Appendix I – Wetland Construction Feasibility Memo

MEMORANDUM

TO:	Will Burns, David J. Powers & Associates	**FROM:**	Scott Yarger, WRA, Inc.
DATE:	July 20, 2023		
SUBJECT:	Roseland Creek Community Park Wetland Construction Feasibility		

The purpose of this memorandum is to provide technical information concerning the feasibility of seasonal wetland establishment for the Roseland Creek Community Park Project (Project). Preliminary conceptual plans (RHAA 2010) for the Project included potential construction of vernal pool and seasonal wetland habitats within the northern portion of the approximately 19.5-acre site located southeast of the intersection of Hughes Avenue and Burbank Avenue (APN #'s: 125-331-001, 125-252-002, -003, and -004; "Project Area") in the southwest quadrant of the City of Santa Rosa, Sonoma County, California. The discussion presented in this memorandum is based on a desktop review of the site, WRA's knowledge and experience designing and restoring mitigation wetlands, supplemented by soils, hydrology, and vegetation conditions observed during multiple biological resources assessment site visits conducted by WRA in 2017, 2018, and 2022 in support of California Environmental Quality Act (CEQA) biological studies. The following sections discuss existing conditions of the site, including soil, topography, and hydrology factors that influence feasibility of wetland construction within the Project Area, and a preliminary assessment of wetland establishment feasibility based on these factors.

Project Area Description

The Project Area is 19.49 acres of vacant, and partially previously developed land which is dominated by valley oak woodland and non-native annual grassland. The Project Area is bisected by Roseland Creek, an intermittent United States Geological Survey (USGS) "blue-line" stream, which flows through the Project Area in a westerly direction. Roseland Creek is flanked by mature riparian valley oak woodland on both sides of the creek. Historic aerial imagery (NETR 2023) indicates that nearly the entire Project Area, with the exception of the creek corridor, supported high density, intensive agricultural (orchard) production from at least 1942 to as recently as 1971. The existing conditions of the site reflect the previous land use history, and existing oak woodlands on site, outside of the riparian corridor, consist of an even-aged stand of relatively young trees.

Soils and Topography

The topography in the Project Area is very flat, with elevations above the top of bank of Roseland Creek ranging from approximately 127 feet above mean sea level (amsl) in the southwest corner of the site, to approximately 132 feet amsl in the northeast corner of the site. Roseland Creek flows through the southern portion of the Project Area, originating from a culvert under McMinn Avenue, and flowing out of the Project Area through a concrete box culvert underneath Burbank Avenue. The

creek channel varies from shallow (approximately 4 foot depth from ordinary high water mark [OHWM] to top of bank [TOB]) upstream to deeply incised (approximately 8-12 foot depth from OHWM to TOB) in the downstream end. Elevations within the streambed range from approximately 128 feet amsl upstream to approximately 120 feet amsl at the downstream end.

SoilWeb (CSRL 2023) indicates that the Project Area contains two native soil types including: Yolo clay loam 0 to 5 percent slopes, MLRA 14, and Wright loam, wet, 0 to 2 percent slopes. Soil series that make up the soil mapping units are described below.

Yolo Series: The Yolo series consists of well drained loams underlain by recent alluvium from sandstone and shale. In a typical profile, the surface layer is neutral very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3) silt loam, about 26 inches thick. This is underlain by various mildly alkaline silt loam or silty clay loam layers to a depth of 65 inches. Yolo clay loam, 0 to 5 percent slopes is the predominant soil type in the Project Area comprising the majority of the site. This soil type is not listed as a hydric soil.

Wright Series: The Wright series consists of somewhat poorly drained and moderately well drained loams that have a clay subsoil. These soils are underlain by old valley plain alluvium of mixed origin such as volcanic and marine sediment. In a typical profile, the surface layer is very dark grayish brown (10YR 3/2) loam with common medium prominent strong brown mottles (7.5YR 5/6), about 15 inches thick. This is underlain by a strongly acidic dark grayish brown (10YR 4/2) sandy clay loam. This is underlain by various clay loam to clay layers to a depth of 98 inches. Wright loam, wet, 0 to 2 percent slopes is mapped in a limited area in the southern portion of the site, south of Roseland Creek. This soil type is listed as a hydric soil.

Climate and Hydrology

Average annual precipitation for Santa Rosa is 30 inches, with the majority falling as rain in the winter months (December through March). The mean daily high temperatures in degrees Fahrenheit range from 56 in December to 81 in September. The mean daily low temperatures in degrees Fahrenheit range from 42 in December to 53 in September (USDA 2023). Sources of hydrology within the Project Area include direct precipitation and surface runoff from adjacent lands.

The local watershed is Lower Laguna De Santa Rosa Creek (HUC 12: 180101100704). Roseland Creek, an intermittent stream flows in a westerly direction through the southern portion of the Property and is the most prominent hydrological and topographical feature within the Property.

Vegetation

The Project Area is dominated by valley oak woodland and non-native grassland vegetation types. Non-native grasslands within the Project Area are dominated non-native annual and perennial grasses including slim oat (*Avena barbata*), soft chess (*Bromus hordeaceus*), and Harding grass (*Phalaris aquatica*), with associated forbs including bristly ox-tongue (*Helminthotheca echioides*), spring vetch (*Vicia sativa*), and carrot (*Daucus carota*). Along the Roseland Creek corridor, the vegetation is dominated by valley oak riparian woodland, with one approximately 0.1-acre riparian wetland located in a concave backflow channel within the bed of Roseland Creek. Areas outside of the Roseland Creek corridor were investigated for wetland conditions during several site visits in 2017, 2018, and 2022, and although occasional areas of semi-mesic grasslands were

observed including Italian ryegrass (*Festuca perennis*), Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), and beardless wild rye (*Elymus triticoides*), no areas outside of Roseland Creek met wetland criteria under normal precipitation conditions, as determined in 2018, and reconfirmed in 2022.

Wetland Feasibility Assessment

A preliminary concept study for the Roseland Creek Community Park (RHAA 2010) proposed constructed seasonal wetland and vernal pool habitats in the northern portion of the Project Area. An approximately 0.10-acre seasonal wetland is shown north of Roseland Creek just outside of the riparian corridor. The conceptual plan also includes four small vernal pool features (approximately 0.03 acre each) in the northwest corner of the site.

Water Budget Model

To evaluate hydrology (and therefore the likelihood of success) for the proposed wetland and vernal pools, a water budget model was used to assess the inundation of the proposed wetland features over time. Using the principles and equations of the TR-55 hydrology model developed by the U.S. Department of Agriculture (USDA), WRA developed a model that generates a daily estimate of water depth in the proposed wetlands using local precipitation records and other data. WRA used historic weather data from a Santa Rosa California Irrigation Management Information System (CIMIS) weather station, soil infiltration data from the SoilWeb data described above, and the estimated watershed area to develop the water budget model.

Precipitation and evapotranspiration data used in the water budget calculations were based on long-term averages and provide a representation of conditions expected during years with normal rainfall. Daily precipitation rates and daily evaporation rates used in the water budget came from the closest weather station with evapotranspiration data to the site (California Irrigation Management Information System (CIMIS) #158, Bennett Valley, Santa Rosa). These data were compared to long-term averages from the closest weather station with available WETS data (Agricultural Applied Climate Information System (AgACIS) climate data; Santa Rosa WETS Station). Daily precipitation and evaporation rates from the years 2004, 2011, 2017, and 2019 at the Bennett Valley station were used in modeling calculations, as precipitation rates during these years matched long-term averages better than other recent years.

Results

The results of water budget model revealed that the wetland features would support little to no inundation during a normal rainfall year as defined by WETS. Even during a wetter than normal year, the model results indicated that little to no inundation would occur. Our preliminary analysis indicated that during normal and wetter than normal years from 2004, 2011, 2017, and 2019, the proposed wetland sites would have little to no inundation. The primary reasons for this include the small watershed areas contributing runoff to the wetlands and the expected relatively high soil infiltration rate of the native Yolo clay loam soil. The U.S. Army Corps of Engineers wetland delineation criteria require a minimum of 14 consecutive days of inundation to meet the definition of a wetland, and, based on our desktop analysis, the proposed wetlands would not likely meet this criterion. Wetlands typically require longer periods of inundation and saturation than this to successfully establish wetland vegetation. The lack of existing wetlands on the site also indicates that it is not likely a favorable location for wetland establishment.

Conclusion

Based on the preliminary assessment provided in this memo, there is a low likelihood that proposed wetland establishment would be successful. The proposed wetland establishment areas are very flat, have small watershed areas contributing runoff, and are underlain by Yolo clay loam soil which has a relatively high soil infiltration rate. The site of the proposed wetlands lack suitable topography, hydrology, and soil characteristics for wetland creation. The water budget indicates that the proposed wetland areas would have little to no inundation during a normal rainfall or even wetter than normal rainfall year as defined by WETS. This analysis is supported by site assessments in 2017, 2018, and 2022 which did not identify any wetlands outside of the Roseland Creek backflow channel. Based on these preliminary results, we recommend that the wetland features not be planned for the Project given that they would likely not be successful.

An agency could attempt to construct wetlands where clay soil types are present and an upstream watershed would provide adequate flows to maintain wetland hydrology but, as described above, the Roseland Creek Community Park site would not likely meet those criteria. Additionally, importation of appropriate soil types to support wetland conditions such as clay or bentonite is generally not supported where regulatory agencies are involved for the purposes of constructing mitigation wetlands. Based on local hydrological conditions, as detailed above, a constructed drainage to convey flows to a wetland on the project site is unlikely to provide adequate flow volumes to support a constructed wetland(s) in the absence of an adequate supporting watershed. Additional considerations in the establishment of constructed wetlands are the need for ongoing biological monitoring that would generally be required over a five-year period to ensure functionality of the wetland. Biological monitoring costs for constructed wetlands on the project site would be approximately $50,000. Assuming the wetlands are constructed outside of a regulatory agency permitting process, the cost for such construction would be approximately $120,000 per acre. In the event the specific success criteria for establishment of the constructed wetland are not met, an additional five-year monitoring period and additional construction costs may be warranted.