



Planning and Zoning Commission

Monday, May 11, 2020
7:00 PM – City Hall
Remote Location

MEETING AGENDA

1. **Call Meeting to Order Attendance**
2. **Approve Agenda**
3. **Approve Minutes**
 - A. P&Z Commission Meeting, April 13, 2020
4. **Meeting Procedures**
5. **Public Hearings**
 - A. **VACA 20-001.** Public Hearing and Possible Vote to Recommend the Approval of an Application to Vacate a Portion of a Water Line Easement
 - B. **REZN 20-003.** Public Hearing and Possible Vote to Recommend the Approval of An Application to Change the Zoning Classification of Approximately Twenty-Three Point Five (23.5) Acres, Located at the 7500 Block of West Farm Road 174, from Agricultural (AG) to High Density Single-Family Residential (R1-H)
 - C. **ORD 20-001.** Public Hearing and Possible Vote to Recommend the Approval of the updated City of Republic Water Master Plan
 - D. **ORD 20-002.** Public Hearing and Possible Vote to Recommend the Approval of the updated City of Republic Wastewater Master Plan
6. **Other Business**
 - E. **SUBD-PRE 20-002.** Possible Vote to Recommend the Approval of an Application for a Preliminary Plat for Old Savannah, a Residential Subdivision Consisting of Approximately Twenty-Four Point Four Eight (24.48) Acres Located at the 6300 Block of South Farm Road 89
7. **Citizen Participation**
8. **Community Development Department Update**
9. **Comprehensive Plan Update**
10. **Adjournment**

ATTENTION

In order to comply with Greene County guidelines prohibiting group gatherings the May 11th Planning and Zoning Commission Meeting will be held remotely. Public participation is encouraged.

Individuals addressing the Commission are asked to step to the podium and clearly state their name and address before speaking. In accordance with ADA guidelines, if you need special accommodations to attend any city meeting, please notify the City Clerks' Office at 732-3140 at least three days prior to the scheduled meeting.



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There are two ways to participate:

- 1. Use the <https://us04web.zoom.us/j/7607262373> and follow the instructions that appear to connect through the Zoom application.**
- 2. Call (312) 626-6799 and use the Meeting ID: 760 726 2373 when prompted.**

Individuals addressing the Commission are asked to step to the podium and clearly state their name and address before speaking. In accordance with ADA guidelines, if you need special accommodations to attend any city meeting, please notify the City Clerks' Office at 732-3140 at least three days prior to the scheduled meeting.



PLANNING AND ZONING COMMISSION

Republic City Council Chambers
213 N. Main, Republic, MO (Virtual Meeting)
Monday, April 13, 2020
7:00 p.m.

Meeting Minutes

The regular meeting of the Planning and Zoning Commission was held at virtually via Zoom and You Tube in Republic, Missouri, on Monday, April 13, 2020, at 7:00 p.m.

Commissioners in attendance included: Ransom Ellis; Chairman, Erik Pedersen, Kevin Haun, Brandon Andrews, Cynthia Hyder, and Randy Phelps. Also, in attendance were officials from the City of Republic's Community Development Department including Karen Haynes, Principal Planner; Chris Tabor, Senior Planner; Andrew Nelson, Community Development/Public Works Director; and Garrett Brickner, Assistant Community Development/Public Works Director.

Call Meeting to Order

The meeting was called to order by Chairman Ransom Ellis at 7:15 p.m.

Approve Minute

Chairman Ellis presented the minutes from the February 10, 2020 Planning and Zoning meeting for approval. Randy Phelps made a motion to approve the meeting minutes. The motion was seconded by Cynthia Hyder. Motion was carried by the unanimous affirmative votes of Brandon Andrews, Ransom Ellis, Erik Pederson, Kevin Haun, Cynthia Hyder, and Randy Phelps.

Meeting Procedures

Chairman Ransom Ellis read a statement regarding the process and procedures to be followed during the meeting of the Planning and Zoning Commission.

Other Business

- A. REZN 20-001:** Public Hearing and Possible Vote to Recommend the Approval of an Application to Change the Zoning Classification of Approximately Six Point Four (6.4) Acres, Located at 830 West O'Neal Road, from Agricultural (AG) to Medium Density Single-Family Residential (R1-M).
 - Staff Report by Karen Haynes.
 - Applicant Todd Wright spoke in favor of the Rezoning Application.
 - Karen Haynes read a comment from resident Sonyia Flowers stating she was not in favor of more land becoming houses and would prefer the land be used for a community garden or walking trail.

- Motion was made by Cynthia Hyder to approve REZN 20-001; motion was seconded by Brandon Andrews. Motion was carried by the unanimous affirmative votes of Randy Phelps, Kevin Haun, Erik Pedersen, Ransom Ellis, Brandon Andrews, and Cynthia Hyder.

B. REZN 20-002: Public Hearing and Possible Vote to Recommend the Approval of an Application to Change the Zoning Classification of Approximately Twenty-Four Point Four Eight (24.48) Acres, Located at the 6300 Block of South Farm Road 89, from Agricultural (AG) to High Density Single-Family Residential (R1-H).

- Staff Report by Karen Haynes.
- Applicant Mike Seitz and Representative Jon Williams spoke in favor of the Rezoning Application.
- Two residents expressed concern regarding whether this was a good time to move forward with more development.
- Motion was made by Randy Phelps to approve REZN 20-002; motion was seconded by Kevin Haun. Motion was carried by the unanimous affirmative votes of Randy Phelps, Kevin Haun, Erik Pedersen, Ransom Ellis, Brandon Andrews, and Cynthia Hyder.

Citizen Participation

Ransom Ellis opened the citizen participation. No one requested to speak, and the citizen participation was closed.

Community Development and SOAR Update

Andrew Nelson, Community Development and Public Works Director, gave an update on the consolidation of the Community Development Department with the Public Works Department and an update on the SOAR Project.

Adjournment

Motion was made by Brandon Andrews and seconded by Randy Phelps to adjourn the meeting at 7:59 p.m. Motion was carried by the unanimous affirmative votes of Ransom Ellis, Erik Pederson, Brandon Andrews, Kevin Haun, Cynthia Hyder, and Randy Phelps.

Karen Haynes
Community Development Principal Planner

Ransom Ellis
Chairman

EXHIBIT A

Project/Issue Name: Recommending the Approval of An Application to Vacate a Portion of a Water Line Easement

Submitted By: Lester E. Cox Medical Centers

Presented By: Planning and Development Department

Date: May 11, 2020

ISSUE IDENTIFICATION

Lester E. Cox Medical Centers (Cox Health) has applied for an Easement Vacation of the Water Line located on Lot 1, Old Stone Planned Development District (PDD), the future site of a Cox Clinic. The proposal also dedicates a new 15' Water Line Easement to accommodate the proposed building footprint.

DISCUSSION AND ANALYSIS

Lester E. Cox Medical Centers (Cox Health) is requesting an Easement Vacation of the Water Line located on Lot 1, Old Stone PDD to accommodate the proposed building footprint; the proposed Replat dedicates a new 15' Water Line Easement on the Cox property.

The following paragraphs contain brief analyses of present site conditions as well as the proposal's relationship to adopted plans of the City:

Transportation: The proposal is not anticipated to have any impact on the City's transportation system.

Land Use: The proposal vacates the existing water line and dedicates the Water Line Easement in the revised location.

Municipal Utilities: The proposed revised location of the Water Line Easement aligns with the Water Line Easement located on the adjacent property (60 West).

Floodplain: The proposal is not anticipated to have any impact on areas of Floodplain.

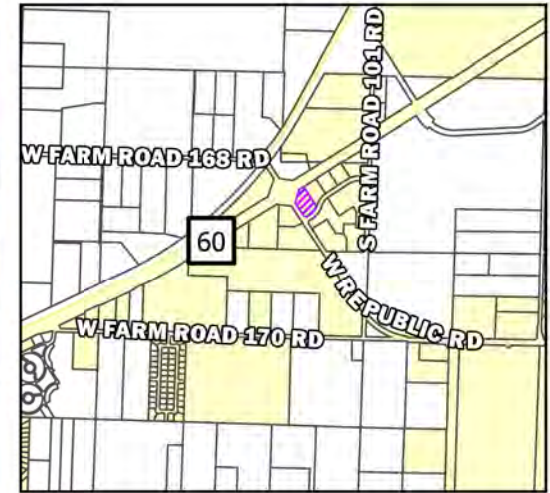
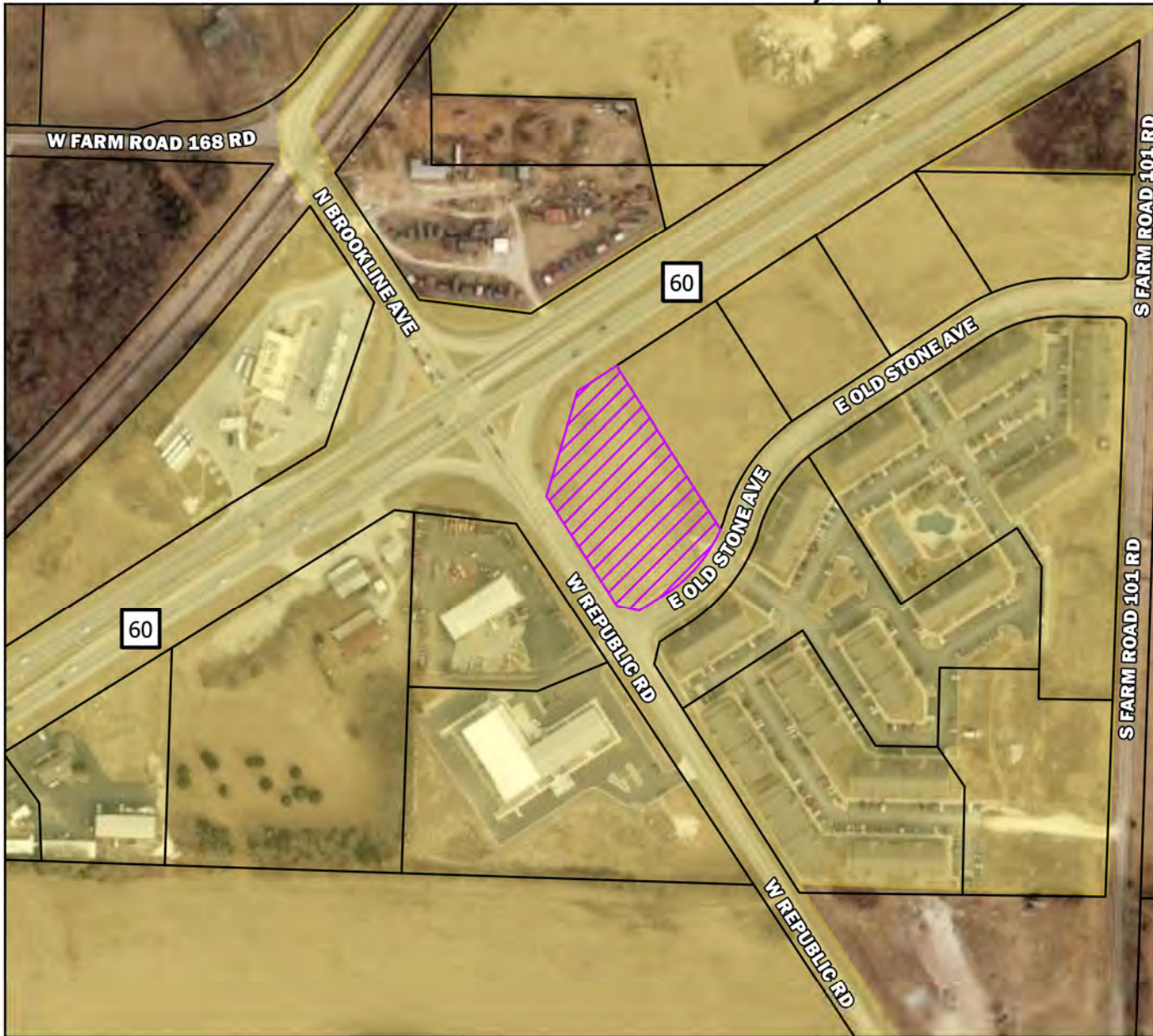
Other Public Services: The proposal is not anticipated to have any impact on any other public services.

STAFF RECOMMENDATION




The Community Development Department recommends approval of the requested Water Line Easement Vacation and the dedication of the new Water Line Easement.

VACA 20-001: Cox Health Waterline Easement

Vicinity Map



Legend

-  VACA 20-001
-  Parcels
-  City Limits

Parcel Owner: Cox Health
Parcel Address: 3204 E Old Stone Ave
Area: 1.9 Acres

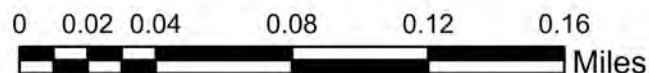




EXHIBIT B

Project/Issue Name: **REZN 20-003.** Public Hearing and Possible Vote to Recommend the Approval of An Application to Change the Zoning Classification of Approximately Twenty-Three Point Five (23.5) Acres, Located at the 7500 Block of West Farm Road 174, from Agricultural (AG) to High Density Single-Family Residential (R1-H)

Submitted By: Rader Trust

Presented By: Community Development Department

Date: May 11, 2020

ISSUE IDENTIFICATION

The Rader Trust has applied to change the Zoning Classification of **(23.5) acres** of property located at 7500 Block of West Farm Road 174 from **Agricultural (AG) to High Density Single-Family Residential (R1-H)**.

DISCUSSION AND ANALYSIS

The property subject to this Rezoning Application is comprised of approximately **(23.5) acres** of land located at the 7500 Block of West Farm Road 174. The property does not contain any structures and is currently utilized for agricultural purposes only.

The following paragraphs contain brief analyses of present site conditions as well as the proposal's relationship to **adopted plans of the City.**

Consistency with the Comprehensive Plan

The City's Comprehensive Plan generally encourages the expansion of residential development through proactive rezoning of land at appropriate locations. Appropriate locations are described generally throughout the Plan, with regard to the **relationship of land at particular locations to infrastructure capable of supporting various intensities and densities of uses.**

The Plan also more particularly describes appropriate future land uses through the depiction of a **"Future Land Use Map" (FLUM)**. In this case, the FLUM depicts the subject property as having a **Low Density Residential FLUM** designation. The City's Adopted 2005 Land Use Plan has identified the **"Low Density Residential"** Future Land Use Map designation as **"Single-Family Residential Development at 1-6 units per acre,"** which includes the Low Density Single-Family Residential (R1-L) at 4 dwelling



units/acre, Medium Density Single-Family Residential (R1-M) at 5 dwelling units/acre, and **High Density Single-Family Residential (R1-H) at 6 dwelling units/acre.**

The 2005 Land Use Plan identifies Land Use Goals and Objectives relating to residential development, as follows:

- **Goal:** Cost-effective Private Development Density. Encourage higher density development that will reduce the amount of infrastructure and cost to the developer and reduce the maintenance costs by the City.
 - **Objective:** Use the Land Use Plan to promote and guide the development of land at higher densities to reduce the amount of infrastructure constructed within the City.
 - **Policies:**
 - Plan for higher density development that will reduce the cost of maintenance of new infrastructure improvements, such as water, sanitary sewer, stormwater and roads.
- **Goal:** Diversify the Republic Housing Market.
 - **Objective:** Promote all types of residential development.
- **Goal:** Improve the quality of all types of housing in the City.
 - **Objective:** Encourage the development of high-quality housing regardless of the size, type, and density of housing being constructed.

The general trend of development in the vicinity of the subject property (along East Hines) in recent years has been the development of **residential subdivisions.**

Compatibility with Surrounding Land Uses

The subject property is surrounded by High Density Single-Family Residential (R1-H) to the north, Twelve Stones Planned Development District (PDD) to the west, Greene County Agricultural zoned property to the east, and Greene County Suburban Residential to the south.

The land uses permitted in the High-Density Single-Family Residential (R1-H) Zoning District include single-family dwellings, residential accessory structures, golf courses, country clubs, and schools.

Capacity To Serve Potential Development and Land Use

Municipal Water and Sewer Service: This site is not currently served by City of Republic water or sanitary sewer service. The site is in proximity to a ten (10) inch water main and eight (8) inch sanitary sewer main at the eastern termination of East Timber Oak Street, approximately 345 feet from the western boundary line of the subject property; connection to these mains will require an off-site Utility Easement and agreement with the owner of the Twelve Stones PDD to the west. The sanitary sewer flows to the Shuyler Creek Lift Station and then through a force main to the Wastewater Treatment Facility; the Lift Station and Treatment Facility currently have capacity. The City's water system



currently has capacity to serve a potential development; final evaluations of capacity will be performed during subsequent development review.

Alternatives to connecting to different points in the City's municipal water and sewer systems may be available and will be reviewed at the time of development review.

Transportation: The subject parcel is currently accessible, for agricultural purposes only from an access point on West Farm Road 174 from the adjacent property to the east owned by the Rader Trust; subsequent development of the subject parcel will require review of new entrances(s) and/or roads identified on the Major Thoroughfare Plan (MTP) through the Preliminary Platting process.

The Republic City Code will require the development of the subject property to include the extension of internal public streets to boundary lines, sidewalks, and the construction of Bailey Avenue from West Farm Road 174 to the southern boundary line as required by the Major Thoroughfare Plan, as well as the dedication of deficient Right-of-Way along West Farm Road 174.

A Traffic Impact Study (TIS) has been completed by the Applicant and reviewed by the City; the Report indicated no major improvements are needed to the City's existing transportation system.

Floodplain: The subject parcel **does not** contain a Special Flood Hazard Area (SFHA/Floodplain).

Sinkholes: The subject parcel **does not** contain any identified sinkholes.

Extent to which Proposed Amendment Creates Nonconformities

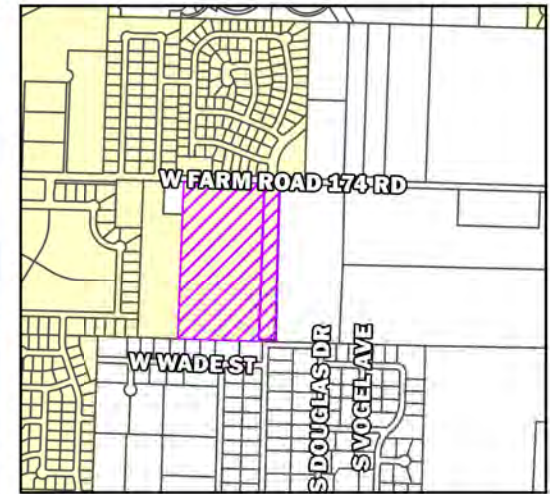
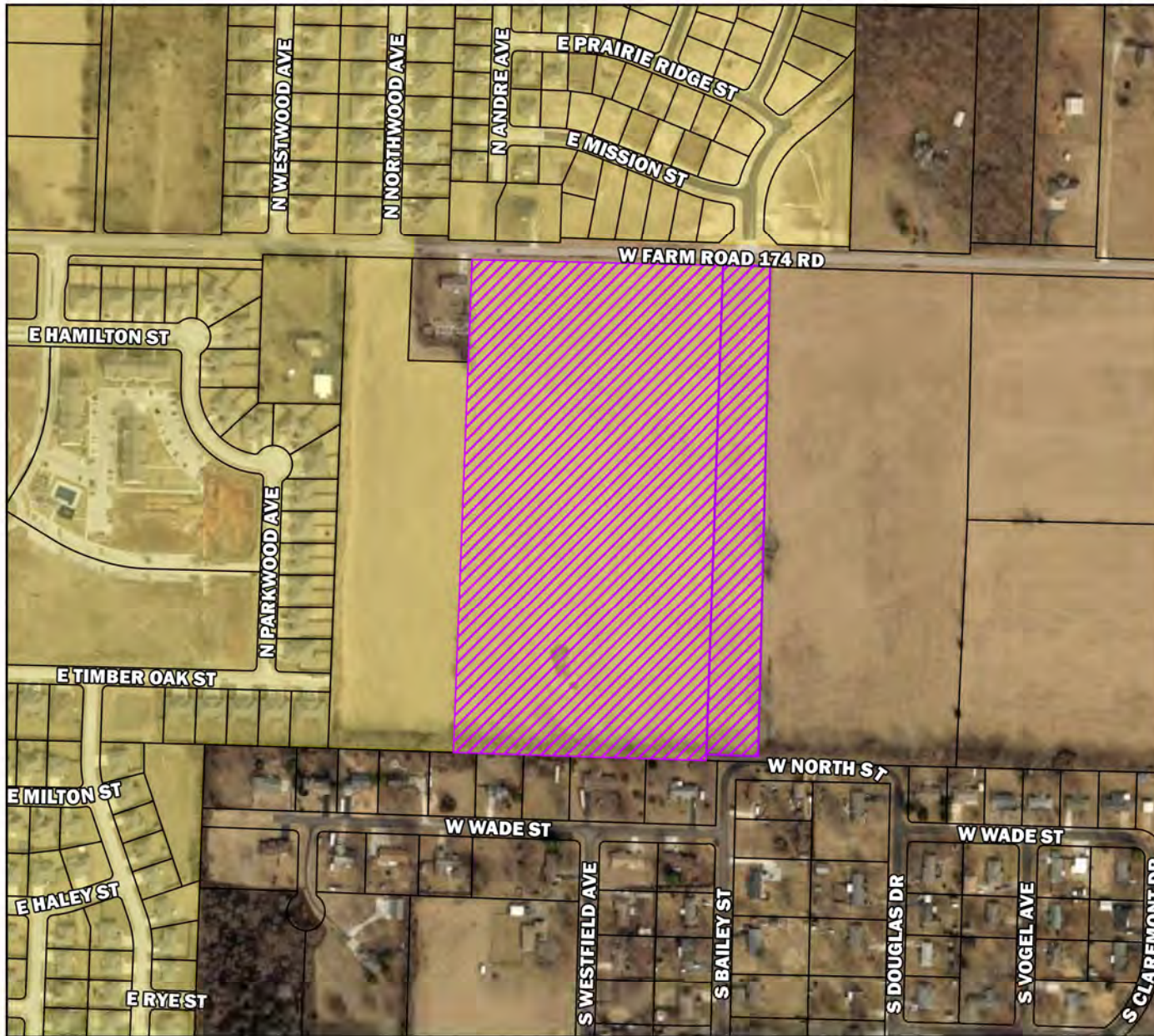
Any existing agricultural uses presently conducted on the subject property would be permitted to continue as is at the time of rezone until such time as the use is altered in a way that would remove that lawfully existing nonconforming status. Types of alterations that would cause the removal of that status include redevelopment, expansion of the nonconforming use, substantial destruction of the nonconformity, etc.

STAFF RECOMMENDATION

Staff considers the **proposed Zoning Map Amendment (Rezoning)** to be generally consistent with the **goals and objectives of the Comprehensive Plan**, consistent with the **trend of development in the vicinity of the site**, generally **compatible with surrounding land uses**, and **able to be adequately served by municipal facilities should off-site easements be obtained**. Based upon this analysis (performed without the benefit of evidence and testimony of a public hearing), **Staff recommends the approval of this application.**

REZN 20-003: Rader Trust

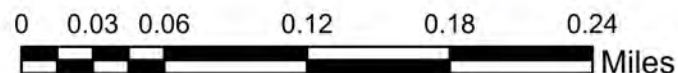
Vicinity Map



Legend

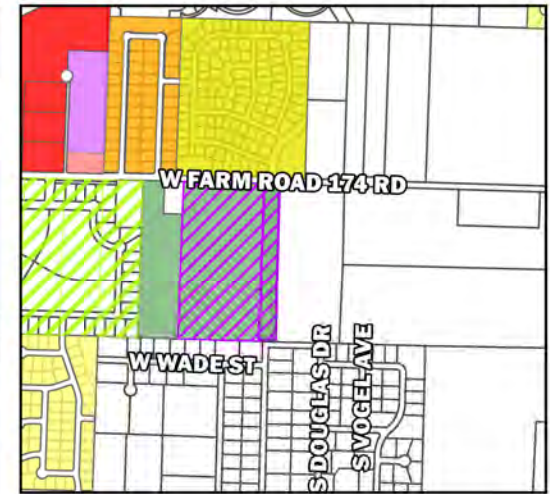
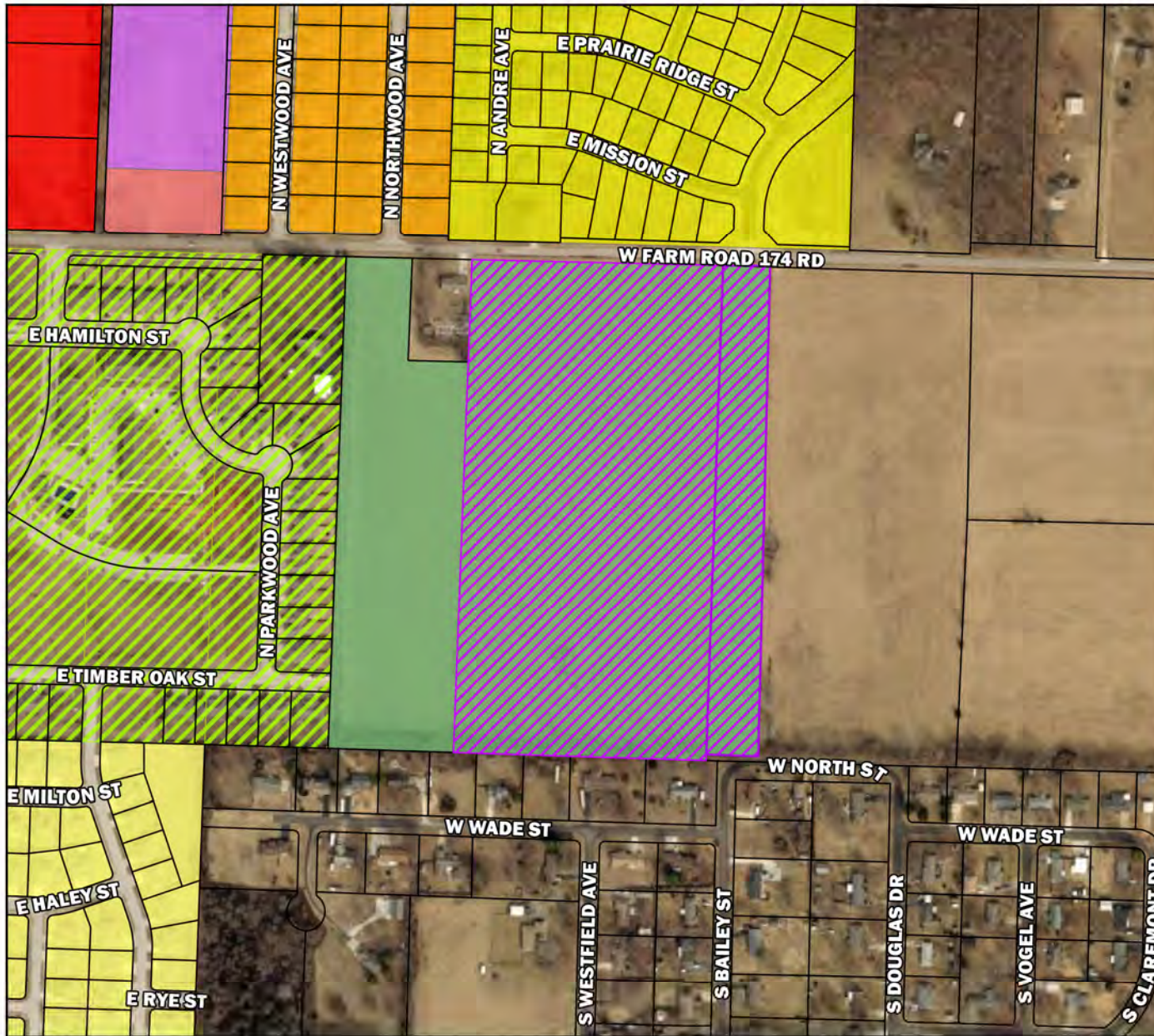
- City Limit Republic
- Parcels
- ANX 20-002

Parcel Owner: Rader Trust
Parcel Address: 7500 Block of Hwy 174
Area: 22.5 Acres
Current Zoning: Agricultural (AG)
Requested Zoning: Single Family High Density Residential (R1-H)
Future Land Use Designation: Low Density Residential



REZN 20-003: Rader Trust

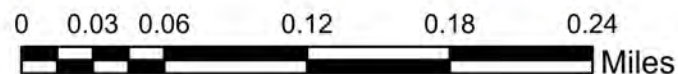
Zoning Map



Legend

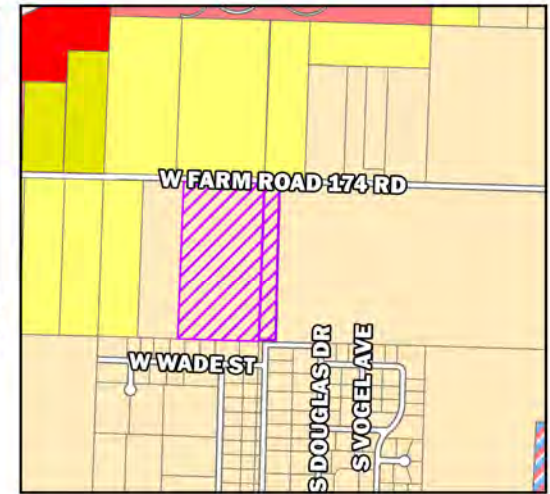
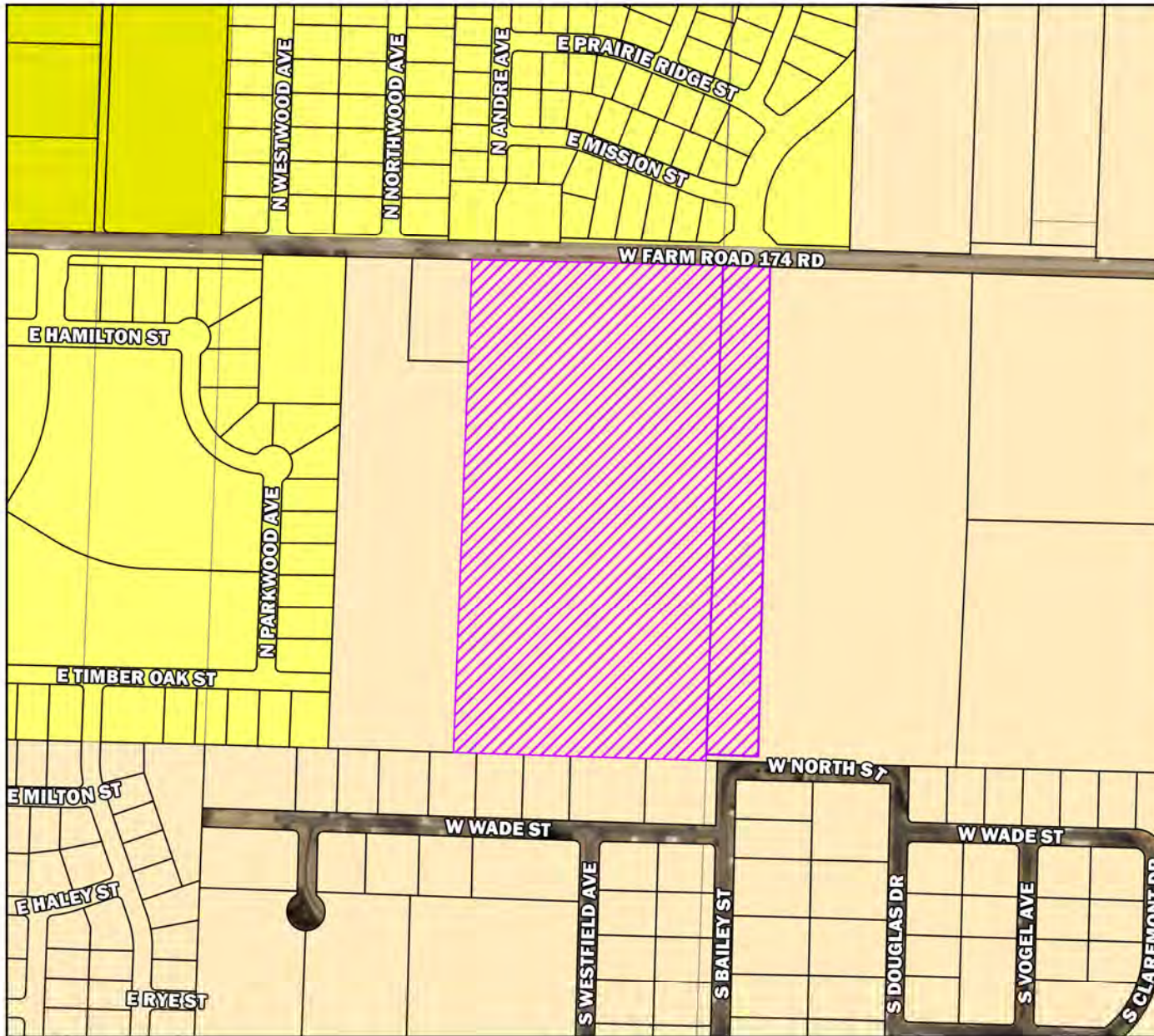
- Parcels
- ANX 20-002
- Zoning**
- AG Agricultural
- C-1 Commercial
- C-2 General Commercial
- C-3 General Commercial
- M-1 Light Manufacturing
- M-2 Heavy Manufacturing
- PDD Planned Development
- R1-L Single Family Low Density
- R1-M Single Family Medium Density
- R1-H Single Family High Density
- R1-Z Zero Lot Line Residential
- R-2 Two-family Residential
- R-3 Multi-family Residential

Parcel Owner: Rader Trust
 Parcel Address: 7500 Block of Hwy 174
 Area: 22.5 Acres
 Current Zoning: Agricultural (AG)
 Requested Zoning: Single Family High Density Residential (R1-H)
 Future Land Use Designation: Low Density Residential



REZN 20-003: Rader Trust

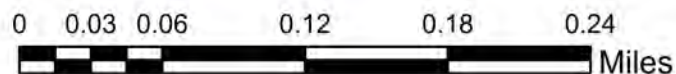
Future Land Use Map



Legend

- Parcels
- ANX 20-002
- Future Land Use**
- Low Density Residential
- High Density Residential
- Med Density Residential
- Main Street District
- C-1
- C-2
- M-1
- M-2
- Park
- Planned Business Park
- Public Land Use
- School Land Use

Parcel Owner: Rader Trust
 Parcel Address: 7500 Block of Hwy 174
 Area: 22.5 Acres
 Current Zoning: Agricultural (AG)
 Requested Zoning: Single Family High Density Residential (R1-H)
 Future Land Use Designation: Low Density Residential



Section 405.100. "R1-H" High Density Single-Family Residential District. [CC 1999 §26-18]

- A. *Purposes.* The intent of the "R1-H" High Density Single-Family Residential District is designed for seven thousand (7,000) square foot single-family detached residential uses at higher densities of approximately six (6) dwelling units per acre. Internal stability, harmony, attractiveness, order and efficiency are encouraged by providing for adequate light, air and open space for dwellings and related facilities and by consideration of the proper functional relationship and arrangement of the different uses permitted in this district. This district is intended for areas that have access for vehicular traffic from collector or higher classification streets without crossing minor streets in adjoining neighborhoods.
- B. *Uses Permitted.*
1. Model homes in accordance with Section 410.190.
 2. Single-family dwellings.
 3. Accessory buildings customary, incidental and subordinate to the main building.
 4. Churches or other places of worship, including parish houses and Sunday Schools, but excluding overnight shelters and temporary outdoor revivals, on a minimum of two (2) acres of land, to provide sufficient land area for off-street parking, bufferyards and proper site design to lessen impact on adjoining residential neighborhoods. The requirements of Article VI and X regarding parking, loading, landscaping, and open space shall be required.
 5. Home occupations in accordance with Section 405.630.
 6. Public school, elementary and high, and educational institutions having a curriculum the same as ordinarily given in public schools, on a minimum of two (2) acres of land, to provide sufficient land area for off-street parking, bufferyards and proper site design to lessen impact on adjoining residential neighborhoods. The requirements of Article VI and X regarding parking, loading, landscaping, and open space shall be required.
 7. Golf courses and country clubs.
 8. Any use conforming at the time the district is mapped.

Section
405.100

Section
405.100

9. *Group homes.* The exterior appearance of the home and property shall be in reasonable conformance with the general neighborhood standards. No group home shall be located within two thousand five hundred (2,500) feet of another group home.
- C. *General Regulations.* Property and buildings in the "R1-H" District shall be subject to the following regulations:
1. *Street frontage.* Each lot shall have a clear, direct frontage on a dedicated City street.
 2. *Platting requirements.* Each dwelling shall be located on its own individual platted lot. If areas for common use of occupants of the development are shown on the plat, satisfactory arrangements shall be made for the maintenance of the common open space and facilities, whether in the form of a neighborhood association or public dedication. The plat shall indicate the easements and covenants appurtenant thereto.
 3. *Off-street parking.* As required by Article VI of this Chapter.
 4. *Accessory buildings and structures.* As required by Section 405.640 of this Chapter.
 5. *Trees.* There shall be a requirement of at least one (1) tree for each platted lot in order to enhance private space. The tree shall be of a variety that provides shade and screening and shall be at least six (6) feet in height at the time of planting.
- D. *Height And Area Regulations.* The height and area regulations shall be provided in accordance with the requirements set forth in Article V.



EXHIBIT C

Project/Issue Name: **ORD 20-001.** Public Hearing and Possible Vote to Recommend the Approval of an Updated Water Master Plan

Submitted By: Andrew Nelson, P.E.

Presented By: Community Development Department

Date: May 11, 2020

ISSUE IDENTIFICATION

Consideration to approve the Water Master Plan.

DISCUSSION AND ANALYSIS

The City of Republic retained Burns & McDonnell (BMcD) to develop an updated Water Master Plan.

The Water Master Plan summarizes the following:

- Water Distribution System
- Population and Water Demand Projections
- Water Supply Planning
- Short-Term Supply Planning
- Long-Term Supply Planning
- Water Master Planning
- Hydraulic Model Development
- Year 2023 System Analysis
- Capital Improvements Plan

STAFF RECOMMENDATION

Staff recommends the approval of the Water Master Plan.



EXHIBIT D

Project/Issue Name: **ORD 20-002.** Public Hearing and Possible Vote to Recommend the Approval of an Updated Wastewater Master Plan

Submitted By: Andrew Nelson, P.E.

Presented By: Community Development Department

Date: May 11, 2020

ISSUE IDENTIFICATION

Consideration to approve the updated Wastewater Master Plan.

DISCUSSION AND ANALYSIS

The City of Republic retained Burns & McDonnell (BMcD) to develop a Sanitary Sewer System Model and to assess the existing Wastewater Treatment Plan (WWTP) to update the City's Wastewater Master Plan.

Wastewater Collections:

The Wastewater Collections Report is a comprehensive evaluation of the existing system and future conditions assessment and summarizes the following:

- Existing Conditions
- Inflow & Infiltration (I&I) Reduction Strategy
- Population Growth
- CIP Projects
- Opinion of Probable Costs

Wastewater Treatment Plant:

The Wastewater Treatment Plan (WWTP) Report is a comprehensive evaluation of the existing facility and summarizes the following:

- Service Area Description
- Capital Improvements
- Headworks
- Secondary Treatment



EXHIBIT D

- Tertiary Treatment (Filtration)
- Disinfection
- Solids Handling
- Administrative Building
- Probable Cost

STAFF RECOMMENDATION

Staff recommends the Wastewater Master Plan.



CITY OF REPUBLIC Water & Wastewater Master Plan

Executive Summary

Abstract

The following Executive summary provides a high-level overview of the master planning efforts for the water and wastewater utility. Including the needed capital improvements to facilitate growth and maintain compliance.

Andrew Nelson, P.E.
Community Development Director



Greetings,

I am pleased to present this executive summary for your consideration. The following document represents 1 ½ years of data collection and planning efforts by City Staff and our consulting engineer Burns & McDonnell. This planning effort provides the staff and the citizens of Republic a clear and precise approach to building and maintaining utilities that are compliant and facilitate the growth of the City.

The Republic Water system is overall in good condition. While we do have areas that suffer from restricted fire flows and aging infrastructure, the service itself is still compliant and acceptable. We are positioned well to take a proactive rather than reactive approach and make the necessary investments to replace these pieces of the system before they disrupt service to our customers. From a perspective the City's projected growth shows that additional wells will be necessary in the 20-year planning period, however this does not adversely affect our aquifer and the underground supply shows to be adequate to facilitate our growth. There are also some options to participate in a regional effort to obtain water supply from Stockton lake if it proves to be economical.

The Republic Wastewater system is in a little bit tougher position. Although we have expired large debt services from the original plant expansion 20 years ago, aging infrastructure and deferred maintenance have created a backlog of capital projects. Along with that, the City entered into a voluntary compliance agreement with Missouri Department of Natural resources that expires in 2021. This agreement was a voluntary effort to achieve system compliance, due to overflow discharges at the wastewater treatment plant from excess stormwater. With no major progress made to eliminate the bypass of the treatment process, the City will now be entering into and Administrative Order with MDNR that will dictate a strict timeline to regain compliance. This Order will require major capital investment to achieve compliance and will have strict penalties associated if this goal is not met. The good news is that our completed master plans are the first major step in this process and position the City well to meet the requirements of the Administrative order within the deadline.

The effort and investment into these master plans create a well-defined path for the City to provide the most efficient, compliant and cost-effective network of utilities for the citizens of Republic. Execution and implementation of these planning efforts will also prepare the City exciting new growth and development opportunities. The best is yet to come!

Sincerely,

Andrew D. Nelson, PE
Community Development Director
City of Republic

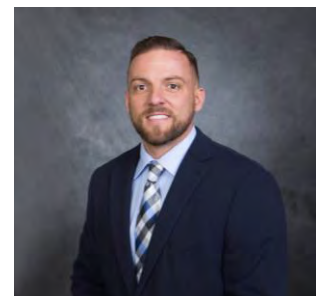


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Republic Master Plan Executive Summaries

Water Master Plan

1.1 Water Distribution System

The City's water distribution system consists of four wells, three elevated storage tanks, one ground storage tank and associated pump station that supply water to the water main network. The four supply wells (Well 3, Well 4, Well 5, and Well 6) pump water from the Ozark Aquifer into the distribution system. Well 5 pumps to a ground storage tank and is pumped into the distribution system with a separate pump station. There are three elevated storage tanks and one ground storage tank with a total volume of 2.1 MG. The water distribution, as modelled, totals approximately 120 miles of pipe ranging in diameter from 4-inches to 12-inches.

1.2 Population and Water Demand Projections

City staff provided population projections for years 2020, 2030, and 2040. The 5-year and 20-year population projections are interpolated for year 2023 and year 2038 and apply a water usage of 91 gpcd and 96 gpcd respectively for the demand projections. The escalation in water usage from 2023 to 2038 is a conservative approach to account for an aggressive population growth which is expected to double in the next 20 years. Customer classes include residential, commercial, city use, and industrial (representative of manufacturing and warehouse facilities). From 2015 to 2018 the residential and commercial classes represented approximately 70 percent and 20 percent, respectively, of the total customer sales, therefore a population-based water demand projection is applied in the master plan. The mix of customers during this period is also representative of the previous 15 years and water usage, in terms of gallons per-capita-day (gpcd), has been consistent ranging between 88 gpcd and 94 gpcd since 2007. The City also anticipates the addition of a large water user in the amount of 1.0 MGD occurring after 2023. A summary of the population and water demand projections (maximum day demand) is listed below:

- Year 2019: 14,958 people at 3.02 MGD.
- Year 2023: 22,110 people at 3.62 MGD; and
- Year 2038: 35,358 people at 7.11 MGD.

1.3 Water Supply Planning

Source water planning to meet short and long-term water demand projections using the firm capacity design concept is recommended and calculates the City’s water supply assuming the highest producing well is out of service. This approach provides additional supply resiliency for the City and help deliver water during periods of high demand, even if one well is out of service for cleaning or repairs. MDNR design guidelines for source water planning with groundwater systems requires the following for water supply capacity planning:

- Criteria 1: the total developed groundwater source capacity shall equal or exceed the design maximum day demand; and
- Criteria 2: all public water systems shall be capable of meeting design average day demand with the largest producing well out of service.

1.4 Short-Term Supply Planning

Based on the water demand projections through 2023, the capacity of the City’s existing water supply sources complies with the firm capacity concept and MDNR guidelines. As indicated previously, the City is planning for a new large water user needing approximately 1.0 MGD occurring in or after 2024, which will fall out of compliance with the firm capacity concept. Therefore, a new well should be implemented as average and maximum day demands approach 3.1 MGD and 4.9 MGD, respectively. Similarly, as average and maximum day demands approach 4.4 MGD and 7.1 MGD respectively another well should be added. The short-term supply planning using the firm capacity concept is summarized in Table 1-1 below:

Table 1-1: 20-Year Water Supply Planning

Year	Demands (MGD)			Supply (MGD)		Recommended Action
	Large User	Average Day	Maximum Day	Firm Capacity	Total Capacity	
2019	0.0	1.7	3.0	2.8	4.3	none
2020	0.0	1.8	3.2	2.8	4.3	none
2023	0.0	2.0	3.6	2.8	4.3	none
2024	1.0	3.1	4.9	4.2	5.8	add 1 new well
2030	1.0	3.6	5.8	4.2	5.8	none
2038	1.0	4.4	7.1	5.7	7.2	add 1 new well

1.5 Long-Term Supply Planning

A total of six new supply wells are required to meet the long-term water demand projections for the 50- year planning horizon. This equates to adding a well every 8-9 years. Wells should be added in areas where growth is occurring to support the hydraulic gradients in the distribution system and elevated storage. Location and quantity should also consider connectivity to portions of the distribution system that have limited highway or railroad crossings to increase water supply redundancy in these areas. Use of water from a project that ultimately results from the Tri-State Water planning effort is an alternative to address the City's long-term supply deficits; however, significant uncertainties remain about that exact nature of that project which could shift it from a viable alternative to not recommended. Those uncertainties impact the business case for evaluating how the City can best meet long-term water demands. Given the uncertainties in the Tri-State Water project and available information as of the date of this report, the 50-year water supply plan includes options to develop wells or introduce surface water from the Tri-State Water project as a new supply source.

1.6 Water Master Planning

The City identified growth areas for the 5-year and 20-year planning periods and are illustrated in Figure 1-1. Distributions for the population projections are allocated by development area and planning period based on input from City staff. The projected water demands for these growth areas are based on anticipated customer and land use classifications and are evaluated with the model to identify capital improvements required to convey these demands to customers in the existing and future water service area.

1.7 Hydraulic Model Development

Field testing was conducted from June 27, 2018 through July 29, 2018 and included fire hydrant testing with pressure monitoring, via data loggers, in the distribution system. Data loggers are positioned on fire hydrants located at or near water mains ranging between 4-inch and 12-inches in diameter. Other data included in the model calibration effort includes SCADA historian information from the City's water system facilities and are listed below:

- Flow and discharge pressure at wells 3, 4, 5, and 6.
- Elevated storage level at Tanks 3, 4, and 6; and
- Flow, discharge pressure, and ground storage tank level at the Well 5/pump station facility.

A total of 28 fire hydrant tests were conducted throughout the distribution system on 4-inch, 6-inch and 8- inch water mains. Fire hydrant testing creates hydraulic stress in the distribution system and the results are used to calibrate the model to accurately simulate static conditions. Model calibration is performed by adjusting the Hazen-Williams coefficient, or C-value, assigned to pipes to simulate the test results, data logger pressure information, well performance, and tank levels. The calibrated model adequately represents the fire hydrant test results and pressure at each of the data logger locations.

**Water Master Planning for
City of Republic, Missouri**

Growth Area	Population and Demand Allocation			
	5- year Population	5-Year Demand (MGD)	20-year Population	20-year Demand (MGD)
1	919	0.15	4,231	1.77
2	552	0.09	2,539	0.46
3	736	0.12	3,385	0.62
4	552	0.09	2,539	0.46
5	919	0.15	4,231	0.77
5-year Subtotal	3,678	0.6	--	--
5-year Total	22,110	3.62	--	--
20-year Subtotal	--	--	16,925	4.08
20-year Total	--	--	35,358	7.11

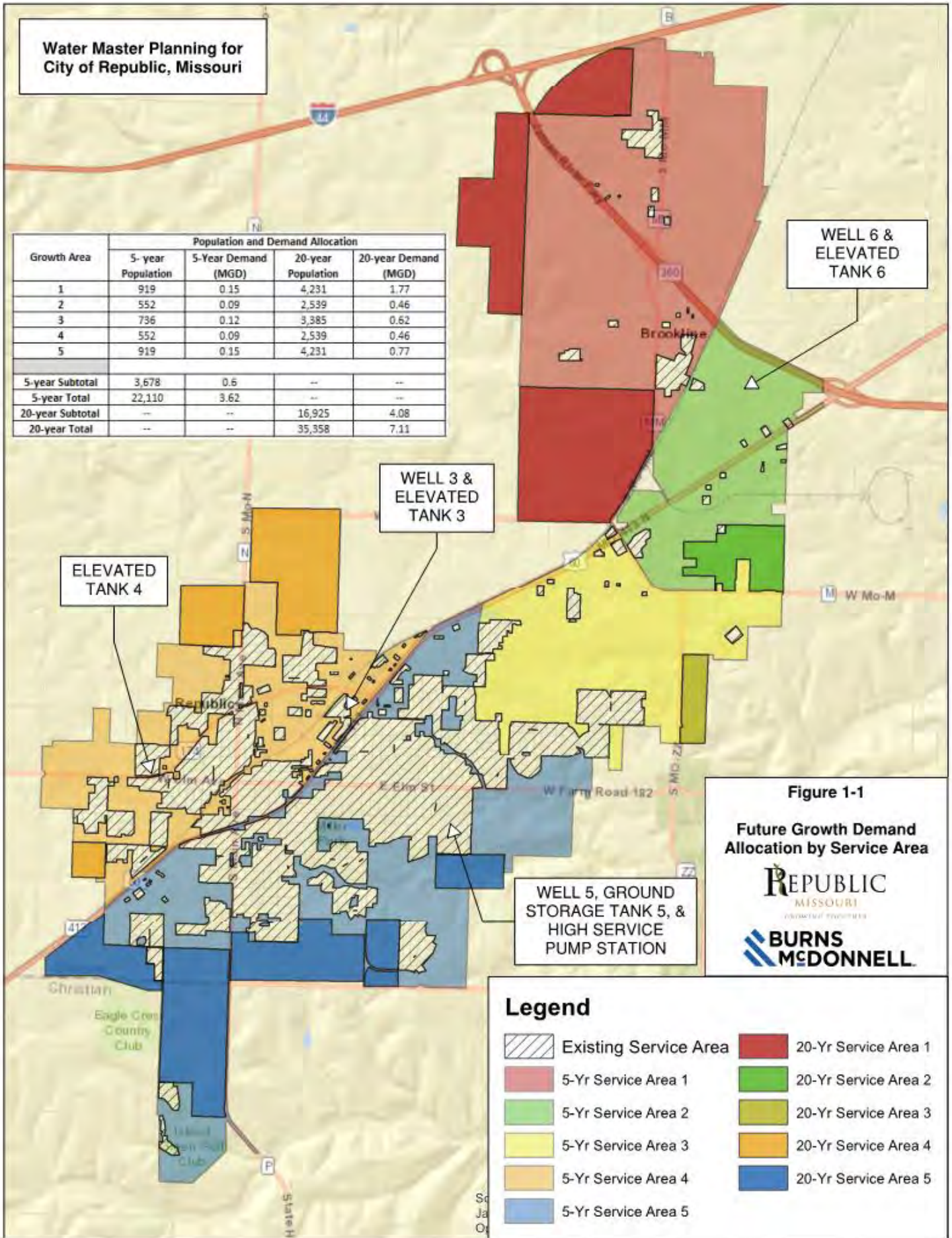


Figure 1-1

**Future Growth Demand
Allocation by Service Area**

REPUBLIC
MISSOURI
CITY OF

**BURNS
MCDONNELL**

Legend

- Existing Service Area
- 20-Yr Service Area 1
- 5-Yr Service Area 1
- 20-Yr Service Area 2
- 5-Yr Service Area 2
- 20-Yr Service Area 3
- 5-Yr Service Area 3
- 20-Yr Service Area 4
- 5-Yr Service Area 4
- 20-Yr Service Area 5
- 5-Yr Service Area 5

1.8 Hydraulic Model Development

The hydraulic analysis for the existing system is based on a maximum day demand of 3.02 MGD, a peak hour demand of 5.78 MGD, a minimum hour demand of 1.66 MGD, and a fire service under maximum day demands. The average pressure in the system under maximum day demands is approximately 68 psi, with approximately 83 percent of the system ranging between 50 psi and 80 psi. The model results identified no high velocity and/or high head loss water mains under these demand conditions. Frisco square experience pressure between 35 psi and 40 psi under peak hour demands and is attributed to the elevation in this area, which is the highest in the distribution system.

The model results indicate all wells and the pump station at the Well 5/ground storage tank facility are adequately sized to convey maximum day demands and fill elevated storage during low demand periods. The desktop, or quantitative, storage analysis indicates a storage surplus of approximately 0.93 MG; therefore, no storage improvements are recommended. Elevated storage is adequately located, with respect to water main capacity, to deliver peaking demands and maintain adequate pressure throughout the distribution system, which is greater than 40 psi, with exception to a couple of dead ends in the Frisco Square area.

The hydraulic model evaluates available fire flow under the maximum day demand condition. The City's fire flow requirement for sizing distribution system water mains is 1,500 gpm at a 20-psi residual. Most of the low fire flow areas, less than 1,500 gpm, are dead-end 4-inch and 6-inch diameter pipes with available fire flow between 800 gpm and 1,500 gpm that may not warrant a fire flow improvement, at least initially, if there are no active service connections. Remaining areas with low available fire flow are evaluated in the Year 2023 model simulation for the projected demand and include fire-flow driven improvements.

The average water age in the distribution system under average day and maximum day demands are 54 hours and 35 hours, respectively. The water age of the existing distribution system is considered good, or low, for this type of groundwater supply-distribution system, customer makeup, water demands, and water main sizing. Tank 6 operating levels exhibit minimal turnover. This is primarily due to the Well 6 pump controls that operate based on tank level and low water demands within the tank's area of influence. The pump cycling can be lengthened with modifications to the control system at Well 6 to promulgate more turnover within the tank; this will also lessen the mechanical taxing on the pump. SCADA historian tank level trending during field testing indicated between 3 and 4 well pump starts per day based on a turnover of approximately 3 ft in the tank bowl with a head range of 37.5 ft. Model results indicate a tank turnover between 7 ft and 9 ft can still provide adequate pressure service within its area of influence. From a water quality perspective, a general guideline is to turnover between 25 percent and 33 percent of the tanks volume daily.

1.9 Year 2023 System Analysis

The hydraulic analysis for the year 2023 planning period is based on a maximum day demand of 3.62 MGD, a peak hour demand of 6.90 MGD, a minimum hour demand of 1.99 MGD, and fire service under maximum day demands. The average pressure in the distribution system under maximum day demands is approximately 69 psi, with approximately 75 percent of the system ranging between 50 psi and 80 psi.

The storage analysis indicates a storage surplus of approximately 0.93 MG; therefore, no storage improvements are recommended.

Capital improvements for fire flow service total approximately 17 miles of water main and development driven improvements total approximately 42 miles of water main to support anticipated growth within the existing distribution system and peripheral growth that will expand the water service area. Development driven improvements that provide looping on the periphery of the existing distribution system also help meet the fire flow requirement, without them, available fire flow will decrease depending on the location and demand conditions and may not comply with the City's fire service requirement of 1,500 gpm at a 20-psi residual.

1.10 Year 2038 System Analysis

The hydraulic analysis for the year 2038 planning period is based on a maximum day demand of 7.11 MGD, a peak hour demand of 12.7 MGD, a minimum hour demand of 4.4 MGD, and fire service under maximum day demands. The average pressure in the distribution system under maximum day demands is approximately 67 psi, with approximately 77 percent of the system ranging between 50 psi and 80 psi.

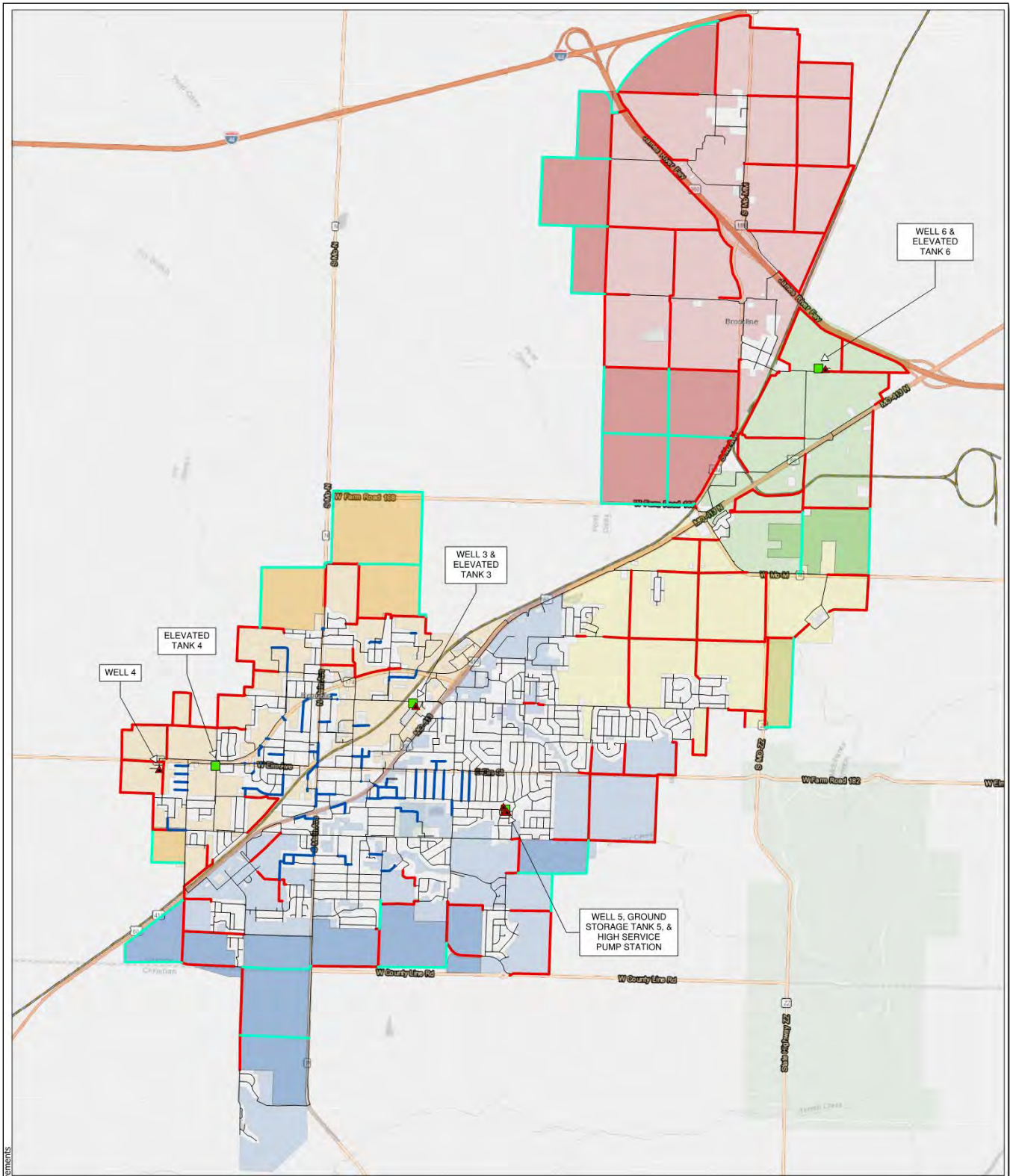
The storage analysis indicates a storage surplus of approximately 0.4 MG; therefore, no storage improvements are recommended.

The water main improvements for fire flow service identified in the year 2023 planning period are adequately sized for the 2038 planning period, therefore, no additional capital improvements are required for compliance with the City's fire flow requirement. There are approximately 17 miles of water main improvements needed for future development to expand the service area.

1.11 Capital Improvements Plan

Opinions of probable cost in today's dollars for capital improvements based on the water demands evaluated in the model are listed below. The small mains replacement cost opinion is a catch-all for any remaining water mains less than or equal to 4-inches not associated with a fire service trigger. Please note that cost opinions can increase for individual linear improvements, or portions thereof in terms of length, if rock excavation is required which can be highly variable based on the sporadic nature of karst formations within the water service area. The opinion of probable cost for each CIP is summarized below:

- Year 2023 Planning Period subtotal at \$31.9 million:
 - New water mains for fire service at \$1.0 million.
 - New water mains for fire service to replace existing small mains at \$4.8 million.
 - Development driven improvements at \$22.5 million; and
 - Development driven improvements that also increase distribution system redundancy/connectivity at \$3.5 million.
- Year 2038 Planning Period subtotal at \$9.7 million:
 - Development driven improvements at \$7.6 million; and
 - Water supply improvements at \$2.2 million.
 - This includes two production wells and associated pump, motor, well house, electrical, mechanical needs for well house, SCADA/controls, and permitting, engineering, and construction.
 - The first production well is contingent based on the demand projections and a new large user(s) requiring 1.0 MGD of water service beginning in or after year 2024.
 - The second production well should be implemented as maximum day demands approach 7.11 MGD and includes the large user(s) water demand indicated above.
- Small mains replacement at \$11.0 million.
- Total opinion of probable cost at \$52.5 million.



Name of Map: 11-1 Capital Improvements

- ▲ Pump
 - Tank
 - Existing Distribution System
 - 2023 Development Improvements
 - 2023 Fire Flow Improvements
 - 2038 Development Improvements
- | 5 Year Growth | | 5 to 20 Year Growth | |
|-----------------------|------------------------|-----------------------|------------------------|
| ■ 5-Yr Service Area 1 | ■ 20-Yr Service Area 1 | ■ 5-Yr Service Area 2 | ■ 20-Yr Service Area 2 |
| ■ 5-Yr Service Area 3 | ■ 20-Yr Service Area 3 | ■ 5-Yr Service Area 4 | ■ 20-Yr Service Area 4 |
| ■ 5-Yr Service Area 5 | ■ 20-Yr Service Area 5 | | |

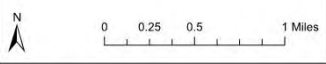


Figure 11-1
Capital Improvements
City of Republic, MO

1.12 Water Master Plan Conclusion

In conclusion, the existing water system is robust in terms of storage, distribution connectivity, and is appropriately sized for current and projected water demands through the end of the 2038 planning period; hence there are no high-priority hydraulic improvements required in the short-term other than the addition of a new well which is recommended to maintain a level of water supply redundancy. Additional water supply capacity is also conditional based on the addition of a new large user occurring in or after 2024, but the impetus for implementing the first new well should be triggered by water demand, not necessarily the improvement period which can accelerate or delay its implementation schedule. This places the City in a repair/replacement mode of operation for known problematic areas (i.e. aging infrastructure, frequent water main break areas, etc.), fire service improvements as funding is available, and development-driven improvements when needed.

Nonrevenue water, by definition in this report (difference between meter production and billed consumption) is moderately high for a system of this size and customer base which is primarily residential and commercial and any efforts to lower this amount can potentially impact the scheduling of water supply improvements and even impact fire flow improvement needs and sizing. Nonrevenue water varied widely since 2013, ranging from 13 percent to 23 percent during a period of marginal variance in average and maximum day demands. An AWWA M36 top-down water audit is recommended as a starting point to better manage, quantify, and identify nonrevenue water and potential sources of real losses and apparent losses.

Real losses are physical water losses (i.e. water main breaks, background leakage, flushing activity, etc.) in the distribution system that are pumped and treated, but never reach customer service taps, and are valued at the variable production cost (electricity and disinfectant). Apparent losses represent “paper losses” attributed to unauthorized consumption, meter inaccuracies, systematic data handling errors in the billing system transcription of customer meter readings, etc. and are valued at the customer retail unit cost. All distribution systems have varying degrees of real and apparent losses; with respect to Republic and the presence of karst in the region, real water losses have more potential to influence the overall water loss standing of the utility because water main breaks and/or leakage may never surface, hence it never gets reported or estimated because this type of topography is known for its sinkholes and caves. Water auditing with the M36 reporting sheets should be conducted annually and integrated as a business practice; the reporting worksheets are made available to all water industry providers at no cost from AWWA and can be downloaded from their website.

Wastewater Collections

2.1 Introduction

The City of Republic, Missouri (City) retained Burns & McDonnell (BMcD) to develop a sanitary sewer system model to complete an existing conditions evaluation and to create a Capital Improvement Plan (CIP) for the 5-year (2023) and 20-year (2038) planning periods. This report provides the City with a comprehensive document pertaining to an evaluation of the existing system and future conditions assessment. Specifically, this report summarizes the following components of the modeling project:

- Existing Conditions
- Inflow & Infiltration (I&I) Reduction Strategy
- Population Growth
- CIP Projects
- Opinion of Probable Costs

2.2 Existing Conditions Analysis

Evaluation of existing conditions included identifying projected sanitary sewer pipes and manholes with a reduced level of service during the 5-year, 24-hour design event. The evaluation was performed using the existing conditions model. Details related to model development can be found in the *Hydraulic Model Calibration & Verification* technical memorandum dated May 2019. The model showed flow constrictions at several locations throughout the model and indicated a restricted level of service in several conduits and manholes. Most of these restrictions were located in the FM- 109 meter catchment and along the Shuyler Creek interceptor.

2.3 I&I Reduction Strategy

To assist in alleviating the restricted levels of service in the existing system, a Goal-Based I&I Reduction strategy is proposed. A Goal-Based I&I Reduction strategy will be used to target specific percent reductions at defined points within the sanitary sewer system. This type of plan identifies the current level of I&I at a point in the system and defines a percent reduction along with a time frame for achievement. Goal-Based I&I Reduction is usually coupled with additional CIP projects to look at the sewer system as part of a comprehensive master plan to achieving a certain level of sanitary service. This type of I&I reduction program provides measurable goals, which are important if I&I reduction is considered in place of or as part of a future capital improvement program. These levels are typically defined utilizing hydraulic models, which identify the most efficient means of achieving the desired level of service. A Goal-Based I&I Reduction strategy will allow the City to utilize their capital budget on cost efficient I&I removal on the basins with the highest priorities.

2.4 Population Growth

In addition to an existing conditions analysis, a future conditions model was developed for use in determining CIP projects. A large portion of these projects are related to projected population growth in the City. The City provided BMcD with growth areas for the 5-year and 20-year planning period, which were allocated throughout the model. The updated population projections, along with increased sanitary flows, were used to identify proposed linear, lift station, and force main improvements as part of the overall Wastewater Master Plan.

2.5 Capital Improvement Plan

Proposed planning level sewer improvements were developed as part of the CIP. These improvements addressed manholes and conduits that indicated a reduced level of service during the existing conditions analysis. The proposed CIP Projects focused on the following measures:

- 2.5.1 I&I reduction
- 2.5.2 Increased pipe diameters
- 2.5.3 Increased pipe slopes
- 2.5.4 Lift station improvements

The proposed improvements were organized into 20 projects for the CIP. These projects were then phased using both a 5-year (2023) and 20-year (2038) planning periods. A summary of the projects, phasing, and opinion of probable cost can be found in, and an overview of the projects can be found in Figure 0-1.

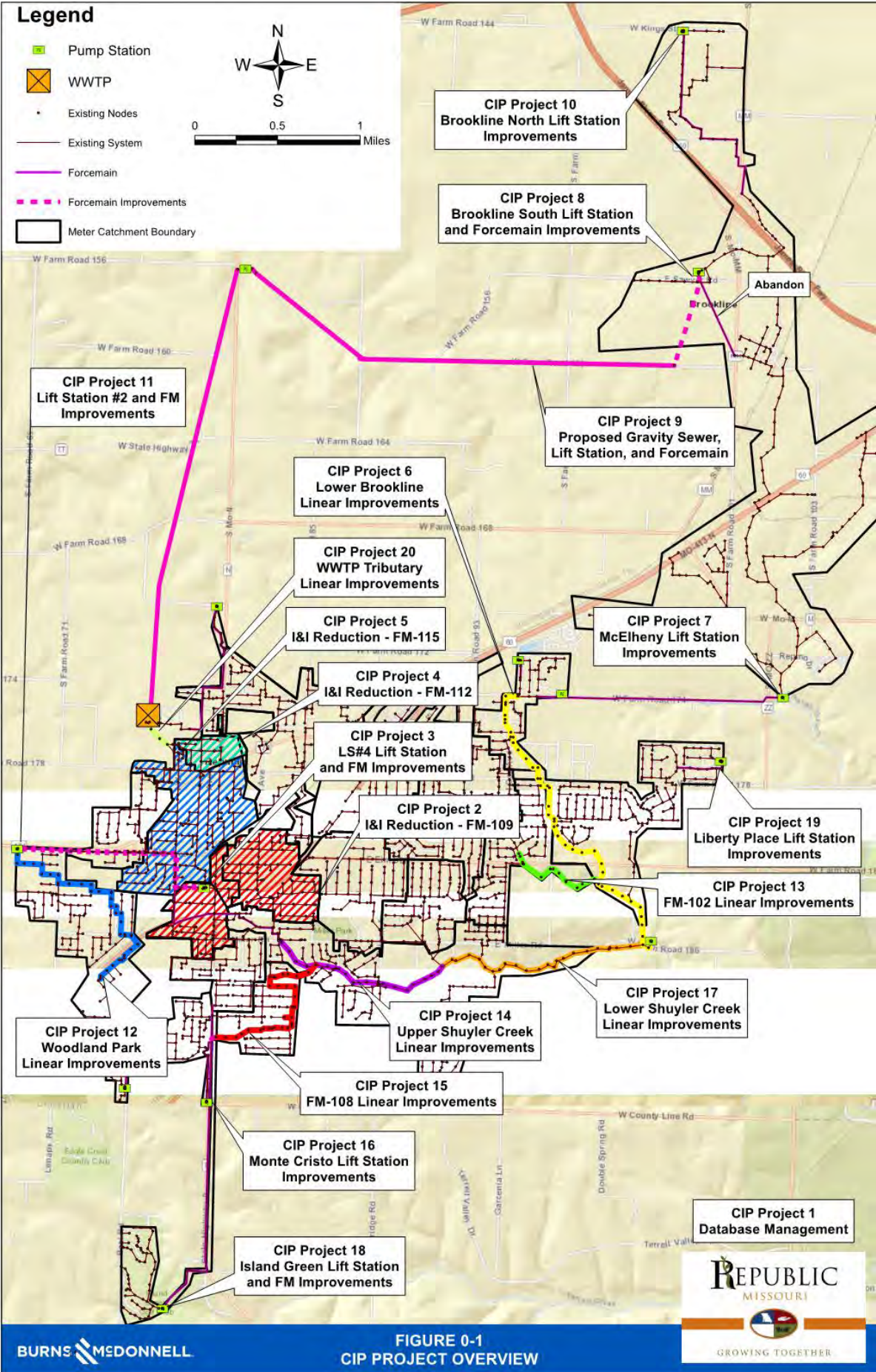


Table 0-1: CIP Project Summary

CIP Project	Description	Phasing Priority	Opinion of Probable Cost
1	Database Management	1	\$52,000
2	I&I Reduction - FM-109	1	\$1,323,000
3	LS#4 Lift Station and FM Improvements	1	\$1,190,500
4	I&I Reduction - FM-112	1	\$280,500
5	I&I Reduction - FM-115	1	\$1,440,500
6	Lower Brookline Linear Improvements	1	\$2,849,500
7	McElhany Lift Station Improvements	1	\$851,500
8	Brookline South Lift Station Improvements	1/2	\$1,100,000
9	Proposed Gravity Sewer, Lift Station, and Forcemain	2	\$9,317,500
10	Brookline North Lift Station Improvements	3	\$530,000
11	LS#2 Lift Station and FM Improvements	1/2	\$1,853,000
12	Woodland Park Linear Improvements	2	\$1,543,000
13	FM-102 Linear Improvements	2	\$812,500
14	Upper Shuyler Creek Linear Improvements	2	\$1,479,000
15	FM-108 Linear Improvements	2	\$1,523,500
16	Monte Cristo Lift Station Improvements	3	\$426,000
17	Lower Shuyler Creek Linear Improvements	2	\$1,965,000
18	Island Green Lift Station Improvements	3	\$402,000
19	Liberty Place Lift Station Improvements	3	\$237,000
20	WWTP Tributary Linear Improvements	3	\$824,000
Contingency	Contingency Projects	X	\$2,387,500
Total Opinion of Probable Cost (Including Contingency Projects)			\$32,387,500

Note: The costs presented above reflect cost estimates as of December 2019 and are not projected to predicted construction year.

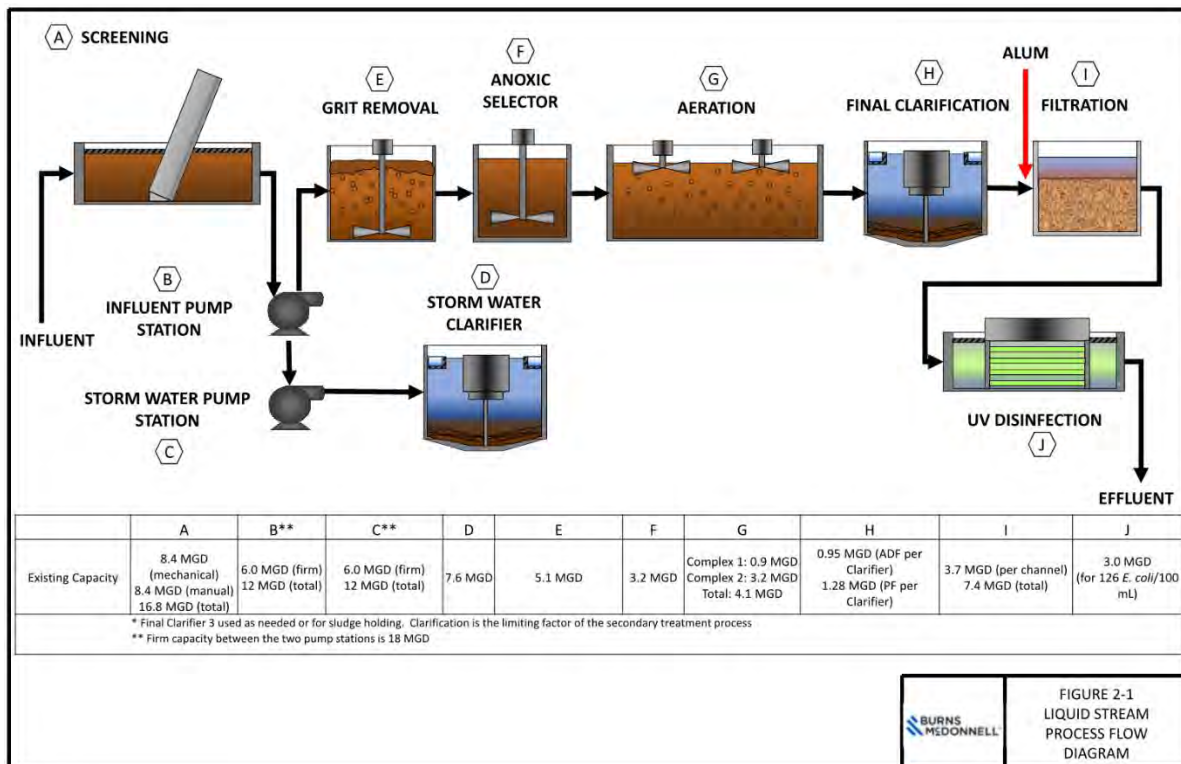
Wastewater Treatment Plant

3.1 Scope of Assessment

The City of Republic (the City) retained Burns & McDonnell (BMcD) to conduct an assessment of the existing wastewater treatment plant (WWTP) as part of the Wastewater Master Plan, setting forth evaluations and a plan of improvements for the facility through the planning year of 2038. Systems evaluated include influent screening, influent pumping, stormwater treatment, secondary treatment, clarification, chemical feed, tertiary filtration, disinfection, solids handling, and ancillary facilities. The existing WWTP was constructed in 1986 as an extended aeration activated sludge process and expanded in 2001. Currently, the WWTP is rated for an average day flow of 3.2 MGD and a peak flow of 5.1 MGD (at full expansion). Implementation of future processes or process modifications to accommodate National Pollution Discharge Elimination System (NPDES) permit changes, including biological nutrient removal (BNR), were also considered. The drivers for the improvements identified in this memorandum are based on anticipated regulations, growth projections, and capacity and performance-related issues.

3.2 Service Area Description

The Republic WWTP treats wastewater generated by residential, commercial, and some industrial customers. Growth projections through the 2038 planning period show the City’s service areas expanding both in terms of physical area and population density. The WWTP is currently able to treat up to 2.2 million gallons per day (MGD), but it will require additional capacity to accommodate the anticipated growth. Refer to the Existing and Future Conditions Assessment Memorandum for additional detail on the WWTP service area.



BURNS & McDONNELL
 FIGURE 2-1
 LIQUID STREAM
 PROCESS FLOW
 DIAGRAM

3.3 Capital Improvements

The drivers for the improvements identified for the WWTP are based on regulations (both existing and anticipated), growth potential, and performance-related issues of supporting processes. The WWTP has historically been in compliance with effluent ammonia limits. However, improvements to increase treatment capacity, provide sufficient aeration, and reduce sludge age are necessary to ensure future compliance. Further, regulations for biological nutrient removal are being planned for future implementation state-wide by MDNR; thus, provisions for future total nitrogen and total phosphorus removal should be considered. The City should contemplate improvements to position the Plant for commercial and industrial growth in the service area. Improvements should aim to easily accommodate potential suitors by offering flexibility in loading scenarios.

Supporting processes, including the headworks, tertiary filtration, disinfection, and solids handling system, necessitate improvements to better control the liquid stream process and operations. A well-operating headworks protects downstream mechanical equipment, such as pumps and mixers, and a well-operating solids handling system with sufficient capacity is critical for nitrification and maintaining biological stability in the secondary process. Further, the hydraulic bottleneck created by the filters and UV disinfection needs to be alleviated to realize 4.1 MGD treatment capacity.

3.3.1 Headworks

The existing WWTP has experienced performance-related issues in downstream processes due to inadequate influent screening, which threatens pipe clogging, wearing pumps, and binding mixers. A grinder is currently installed upstream of the influent screen to reduce the size of larger influent solids. However, the grinder is performing poorly and is producing stringy material rather than more homogeneously ground material. Also, the screening area floods during peak wet weather events due to the insufficient hydraulic capacity of the existing screen.

Installation of new influent screening and grit removal is recommended. Interceptor capacity to convey flow to the WWTP is approximately 16 MGD. The WWTP, with the improvements recommended by BMcD, has a capacity to treat a peak flow of 8.2 MGD through the secondary treatment process. Flow in excess of this would be conveyed to the stormwater treatment system. Direct discharges from the stormwater clarifier are no longer permitted and must be reported. MDNR has accommodated blending at other municipalities as an alternative for wet weather management. Peak flows in a blending scenario typically pass through primary treatment prior to being blended with fully treated effluent. Construction of a wet weather transfer pump station is recommended to pump peak flows from the stormwater clarifier to filtration for particulate BOD and TSS removal prior to discharge. Blending would eliminate future discharges from the stormwater system.

3.3.2 Secondary Treatment

The performance of the liquid stream process is threatened by insufficient solids handling capacity. Elevated MLSS concentrations yield SRTs that threaten the biological health in the aeration basins. The historic operational SRT of the aeration process (approximately 25 days) has been in the range where endogenous respiration occurs. During endogenous respiration, the microorganisms oxidize their own cellular mass in lieu of an organic source and release ammonia in the process. Further, elevated solids concentrations in the secondary process impacts the capacity of the system and hinders its ability to react during periods of higher loading. Thus, operating at a long SRT and high MLSS concentration threatens permit compliance without improvements to the solids handling and liquid stream processes.

A two-phase approach is recommended to improve the liquid stream process: (1) expansion of the selector basin, rehabilitation of Aeration Complex No. 2, and construction of a fourth clarifier (2) rehabilitation of Aeration Complex No. 1. The phased approach allows the City to gradually implement changes and add additional capacity when needed. Improvements made in each phase serve to incrementally improve treatment performance and capacity and preclude the need to construct a new treatment plant.

3.3.3 Tertiary Treatment (Filtration)

The existing traveling bridge sand filters are inefficient and lack the performance of cloth media filtration. Replacement of the traveling bridge sand filters with disc filters is recommended to maintain TSS and total phosphorus removal.

The existing traveling bridge filters are hydraulically located such that the disc filters could be installed within the existing filter channels. Two disc-filters, each rated for 8 MGD, would be installed in the filter channels and would receive clarifier effluent and stormwater flow from the proposed transfer pump station. One disc-filter would be used during normal operation, and both would be operated during peak conditions.

3.3.4 Disinfection

The existing UV disinfection system was installed in 2000 and has exceeded its useful design life. Further, the process creates a hydraulic bottleneck during wet weather events, as it was designed for a peak flow of 3.7 MGD. The original system was designed to achieve an effluent *fecal coliform* limit of 400 CFU/100 mL at 3.7 MGD, but the process has since been de-rated twice due to the more stringent *E. coli* limits in the facility's NPDES permit (126 colonies/100 mL). Operations staff indicated the maximum flow the UV equipment can treat is 3.0 MGD.

The UV system should be sized to accommodate flows equal to the influent pumping capacity – 16 MGD. The UV system would disinfect the 4.1 MGD treated by the plant and the 12 MGD peak wet weather flow pumped via the proposed transfer pump station. In order to reduce capital cost and make use of existing infrastructure, the new

equipment could be installed in the center channels of the abandoned chlorine contact basin.

Inclined UV systems are relatively new to the market and were created to alleviate issues with the large footprints associated with horizontal and vertical configurations for systems exceeding 5 MGD. They were designed to fit within the channels of chlorine contact basins, as numerous utilities replaced their chlorine disinfection systems with UV technologies. The inclined configuration improves on the potency of UV lamps without sacrificing efficiency or lamp size. The inclined configuration eliminates dead space within the channel and provides constant contact between the wastewater and UV light, which reduces the overall number of components (lamps, ballasts, cabinets, etc.).

3.3.5 Solids Handling

Sludge hauling frequency is dictated by land availability. When land application is not a viable option, the City occasionally hauls sludge to the City of Springfield's WWTP for further processing and disposal. Digestion capacity is insufficient, which often causes operations staff to store solids in the liquid stream process, yielding a long sludge age and threatening settleability and nitrification ability. Burns & McDonnell recommends constructing an additional aerobic digester and adding solids dewatering to produce a cake prior to land application.

The sludge quantities developed for this evaluation were based on influent BOD, TSS and temperature data provided by operations staff. The design wasting rate to maintain an eight to ten-day SRT in the secondary treatment process is 140,000 gpd at 0.5% to 1.0% solids, which equates to approximately 10,000 lbs./day. This solids loading will be used as the design basis for the solids processing system.

3.3.6 Administrative Building

The existing Administration Building (Admin Building) lacks adequate space for the operations staff, so the City has added a trailer behind the building to supplement the administrative space. Further, the shop within the Admin Building is too small to allow operations staff to work on most equipment. The City indicated they have plans to construct a new shop within the next year; however, additional office space is still needed. A new multi-purpose building is proposed to supplement the existing administrative space. The proposed addition would be a metal building that includes both administration and dewatering spaces.

The dewatering space will include a room to house the screw press or centrifuge and associated chemical feed equipment. The room would have an adjacent exterior area with overhead cover for cake storage and loadout. The building would also include an electrical room with CMU walls. The administration area would include an office, control room, and breakroom. It will also have new restroom, locker, shower and laundry facilities, and storage spaces.

3.3.7 Probable Cost

Based on these improvements, BMcD developed opinions of probable construction costs. The cost opinions show the capital required for each project and the opportunity for phasing. Cost opinions are based on preliminary manufacturer data and raw water quality. These order-of-magnitude cost opinions are based primarily on our experience and judgment as a professional consultant combined with information from past experience, vendors, and published sources. Since BMcD has no control over weather, cost, availability of labor, availability of material and equipment, labor productivity, construction contractor's procedures and methods, unavoidable delays, construction contractor's methods of determining prices, economic conditions, government regulations and laws (including the interpretation thereof), competitive bidding or market conditions, and other factors affecting such opinions or projections, BMcD does not guarantee the actual rates, costs, etc. will not vary from the opinions and projections developed herein.

Table 5-11: WWTP Opinions of Probable Cost

Project	Capital Cost
Headworks	\$3,900,000
Secondary Treatment: Phase I	\$5,800,000
Secondary Treatment: Phase II	\$1,500,000
Filtration	\$2,500,000
Disinfection	\$2,000,000
Solids Handling	\$4,000,000
Total	\$19,700,000

A 30-percent contingency allowance is included to cover all types of unaccounted-for project costs resulting from conditions, details, or components which are not normally known or determined until final detailed design. Costs specifically do not include geotechnical evaluations, deep foundations, surveys, permitting preparation and fees, utility services to site, and taxes.

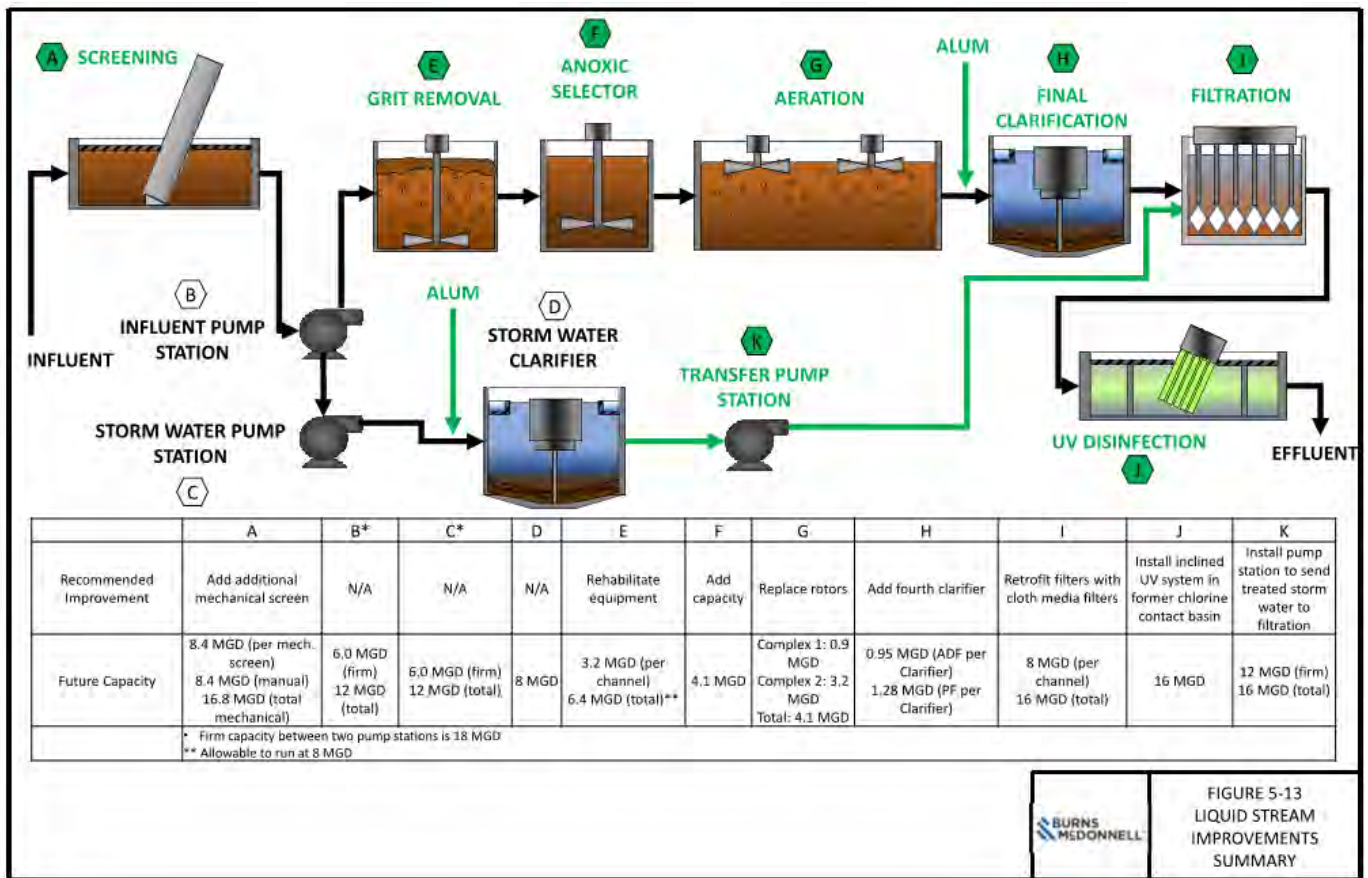


FIGURE 5-13
LIQUID STREAM
IMPROVEMENTS
SUMMARY



EXHIBIT E

Project/Issue Name: **SUBD-PRE 20-002.** Possible Vote to Recommend the Approval of an Application for a Preliminary Plat for Olde Savannah, a Residential Subdivision Consisting of Approximately Twenty-Four Point Four Eight (24.48) Acres Located at the 6300 Block of South Farm Road 89

Submitted By: Steven McElhaney, Olde Savannah LLC

Presented By: Community Development Department

Date: May 11, 2020

ISSUE IDENTIFICATION

Steven McElhaney and Olde Savannah LLC have requested review and approval of a Preliminary Plat of approximately (24.48) acres, Olde Savannah, consisting of (81) residential lots, zoned High Density Single- Family Residential (R1-H), streets, and infrastructure.

Conformity with Preliminary Plat Review Criteria: Preliminary Plats are reviewed for their conformance with the following review criteria to ensure the development, in the proposed location:

- (1) Will not endanger the public health or safety;
- (2) Will not injure the value of adjoining property or abutting property;
- (3) Will be in conformity with the Comprehensive Plan, Transportation Plan, Zoning Code, Water System Master Plan, Wastewater System Facility Plan, or other plans officially adopted by the City Council; and
- (4) Will be in harmony with the area in which it is located

Preliminary Plats are reviewed by the City Planner and the City Engineer in conformance with the requirements of Chapter 410 of Republic’s Municipal Code, the Comprehensive Plan, and all applicable City adopted codes and regulations.

DISCUSSION AND ANALYSIS

The property subject to this Preliminary Plat Application is comprised of approximately (24.48) acres of land located at the 6300 Block of South Farm Road 89. The property is zoned High Density Single-Family Residential (R1-H), the property contains no structures and is used for agricultural purposes only.

The following paragraphs contain brief analyses of the application’s conformity with the Preliminary Plat Review Criteria identified above.



EXHIBIT E

Consistency with the Comprehensive Plan

The referenced Preliminary Plat contains (81) High Density Single-Family Residential (R1-H) lots with a minimum lot size of (7,000) and consists of streets, open space, and detention area. The Preliminary Plat of Olde Savannah contains lots with an average size of (8,890) square feet.

Transportation Plan

The Preliminary Plat proposes (1) new Local Street connection to South Farm Road 89, connection to New Madrid Street in The Lakes at Shuyler Ridge Subdivision, and (4) new connections to undeveloped properties to the north and south. The new public streets, internal to the subdivision, will include approximately (4,917) feet of street and sidewalk, which will be dedicated to the City during the Final Platting Process; deficient Right-of-Way (ROW) along South Farm Road 89 will be dedicated to the City during the Final Platting Process.

A Traffic Impact Study (TIS) was completed by the Applicant and reviewed by the City during Rezoning; the report indicated no major improvements were needed to the City's existing transportation system to accommodate the increase in traffic generated by the proposed development.

Water and Wastewater Master Plan

The referenced parcel is not currently connected to municipal utilities, development of the property will require connection to the City's water and sanitary sewer systems. The development will be served through a looped water main system with connections to an eight (8) inch water main located at the termination of New Madrid Street in The Lakes at Shuyler Ridge Subdivision and to a ten (10) inch water main located near the intersection of Hickory Street and South Farm Road 89. The development will connect to an existing eighteen (18) inch sewer main located on East New Madrid Street. The sanitary sewer system flows to the Shuyler Creek Lift Station before travelling through a force main to the Wastewater Treatment Facility. The water and sewer system currently have the capacity to serve the potential development.

Zoning Code

The Preliminary Plat of Olde Savannah has been platted for the construction of (81) single-family residential lots and associated infrastructure, including public streets and sidewalks, public water and sanitary sewer mains, and stormwater detention.

Floodplain: The subject parcel **does not** contain a Special Flood Hazard Area (SFHA/Floodplain).

Sinkholes: The subject parcel **does not** contain any identified sinkholes.



EXHIBIT E

Stormwater: The Preliminary Plat contains a Stormwater Detention Area in the mid-eastern and northern portions of the property, designed to control the release of stormwater attributable from the development. The Plat contains a conceptual layout of the Detention Area; the area will be designed to mitigate existing conditions to reduce the amount of post-development flows to less than pre-development flows. The Stormwater Detention Area's outflow will flow onto adjacent property to the north; a Stormwater Report will be reviewed by the TRT during Infrastructure Design review. The Stormwater Detention Area and all open space/common area will be maintained by a Homeowner's Association.

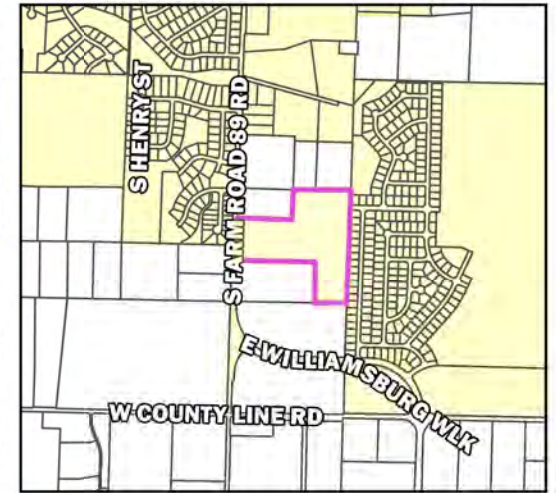
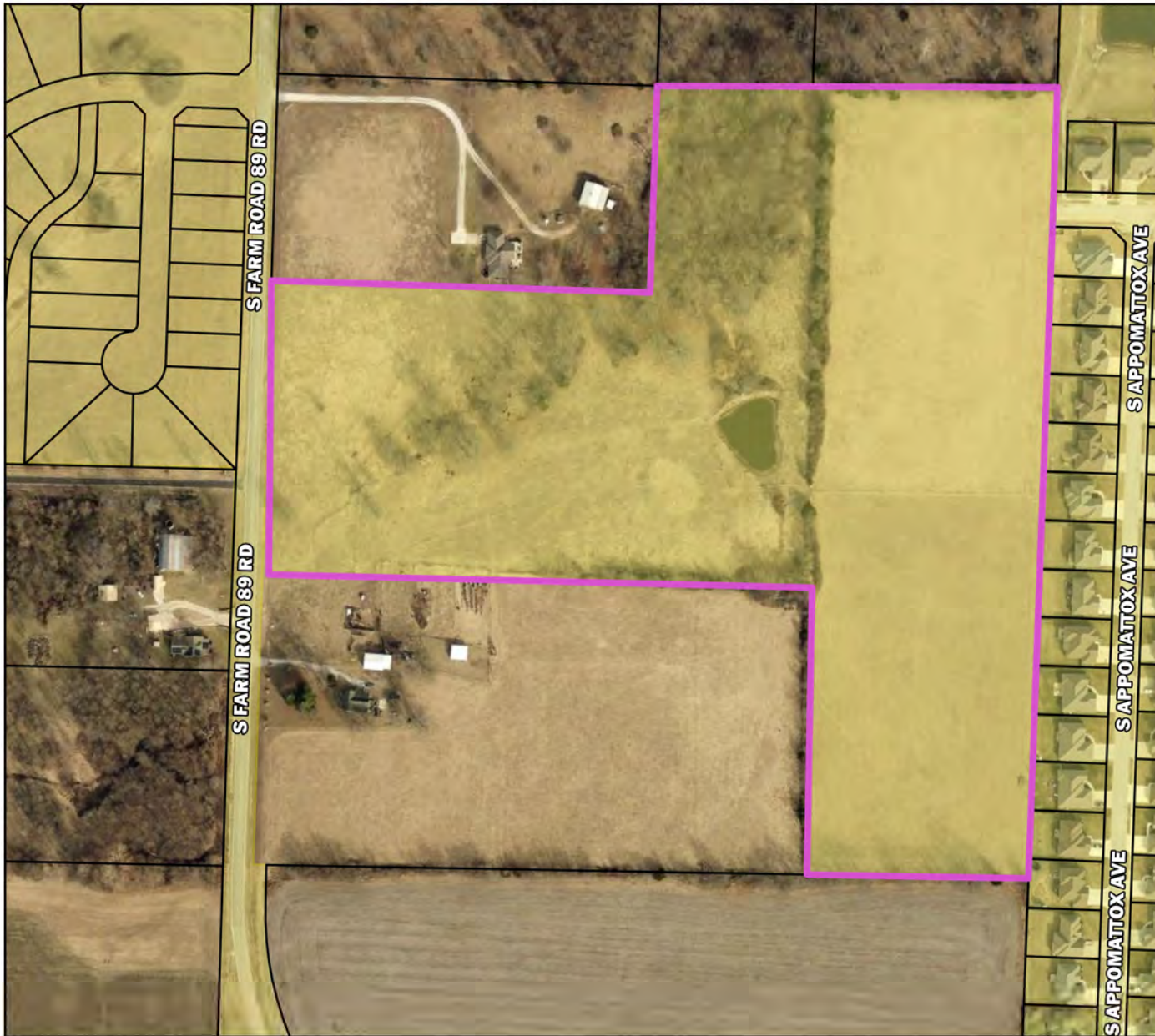
Infrastructure Design: The design of the streets, sidewalks, water and sanitary sewer systems, and stormwater detention will be reviewed and permitted during the Infrastructure Permitting Process.

STAFF RECOMMENDATION




Staff considers the **proposed Preliminary Plat in general conformity with the requirements for Preliminary Plats and is recommending approval of the application.**

SUBD-PRE 20-002: Olde Savannah

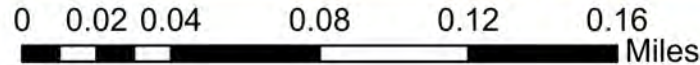
Vicinity Map

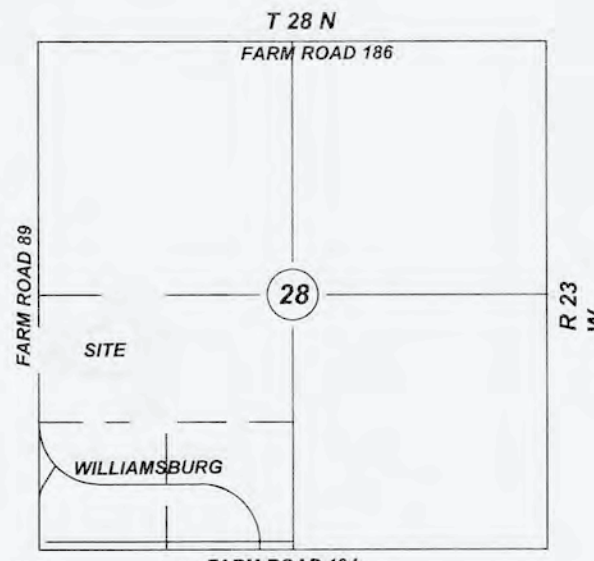


Legend

-  SUBD-PRE 20-002
-  Parcels
-  City Limits

Parcel Owner: Steven McElhany
Parcel Address: 6354 S Farm Rd 89
Area: 24.12 Acres
PIN: 881728300004
Zoning: Single Family High Density Residential





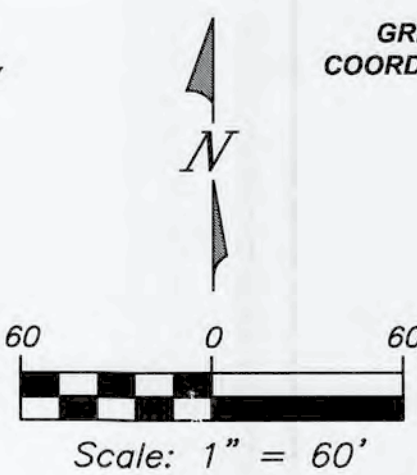
Curve #	Length	Radius	Delta	Chord Direction	Chord Length
C1	54.94	200.00	15.74	N78° 53' 58" W	54.77
C2	54.94	200.00	15.74	S78° 53' 58" E	54.77
C3	207.16	200.00	59.35	N63° 33' 22" E	198.03
C4	203.28	200.00	58.23	S62° 59' 58" W	194.64
C5	42.44	150.00	16.21	S11° 20' 06" W	42.29
C6	48.40	160.00	17.33	S10° 46' 26" W	48.21
C7	108.81	150.00	41.56	N65° 59' 19" W	106.44
C8	50.46	150.00	19.27	S83° 35' 36" W	50.22
C9	44.95	150.00	17.17	S82° 32' 25" W	44.78
C10	20.97	150.00	8.01	S2° 40' 42" E	20.95

PRELIMINARY PLAT
OLDE SAVANNAH
 PART OF THE NW 1/4 OF THE SW 1/4 OF
 SECTION 28, TOWNSHIP 28, RANGE 23
 GREENE COUNTY, MISSOURI

OWNER
 STEVEN GEORGE McELHANEY
 6204 S. FARM ROAD 89
 REPUBLIC MO 65738

DEVELOPER
 OLDE SAVANNAH LLC
 3800 S FREMONT AVE
 SPRINGFIELD MO 65804

**GRID NORTH MISSOURI STATE PLAN
 COORDINATE SYSTEM 1983: CENTRAL ZONE**
 STATION: GR-86
 N: 466387.5646
 E: 1365363.6960
 ELEV: 1204.40



PROPERTY DESCRIPTION

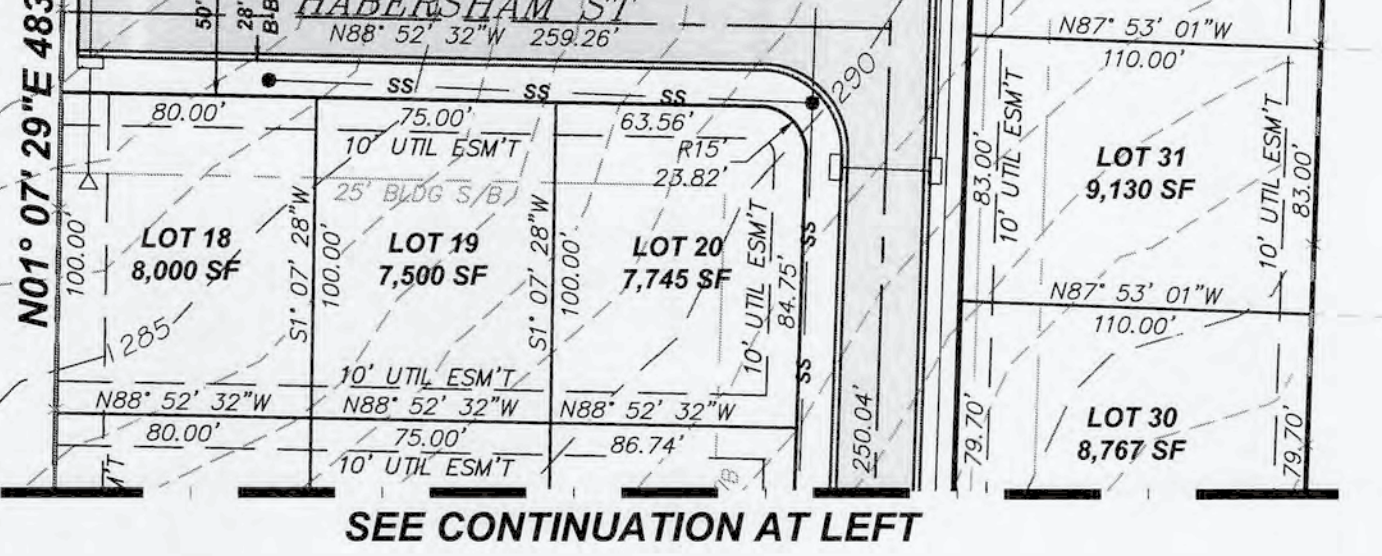
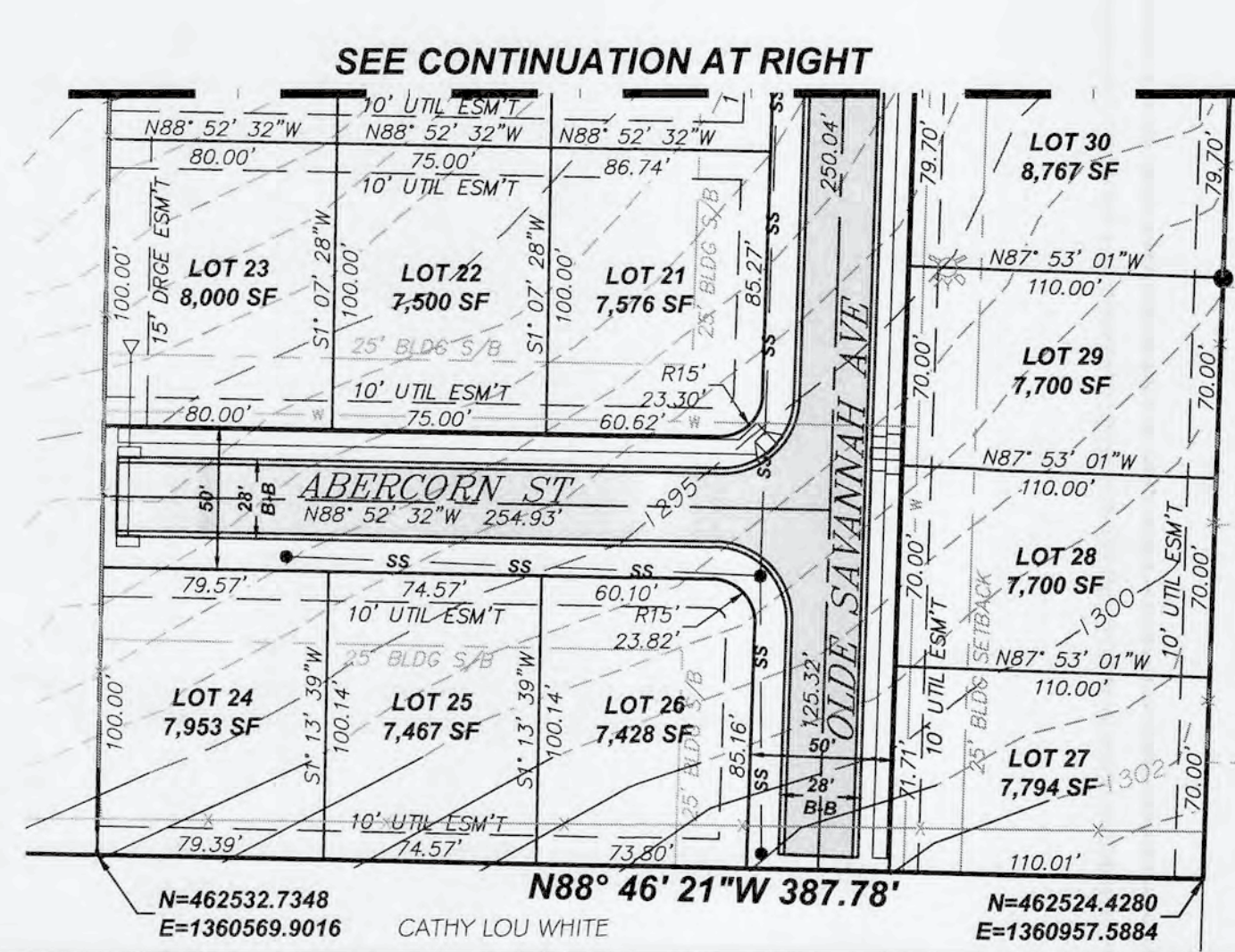
A TRACT OF LAND BEING A PART OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF SECTION 28, TOWNSHIP 28 NORTH, RANGE 23 WEST, GREENE COUNTY, MISSOURI, BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF SAID SOUTHWEST QUARTER; THENCE NORTH 02°06'33" EAST, ALONG THE WEST LINE OF SAID SOUTHWEST QUARTER, A DISTANCE OF 1328.67 FEET TO THE SOUTHWEST CORNER OF SAID NORTHWEST QUARTER OF THE SOUTHWEST QUARTER; THENCE NORTH 02°06'26" EAST, ALONG THE WEST LINE OF SAID NORTHWEST QUARTER OF THE SOUTHWEST QUARTER, A DISTANCE OF 516.27 FEET TO THE POINT OF BEGINNING; THENCE NORTH 02°06'26" EAST, CONTINUING ALONG SAID WEST LINE, A DISTANCE OF 487.44 FEET; THENCE SOUTH 88°40'24" EAST, LEAVING SAID WEST LINE, A DISTANCE OF 650.00 FEET; THENCE NORTH 02°06'26" EAST, A DISTANCE OF 345.00 FEET TO THE NORTH LINE OF SAID NORTHWEST QUARTER OF THE SOUTHWEST QUARTER; THENCE SOUTH 88°40'24" EAST, ALONG SAID NORTH LINE, A DISTANCE OF 680.95 FEET TO THE NORTHEAST CORNER OF SAID NORTHWEST QUARTER OF THE SOUTHWEST QUARTER; THENCE SOUTH 02°06'59" WEST, ALONG THE EAST LINE OF SAID NORTHWEST QUARTER OF THE SOUTHWEST QUARTER, ALSO BEING THE WEST LINE OF THE LAKES AT SHUYLER RIDGE, A SUBDIVISION RECORDED IN PLAT BOOK ZZ AT PAGE 279 GREENE COUNTY RECORDER'S OFFICE, A DISTANCE OF 1328.42 FEET TO THE SOUTHEAST CORNER OF SAID NORTHWEST QUARTER OF THE SOUTHWEST QUARTER; THENCE NORTH 88°46'21" WEST, ALONG THE SOUTH LINE OF SAID NORTHWEST QUARTER OF THE SOUTHWEST QUARTER, A DISTANCE OF 387.78 FEET; THENCE NORTH 01°07'29" EAST, LEAVING SAID SOUTH LINE, A DISTANCE OF 483.19 FEET; THENCE NORTH 86°46'11" WEST, A DISTANCE OF 944.79 FEET TO THE POINT OF BEGINNING, EXCEPTING ANY PART THEREOF TAKEN, DEEDED OR USED FOR ROAD PURPOSES.

SUBJECT TO ALL EASEMENTS AND RESTRICTIONS OF RECORD. EX. R/W LINE PROP. R/W LINE CONTAINING 1,066,470 SQ FT OR 24.48 ACRES EXCLUDING RIGHT OF WAY.

LEGEND

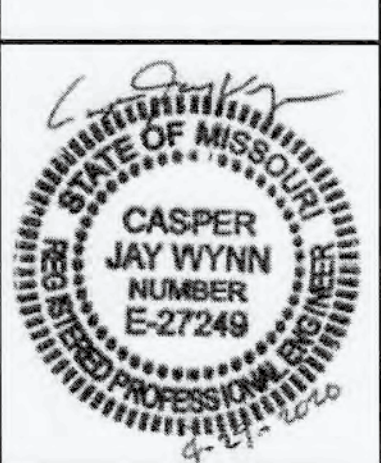
- IRON PIN SET CAPPED "LC 2007008003"
- EXISTING IRON PIN
- △ EXISTING RIGHT-OF-WAY MARKER MEASURED
- PLATTED DEEDED
- WATER LINE
- GAS LINE
- SANITARY SEWER
- OHE OVERHEAD ELECTRIC LINE
- UGE UNDERGROUND ELECTRIC LINE
- COMM UNDERGROUND COMMUNICATION LINE
- FO FIBER-OPTIC CABLE
- CHAIN LINK FENCE
- WOOD PRIVACY FENCE
- BARBED WIRE FENCE
- ELECTRIC TRANSFORMER
- SANITARY SEWER MANHOLE
- STORM SEWER MANHOLE
- WATER MANHOLE
- TELEPHONE PEDESTAL
- FIRE HYDRANT
- WATER VALVE
- GAS VALVE
- GAS METER
- POWER POLE
- ELECTRIC METER
- GUY ANCHOR
- PULL BOX
- 2 PED WATER METER
- GAS METER
- AIR CONDITIONER
- SIGN
- LIGHT POLE
- POST
- MAIL BOX
- TREE DECIDUOUS
- TREE EVERGREEN



- GENERAL NOTES:**
- TOTAL AREA - 24.48 ACRES
 - TOTAL NUMBER OF LOTS - 81
 - 5' SIDEWALK TO BE LOCATED ON ONE SIDE OF STREET.
 - NO DIRECT ACCESS SHALL BE ALLOWED FROM ANY RESIDENTIAL LOTS TO FARM ROAD 89.
 - NO PORTION OF THIS SITE LIES WITHIN THE 100-YEAR FLOOD PLAIN, ACCORDING TO FEMA FLOOD INSURANCE MAP, PANEL NUMBER 290782 0120 B, EFFECTIVE DATE JUNE 15, 1983.
 - HORIZONTAL AND VERTICAL DATUM BASED ON THE MISSOURI GEOGRAPHIC REFERENCE SYSTEM MONUMENT "GR-87".
 - ALL STREETS SHALL BE 50' RIGHT-OF-WAY.
 - DETENTION BASINS SHALL BE MAINTAINED BY THE HOMEOWNERS ASSOCIATION.
 - ALL LOTS ADJACENT TO DETENTION BASINS SHALL HAVE A MINIMUM FINISH FLOOR AT LEAST 1' ABOVE THE TOP OF BERM ELEVATION FOR THE RESPECTIVE DETENTION BASINS.
 - ALL CURVED LOT LINES ARE CONCENTRIC WITH CENTERLINE OF ADJACENT STREETS.
 - AVERAGE LOT SIZE: 8,890 S.F.

- GENERAL NOTES:**
- THE SURVEY SHOWN HEREON WAS PERFORMED TO MEET OR EXCEED THE ACCURACY REQUIREMENTS FOR URBAN CLASS PROPERTY
 - THIS SURVEY IS IN COMPLIANCE WITH THE MISSOURI STANDARDS FOR PROPERTY BOUNDARY SURVEYS
 - SOURCE OF TITLE DEED BOOK 2779 PAGE 996, GREENE COUNTY RECORDER'S OFFICE

Prepared by:
CJW
 CJW Transportation Consultants, L.L.C.
 505 S. National
 Springfield, MO 65810
 Tel: 417.889.9400
 Fax: 417.889.9402
 www.CJW.com



**OLDE SAVANNAH
 PRELIMINARY PLAT
 REPUBLIC, MISSOURI**

Date:	
No.:	Description:
SURVEY BY	CJW
DATE	04/15/20
DWG	19122 PP
DESIGN	CJW
DRAWN	CJW
CHECKED	CJW
SCALE HOR.	1"=60'
SCALE VERT.	N/A

**PRELIMINARY
 PLAT**

SHEET NO.
01

CJW NO. 19122 OF 01

C:\Civil 3D\Projects\19122\19122 preliminary plat.dwg - LAST SAVED: 4/29/2020 2:04:55 PM - PLOTTED: 4/29/2020 2:15:05 PM