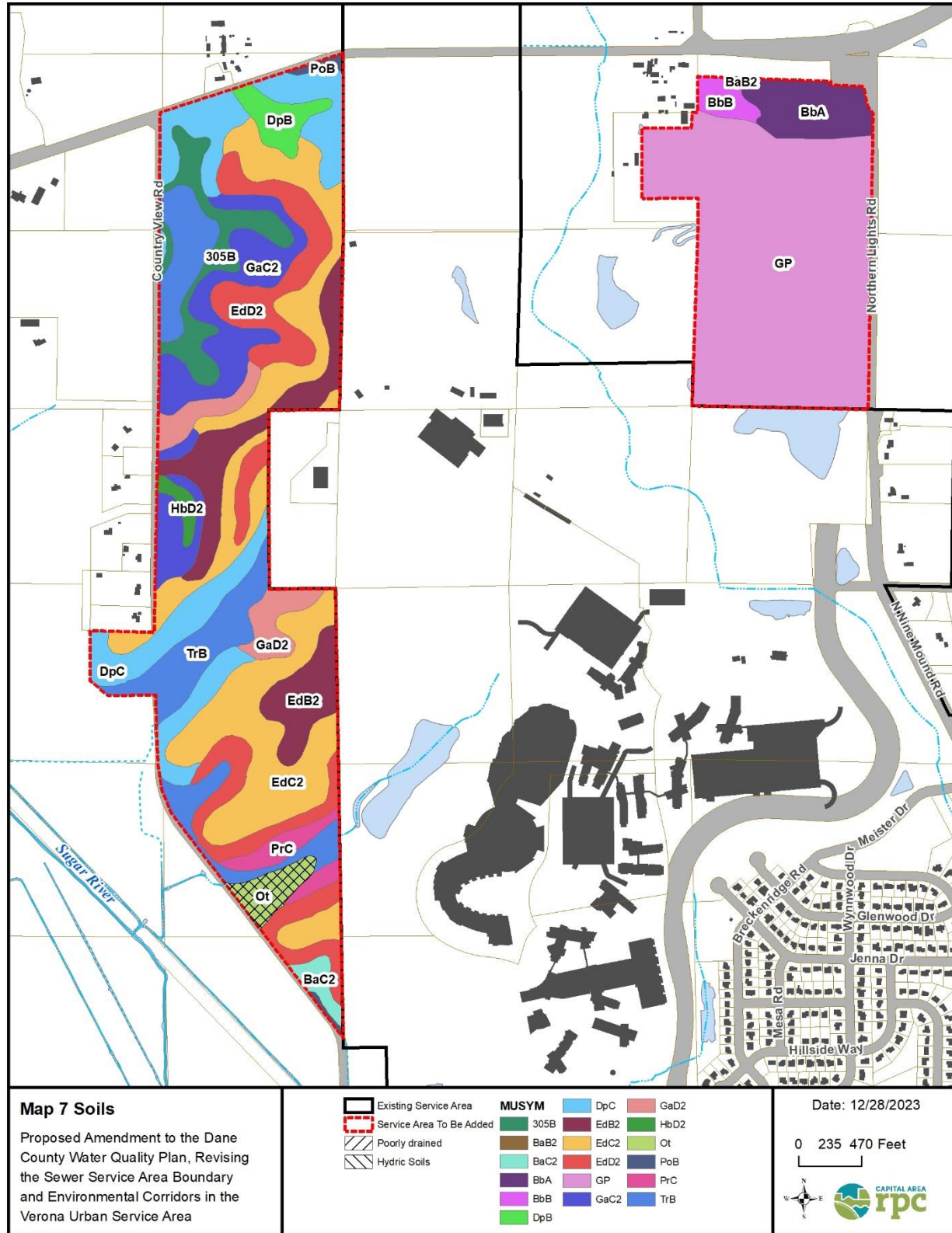


## Map 6 – Elevations

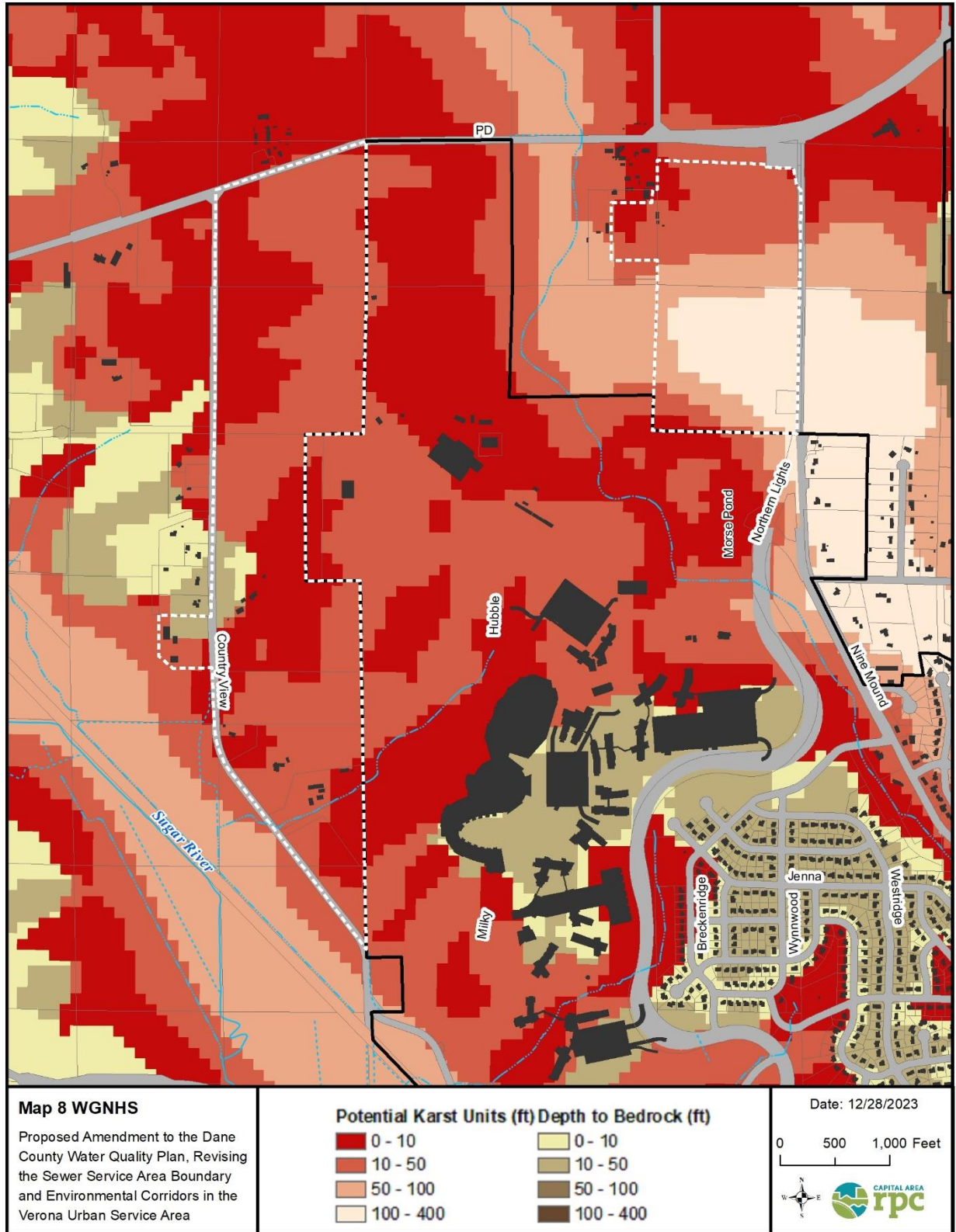




## Map 7 - Soil Type

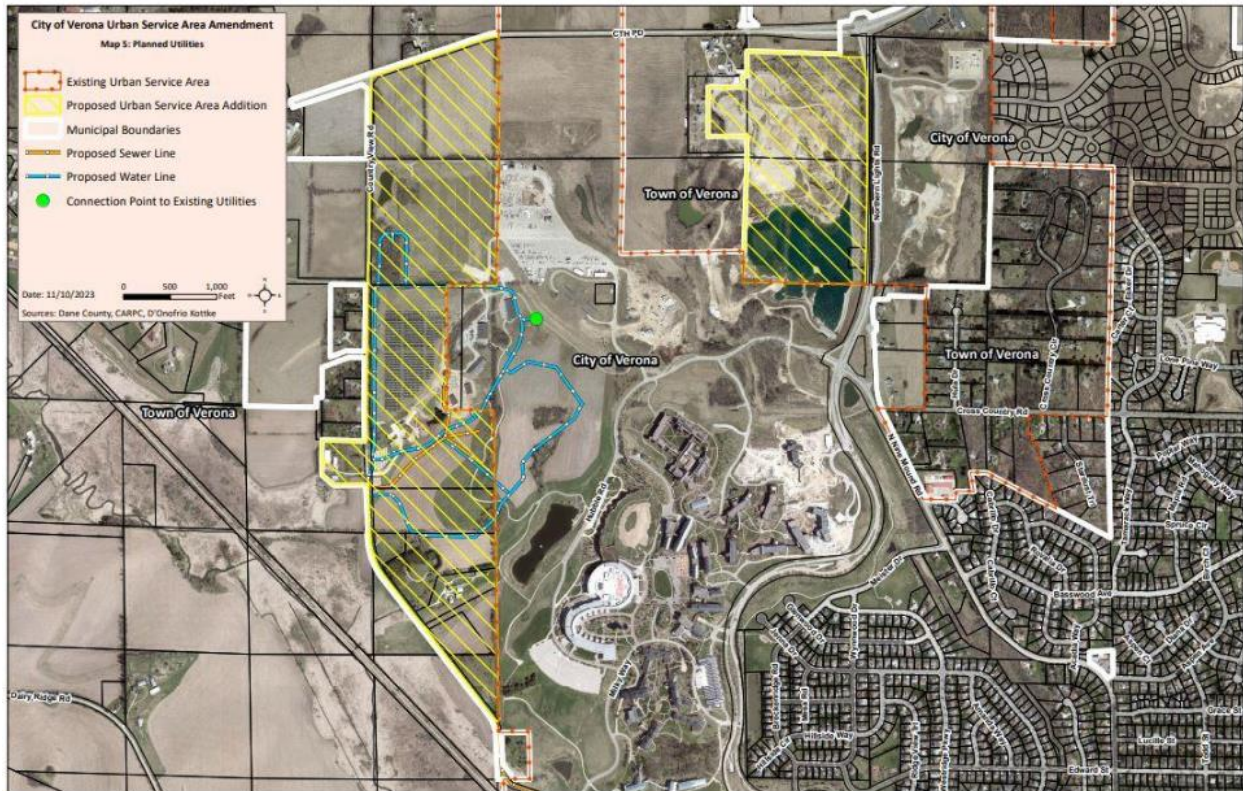


**Map 8 – WGNHS Bedrock Depth and Potential Karst Features**

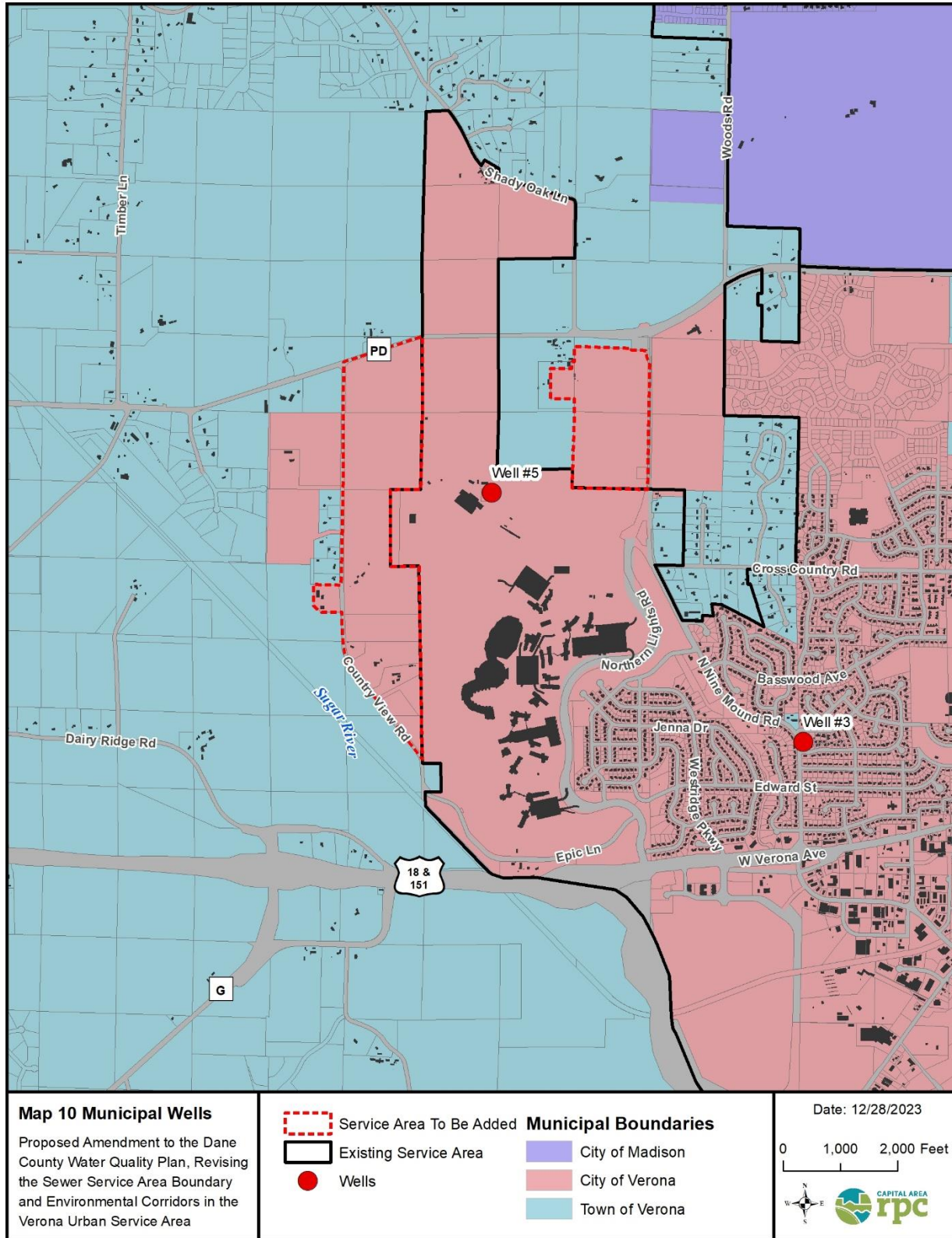




## Map 9 – Proposed Sanitary Sewer and Water Main

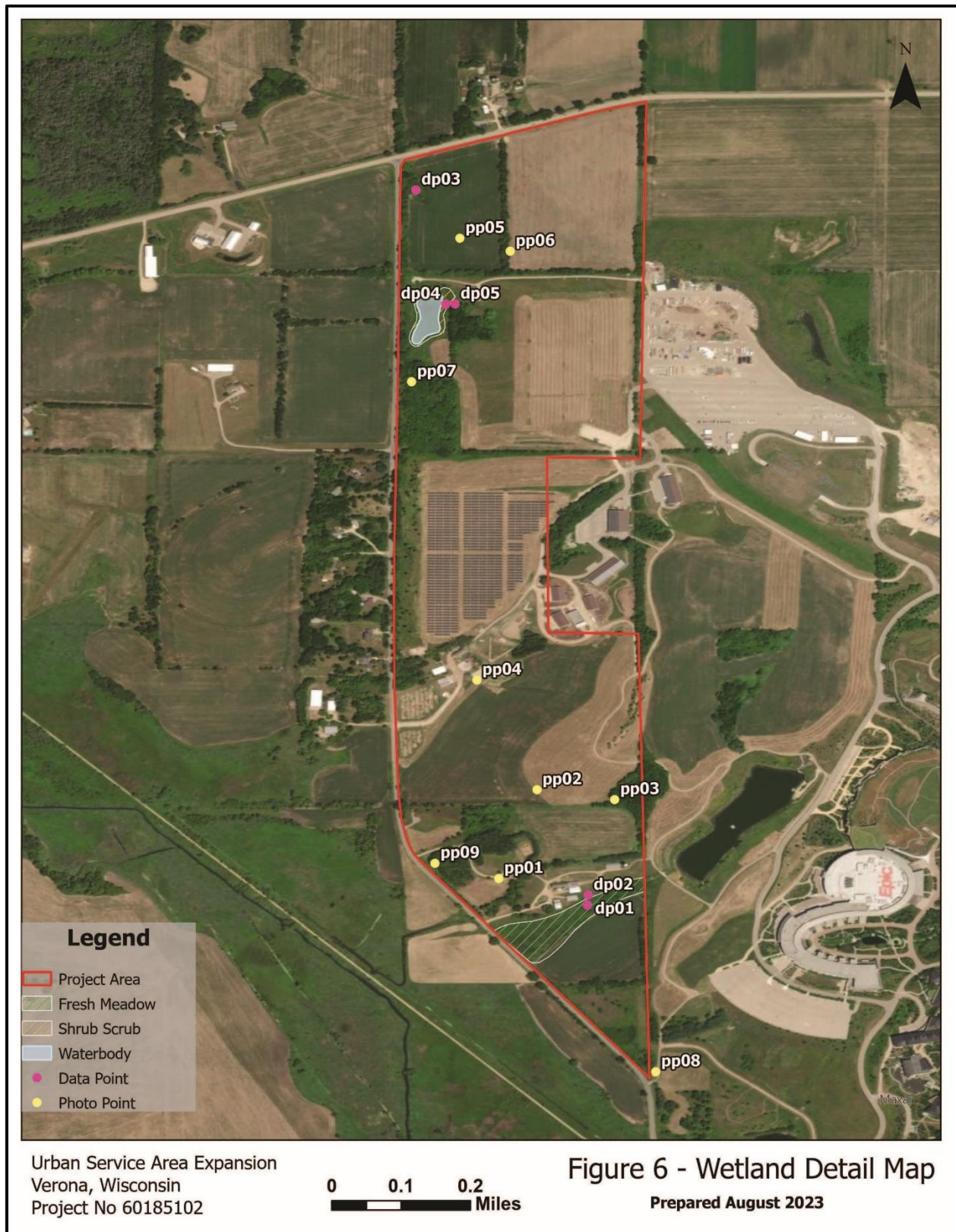


## Map 10 – Municipal Wells



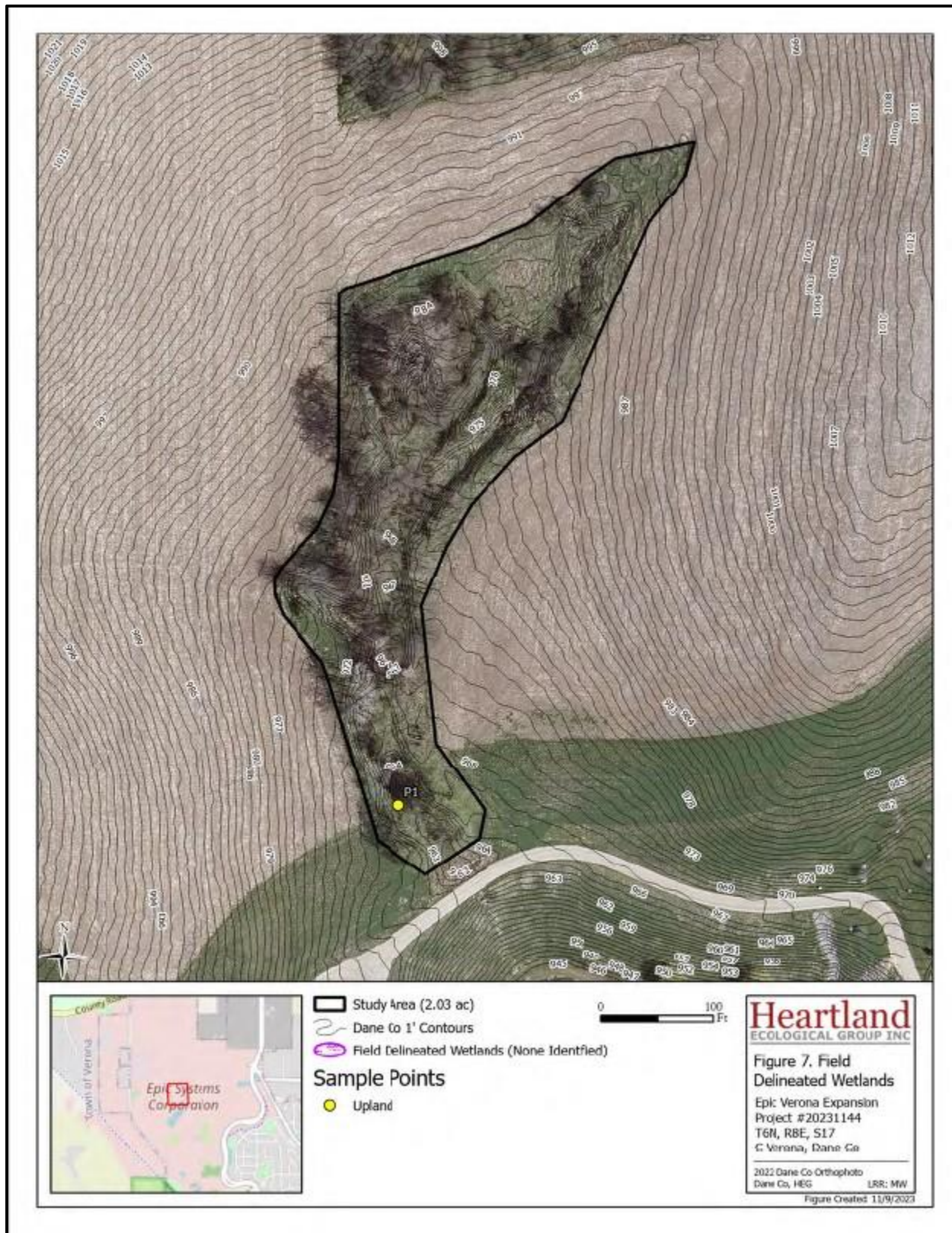


## Map 11a – Wetland Delineations





## Maps 11b – Wetland Delineations





## Map 12 – Proposed Environmental Corridor

