September 6, 2023

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

History of the Oregon Urban Service Area

The Oregon Urban Service Area was first delineated in 1980. The first amendment to the Oregon Urban Service Area occurred in 1984, refining the boundary and delineating Environmental Corridors. There has been a total of 12 amendments to this urban service area since its creation totaling 690 acres of developable land and 371 acres of Environmental Corridor. The most recent amendment of the service area by the Village of Oregon was recommended by the Commission and approved by the WDNR in 2021.

Planning in Oregon

The Village of Oregon is currently rewriting their comprehensive plan. The existing plan was most recently amended this spring. The existing Comprehensive Plan is substantially consistent with the adopted 2050 Regional Development Framework (Framework). The amendment area is identified in the Village's future land use maps as "Planned Neighborhood." However, the requested amendment area is not identified as a location of priority development through the Framework's development strategies.

Existing Conditions

Land Use

The Village of Oregon is requesting amendment to the Oregon USA southeast of the existing Village boundary, east of CTH MM, for an area known as "Autumn Ridge – Phase 3 & 5". The amendment area is contiguous to the west and north with the existing USA boundary and is a continuation of the existing Autumn Ridge development located west of CTH MM. Existing land uses adjacent to the requested amendment area include single-family residential to the west, north, and south. Agriculture borders the eastern edge of the requested amendment area. The Foxboro Golf Club also borders the area to the north and a portion of the course is included in the request. This portion of the course will be reconfigured to include residential development. The surrounding area is envisioned as low-density and rural residential transitioning into a mixed-use center (identified in the Framework) east of Highway 14 along Highway 138 with additional commercial development to the south. The requested amendment area is approximately 48 acres.

Surrounding Planned Land Uses:

- **North**: "Planned Neighborhood" (primarily low-density residential)
- **West**: Existing Low-Density Residential
- **South**: Rural Residential
- **East**: Mixed-use and Commercial

Table 1
Existing and Planned Land Use

Land Use Category	Existing Land Use Acres (see Map 3)	Proposed Land Use Acres (see Map 4)
Agriculture	21.2	
Natural Area		17.4
Recreation	25.4	0.1
Residential, Low-Density	0.1	20.5
Residential, Medium-Density		1.9
Transportation, Communications, and Utilities	1.2	8.2
Water	0.2	
	48.1	**48.1**

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. As of the date of this report, CARPC staff have not heard anything back from WHS. Given the previous disturbance of this area, staff do not anticipate any additional site investigations to be necessary.

Natural Resources

The proposed amendment area is in the Oregon Branch (HUC 12: 070900020801) subwatershed (see Map 5), a tributary to Badfish Creek. There are no mapped wetlands or floodplains within the amendment area.

Wastewater from the amendment area will be treated at the Oregon Wastewater Treatment Plant (see Map 5). The treated effluent is discharged to the Oregon Branch of Badfish Creek.

Wetlands

WDNR's Wisconsin Wetland Inventory (WWI) shows two excavated ponds within the amendment area. These existing ponds are associated with the golf course and fall within an area proposed as Environmental Corridor.

According to the WWI, the wetlands approximately 0.3 miles downstream of the amendment area are associated with Oregon Branch and its tributaries and classified as palustrine persistent emergent/wet meadow and broad-leaved deciduous forest. According to the Minnesota Stormwater Manual (link to webpage), fresh (wet) meadows are slightly to moderately susceptible to degradation by stormwater input, and floodplain forests are slightly susceptible.

Oregon Branch

Oregon Branch (WBIC 800700 / WATERS ID 11656) is a small spring-fed stream that originates within the Village of Oregon and flows southeast approximately ten miles to the confluence with Rutland Branch to form Badfish Creek (Map 5). The 22.1 square-mile Oregon Branch subwatershed encompasses predominantly agricultural lands. The creek has a low gradient of 8.2 feet/mile. Prior to the 1920s, Oregon Branch was considered a marginal trout water, but habitat was destroyed by stream ditching and straightening. The combined historic effects of stream channelization, urban and agricultural nonpoint source pollution, and wastewater discharges have greatly modified the original stream characteristics. The stream is classified by WDNR as a limited aquatic life (LAL) stream from its headwaters to the confluence with the Rutland Branch; the stream is classified as a limited forage fishery (LFF).

Oregon Branch has been listed as impaired for PCBs in fish tissue since 2012. This water was assessed by DNR during the 2018 listing cycle; based on the most updated information, no change in the existing impaired waters listing was needed.

There are two DNR monitoring stations on Oregon Branch, one at Rutting Road (Station ID 133105) and one at Sunrise Road (Station ID 133102). Summer 2022 monitoring at the Sunrise Road station indicated field measurements of dissolved oxygen of 9 to 14 mg/L, an average transparency of 120 cm, and a macroinvertebrate index score of 2.0. Chloride samples have been collected in 2023, but results are not yet available. There are no active USGS baseflow monitoring stations on Oregon Branch. Oregon Branch has cool-warm headwater, cool-warm main stem natural community.

Badfish Creek

Badfish Creek (WBIC 799500 / WATERS ID 11653), a small stream formed by the confluence of its Oregon and Rutland Branches, has also been ditched, straightened, and widened. In the 1970s water quality was poor due to the large volume of effluent from MMSD and Oregon's treatment plant. Improvements in wastewater treatment capabilities and effluent quality since then have improved water quality in Badfish Creek. Since 1983, more than 42 fish species have been observed. Badfish Creek has been listed as impaired for PCBs in fish tissue and sediment since 1998. Badfish Creek is considered a cool-warm mainstem natural community.

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 Oregon Branch Watershed contains one inventoried spring in Dane County—Dane County Spring #26, located at Thomson Park in the Village of Oregon (see location on Map 2). It was surveyed in 2016 with a discharge rate of 0.5 cfs, specific conductance of 860 µS/cm, temperature of 50° F, and a pH of 7.12.

Groundwater

Groundwater modeling, using the 2016 Groundwater Flow Model for Dane County developed by the WGNHS (link to website), shows that 2010 modeled baseflow in the Oregon Branch, approximately 1,700 feet east of Highway 14 (see Map 5), increased compared to predevelopment flow conditions (0.9

to 2.5 cfs; Table 4). This increase is primarily due to the return of treated wastewater effluent to the Oregon Branch. Pre-development conditions represent no well pumping and no effluent discharge within the model.

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 10 inches per year.

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 Preliminary Endangered Resources Review was completed on April 28, 2023, by the WDNR Bureau of Natural Heritage Conservation. It indicated that a formal Endangered Species Review letter is not needed (see Attachment G in amendment application).

The amendment area overlaps with 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 amendment area is located within the East Johnstown-Milton Moraines Land Type Association of Wisconsin. The Association classifies the surficial geology of this area as undulating hummocky moraine and outwash plain complex with scattered lake plains.

Surface elevations within the amendment area range from around 949 feet to 1025 feet. There are two areas of steep (> 12%) and very steep (>20%) slopes, one in the far northwest corner and one in the north central corner 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 northwestern half of the amendment area are in the Dodge-St. Charles-McHenry association. These soils are well to moderately well drained deep silt loams. The soils in the southeastern half of the amendment area are in the Batavia-Houghton-Dresden association. These are well to poorly drained, deep to moderately deep silt loams and mucks that are underlain by silt, sand, and gravel. 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 are no hydric soils within the amendment area (see Map 7). Hydric soils are good indicators of existing and former (drained) wetlands.

According to the Soil Survey Geographic data for Dane County developed by the NRCS (link to web soil survey), the Troxel and St. Charles soils (the TrB and ScB 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. The Troxel soils are classified as moderately well drained, and therefore do not pose a limitation for buildings with basements. The St. Charles soils (<1% of the amendment area) are classified as well drained and do not pose a limitation for buildings with basements.

Table 2
Soils Classification

Soil	% of Area	General Characteristics
Troxel Silt Loam; TrB	31.0	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.
Dresden Silt Loam; DsB	21.4	Well drained, gently sloping to steep slopes on benches in stream valleys. Soils have medium fertility, low permeability, and a moderate to severe hazard of erosion. Poses slight to moderate limitations for development due to slope.
Batavia Silt Loam; BbB	11.8	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.
Dresden Silt Loam; DsC2	9.3	Well drained, gently sloping to steep slopes on benches in stream valleys. Soils have medium fertility, moderate permeability, and a severe hazard of erosion. Poses moderate limitations for development due to slope.
Boyer Sandy Loam: BoC2	8.7	Well drained, gently sloping to moderately steep soils on benches in valleys. Soils have low fertility, moderately rapid to rapid permeability, and a severe hazard of erosion. Poses slight to moderate limitations for development due to slope.
St. Charles Silt Loam; ScC2	8.5	Deep, well drained, sloping soils to moderately steep soils on glaciated uplands. Soils have high fertility, moderate permeability, and a severe hazard of erosion. Poses severe limitations for development due to slope.
Kidder Loam; KdD2	6.1	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. Poses severe limitations for development due to slope.
Westville Silt Loam; WvD2	1.5	Deep, gently sloping to moderately steep, well-drained soils on glaciated uplands and high benches in stream valleys. Soils have medium fertility,

		moderate permeability, and a very severe hazard of erosion. Poses severe limitations for development due to slope.
St. Charles Silt Loam; ScB	1.1	Deep, well drained, sloping soils to moderately steep 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 slopes, shrink/swell potential and low bearing capacity.

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

Table 3
Soils Characteristics

Characteristic	**Soil Map Symbols** (see Map 7)	**% of Area**
Prime Agricultural Soils	TrB, DsB, BbB, ScB, DnB	65.9
Hydric Soils (Indicates Potential / Restorable Wetlands)	None	0
Poorly Drained Soils with Seasonal High Water Table (< 5')	None	0
Soils Associated with Steep Slopes (> 12%)	KdD2, WvD2	7.6
Soils Associated with Shallow Bedrock (< 5')	None	0
Best Potential for Infiltration in Subsoils	DsB, BbB, DsC2, BoC2, ScC2, KdD2, WvD2, ScB, DnB	69.0

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

According to WGNHS data, bedrock within the far northwest corner of the amendment area is in the Sinnipee Group. Bedrock in the Sinnipee Group is dolomite with some limestone and shale, and consists of three formations including the Galena, Decorah, and Platteville Formations. Thickness is less than 100 feet. Bedrock in remaining western third 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. Bedrock in the central third 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. Bedrock in the eastern third of the amendment area is in the Trempealeau Group. Bedrock in the Trempealeau Group is quartz sandstone, dolomitic siltstone, silty dolomite, and sandy dolomite, and 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. According to WGNHS data, the depth to

bedrock in the amendment area ranges from 0-56 feet, with the shallowest depths generally being in the western portion of the amendment area and deepest depths being in the southeastern 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 anticipated within the proposed Environmental Corridors at depths ranging from 16-50 feet (see Map 8).

Given the expected separation of typical stormwater management practices compared to the anticipated depth of potential karst (16 feet or more), there is not a concern for groundwater contamination due to karst features. In addition, *WDNR Conservation Practice Standard 1001 – Wet Detention Pond* (2007) and *WDNR Conservation Practice Standard 1002 – Site Evaluation for Stormwater Infiltration* (2017) require 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 most 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 1.9 acres of parkland (including one neighborhood park) in the amendment area (see Map 11). Two stormwater management areas, connected by the proposed park and totaling 6.4 acres within the amendment area, are also proposed. The remnant portion of the existing golf course, totaling 8.6 acres, is proposed as open space within the amendment area. All parks and stormwater and open space areas are proposed for placement in public outlots and Environmental Corridors.

Wastewater

Sanitary sewer service will be provided to the amendment area by connection to the Village's sanitary sewer collection and treatment system. The amendment area is comprised of Phase 3 and 5 of the Autumn Ridge development. The area of Phase 4 is within the existing urban service area but is currently an existing golf course. To provide a more complete analysis and account for the additional loading on

the system that will be realized upon full development of Autumn Ridge, Phase 4 was included in the wastewater analysis presented here.

The proposed Autumn Ridge development consists of single-family residential (113 dwelling units per layout) land uses contributing to wastewater flows. Public 8-inch gravity sanitary sewer main will be extended throughout the development with individual service laterals provided to each lot. Based on the provided conceptual layout, 103 lots will flow to the existing 8-inch sewer located on Lexington Drive and 10 lots will flow to the existing 8-inch sewer located on Foxboro Dr (see Map 9A). Both existing sewers ultimately flow to the Park Street Interceptor and to the Village of Oregon Wastewater Treatment Facility.

The Village's application estimates that the amendment area will generate an annual average flow of approximately 30,750 gallons per day (gpd) of wastewater, or 21 gallons per minute (gpm). This assumes 2.5 persons per single-family dwelling unit and an average wastewater generation rate of 100 gallons per capita per day (gpcd) for residential land uses. The Village estimates that the amendment area will generate a peak daily flow rate of approximately 123,000 gpd, or 85 gpm, utilizing a peaking factor of 4. Note: this estimate assumes 123 units based on the application narrative, which is conservative by comparison to the proposed layout and detailed capacity analysis described below. The proposed 8-inch sanitary sewers within the amendment area are each anticipated to have a capacity of 332 gpm, assuming a design slope of 0.40% (minimum allowable per NR 110), which will provide sufficient capacity for the anticipated peak flows from the amendment area.

To analyze the downstream sewer system capacity, the Village completed a sewer study analyzing the receiving sewers downstream of the Lexington Drive connection, which is where the entire amendment area and vast majority of the proposed development (including Phase 4) flows to. The results of this study are presented in the July 6, 2023, memorandum titled *Sewer System Analysis Results for Park Street Interceptor*, prepared by Town and Country Engineering (*2023 Sewer System Analysis*). The study estimated existing and future flows from the amendment area using actual sewer sales records. Based on these, the average residential flows per meter were 130 gpd (refer to *2023 Sewer System Analysis* study for methods to determine flows from other uses). Using this value, the annual average flow of the amendment area flowing to the Lexington Drive interceptor was estimated to be approximately 13,493 gpd (or 10 gpm) with a peak flow of 40 gpm, assuming a peaking factor of 4. Each downstream sewer was analyzed to determine the ratio of peak flow to pipe capacity. Based on the results of this study, no downstream sewer exceeded a ratio of 0.70. Therefore, the study concluded that the existing downstream collection system has the capacity to serve the amendment area.

The remaining 10 lots represent a comparatively insignificant amount of flow and were omitted from the *2023 Sewer System Analysis*. Nonetheless, using the same sales records of 130 gpd per residential unit, these lots are anticipated to generate an annual average wastewater flow of approximately 1,300 gpd, or 0.90 gpm, and a peak flow of 3.6 gpm. By reviewing the March 31, 2021, memorandum titled *Sewer System Analysis Results for Park Street and South Perry Parkway Interceptors*, prepared by Town and Country Engineering (*2021 Sewer System Analysis*), it was determined that the downstream receiving sewers are not approaching their capacity and have the ability to serve these additional 10 lots.

Wastewater Treatment Facility

The Oregon Wastewater Treatment Facility (WWTF) will provide wastewater treatment for the amendment area. The WWTF is located on Perry Parkway and discharges to the Oregon Branch of Badfish Creek within the Badfish Creek watershed. The rated average annual design flow of the facility is 1.8 million gallons per day (MGD) (per WPDES Permit) and the rated monthly design flow capacity is 1.80 MGD (per CMAR). In the year 2022, the facility received an average monthly influent hydraulic loading of 1.17 MGD (65% of the design monthly capacity), including infiltration and inflow, according to the 2022 Compliance Maintenance Annual Report (CMAR) (link to 2022 CMAR).

In recent years the monthly loading has exceeded capacity at times. The Village of Oregon is growing steadily, and the Village recognizes that WWTF upgrades are needed. In July 2020, the Village's engineering consultant prepared a Facilities Planning Document report which evaluated alternatives to meet future loading conditions and comply with current and future permit requirements (link to Facilities Planning Document Report). The primary alternatives evaluated were: 1) maintenance and improvements to the existing WWTF, and 2) regionalization with the Madison Metropolitan Sewerage District (MMSD) via pumping. Based on several factors, the Facilities Planning Document recommended the option for maintenance and improvements to the existing WWTF. The planned improvements are intended to be completed in phases, with the first phase having been implemented immediately and the final phase planned for implementation in approximately 2035, or as dictated by peak flows. In 2022, the monthly influent loading did not exceed capacity.

The Village did not have any issues meeting its WPDES permit (effective May 2020, expires March 2025) limits for the quality of effluent discharged to Oregon Branch in the most recently reported calendar year. Below is a summary of the major effluents reported on in the 2022 CMAR:

- The biochemical oxygen demand (BOD) effluent quality for 2022 was below the monthly average limit, with a monthly average of 5.3 mg/L (26% of the limit) and a maximum of 6 mg/L (30% of the limit) for the months of March and October through December.
- 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 of 7 mg/L (35% of the limit) for the months of October through December.
- The ammonia (NH3) effluent quality for 2022 was well below the monthly average limit (varies by month), with a monthly average of 0.035 mg/L (0-2% of the respective limits) and a maximum concentration of 0.098 mg/L (1% of the limit) for the month of January.
- The phosphorus (P) effluent quality for 2022 was below the monthly average limit, with a monthly average was 0.51 mg/L (average of 51% of the monthly limit) with a maximum of 0.663 mg/L (66% of the limit) in the month of January.

The WWTF discharges to a tributary of the Rock River, and thus the WPDES permit includes TSS and phosphorus limits to comply with the Total Maximum Daily Load (TMDL) developed for the Rock River Basin to protect and improve water quality. To meet the future water quality-based effluent limit (WQBEL) for phosphorous, the Oregon WWTF has been approved by Wisconsin DNR to implement a watershed adaptive management approach (WAM) through participation in Yahara Watershed Improvement Network (Yahara WINs) to implement phosphorus reducing practices within the

watershed (link to website). The adaptive management interim limitation for phosphorus is 0.6 mg/L, expressed as a six-month average (May through October and November through April), and goes into effect beginning the period from May 1, 2023, through October 31, 2023. Additionally, a 1.0 mg/L monthly average has been required since May 2020 (previous limit was 1.3 mg/L).

Water System

Oregon Municipal Water and Sewer Utility provides municipal water through a public water distribution system which includes approximately 294,000 lineal feet of water main and three active high-capacity groundwater wells within the Village. The active wells are at depths ranging from approximately 843 to 953 feet with an average capacity of 850 to 1,000 gallons per minute (gpm). In total, the gross capacity of the municipal wells is approximately 2,700 gpm, or 3.89 million gallons per day (MGD). The firm capacity (with the largest well assumed to be out of service) is approximately 1,700 gpm, or 2.45 MGD. The Village has three ground-level reservoirs, two standpipes, and one elevated tank, with a combined storage capacity of 1.27 million gallons. According to the 2022 Annual Report to the Public Service Commission of Wisconsin (link to 2022 Annual Report), the Village pumped an average of 596 gpm, or 0.86 MGD, in 2022, which is approximately 35% of its firm pumping capacity. In 2022, the maximum amount pumped in any one day was 1.44 MGD. The Village's application estimates the current average daily demand on the system is 535 gpm, or 0.77 MGD, which is reasonably consistent with the Annual Report value. The Village's application estimates a peak daily demand of 1,900 gpm, or 2.74 MGD, based on an apparent peak daily factor of 3.5. The Village is currently updating its Water System Master Plan.

Water losses in the Village's distribution system were an average of 144,307 gpd in 2022, which accounted for 13% of the net water supplied in 2022. Approximately 82% of this was due to unreported and background leakage, with the remaining due to reported leaks and other apparent losses. In 2022, there were 6 main breaks and 2 service breaks which were repaired. Water losses in the Village's distribution system were 11% in 2021 and 6% 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%.

The amendment area is comprised of Phase 3 and 5 of the Autumn Ridge development. The area of Phase 4 is within the existing urban service area but is currently an existing golf course. To provide a more complete analysis and account for the additional demand on the system that will be realized upon full development of Autumn Ridge, Phase 4 was included in the water demand analysis presented here.

Water supply within the development area will be provided by connecting to existing 8-inch water main in Lexington Street and 12-inch water main in Foxfield Road. Additionally, it is anticipated that a connection will be made to existing water main in Foxboro Dr/Clubhouse Dr (see Map 9A). Water main will loop throughout the proposed development to serve the lots via individual service laterals.

The proposed Autumn Ridge development consists of single-family residential land uses contributing to water demand. The Village anticipates the annual average daily water demand for the development area to be approximately 30,750 gallons per day (gpd), or 22 gpm. This assumes 2.5 persons per single-family dwelling unit and an average water demand of 100 gallons per capita per day (gpcd) for residential land uses. The estimated peak hourly demand on the system due to the additional development is approximately 5,125 gallons/hour, or 85 gpm, based on a peak hourly demand factor of

4 for residential land uses. Note: these water demand estimates assume 123 units based on the application narrative, which is conservative by comparison to the proposed layout and detailed capacity analysis described below. The estimated average daily water demand represents an increase of approximately 4% of the current demands on the system. While the current and proposed peak hourly demand exceeds the firm capacity of the system, it is within the gross capacity of the system and there is sufficient available storage capacity to keep up with demand. It is anticipated that the existing water supply system will support the additional demand from the proposed amendment area.

Stormwater Management System

The amendment area is within the Oregon Branch (HUC 12: 070900020801) subwatershed. The area currently consists of open space/grazing lands, a farmstead, and a golf course and related building facilities. The predominant land covers are turf grass and cropland/rangeland. Drainage patterns within much of the Village and the amendment area are not well defined. However, runoff that leaves the amendment area generally flows to the northeast following a series of mapped wetlands and crossing the USH 14 right-of-way, then continues through constructed drainageways and intermittent streams and into the Oregon Branch perennial stream approximately 4,700 feet to the north, a tributary to Badfish Creek.

Conceptual stormwater management areas are proposed along the eastern and southeastern edges of the Phase 3 area and within the northeastern quadrant of the Phase 5 area (see Map 9A). According to the Village's application, 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), and oil/grease control (as applicable). The Village's ordinance includes more protective measures for peak rate control, which in turn results in higher achievement of volume controls. Based on conceptual stormwater modeling, the Phase 3 area is anticipated to provide post-development infiltration (stay-on) at nearly 100% of the predevelopment infiltration volume for the average annual rainfall (exceeding the 90% standard). Additionally, the volume of runoff in post-development conditions matches the pre-development runoff volume for 24-hour design storms up through the 50-year storm. This exceeds current state, county, and local requirements for volume control and will help mitigate negative impacts to downstream properties, water resources, and conveyances due to the proposed development.

The proposed drainage conditions will generally match existing conditions. Runoff from off-site areas that currently flows through the amendment area, including discharge from the Autumn Ridge – Phase 2 area (located west of Phase 3), will be conveyed around the proposed Phase 3 improvements and stormwater facilities within an engineered drainage swale and collected within the Phase 5 stormwater facilities where it will receive water quality treatment prior to discharge downstream.

The Village and Developer have engaged with downstream property owners, the Town of Oregon, and the Town of Rutland through the design process for the Autumn Ridge development. The area that is Phase 3 of Autumn Ridge was originally intended to be added to the urban service area at the same time as Phase 2 in 2021. However, due to stormwater concerns by the Town of Oregon and its residents the two phases were separated, and it was agreed that Phase 2 would be developed first and if any unexpected issues occur because of Phase 2, that the Village would address flooding and drainage issues

prior to development of Phase 3, or not pursue Phase 3. Since that time, nearly the entirety of Phase 2 has been developed with single-family homes and no significant flooding or drainage issues downstream of the development have been reported. The Village of Oregon reports that the stormwater management facilities of Phase 2 are fully operational and working as designed, and they are nearly ready to take over ownership and maintenance of these Phase 2 facilities as planned.

Plat-wide or regional stormwater facilities will be placed in outlots dedicated to the public and will be owned and managed by the Village, while any stormwater facilities privately owned and managed will be subject to a stormwater maintenance agreement to be recorded with the Dane County Register of Deeds. The Village intends to take over ownership and maintenance of the proposed stormwater facilities once demonstrated to be clean, built as designed, and fully operational.

A 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 Village of Oregon, Dane County, and WDNR current at the time of development, as well as any additional or more protective standards made a condition of the approval of this proposed amendment.

Performance Standards

The Village of Oregon stormwater management and performance standards are contained within Chapter 22 of the Village of Oregon Code of Ordinances. Dane County stormwater standards are detailed within Dane County Code of Ordinances, Chapter 14. WDNR stormwater standards are contained in 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 Village of Oregon 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 Village of Oregon, 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-development levels, in accordance with Dane County Stormwater Ordinances. In addition, peak runoff rate control is required to limit the 10-year, 24-hour design storm to the pre-development level of the 2-year event, and the 100-year, 24-hour design storm to the pre-development level of the 10-year event, in accordance with the Village of Oregon Stormwater 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 Village of Oregon and Dane County Stormwater Ordinances.

3. Runoff volume control is required to 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 Village of Oregon and Dane County Stormwater Ordinances.

4. For the Phase 3 area: Runoff volume control is required to maintain post-development runoff volume control for the 1-, 2-, 10-, and 50-year, 24-hour design storms (using NRCS MSE4 storm distributions) to limit post-development runoff to pre-development levels. This exceeds the Village of Oregon and Dane County Stormwater Ordinances.

5. 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 10 inches/year) or by a site-specific analysis, when required in lieu of meeting stay-on standards in accordance with the Village of Oregon and Dane County Stormwater Ordinances.

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 Village of Oregon and Dane County Stormwater Ordinances.

Impacts and Effects of Proposal

Environmental Corridors

The proposed amendment area includes a total of approximately 16.9 acres of Environmental Corridor (see Map 11). This will include proposed stormwater management, park, and open space areas in accordance with the Environmental Corridor Policies and Criteria (link to document) adopted in the *Dane County Water Quality Plan*. Some of what is proposed as Environmental Corridor also coincides with mapped Stewardship Areas, as described below.

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. There are no protection areas mapped within the amendment area.

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 (RDF) 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.

The proposed amendment area includes 8.5 acres mapped as Stewardship Area, including potentially restorable wetlands and internally drained areas, of which 4.8 acres are proposed to be designated as Environmental Corridor with this amendment (see Map 11).

Meeting Projected Demand

Oregon is projected to grow by roughly 5,700 people comprising 2,300 households over the next 30 years. The proposed amendment would add 76 detached single-family units. The larger neighborhood is projected to add 118 units. Between 2021 and 2025, the Village has identified 720 additional units that have been or will be constructed. Almost all that construction is multi-family.

Phasing

The proposed amendment area is smaller than 100 acres. No phasing plan is required.

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. In 2017, State statute 281.33(6)(a)(1) was changed to limit the ability of local governments to adopt higher standards for runoff volume through local ordinances.

In response to climate change, the City of Madison adopted peak rate control for the 200-year storm event in their ordinance in June 2020. Dane County adopted this same peak rate control requirement as well as requirements for closed basins in November 2021, which made these requirements universal to all communities in Dane County.

The Village of Oregon 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 current Dane County standards for pollutant reduction, runoff volumes, peak flows, water temperature, and groundwater recharge. Such practices will address the potential water quality impacts of stormwater runoff from the proposed development on the receiving waters. The Village has also agreed to pursue stormwater management controls that exceed current standards by aiming for higher levels of volume control for this development.

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

The Village of Oregon 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 consistent messaging throughout the communities, including maintaining the 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 beneficial onsite reuse of leaves and grass clippings, proper use of lawn and garden fertilizers and pesticides, and promoting infiltration of residential stormwater runoff from rooftops, driveways, and sidewalks.

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 transitions to biological communities more tolerant to these poorer conditions.

Groundwater modeling indicates that the return of treated effluent to the Oregon Branch effectively compensates for the loss of stream baseflow due to local groundwater withdrawals within the Oregon Branch watershed and have resulted in a 1.6 cfs increase in Oregon Branch baseflow (location of

modeling shown on Map 5) from predevelopment conditions (no pumping) to 2010 conditions (Table 4). However, modeling indicates that a 0.1 cfs decline is anticipated for the year 2040, as compared to 2010 conditions.

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	0.9 cfs	2.5 cfs	2.4 cfs

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 August 10, 2023, meeting of the Capital Area Regional Planning Commission. Representatives from the Village of Oregon spoke in favor of the amendment. There were no registrants opposed to the amendment. Commissioner McKeever inquired about the stormwater and flooding concerns that were raised during the amendment process for Autumn Ridge – Phase 2 (prior phase of this development) and how the Village has addressed those concerns. Bruce Hollar with D'Onofrio Kottke & Associates (Developer's Engineer) answered by describing the routing of stormwater flow and the stormwater management system in place to handle stormwater runoff from the development, including controls for the Phase 2 area which exceed local and county standards. The Town of Oregon submitted a letter to CARPC, dated August 9, 2023, noting the concerns that had been raised during the amendment process for Phase 2. Staff have further addressed this topic within this report.

Conclusions and Staff Water Quality Recommendations

There is sufficient existing treatment plant system capacity at the Oregon Wastewater Treatment Facility and sufficient existing or planned 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 designed to address the impacts of development on water quality, runoff volumes, peak flows,

water temperature, and groundwater recharge. Most recently, in 2021 Dane County adopted requirements for peak rate control for the 200-year storm event and for closed basins that now apply to all communities in Dane County. The Village of Oregon 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, infiltration (or "stay-on"), peak flow rates, water temperature, and groundwater recharge.

In addition, the Village of Oregon and the development team have agreed to pursue higher stormwater management standards for this amendment area. Namely, this includes providing runoff volume control to limit post-development runoff to pre-development levels for the Phase 3 area; and providing this same level of volume control to the maximum extent practicable for the Phase 4 & 5 areas.

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. 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-development levels, in accordance with Dane County Stormwater Ordinances. In addition, peak runoff rate control is required to limit the 10-year, 24-hour design storm to the pre-development level of the 2-year event, and the 100-year, 24-hour design storm to the pre-development level of the 10-year event, in accordance with the Village of Oregon Stormwater 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 Village of Oregon and Dane County Stormwater Ordinances.

d. Runoff volume control is required to 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 Village of Oregon 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 10 inches/year) or by a site-specific analysis, when required in lieu of meeting stay-on standards in accordance with the Village of Oregon and Dane County Stormwater Ordinances.

f. 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 Village of Oregon and Dane County Stormwater Ordinances.

2. Easements and perpetual legal maintenance agreements with the Village, to allow the Village 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 Village of Oregon and the development team have agreed to pursue the following water resource management measures for the amendment area:

1. Provide post-development runoff volume control for the 1-, 2-, 10-, and 50-year, 24-hour design storms (using NRCS MSE4 storm distributions) to limit post-development runoff to pre-development levels for the Phase III area; and provide the same level of volume control to the maximum extent practicable for Phase IV & V.

Recommendations

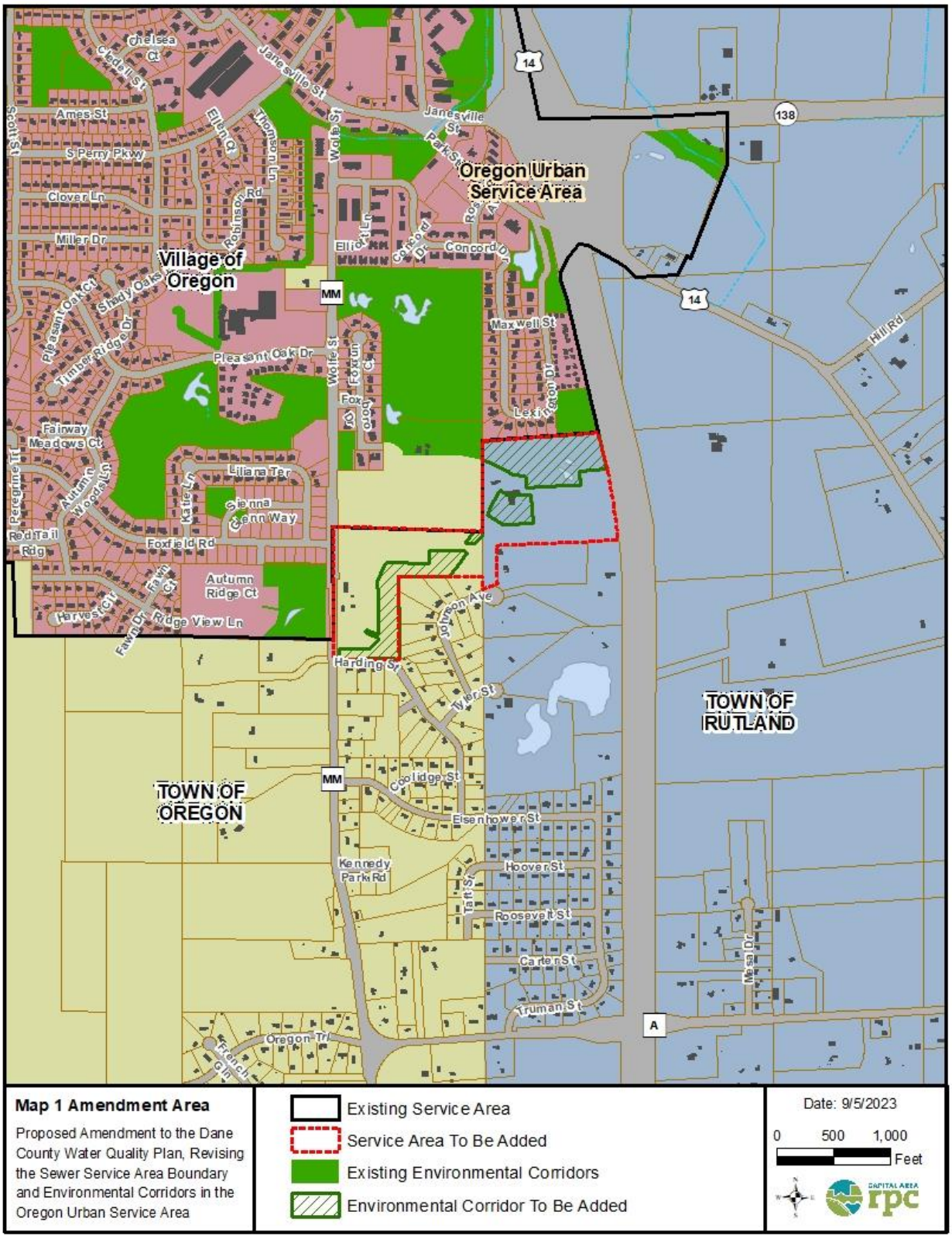
It is recommended that the Village of Oregon pursue the following to further improve water quality and environmental resource management:

1. Continue to participate in regional water quality initiatives including Wisconsin Salt Wise, the Madison Area Municipal Storm Water Partnership, and Yahara WINs.

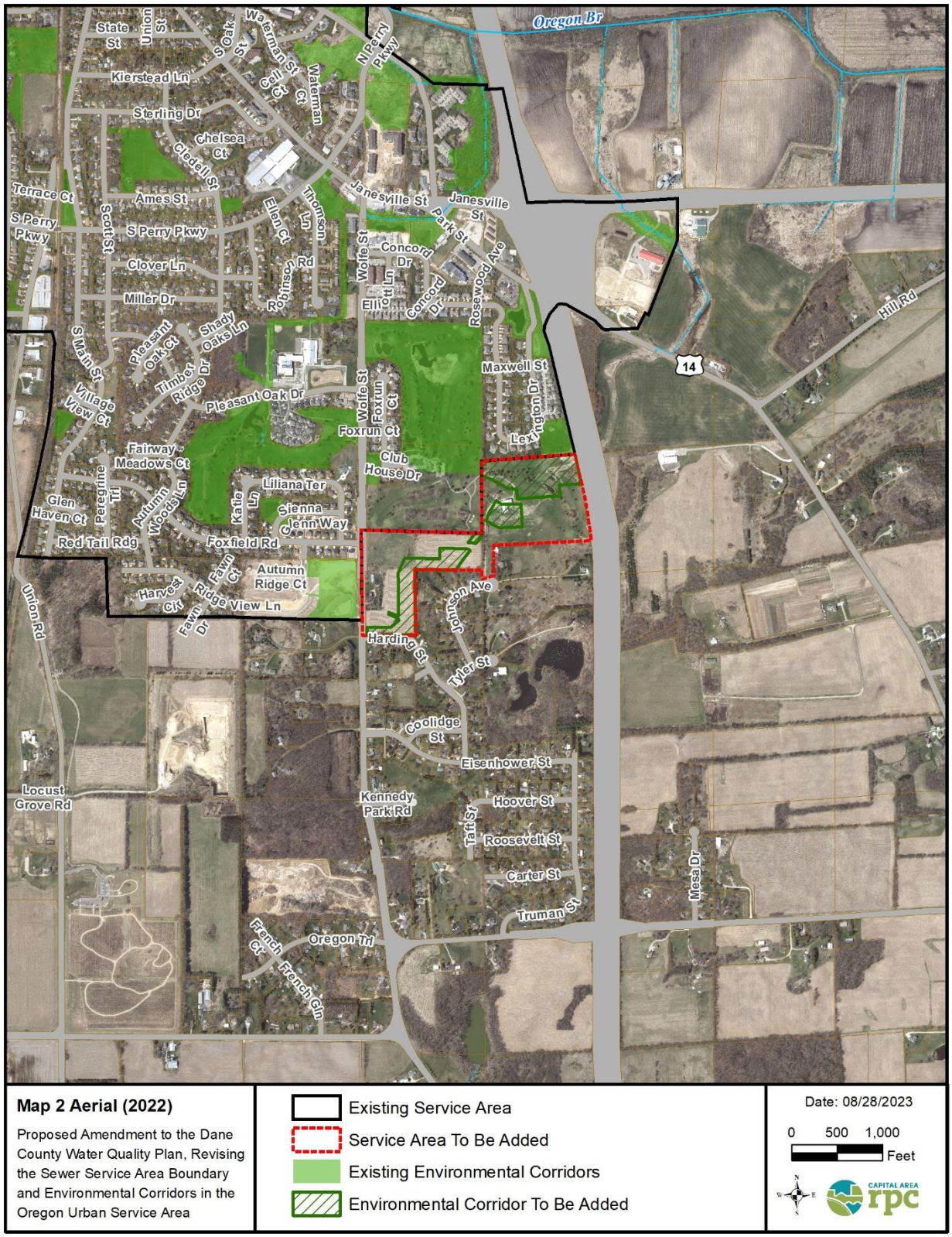
2. Encourage the removal and control of invasives and the use of native flora favored by the Rusty Patched Bumble Bee in landscaping to provide suitable habitat for this pollinator, where appropriate, due to the amendment area being within the High Potential Zone for the federally endangered Rusty Patched Bumble Bee.

3. Request an archaeological survey to be performed by a qualified archaeologist for the amendment area, if recommended by the Wisconsin Historical Society, and take necessary protection measures if artifacts are found.

Map 1 - Amendment Area



Map 2 – Aerial



Map 2 Aerial (2022)

Proposed Amendment to the Dane County Water Quality Plan, Revising the Sewer Service Area Boundary and Environmental Corridors in the Oregon Urban Service Area

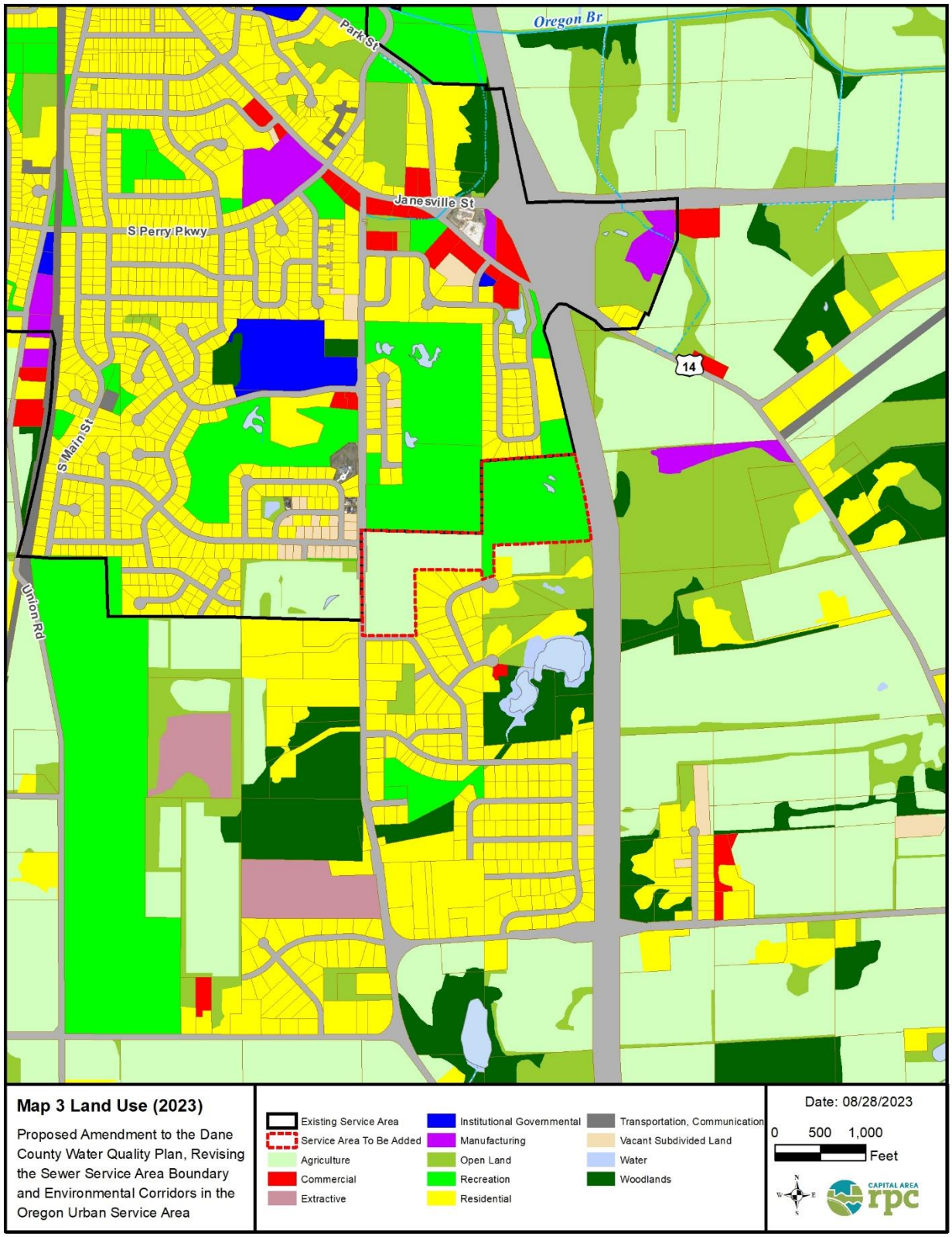
- Existing Service Area
- Service Area To Be Added
- Existing Environmental Corridors
- Environmental Corridor To Be Added

Date: 08/28/2023

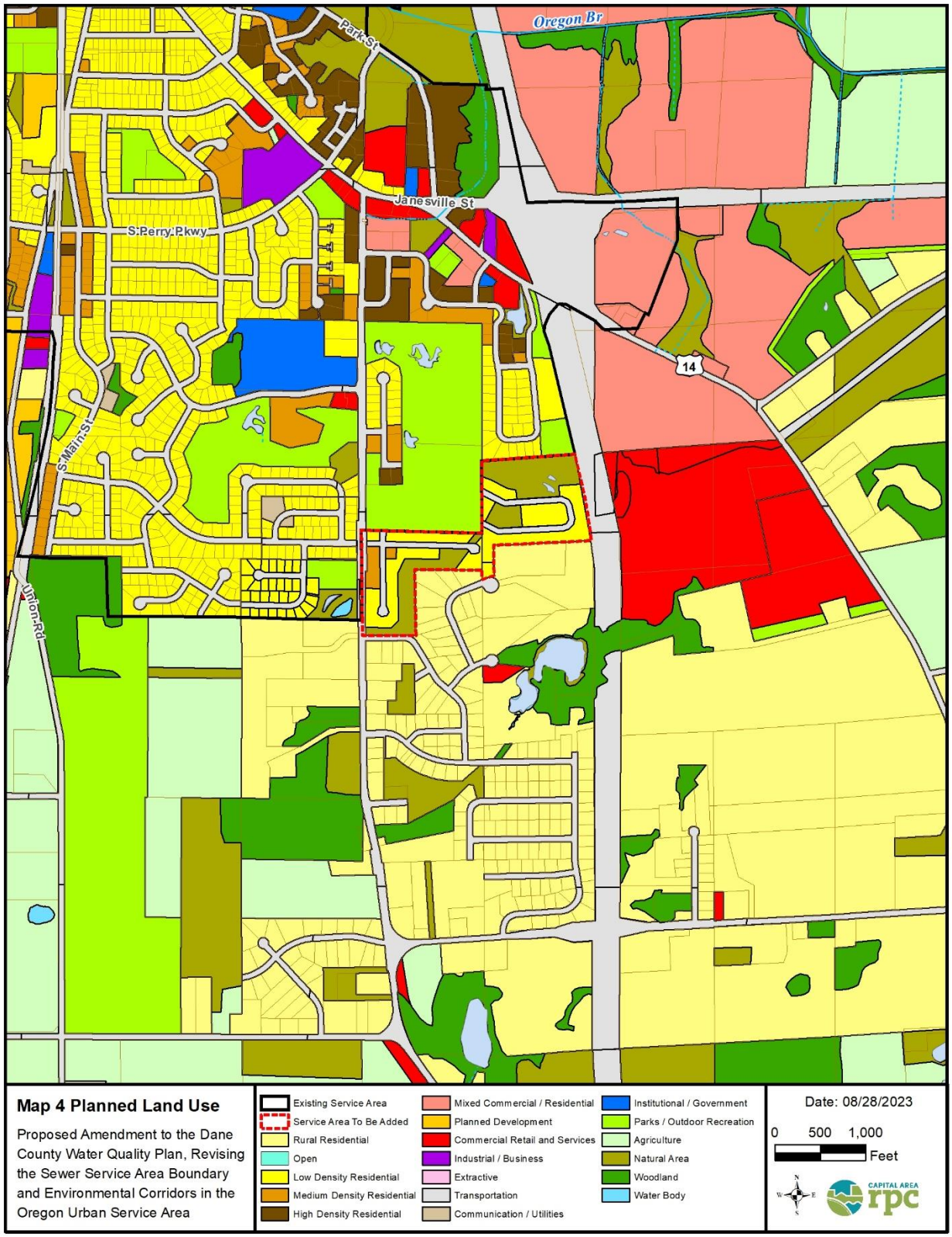
0 500 1,000 Feet

CAPITAL AREA rpc

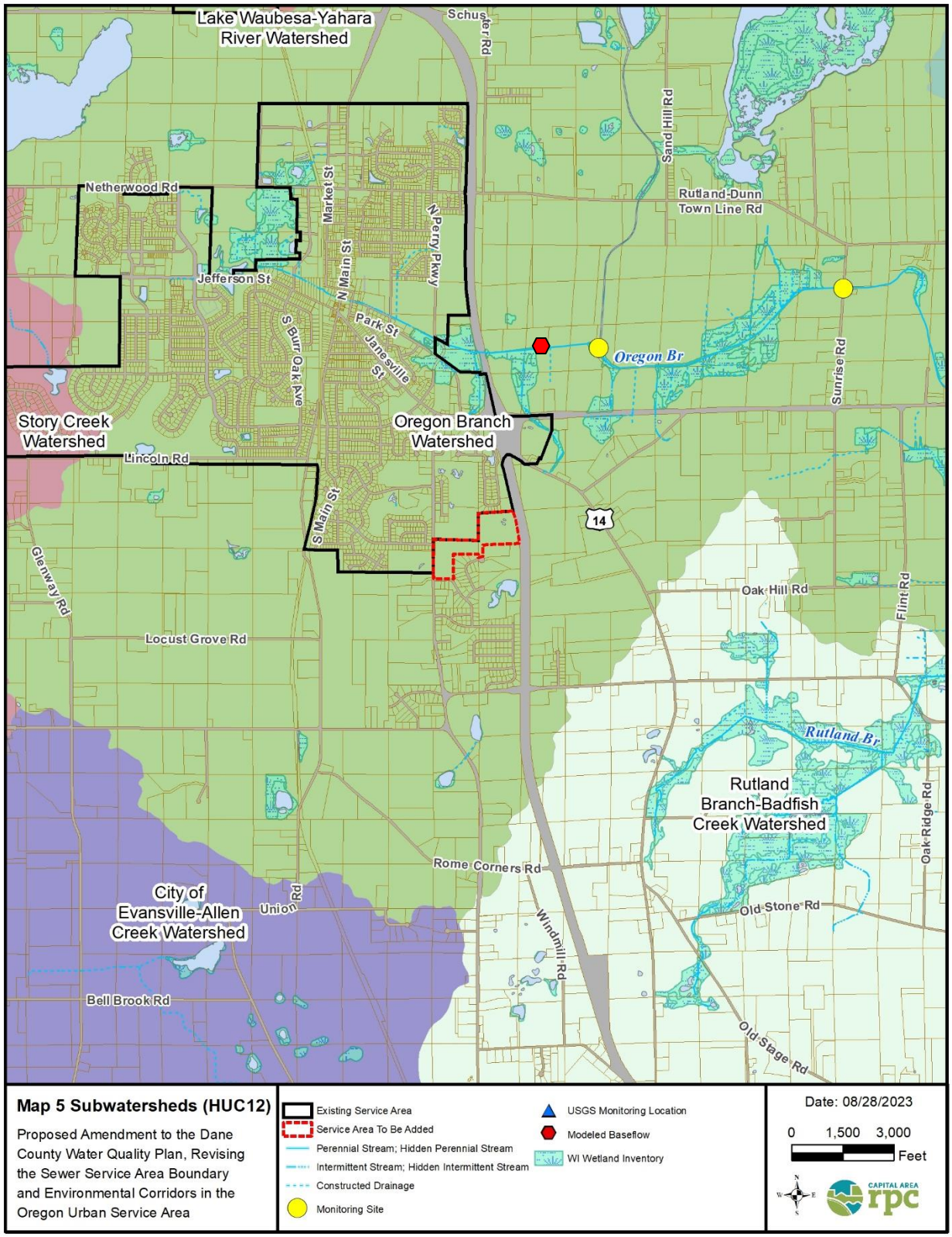
Map 3 – Existing Land Use



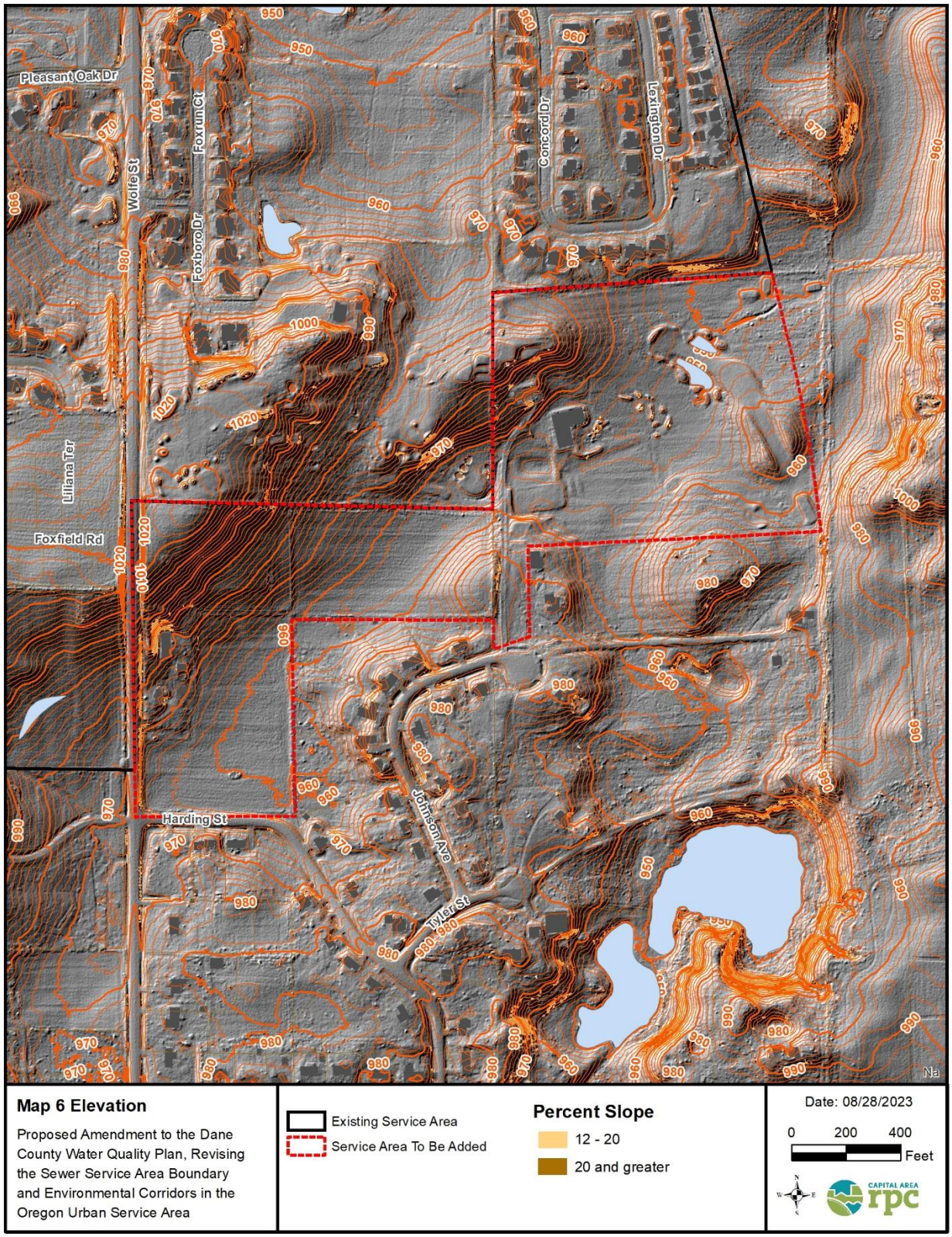
Map 4 – Planned Land Use



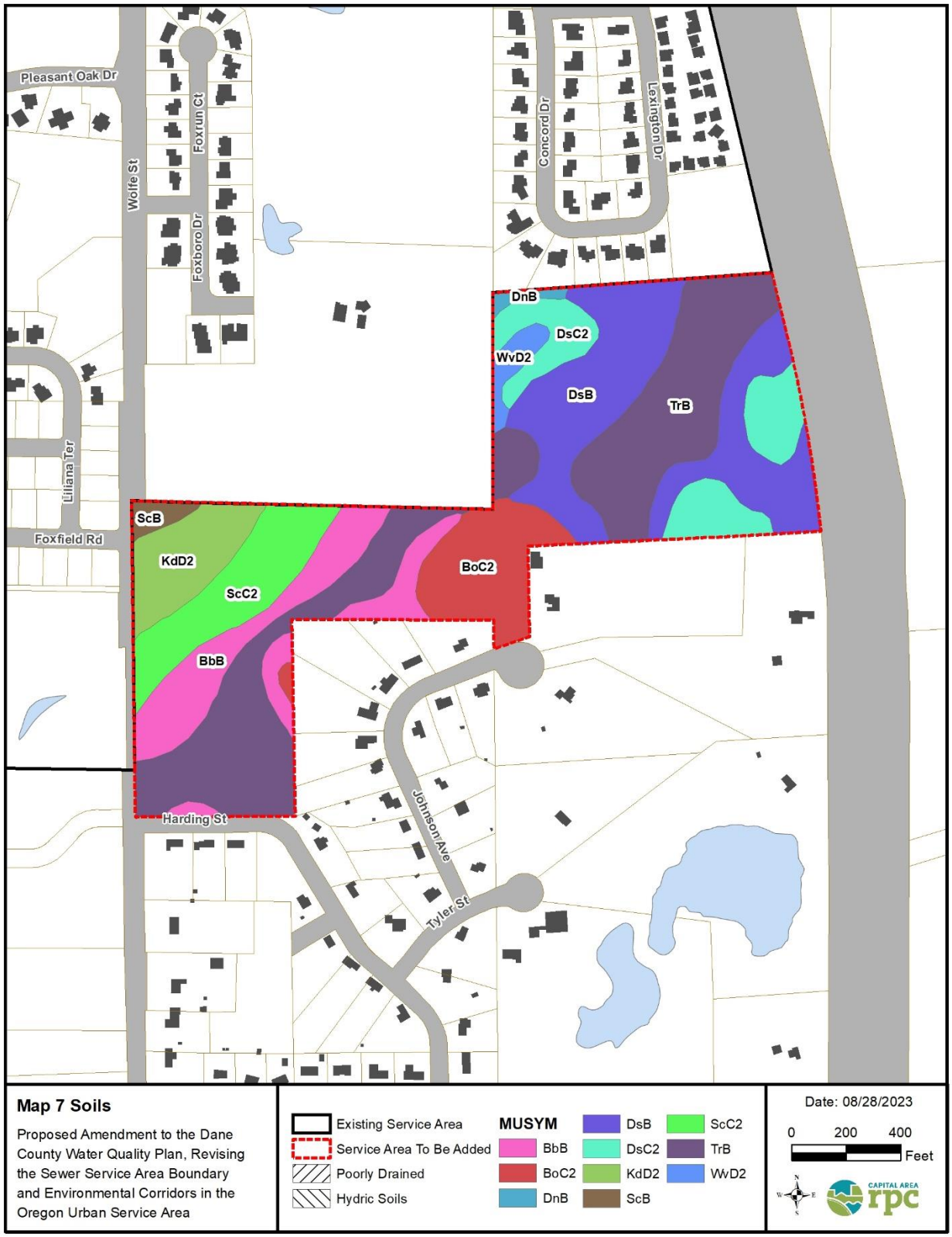
Map 5 – Subwatersheds



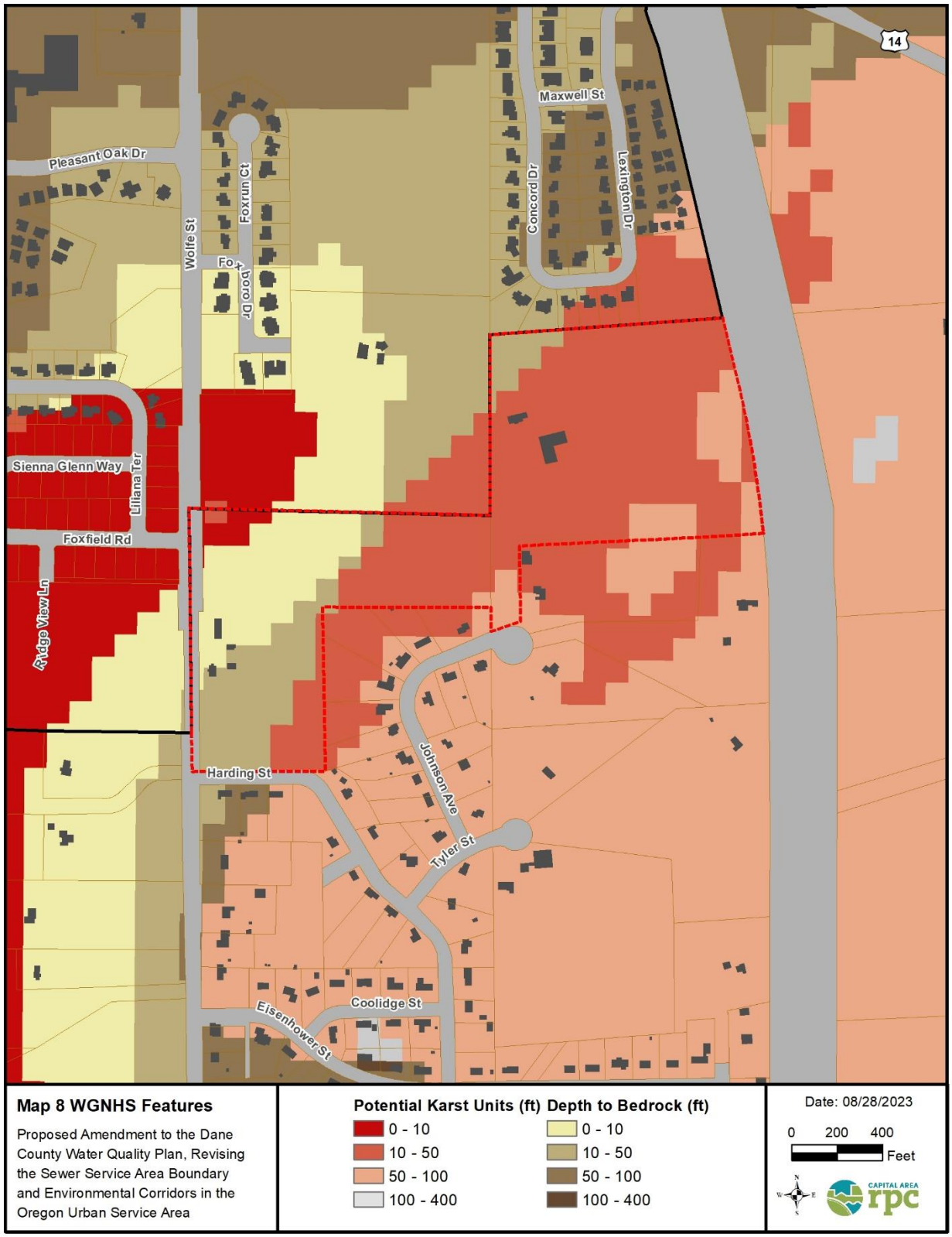
Map 6 – Elevations



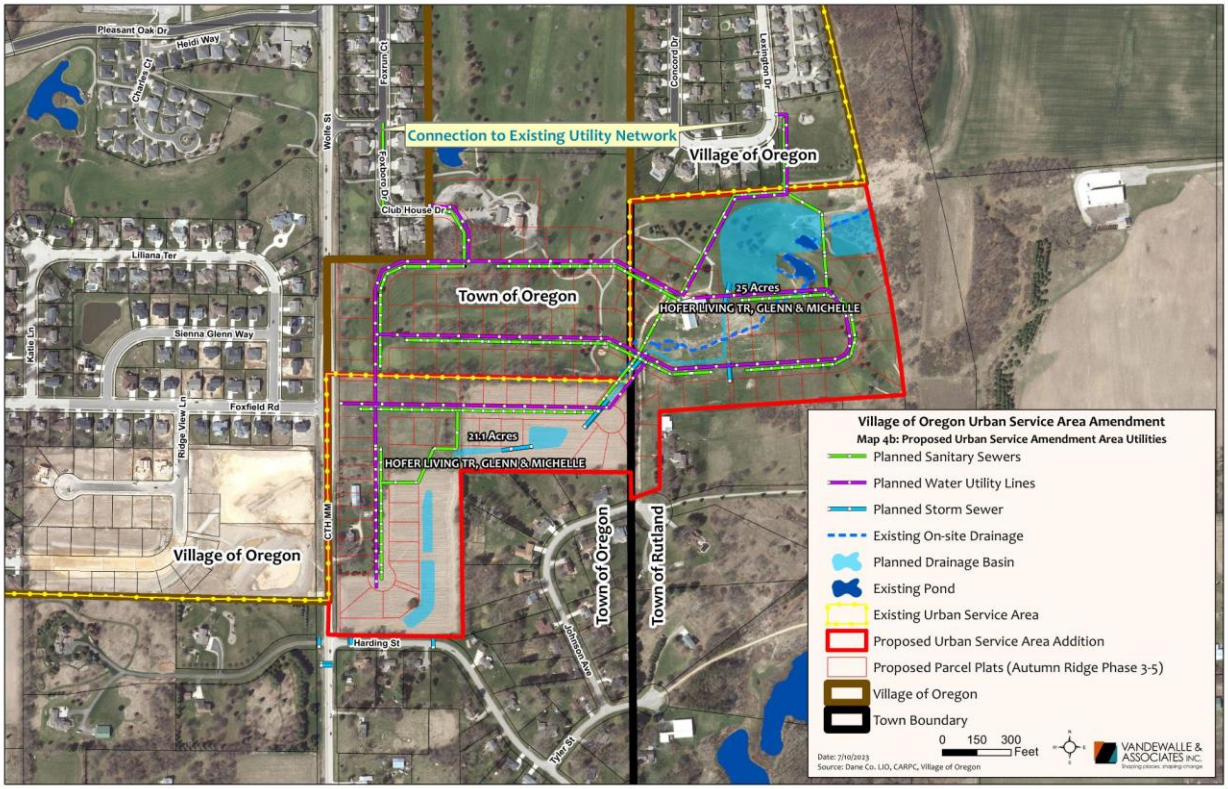
Map 7 - Soil Type



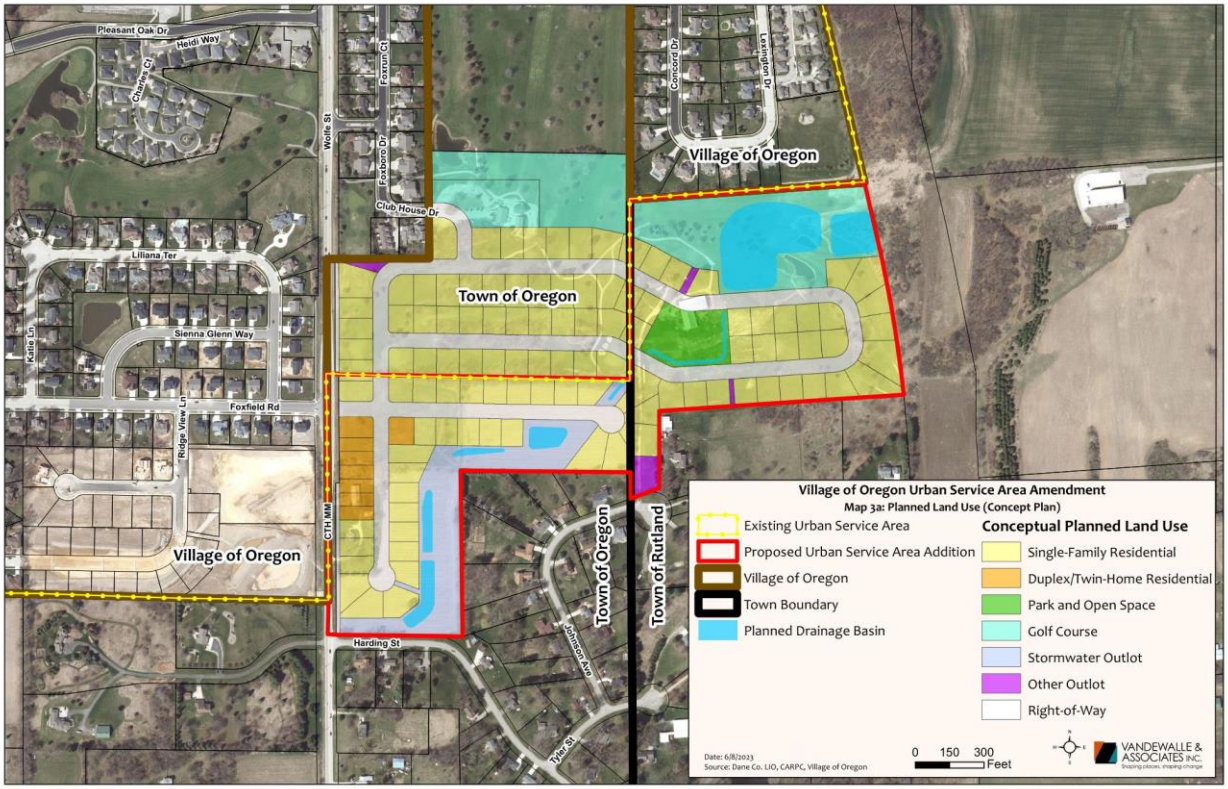
Map 8 – WGNHS Bedrock Depth and Potential Karst Features



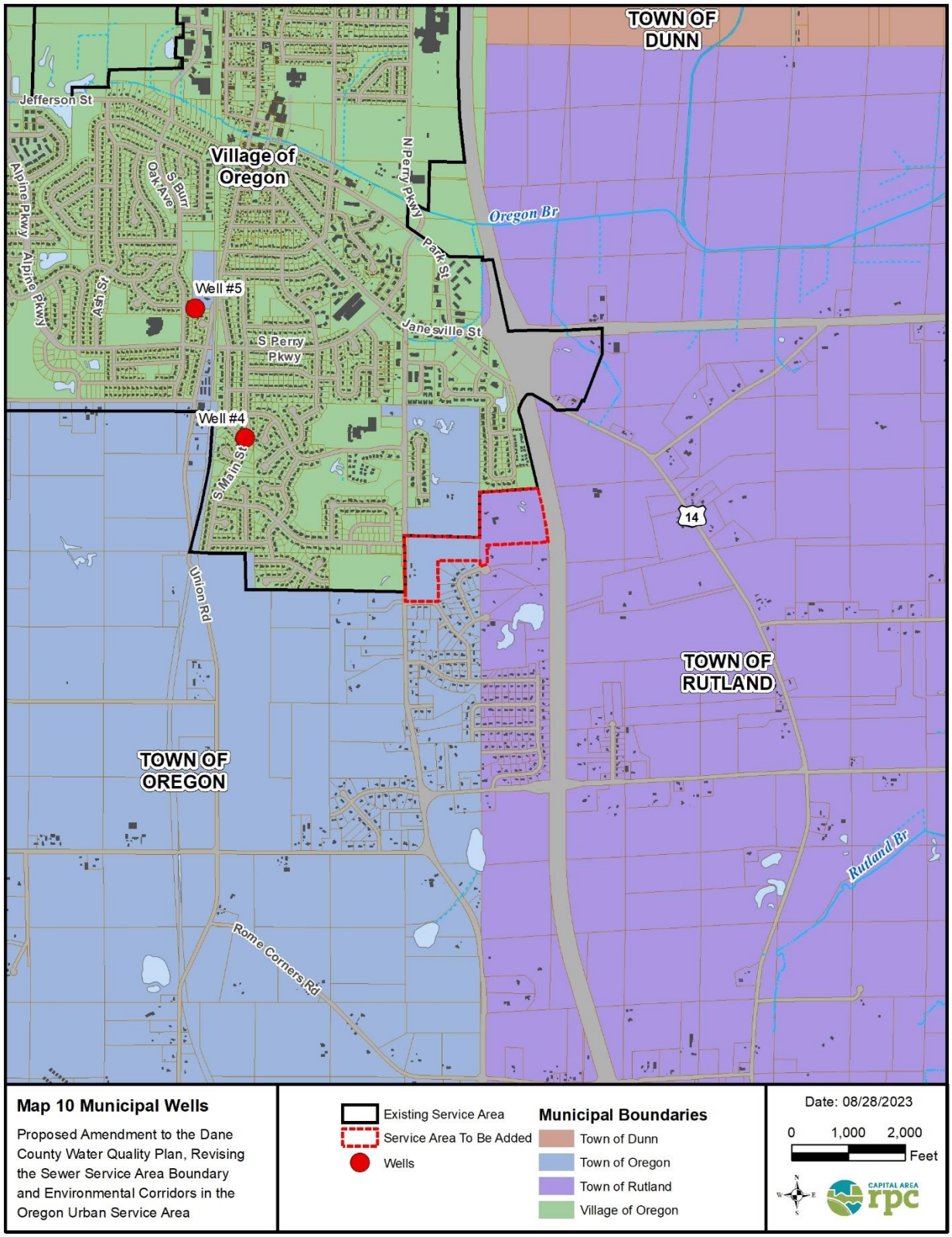
Map 9A – Proposed Sanitary Sewer and Water Main



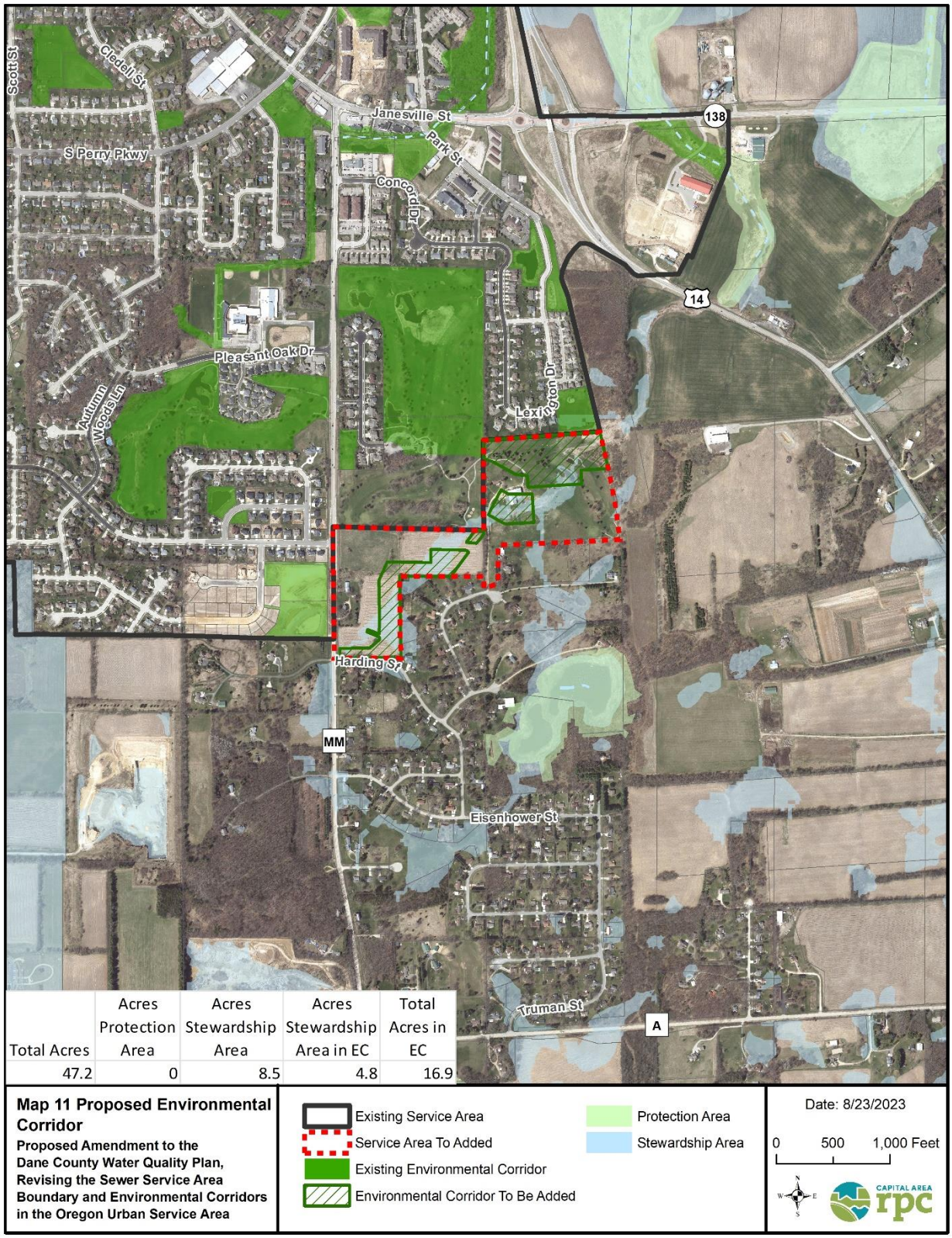
Map 9B – Proposed Stormwater Management



Map 10 – Municipal Wells



Map 11 – Proposed Environmental Corridor



Total Acres	Acres Protection Area	Acres Stewardship Area	Acres Stewardship Area in EC	Total Acres in EC
47.2	0	8.5	4.8	16.9

Map 11 Proposed Environmental Corridor

Proposed Amendment to the Dane County Water Quality Plan, Revising the Sewer Service Area Boundary and Environmental Corridors in the Oregon Urban Service Area

Existing Service Area
Service Area To Added
Existing Environmental Corridor
Environmental Corridor To Be Added
Protection Area
Stewardship Area

Date: 8/23/2023

0 500 1,000 Feet