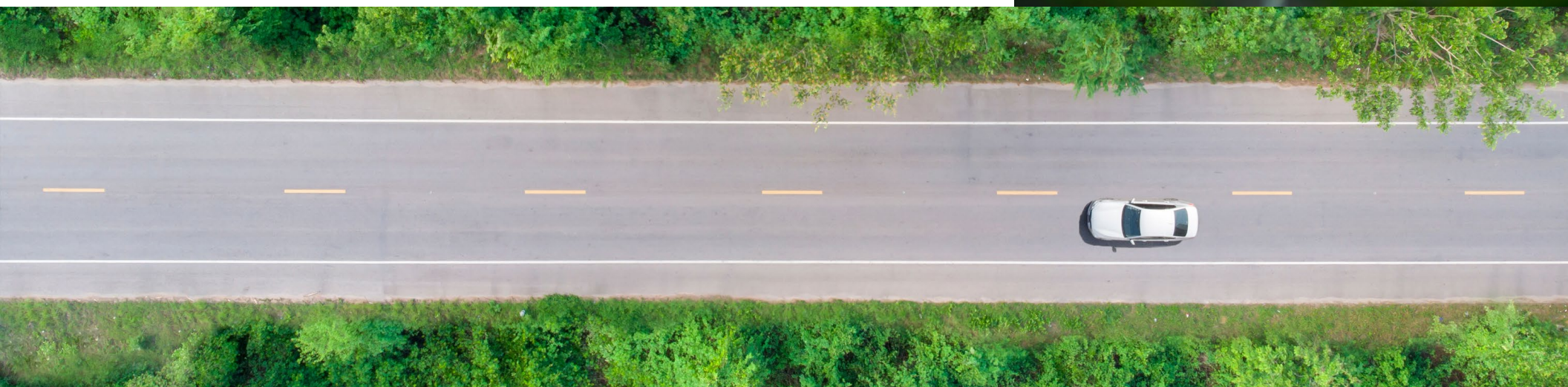
Wye Infrastructure Needs Assessment

November 2023



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Sṗeƛ̓m̓ (bitterroot)

Acknowledgement

Missoula County recognizes this planning effort takes place in the aboriginal territories of the Séliš (Salish) and Q̓lispe (Kalispell) people. We pay respect to their stewardship of the Wye area, where Snɬṗú(pƛ̓ḿ) (base of Evaro Hill), Ṅeslték^{w} (Lavalle & Butler Creeks), and Ṅmi̓šé (Grass Valley) converge, and their guidance for its care for generations to come.

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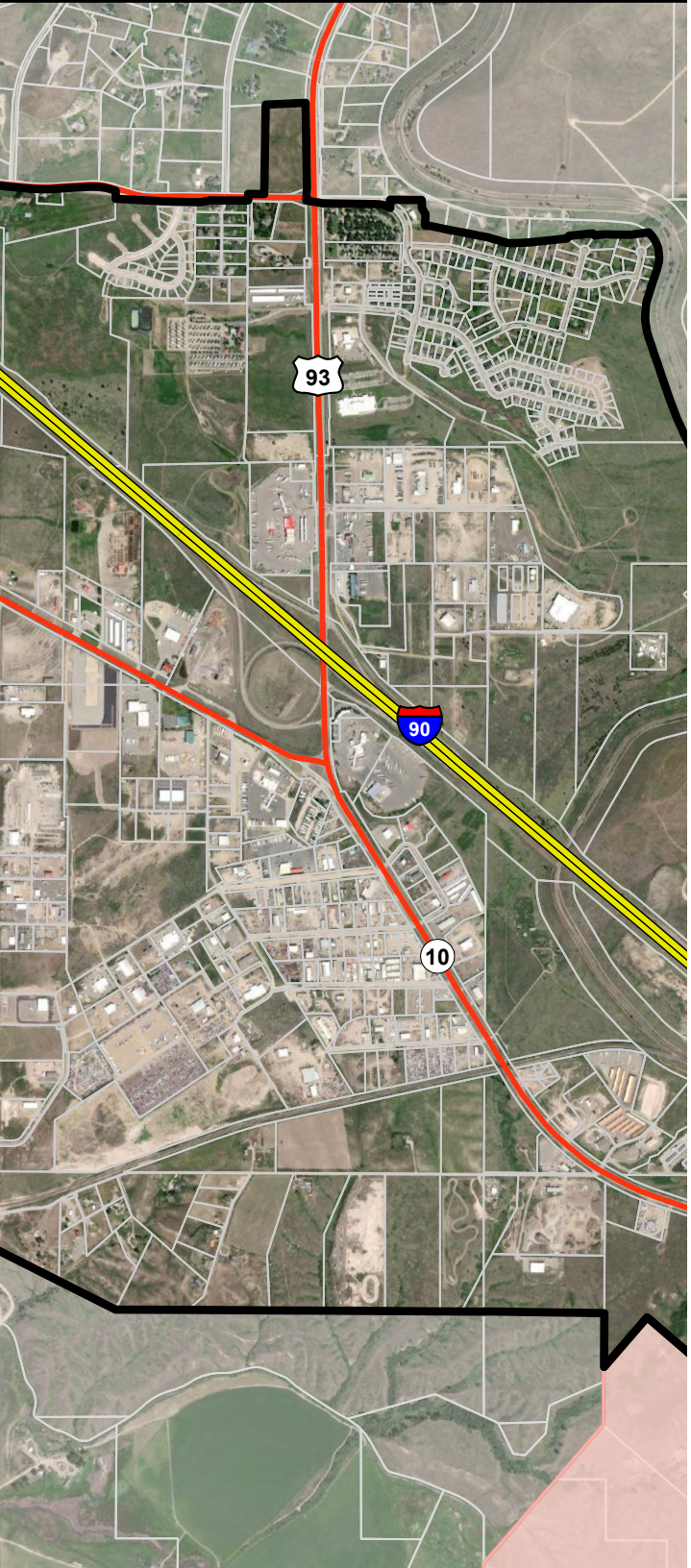


Introduction

In the heart of Missoula County, Montana, lies an emerging neighborhood known as the “Wye,” located approximately eight miles northwest of Downtown Missoula. This area, steeped in history as a vital component of the local industrial base, is experiencing a profound transformation. The Wye is now evolving into a crucial transportation hub, brimming with opportunities for significant industrial, residential, and commercial development.

Yet, as this neighborhood experiences this exciting transition, one significant challenge persists: inconsistent infrastructure that is crucial for accommodating future growth. A comprehensive street network, robust storm and groundwater management, a centralized water system, an expanded sewer service, and other critical elements are the foundation upon which equitable and thriving communities can be built.

The recent global pandemic underscored the importance of planned growth for equity and livability. At the Wye, unregulated growth could result in housing developments reliant on septic systems and wells, leading to sprawl that under-utilizes the land intended for growth and limits housing quantity and neighborhood equity.

To address these challenges, Missoula County embarked on a pivotal journey with the development of the Wye Infrastructure Plan. The aim of this comprehensive plan is to identify opportunities to develop, expand, or extend infrastructure throughout the area in an orderly, efficient, and cost-effective manner.

The first part of this plan, this Infrastructure Needs Assessment, delves into the infrastructure deficiencies at the Wye, providing an overview of the challenges and opportunities for improvement and laying the foundation for a comprehensive and transformative Wye Infrastructure Plan (WIP). Addressing these issues will pave the way for a more vibrant, equitable, and sustainable future for this emerging neighborhood, fulfilling the promise of a unified Missoula County.

Plan Area

The Wye Infrastructure Plan (WIP) Area, shown in Figure 1, can generally be described as straddling I-90 at the intersection of Highway 93, encompassing approximately 3,400 acres of parcel area. The WIP area can be characterized as a mix of commercial, industrial, and residential, with much of the land currently undeveloped or underdeveloped. Many of the internal roads were only constructed to rural industrial standards and much of the area has deficient access and lacks connectivity. In a majority of cases there are no sidewalks. Public water and sewer service is not available for a large percentage of the area. Available broadband service is substandard. Stormwater handling is de-centralized and substandard in many areas. Natural gas and electric service in the area is favorable for most types of development. The large diameter natural gas distribution line routed to the former Smurfit Stone mill site is noteworthy and could provide significant supply if needed for specific uses

The WIP area is composed of County land on the western fringe of the City of Missoula.

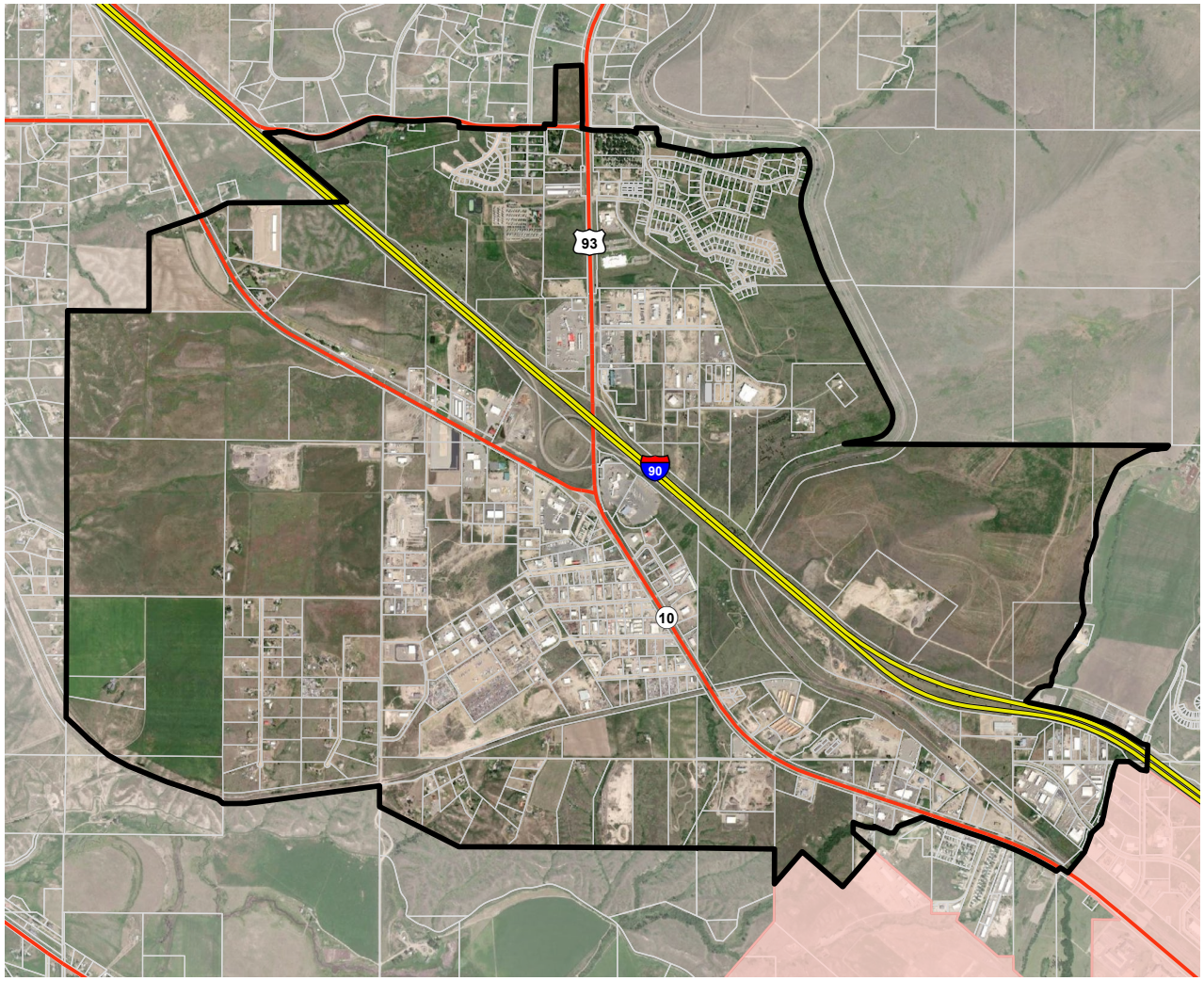


Figure 1. Plan Area

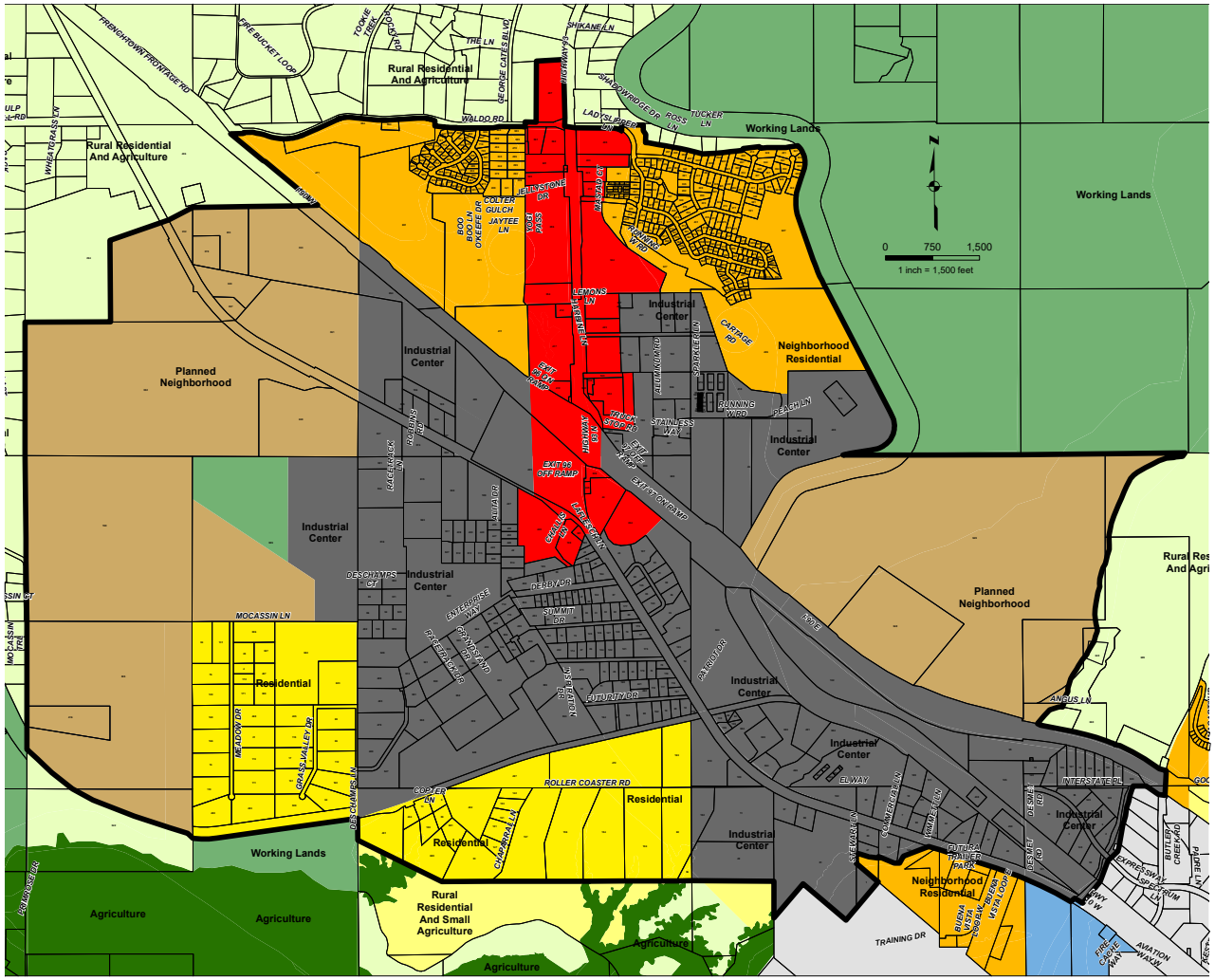


Figure 2. Plan Area Land Use

Source: 2019 Missoula Area Land Use Map

- WIP Boundary
- Agriculture
- Working Lands
- Rural Residential and Agriculture
- Rural Residential and Small Agriculture
- Residential
- Neighborhood Residential
- Planned Neighborhood
- Commercial Center
- Civic Employment Center
- Industrial Center
- City of Missoula

Opportunities

The Wye is identified for growth in Missoula County's Growth Policy and is also established as a critical place for development in the Community Development Strategy as adopted by the Federal Economic Development Agency. Of the 3,400 acres of parcel area within the study area (excluding rights-of-way) there are over 1,200 acres of undeveloped Planned Neighborhood and Neighborhood Residential areas; both of these land use designations call for minimum residential densities of eight units per acre with a likelihood that some development patterns in these areas could result in average densities of 12 units per acre. Development at these densities creates opportunities for 10,000 to 15,000 new homes.

Industrial parcel area within the study area totals approximately 1,150 acres, of which roughly 540 acres are undeveloped, and 250 acres are underdeveloped and likely to redevelop as infrastructure becomes available. Current industrial market trends suggest probable parcel development ratios where 30% of a parcel's area is comprised of building footprint and the remaining 70% of the lot is developed in parking, landscaping, and utility areas. Assuming that 25% of the 790 acres of undeveloped and underdeveloped industrial lands are set aside as rights-of-way or are otherwise undevelopable because of steep slopes, riparian areas, or other impediments, a total of 590 acres remain as developable. Applying a 30% building to lot development ratio results in the potential for 175 acres of new building footprint within the development area, or 7.7 million square feet of new industrial buildings. Market trends suggest an average of 1.5 industrial employees per

Introduction

1,000 square feet of building area, suggesting these 7.7 million square feet of industrial building would support as many as 11,500 jobs.

Development Status

All parcels within the Wye Infrastructure Plan Study area have been assessed as to development status. Designations of Developed, Undeveloped, or Underdeveloped have been applied to each parcel as depicted in Figure 3.

Developed parcels are generally built out to the density or intensity that would be expected for the given land use designation (for example: a single-family home exists on a single-family lot, or an existing industrial building covering 10% or more of an industrial parcel's area). Undeveloped parcels are generally not built upon or have very minor improvements compared to the density envisioned by the land use designation (for example: vacant land, or a 160-acre planned neighborhood parcel with a lone existing single-family home). Underdeveloped parcels are those that fall somewhere between developed and undeveloped lands and are likely to re-develop upon provision of adequate infrastructure (an industrial parcel with minor outbuildings or a small building that occupies less than 10% of the parcel area for instance).

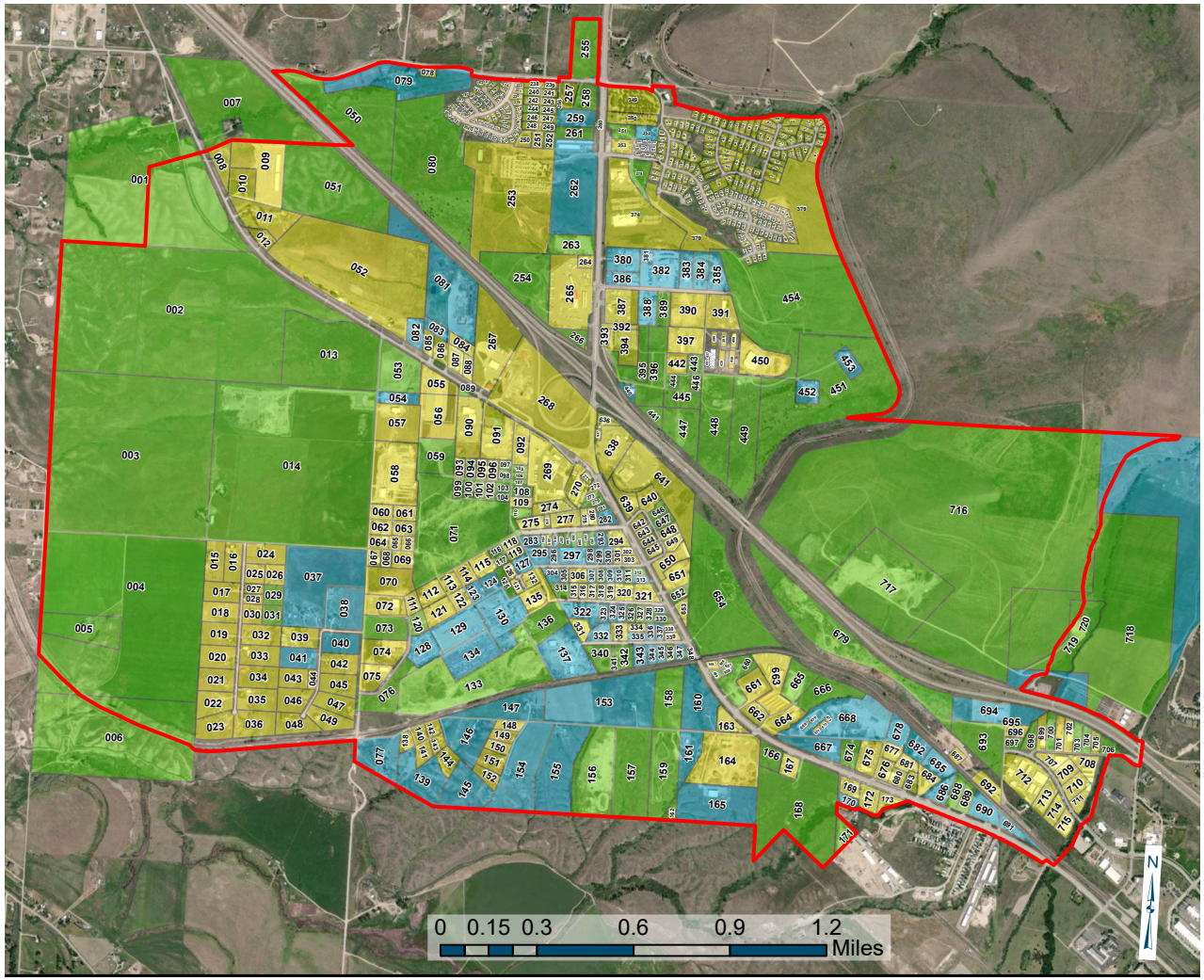
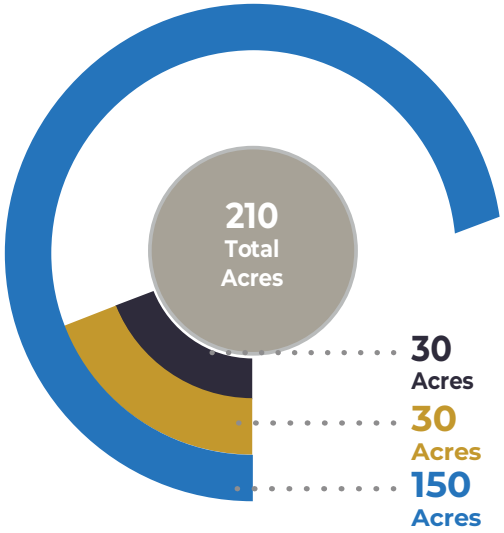
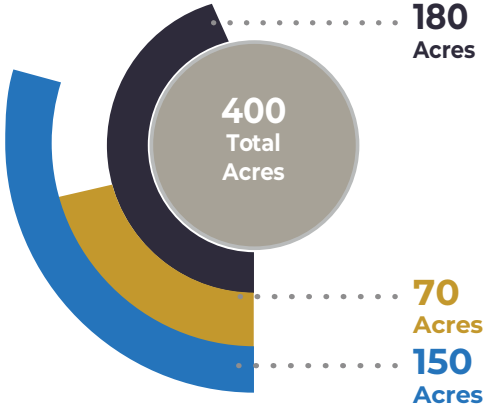


Figure 3. Parcel Development Status

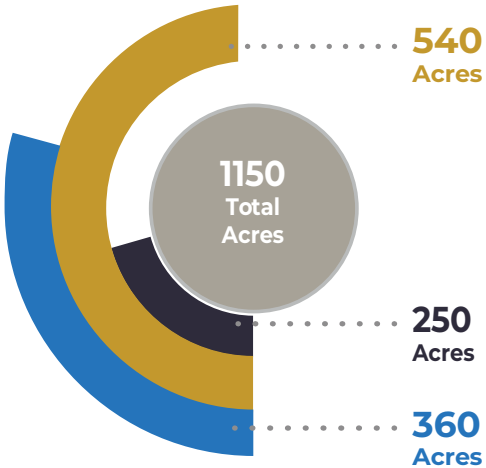
- WIP Boundary
- Developed
- Underdeveloped (future re-development potential)
- Undeveloped



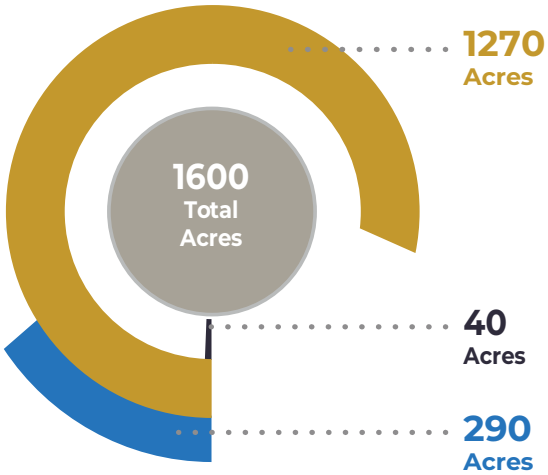
Commercial Center Parcels



Lower Density Residential Parcels

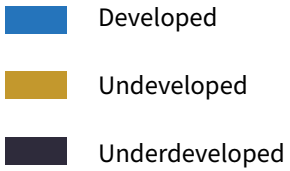


Industrial Parcels



Planned Neighborhoods/ Neighborhood Residential Parcels

Figure 4. Parcel Summaries Within the WIP area (rounded to the Nearest 10 Acres)



Introduction

Infrastructure Plan Objectives

1 Provide Infrastructure for the Wye to Achieve its Potential as an Industrial and Residential Hub for Missoula County

The Wye's infrastructure meets new and shifting demands from a growing and changing population.

2 Foster a Healthy, Safe and Inclusive Community

Quality-of-life infrastructure such as schools, parks, and community gathering spaces ensure the Wye is an equitable and healthy place and address transportation barriers.

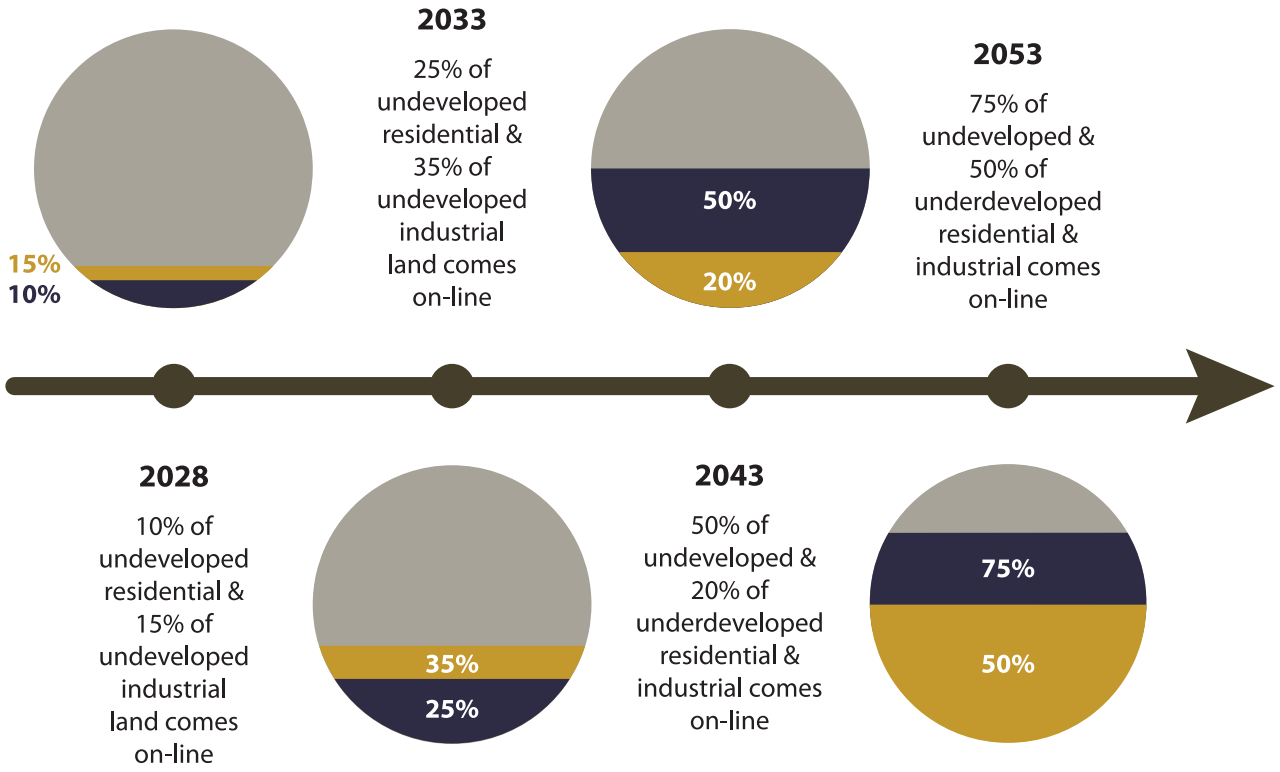


Figure 5. Development Timeline

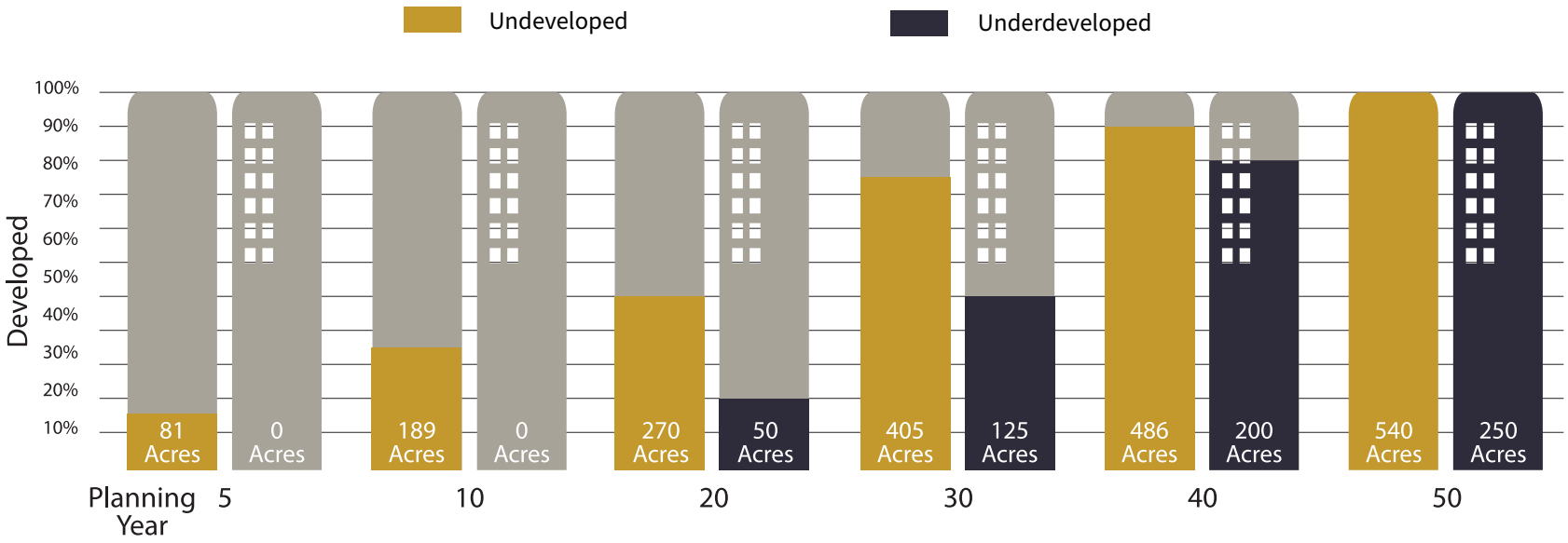


Figure 6. Industrial Development Acreage by Planning Year

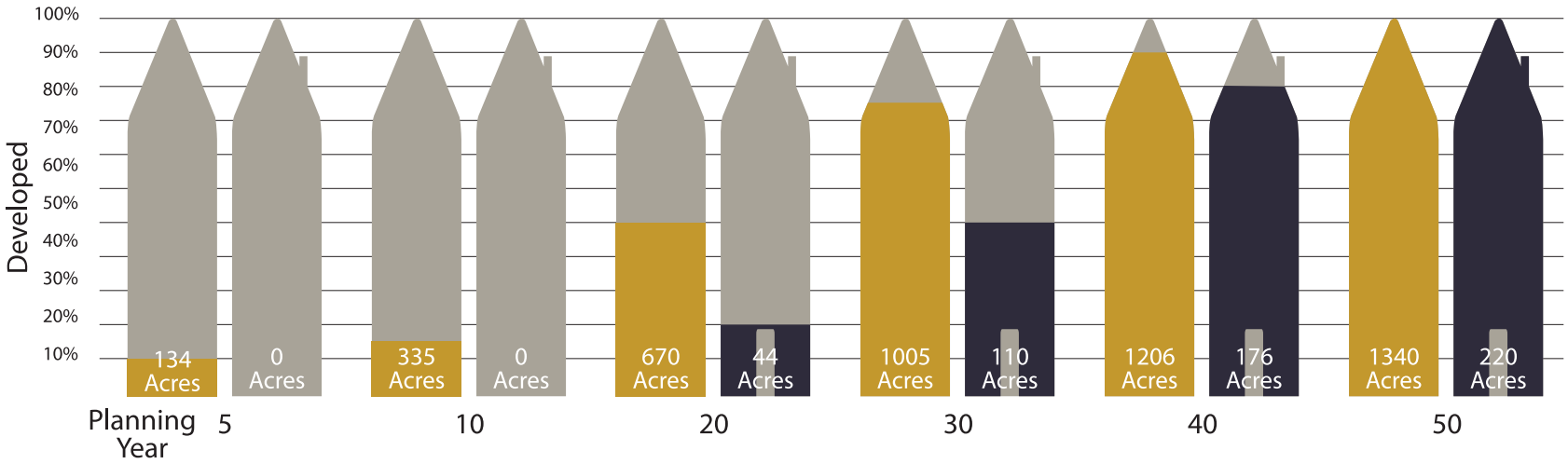


Figure 7. Planned Neighborhood and Neighborhood Residential Development Acreage by Planning Year

Relationships to Other Plans

Land Use Element

The Missoula County Growth Policy was amended in 2019 to include the Missoula Area Land Use Element. The plan emphasizes the **One Community** idea - that residents do not distinguish between Missoula County and the City of Missoula. Therefore, the WIP complements both City and County plans.

2019 Missoula Area Land Use Element

Adopted as an amendment to the 2016 Missoula County Growth Policy, The 2019 Missoula Area Land Use Element is a long-range planning tool, guiding growth over a 20-year horizon. It is a visual and written description of the desired future character of land use in the community, containing 15 land use designations which describe places with similar goals, characteristics, uses, and mobility considerations.

Within the WIP area, the primary desired future land use conditions include:

- Industrial
- Commercial
- Residential
- Planned Neighborhood

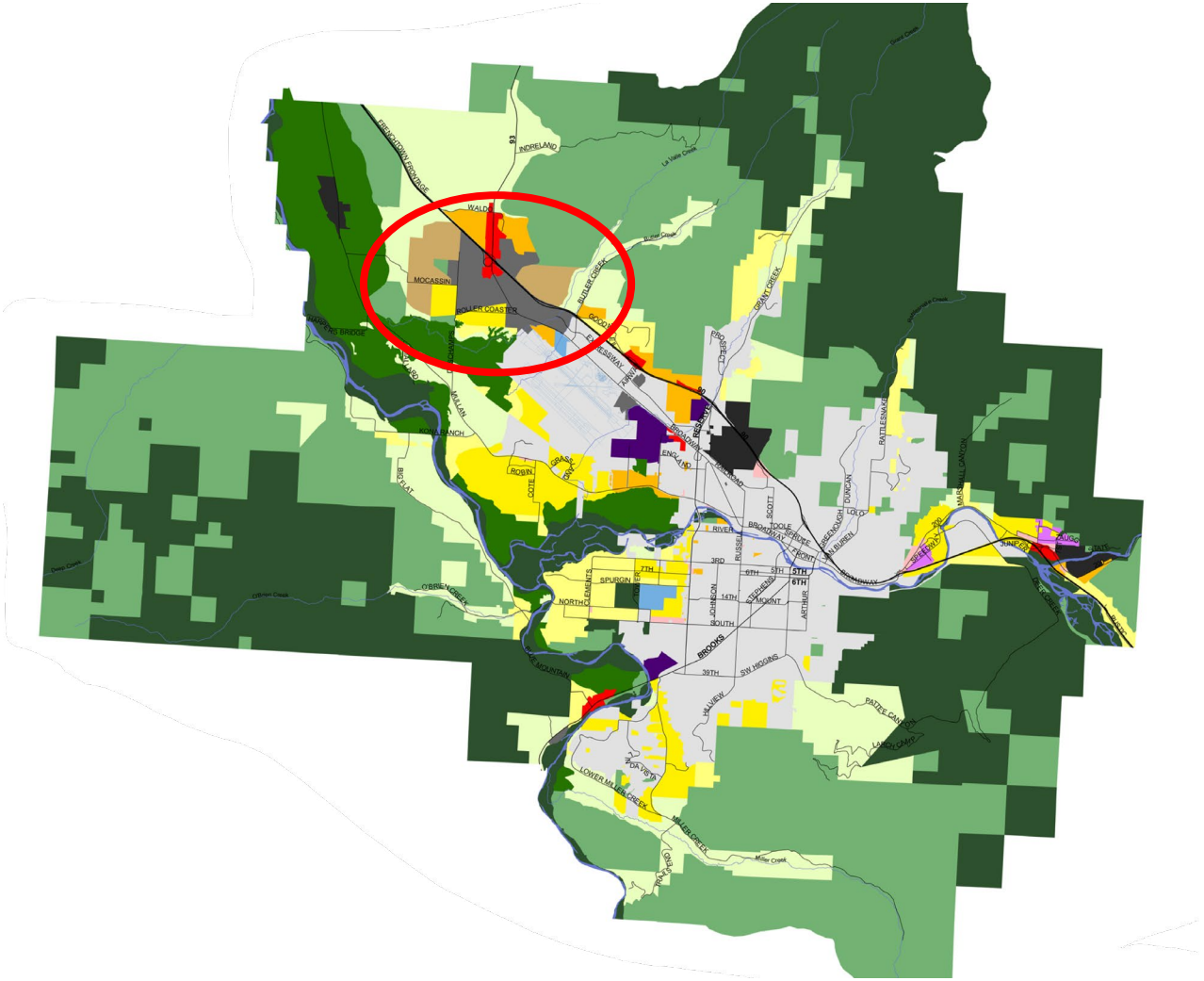


Figure 8. Land Use

WIP Area

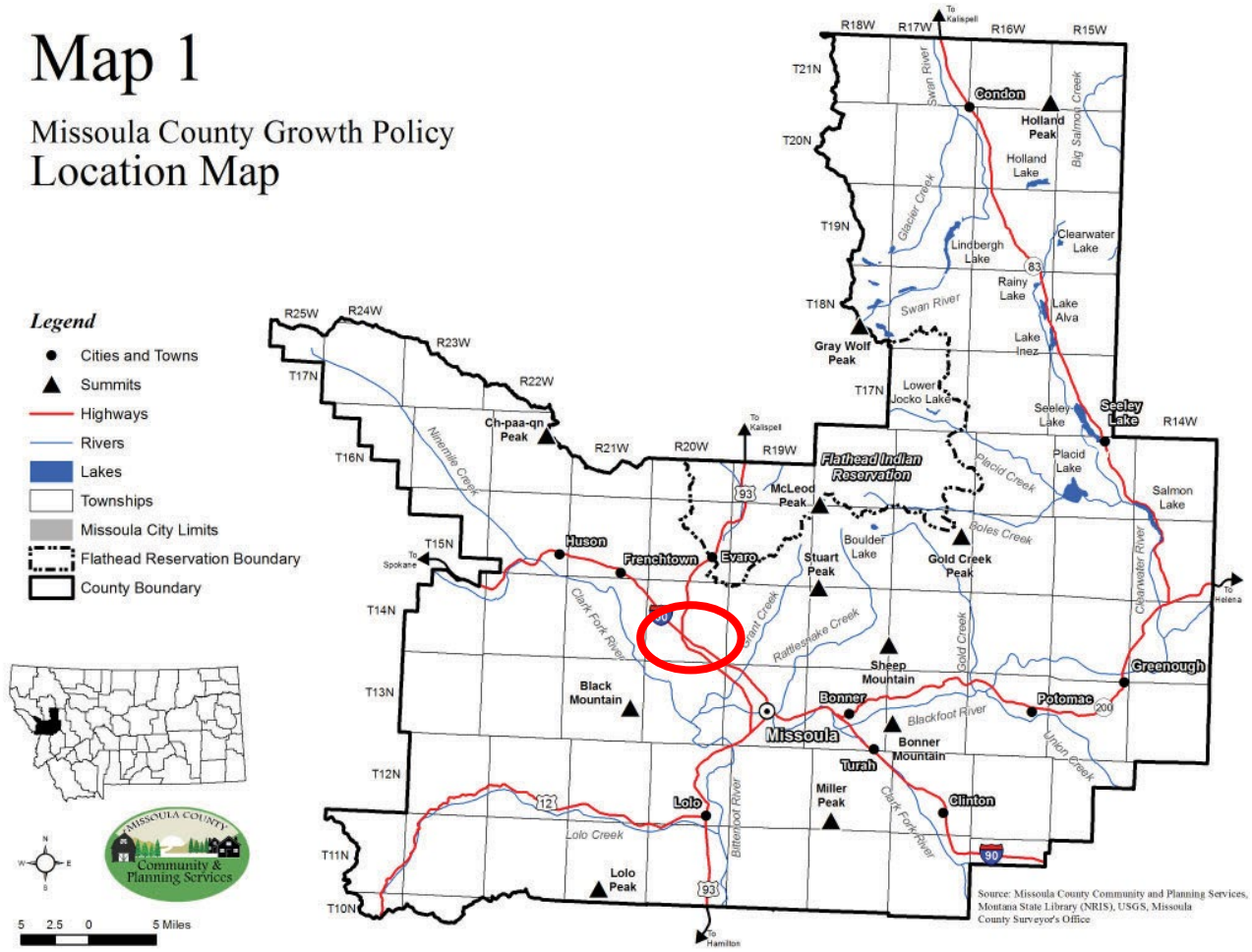


Figure 9. Existing Growth Policy Map

WIP Area

Growth Policy

2016 Missoula County Growth Policy

The 2016 Missoula County Growth Policy provides desired development patterns and land use objectives to conserve the natural landscapes and open spaces that are important to Missoula County, while accommodating growth and promoting the economic wellbeing of its residents. These include allocating land for uses that meet specific needs and adheres to adopted land use policy while efficiently and economically providing public services to those areas. Examples of Growth Policy goals that inform the WIP include:

- Promote economic development that creates opportunities throughout Missoula County including people living and working in rural communi es and across wage levels
- Proactively plan and provide for the logical growth of communi es while protecting rural character and sustaining county resources by guiding development to areas most suited for it
- As part of planning, support the provision of infrastructure and services to and within rural communities
- Promote healthy active communities

Relationships to Other Plans

City of Missoula Growth Policy

2015 Our Missoula City Growth Policy

The City of Missoula's Growth Policy was updated in 2015 with a goal of looking forward for growth and development through 2035. A primary goal of this policy is to "focus inward" and promote compact development in the urban core where infrastructure already exists. This plan is supported by the 2019 City Annexation Policy which prioritizes annexation of areas where infrastructure and services already exist and where annexation agreements are in place. This policy also includes guidelines for providing contract services, which are generally only provided when City planning goals can be met or where the City can address an environmental issue.

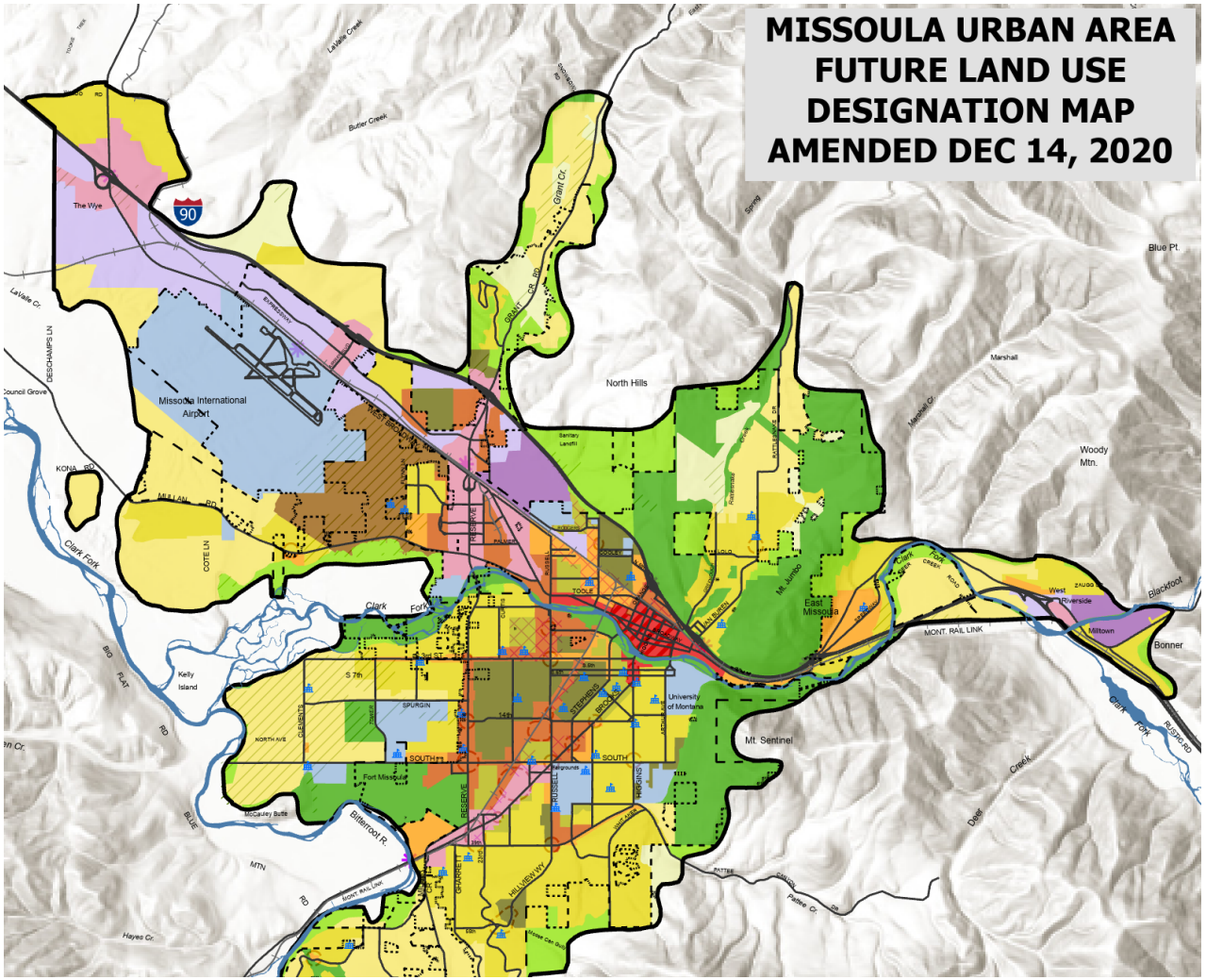


Figure 10. Missoula Urban Land Use

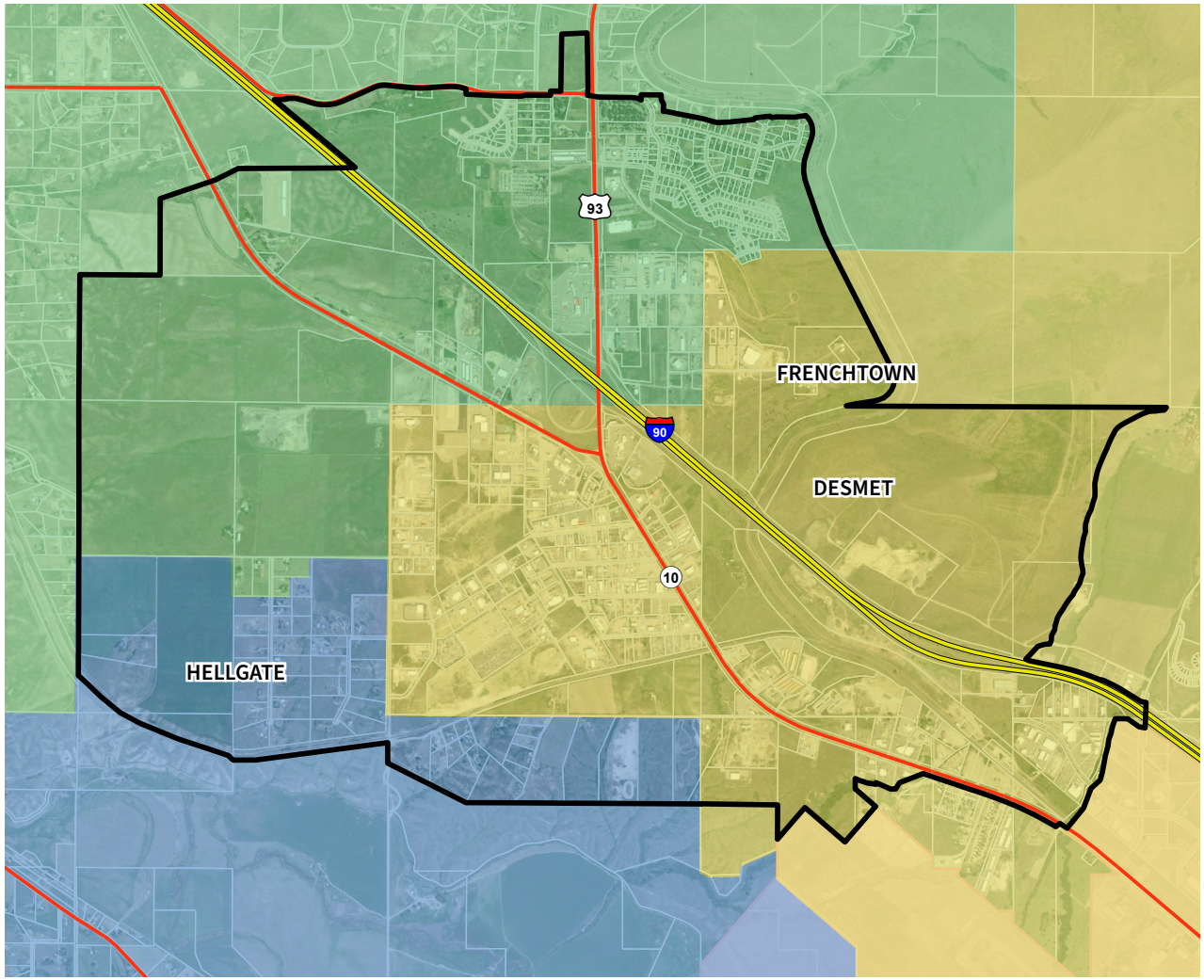


Figure 11. School Districts

- WIP Boundary
- DeSmet School District
- Frenchtown School District
- Hellgate School District

Schools and Parks

The planned residential development at the Wye will require school facilities and parks amenities to serve the area's residents.

Increased population will require expansion of the existing school facilities and construction of new school facilities within the three West Valley School Districts: Frenchtown, DeSmet, and Hellgate. Best practices for school siting should be incorporated into the final Wye Infrastructure Plan. Siting criteria should consider input from the three West Valley School Districts, guidance from published guidelines such as Safe Routes Partnership and the EPA, and contextual factors within the study area such as future population centers and opportunities for securing land.

Siting criteria for new park facilities should be incorporated into the final infrastructure plan as well with input from the Missoula County Parks, Trails, and Open Lands, and a linkage with the Missoula County Pathways and Trails Plan.

Infrastructure Needs

Circulation

Street Network/Classification

The WIP area is located entirely within Missoula County and is known for its good regional access through Interstate 90, US Highway 93, and Old Highway 10. These major roadways serve as the backbone for vehicular travel but pose challenges for non-motorized access and internal circulation within the neighborhood. Additional transportation infrastructure conditions within the WIP area that influence circulation include the following:

Vehicular Transportation

Strengths:

- Regional Access: The neighborhood enjoys excellent regional access via Interstate 90, US Highway 93, and Old Highway 10, providing efficient connectivity to the urban core of Missoula and surrounding regions.
- Highway Network: The presence of these major highways enhances the accessibility and dispersal of vehicular traffic, reducing congestion during peak hours.

Challenges:

- Internal Circulation: The major highways within the WIP area can act as barriers for internal circulation within the neighborhood. Crossing these highways, especially for pedestrians and cyclists, can be difficult or even impossible, hindering non-motorized access within the community.

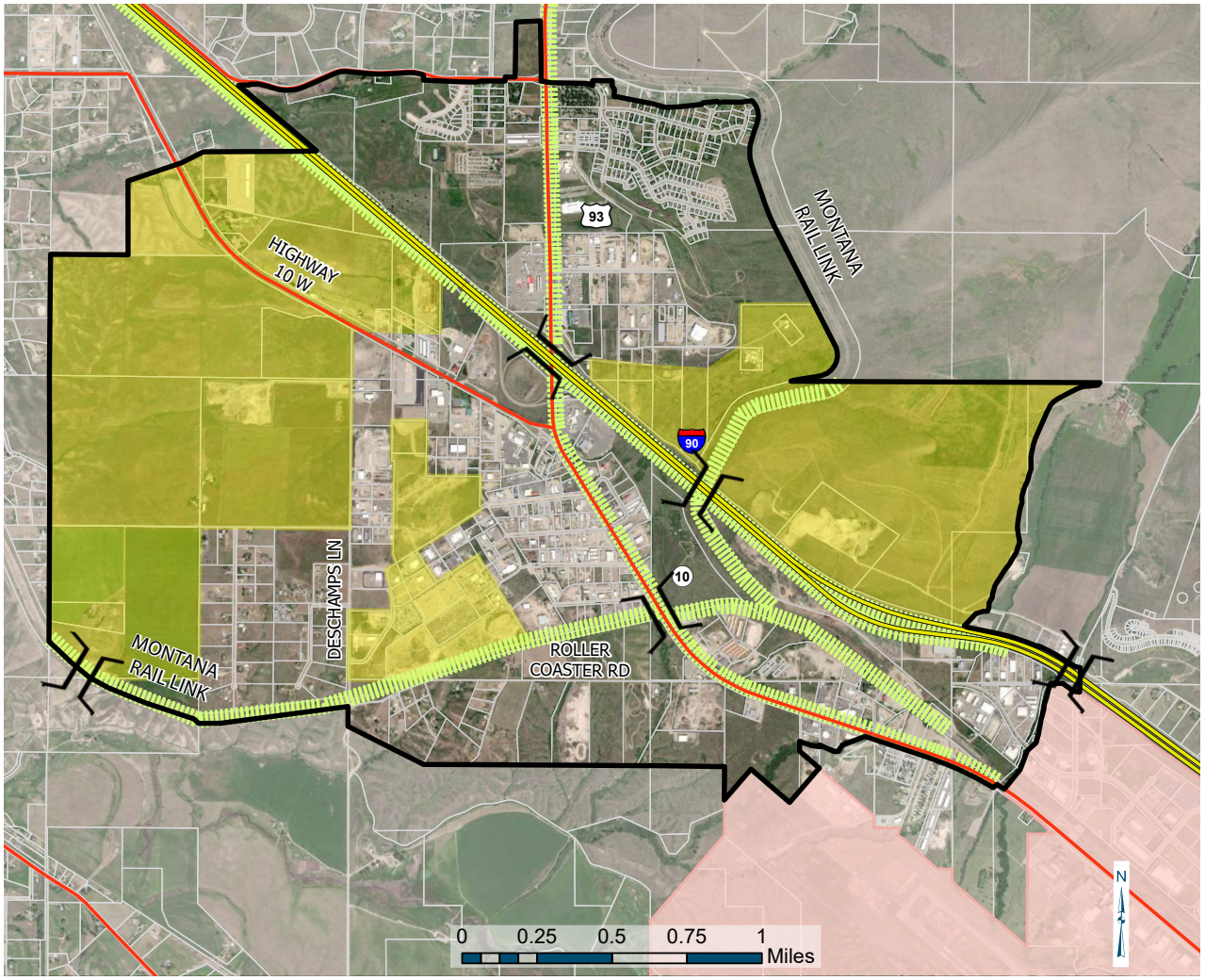


Figure 12. Underserved Transportation Areas

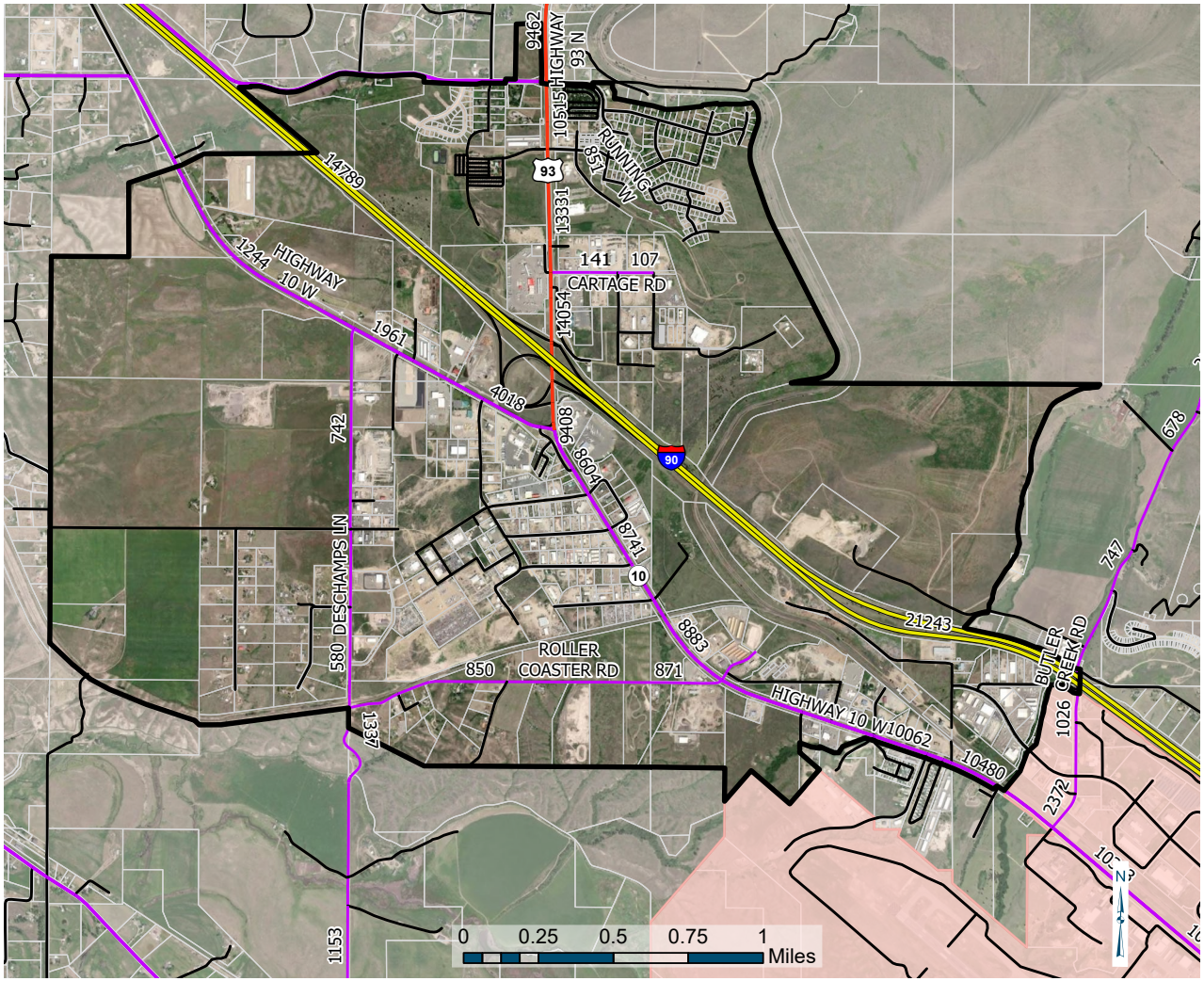


Figure 13. Transportation Demand Model

- Interstate
- Highway
- Collector Road
- Infrastructure Planning Study Area
- Incorporated Cities and Towns
- Property Lines

Non-Motorized Transportation

Challenges:

- Unpaved Roads: Numerous roads within the WIP area remain unpaved, discouraging non-motorized travel and posing challenges for residents.
- Lack of Non-Motorized Facilities: The major highways in the WIP area, including Interstate 90, Old Highway 10, and US Highway 93, lack dedicated non-motorized facilities, such as sidewalks, bike lanes, and pedestrian crossings.
- Crossing Challenges: Interstate 90 is a limited-access route with only one overpass for HWY 93, an underpass for the BNSF railroad, and an underpass for Butler Creek Road on the eastern boundary of the WIP area. Unfortunately, other than the Butler Creek Road underpass, these crossings lack non-motorized facilities, making safe and convenient non-motorized access challenging.
- High-Speed Highway: US Highway 93, with its high-speed design and up to five lanes of traffic, presents significant barriers to both motorized and non-motorized access. The absence of non-motorized facilities along HWY 93, except at the two signalized intersections of Old HWY 10 and Cartage Road, further exacerbates these challenges.
- BNSF Rail Crossings: The BNSF railroad lines bisect the WIP area, with only HWY 93, Deschamp Lane, and Interstate 90 crossing these lines. Among these, only Deschamp Lane offers an at-grade crossing, potentially making it expensive to expand existing grade-separated crossing infrastructure for non-motorized access.

Infrastructure Needs

In conclusion, the Wye benefits from good regional access but faces significant challenges in terms of non-motorized travel and internal circulation, particularly due to the lack of dedicated facilities and the unique characteristics of the transportation infrastructure within the WIP area. Addressing these issues is essential to enhance transportation circulation and promote safe, accessible, and efficient travel within the neighborhood.

Generally, uncongested conditions prevail on the streets within and bordering the WIP area. The exception to this is the westbound off ramp for the interstate that is beginning to show congestion during the PM peak hour. Existing average daily traffic (ADT) volumes within the project area are shown in Figure 13. These volumes represent the total two-way 24-hour volume of motorized traffic, and are based on actual traffic counts conducted by the City of Missoula.

The proposed growth in the WIP area, as outlined in the recent Missoula Area Land Use Element, marks a significant shift in density from the previous zoning regulations. The allowance for up to 10,000 to 15,000 additional residential units contrasts sharply with the prior cap of 1,200 units, potentially resulting in 90,000 to 135,000 daily trips within the WIP area (including industrial and commercial uses). While the exact distribution of these trips remains undetermined, it is evident that the existing collector street network may require enhancements to accommodate such a substantial increase. Presently, the roadways demonstrate decent capacity, characterized by multiple lanes and signalized major intersections. However, addressing intersection operations, ensuring safety, fostering multimodal connectivity, and contemplating the expansion of the Mountain Lines Transit network are crucial steps in preparing for this growth. Strategically investing in multimodal infrastructure not only addresses the surge in vehicular trips but also aligns with the County's broader goals of reducing reliance on single-occupancy vehicles, subsequently mitigating both capital and maintenance costs.

Rail

The rail line that bisects the WIP area shown in Figure 12 is owned by BNSF. Historically this line was operated and maintained by Montana Rail Link, but MRL's lease is set to expire on January 1st, 2024, at which time BNSF will take over operations and maintenance of the line. The line splits in the WIP area with one branch heading north toward Arlee, MT., and the other branch heading west toward St. Regis, MT. The lines eventually merge in Paradise, MT before heading west into Idaho along the Clark Fork River.

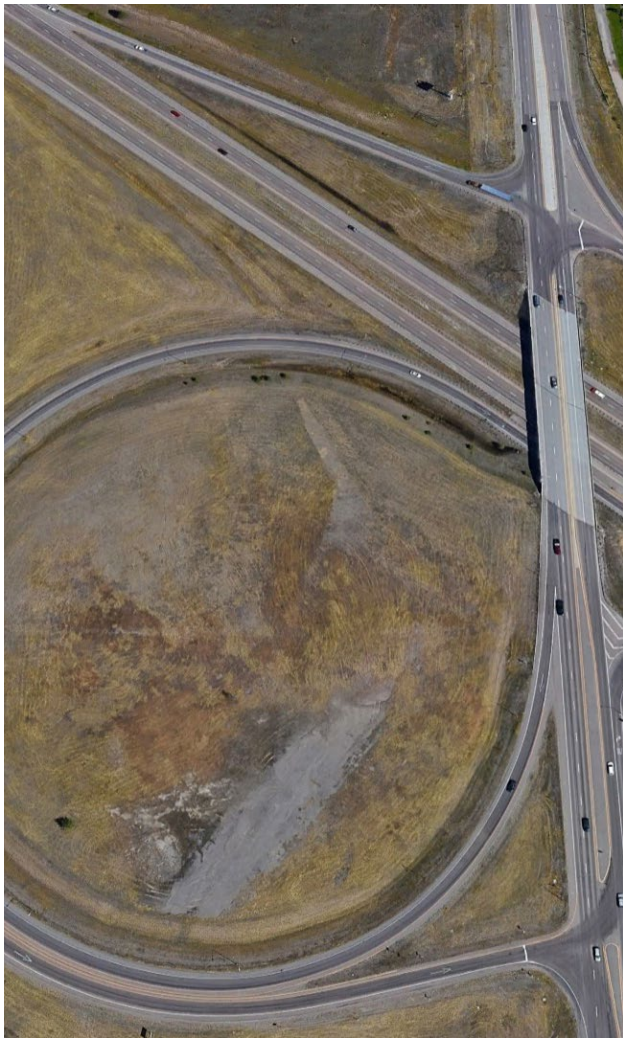


Figure 14. Interstate 90 Intersection

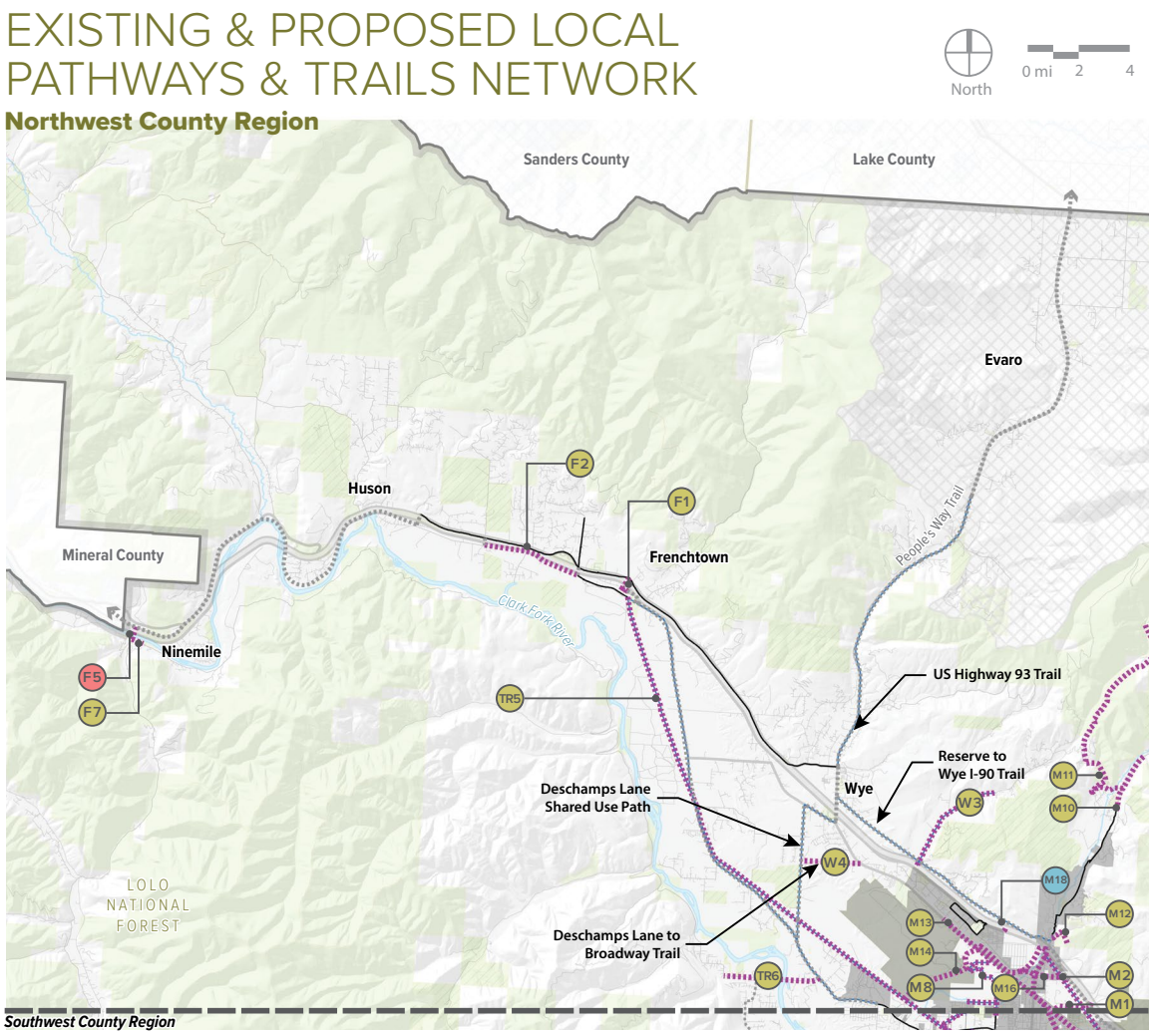


Figure 15. Existing Trail Network

Source: 2022 Missoula County Pathways and Trails Plan

- Existing Pathways and Trails
- Proposed Regional Connection Projects
- Proposed Local Enhancement Projects
- MPO Proposed Projects
- City of Missoula
- Highway/Freeway
- Road
- Major Streams
- Tribal Land
- Public Lands

Transit and Non-Motorized

Mountain Line's route 11 ends/turns around just short of the WIP area at the Airport. No other transit services exist in the area. Non-motorized facilities are limited within the WIP area, with the exception being newer developments. The Running W subdivision includes bike lanes along its collector roads, and sidewalks on all public roads. A small piece of shared use path was recently installed along the south side of Old Highway 10 between Alita Drive and US Highway 93, however this facility bends south with the right-of-way line and does not connect to the sidewalk/crosswalk facilities at the intersection of US Highway 93 and Old Highway 10. The intersection of US Highway 93 and Cartage Road includes sidewalk at it's corners to facilitate accessible crosswalks. No other non-motorized facilities exist in the WIP area.

The Missoula County Pathways and Trails Plan includes a trail from Deschamps Lane to Broadway along Roller Coaster Road as a Tier 1 Project. The Plan notes Tier 1 projects as having the highest ranking evaluation criteria and are geographically diverse within the county. Other planned trails in the study area are the Highway 93 trail (Tier 3), the Deschamps Lanes shared use path (Tier 1), and the Reserve to Wye I-90 Trail (Alt. 2 northern alignment) (Tier 2).

Infrastructure Needs

Right-of-Way

In the specified plan area, a comprehensive analysis of the existing conditions for collector roadway rights-of-way widths has been conducted, which is essential for planning and accommodating proposed typical sections and utilities. The following summary outlines the widths of these rights-of-way for each road segment:

County Road Right-of-Ways (60 ft wide):

- Deschamps Lane
- Cartage Road
- Roller Coaster Road

County Road Right-of-Way (Prescriptive Use of Road Prism Only):

- Butler Creek Road's right-of-way has long been assumed to be the standard 60' right-of-way width associated with typical county rights-of-ways, however, no declaration of this right-of-way has been discovered. Therefore its right-of-way is likely defined by prescriptive use of the road prism only, with no specific width. There is ample right-of-way width to traverse under the freeway.

MDT Right-of-Way (Varies, 160 ft typical, 140 minimum):

- US Highway 10 West: 160 feet.
- US Highway 93: Varies in width, 140 - 300 feet.

These existing conditions are critical in determining the available space for accommodating proposed typical road sections and utilities within the WIP area. This information will play a fundamental role in the planning and design of road improvements and infrastructure enhancements for the specified collector roadways.

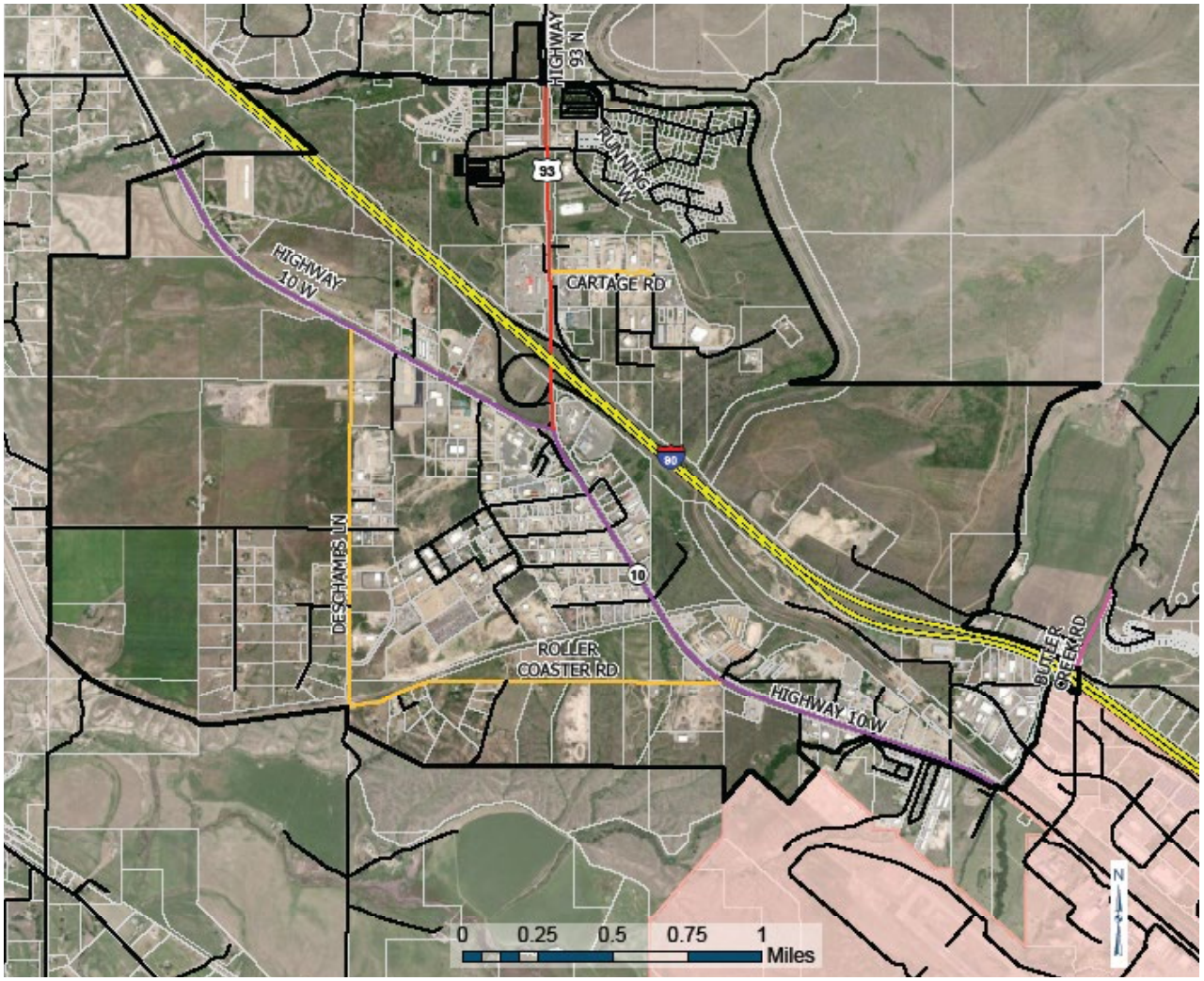


Figure 16. Existing Rights-of-Way

- Interstate
- Highway 93 (variable)
- Highway 10 (160 ft)
- County Road (60 ft)
- County Road (prescribed)
- Infrastructure Planning Study Area
- Incorporated Cities and Towns
- Property Lines

Planning Year	Undeveloped		Underdeveloped	
	Acres to be Developed	% to be Developed	Acres to be Developed	% to be Developed
5	207	10	0	0
10	518	25	0	0
20	1036	50	101	20
30	1554	75	252	50
40	1865	90	404	80
50	2072	100	505	100

Figure 17. Development Acreage by Planning Year

Water & Wastewater Demand Calculations

The water and wastewater needs assessment is based upon the population and build out phasing for the WIP area. The following assumptions are made:

- 12 dwelling units per acre for undeveloped and underdeveloped land
- 2.3 persons per dwelling unit

The phasing plan in Figure 17 is assumed for the time it takes to develop the available land in the WIP area. It is assumed that the undeveloped land will develop more over the first ten years that the underdeveloped parcels.

Infrastructure Needs

Water

Water allocation and infrastructure availability in the WIP area has been largely driven by the demand created from individual development opportunities. This has left many logical areas of development underserved or without water availability commitments. Underserved parcels in the WIP area are limited by a variety of reasons, including:

- No reasonable access to existing water mains
- No system for disbursing or sharing water improvement costs
- No documented water availability commitments
- Lack of water company capital to implement system improvements to proactively facilitate desired development
- Lack of water system capacity to provide required water demand

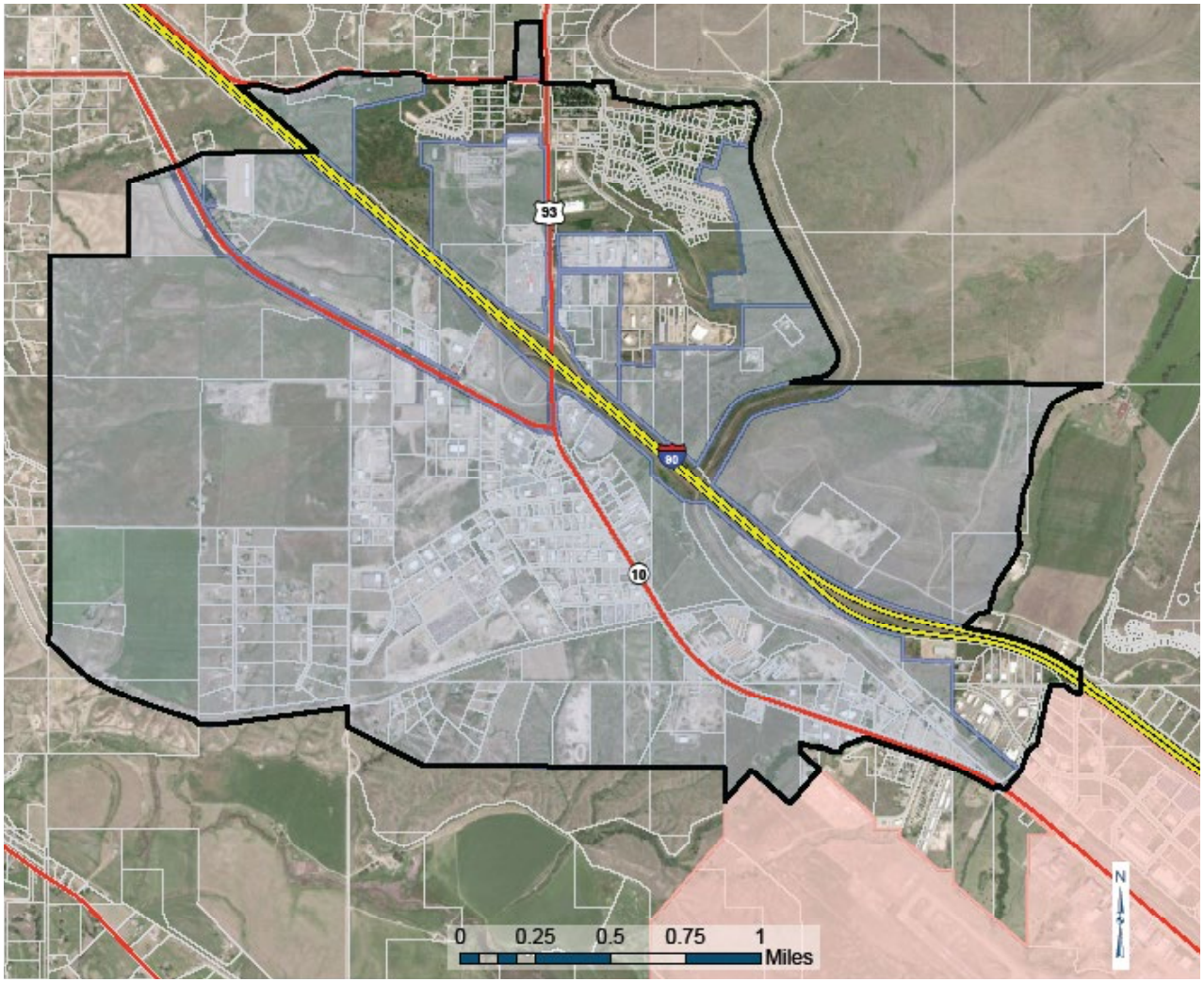


Figure 18. Underserved Water Areas

Interstate
Highway
Infrastructure Planning Study Area
Incorporated Cities and Towns
Underserved Water Area
Property Lines

Year	Projected Water Demand (MGD)		
	Residential	Commercial/ Industrial	Total
5	0.76	0.10	0.86
10	1.90	0.26	2.16
20	3.80	0.52	4.32
30	5.70	0.78	6.48
40	6.84	0.94	7.78
50	7.60	1.04	8.64

Figure 19. Projected Water Demands in Million Gallons per Day (MGD)

Water

Projected Water

In calculating the projected water demand, 2.3 persons per dwelling were assumed. A projected flow rate of 160 gallons per capita day (gpcd) was used, based on the average water use for surrounding, similarly sized cities: Billings, MT, Bozeman, MT, and Rapid City, SD. Flow projection figures based upon square footage for various industrial and commercial applications were taken from the 2012 Commercial Buildings Energy Consumption and applied to parcels zoned as commercial or industrial. A projected flow rate of 0.025 gallons per day/square foot (gpd/sq ft) was used for commercial space, and a projected flow rate of 0.06 gpd/sq ft was used for industrial space.

The allocation of phasing for development includes the associated acreage for undeveloped and underdeveloped acreage shown previously. For that reason, developed areas that are served by small public water supply or private wells aren't included in the future water demand projections.

Existing Capacity

The existing infrastructure in the Wye area is a mix of individual wells, small public water systems serving neighborhoods and undeveloped areas (with minimal water rights available).
Alternatives screening performed during the Wye Area Regional Water System Preliminary Engineering Report (2006) determined the best option for providing public water service to the Wye Area are creation of a water district and expansion into the City of Missoula Water System.
As detailed in 2019 City of Missoula Facility Plan, the North pressure zone is in the closest proximity to the Wye Area Development. This pressure zone includes 7 wells, 1 storage facilities. According to the 2019 Facility Plan, this pressure zone has the highest fire flow requirement; 3,500 gpm fire flow for a 3 hour duration. The North pressure zone has a projected average day demand capacity of 9.63 million gallons (MG) for 2037.

Although the North pressure zone is predicted to meet projected 2037 demand, the Wye Area Development was not included in the 2037 projected demand for this pressure zone. Due to the large water demands of the Wye Area upon development, any alternative will require new supply and storage. Source water for the expansion of the Wye Area water system will be sourced from ground water wells. As indicated in the Wye Area Regional Water Supply System Groundwater Evaluation report, the Missoula aquifer is known to be prolific, capable of producing supply water to meet the projected water demand, and in general of good water quality, however the water rights are challenging. All of this will need to be considered in the future alternatives analysis.

Infrastructure Needs

Wastewater

Some of the WIP area is served by Wye Area Sanitary Sewer Rural Special Improvement District (RSID) #8489. Since portions of the WIP area fall outside of the RSID service area and a phased system has not been adopted to further expand into the planning area, there are parcels that are limited or underserved for the following reasons:

- Location outside the utility service area boundary has, so far, prevented the City from allowing sewer main extensions or connections
- Service requires new lift stations that are cost prohibitive for a single development project to undertake. Late-comer agreements and memorandums of understanding have been unsuccessful at distributing the cost of improvements
- Current lift station capacities are limited and require costly upgrades to provide additional service
- No reasonable access to existing sewer mains
- Soil drainage in the area makes on-site treatment systems difficult and limits the density available to maintain groundwater quality
- Specific centralized treatment for the area doesn't yet exist; difficulty in permitting discharge

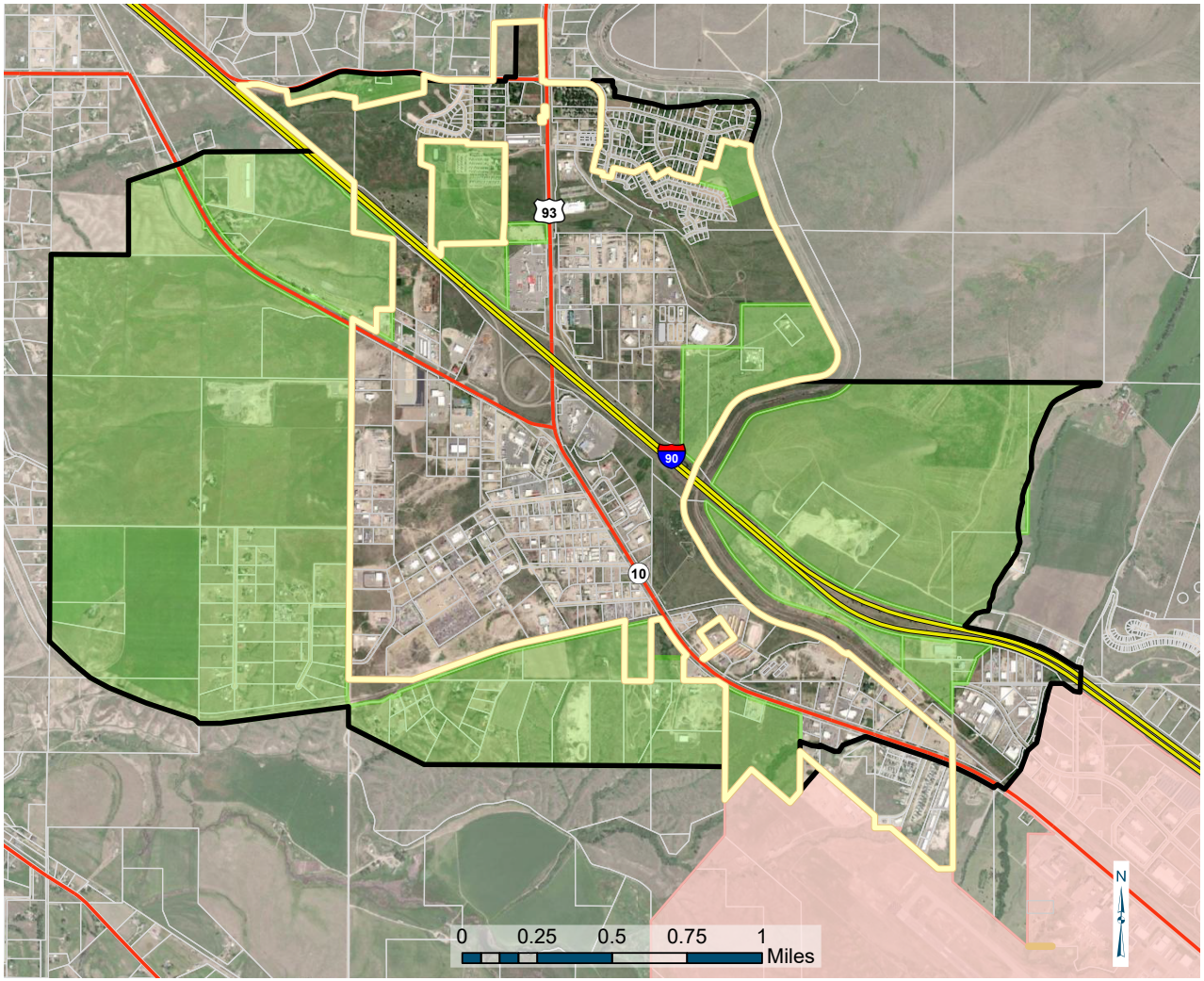


Figure 20. Underserved Sewer Areas

Year	Projected Wastewater Demand (MGD)		
	Residential	Commercial/ Industrial	Total
5	0.33	0.06	0.40
10	0.83	0.16	0.99
20	1.67	0.32	1.99
30	2.50	0.48	2.98
40	3.00	0.58	3.58
50	3.33	0.64	3.97

Figure 21. Projected Wastewater Demands

Wastewater

Projected Wastewater

To calculate projected wastewater loadings, 2.3 persons per dwelling were assumed as recommended by the Missoula City Public Works Standards and Specifications Manual. A projected flow rate of 100 gpcd was also used, consistent with MDEQ Circular 2. An approximation of 80% of industrial and commercial water demand was used to approximate wastewater demand. A projected flow rate of 0.05 gpd/sq ft was used for commercial space, and a projected flow rate of 0.02 gpd/sq ft was used for industrial space. There is a large portion of the WIP area that is included in the Wye RSID providing wastewater service in the County with a system that conveys wastewater to the City of Missoula System. The allocation of phasing for development includes the associated acreage for undeveloped and underdeveloped acreage shown previously. For that reason, developed areas that are served by RSID and City of Missoula system aren't included in the future wastewater demand projections shown in the table below. If the RSID sewer service area were to redevelop at the higher densities assumed for this study, the total flow for the 50-year period would be 5.58 MGD.

Existing Capacity

In January 2008, RSID 8489 was formed to provide sewer service to more than 250 properties. The service area for the WIP study includes 539 parcels which will be immediately served by the wastewater facilities, at an anticipated density of development.

The RSID discharges into the City of Missoula's system at the Momont Development Park. The capacity of the Momont No.1 and No.2 Lift Stations were evaluated to be 600 gallons per minute (gpm) and 1,000 gpm, respectively, in the 2019 Missoula Wastewater Facility Plan. Based on the facility plan, Lift Station Momont No.2 will experience inadequate capacity for the predicted population loading which did not account for the WIP Study Area development loading. Further evaluation and coordination with the City of Missoula will be required to determine the City's ability to take additional wastewater than what was planned in the RSID development.

According to the 2019 City of Missoula Facility Plan, the wastewater treatment plant is now designed for an average daily flow of 12 million gallons per day with a 2037 projected average day flow of 11.2 million gallons per day. Hydraulically, the plant could handle 2037 average and maximum month flows, but would be challenged at projected 2037 maximum day and peak hour flows. Further analysis would be required to determine at what year the plant will exceed capacity and what expansion will be required to accommodate the additional Wye area capacity.

Infrastructure Needs

CLIMATE CHANGE

In some climate change scenarios examined by Climate Ready Missoula, annual precipitation is expected to concentrate in the fall, winter, and spring months, potentially leading to more rain on snow events, increased flooding, and higher seasonal groundwater. The WIP area is particularly susceptible to these impacts from climate change due to its insufficient drainage systems.

Stormwater

EXISTING CONDITIONS

The study area contains nine major drainage basins. Some basins extend offsite well beyond the WIP boundary to the north and northeast, including the headwaters of LaValle Creek, Butler Creek, and O'Keefe Creek, although only small portions of these streams flow through the study area itself. The Grass Valley French Ditch lies to the south and intercepts several ephemeral drainages from the WIP area before they reach LaValle Creek.

Existing development in the study area is primarily served by open channel drainage systems and roadside ditches that feed into natural ephemeral drainages. The open channel system is fragmented, and there are many locations where no roadside ditches exist to perpetuate drainage patterns. The result is nuisance flooding and road damage (due to saturation), which is particularly predominant in the central commercial area bounded by Hwy 10 (east and north), the railroad (south), and Deschamps Ln (west).

Major road corridors (I-90, Hwy 10, and Hwy 93) and the railroad all present interference to natural drainage patterns. Culverts of appropriate size are located at most critical crossing locations; however, some culverts are in poor condition or plugged with sediment. Except for the Missoula Meadowlands subdivision, formally Running W Ranch, located in the northern study area east of Hwy 93, there are no significant piped storm drain systems. The Missoula Meadowlands storm drain system is currently small, but there are plans to substantially expand it as the subdivision builds out.

Numerous small stormwater detention basins exist within the WIP area, most of which serve single developed sites or small subdivisions. The Missoula Meadowlands subdivision contains a relatively large stormwater detention basin that serves the entire subdivision as well as the U.S. Army Reserves site on Running W Rd. There are no publicly owned regional detention facilities within the WIP area.

The WIP area is currently split by the administrative boundary for the County's Municipal Separate Storm Sewer System (MS4) program. Missoula County performs stormwater reviews within the MS4 boundary while MDEQ performs stormwater reviews outside the MS4 boundary. The two entities have different stormwater design requirements, thereby creating inconsistent infrastructure implementation and levels of service.

Stormwater

Legend

- Stormwater Detention Basin
- Impacted/Destroyed Drainages
- Roadside Conveyance
- Drainage Basin Boundary

Streams

- Perennial
- Ephemeral

Culverts

- Major (>24” Diameter)
- Minor (< =24” Diameter)

Culvert Condition

- Unknown
- Fair
- Good
- Poor
- Property Lines
- Infrastructure Planning Study Area

Refer to Appendix pages A1-A3 for detailed descriptions of culverts.

Figure 22. Existing Stormwater Infrastructure

Infrastructure Needs

Stormwater

EXISTING CONDITIONS

The WIP area is predominantly situated on high ground between O'Keefe Creek, La Valle Creek, and the Grass Valley French Ditch. Most parcels drain to small ephemeral streams that serve as critical arteries during runoff. Many of the ephemeral drainages do not have well-defined bed and banks, and several have been highly altered or destroyed by development. This has led to issues with nuisance flooding in developed areas and has left some parcels stranded with no access to suitable receiving drainages.

The study area is comprised mostly of tight fine-grained clay and silt soils (predominantly hydrologic soil groups C & D) that do not readily infiltrate runoff. Land cover is comprised of a mix of commercial and residential development, as well as undeveloped parcels with primarily grass cover and very few trees. The tight soils and lack of tree cover create a combination that can cause quick intense peak runoff flows during larger rainfall events, especially if soils are frozen.

Groundwater in the WIP area is also a challenge. The clay and silt soil strata often creates semi- or impermeable geologic layers and hanging complexes of groundwater that will create unexpected springs during excavations for development. If this is an unplanned situation, nuisance flooding can occur in roads, yards, and basements. Research by the Missoula Water Quality district has also revealed an unusual trend of rising groundwater within the O'Keefe Creek drainage.

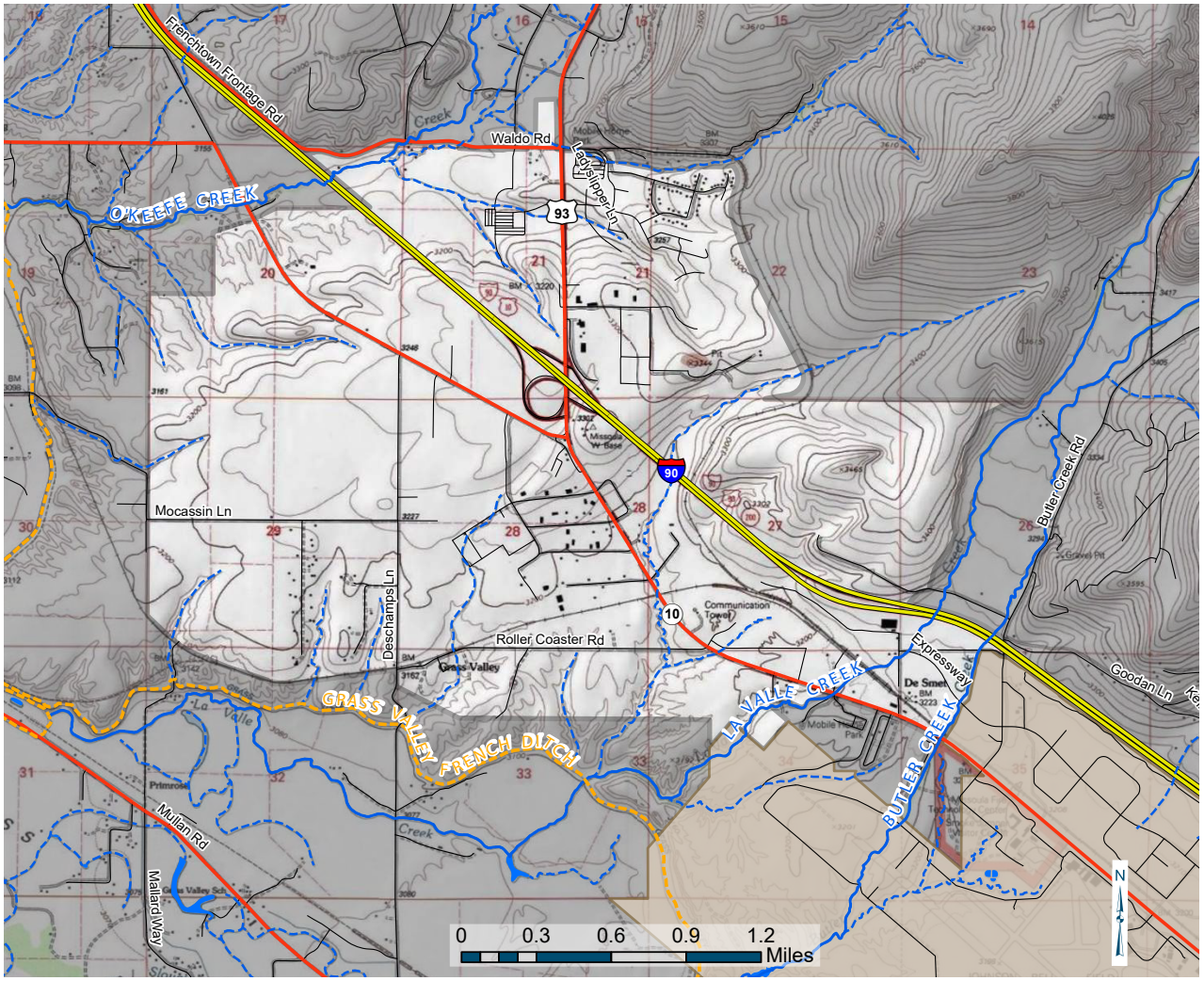


Figure 23. Wye Area Hydrography

- Interstate
- Highway
- Other Roads
- Infrastructure Planning Study Area
- NHD Lake/Pond
- Incorporated Cities and Towns
- Perennial Stream/River
- Ephemeral Stream/River
- Canal/Ditch

Stormwater

STORMWATER NEEDS ASSESSMENT

Drainageways

- Ephemeral streams and natural drainageways have been manipulated and destroyed in several locations, causing them to be non-functional or undersized.
- Lack of drainage conveyance infrastructure has resulted in developed parcels discharging concentrated stormwater onto adjacent private property with unsuitable drainageways to receive it. This is causing flooding and erosion issues even when detention facilities are in place.
- Some undeveloped parcels are stranded and do not have appropriate discharge points for concentrated stormwater overflows from detention facilities.

Commercial Core Area (South of I-90 and west of Hwy 10)

- There is a general lack of consistent conveyance infrastructure and appropriate receiving drainages. The central ephemeral drainageway that historically carried water from this area to the south toward the Grass Valley French Ditch has been destroyed by development and is no longer functional.
- Roadside ditches are highly fragmented, so runoff often ponds on and alongside roadways.
- Many private detention facilities appear undersized, and they do not consistently discharge to suitable and safe locations.

Runoff Treatment

- Requirements for runoff treatment are relatively new, and legacy detention facilities are not designed to meet treatment requirements.
- Specific stormwater quality treatment requirements and design standards are not outlined in detail within the County public works manual.

Culverts

- Several major culverts (24” or larger) have been poorly maintained and are plugged with sediment and debris, increasing flood risk to adjacent structures and roadways.
- Several culverts have been identified as undersized and/or in poor condition.

Administrative

- Stormwater detention features reviewed by the County are designed for the 100-year rainfall event while those reviewed by DEQ are designed for the 10-year event.
- There are no detailed standards for stormwater quality treatment or conveyance design in the County public works manual.
- The County public works manual specifies that natural drainageways should be preserved, but there is no clear methodology or planning document to define critical drainageways.

Infrastructure Needs

Stormwater

Legend

- Stormwater Detention Basin
- Impacted/Destroyed Drainages
- Roadside Conveyance
- Drainage Basin Boundary
- Property Lines
- Infrastructure Planning Study Area

Streams

- Perennial
- Ephemeral

Culverts

- Major (>24” Diameter)
- Minor (< =24” Diameter)
- Deficiency Area
- D — Deficiencies

Figure 24. Underserved Stormwater Areas

Infrastructure Needs

Stormwater

DEFICIENCIES

- D1 Possible undersized culvert in a major ephemeral drainageway.
- D2 Significantly undersized culvert under driveway to Granite Peak RV resort. Conveys ephemeral drainage with frequent large flows.
- D3 High density commercial area with very little stormwater detention and treatment facilities. Fragmented conveyances. Inadequate discharge point.
- D4 Minor culverts undersized and poorly maintained.
- D5 Undersized detention facilities. Runoff discharges to ephemeral drainage through private property with inadequate conveyance infrastructure and no drainage easements.
- D6 Ephemeral drainageway destroyed by development. Inadequate conveyance infrastructure and discharge point.
- D7 High density commercial area with no stormwater detention and treatment facilities. Fragmented conveyances, no stormwater pipe system, unpaved roads have ponding and surface issues.
- D8 Fragmented conveyance infrastructure and inadequate discharge points for existing detention facilities.
- D9 Major ephemeral drainage culverts are filled with sediment and vegetation at inlets and outlets. One of the two major culverts under Hwy 10 is buried.
- D10 Major culvert filled with sediment and appears to be undersized. HDPE culvert inlet and outlet exposed to UV degradation.
- D11 Ephemeral drainageway destroyed by development. Private culvert for large drainage area is half the size of upstream culvert under Hwy 10 and significantly undersized.
- D12 No stormwater detention and treatment facilities in a dense commercial area near two major perennial drainages.
- D13 Inadequate discharge point for undeveloped lots.
- D14 Undersized culvert under railroad exacerbates flooding issues.
- D15 Major culvert under railroad is plugged/buried.

Infrastructure Needs

Broadband

The Federal Communications Commission (FCC) is in the process of updating the broadband speed definition to 100 Mbps download and 20 Mbps upload. Montana is ranked last among all states in BroadbandNow's ranking of high-speed internet availability (2023) with only 72.5% of people having access to 100Mbps broadband. In Missoula County, 88.1% of people have access to 100Mbps broadband. In Figure 25, areas that have access to broadband (1000 Mbps or greater) are shown in green and those areas lacking broadband access are shown in pink. Much of the area within the Wye that is undeserved by broadband lies within areas that are undeveloped and lacking transportation networks along which communication lines are typically installed.

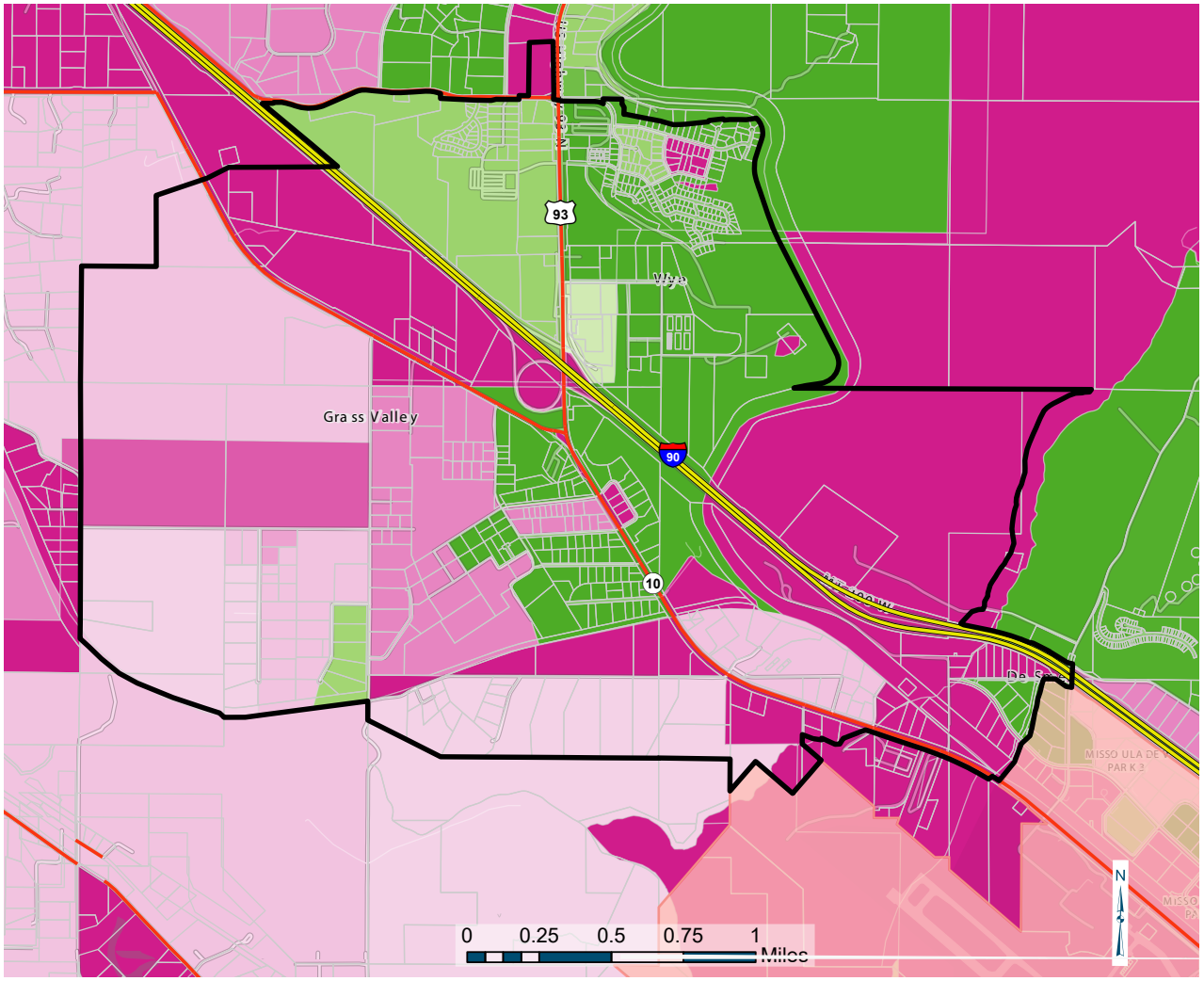


Figure 25. Underserved Broadband Areas

Interstate
Highway
Broadband Service Rating (>100 is acceptable)*
>200
100
<50

Infrastructure Planning Study Area
Incorporated Cities and Towns
Property Lines

*Broadband service rating based on broadband providers' FCC Form 477 (2020)

Appendix

Stormwater

Legend

- Stormwater Detention Basin
- Impacted/Destroyed Drainages
- Roadside Conveyance
- Drainage Basin Boundary

Streams

- Perennial
- Ephemeral

Culverts

- Major (>24” Diameter)
- Minor (< =24” Diameter)

Culvert Condition

- Unknown
- Fair
- Good
- Poor
- Property Lines
- Infrastructure Planning Study Area

Figure 26. Existing Stormwater Infrastructure

Infrastructure Needs

Stormwater

Culvert No.	Size	Material	Condition	Notes
1	36" x 72"	Concrete	Good	La Valle Creek under Expressway Avenue.
2	48" x 96"	Concrete	Good	Heavy vegetation at outlet.
3	-	Mixed	Fair	Railroad bridge span. Concrete top and sides, soil bottom.
4	48" x 96"	Concrete	Poor	Channel on outlet side is full of willow root system.
5	72"	HDPE	Poor	Culvert outlet mostly filled by sediment.
6	72"	RCP	Good	Discharges to a local topographic depression with no outlet.
7	30"	HDPE	Good	Could not locate other end of pipe.
8	24"	HDPE	Poor	Mostly filled with sediment.
9	24"	CMP	Fair	Ephemeral drainage under Roller Coast Road.
10	8"	CMP	Poor	Appears to be an 8" that is 95% full.
11	12"	RCP	Fair	
14	36"	CMP	Poor	Full of sediment. Lots of edge damage.
12	48"	CMP	Fair	Partially full of sediment.
13	24"	RCP	Poor	Estimated as 24". Mostly filled w/ sediment. Double barrel at inlet and single outlet. One buried?
15	12"	HDPE	Good	Culvert for flow from upper to lower detention pond.
16	18"	CMP	Good	Detention pond outlet pipe.
17	18"	CMP	Good	Estimated 18". Deschamps Lane culvert. Conveys detention pond discharge to downstream residential property.
18	48"	CMP	Fair	Showing signs of corrosion.
19	60"	CMP	Good	Estimated as 60"
20	18"	CMP	Fair	Estimated as 18"
21	36"	CMP	Good	

Note: Cells with "-" indicate culverts that were not field verified.

Figure 27. Culvert Conditions

Stormwater

Culvert No.	Size	Material	Condition	Notes
22	24"	CMP	Good	
23	36"	CMP	Fair	
24	12"	CMP	Good	
25	36"	CMP	Good	
26	36"	CMP	Good	
27	24"	RCP	Fair	Separated barrell section.
28	24"	RCP	Good	
29	2 x 36"	CMP	Good	Two (2x) barrels of estimated 36" CMP. Unable to access to measure.
30	72"	CMP	Good	Unable to access, estimated size and assumed condition.
31	36"	CMP	Good	
32	42"	HDPE	Good	
33	42"	HDPE	Good	
34	-	-	-	Mapped from aerial imagery.
35	48"x96"	Concrete	Good	Concrete box culvert under Interstate Place.
36	36"x72"	Concrete	Good	Concrete box culvert under Desmet Road.
37	-	-	Poor	Unable to verify in field. Possibly plugged and/or undersized.
38	-	-	-	Mapped from aerial imagery, 10' LiDAR contours, and NHD ephemeral drainage.

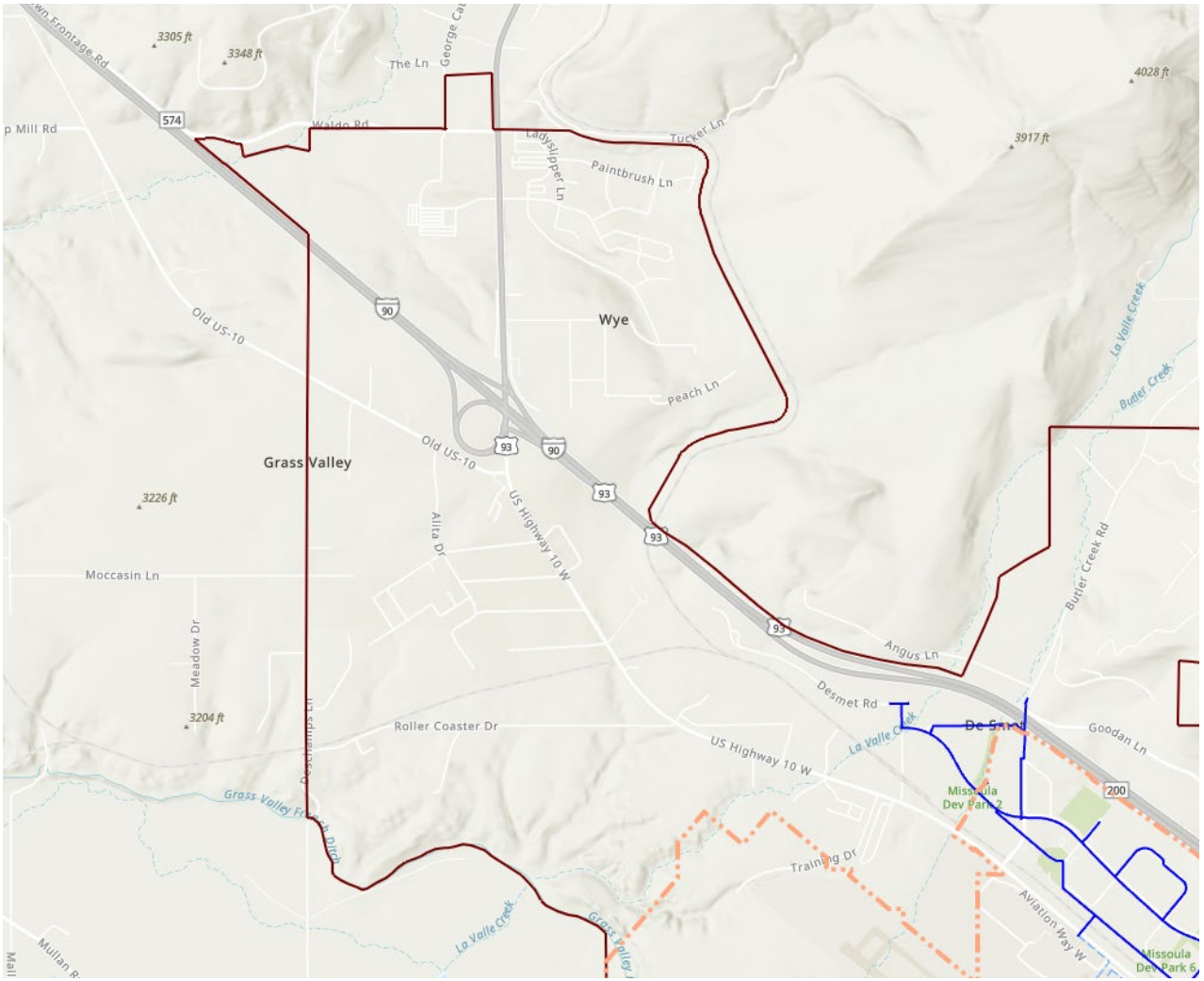
Note: Cells with "-" indicate culverts that were not field verified.

Figure 28. Culvert Conditions

City Water Service

City Water

City of Missoula Public Utility Map



City Limits

Utility Service Area

Water

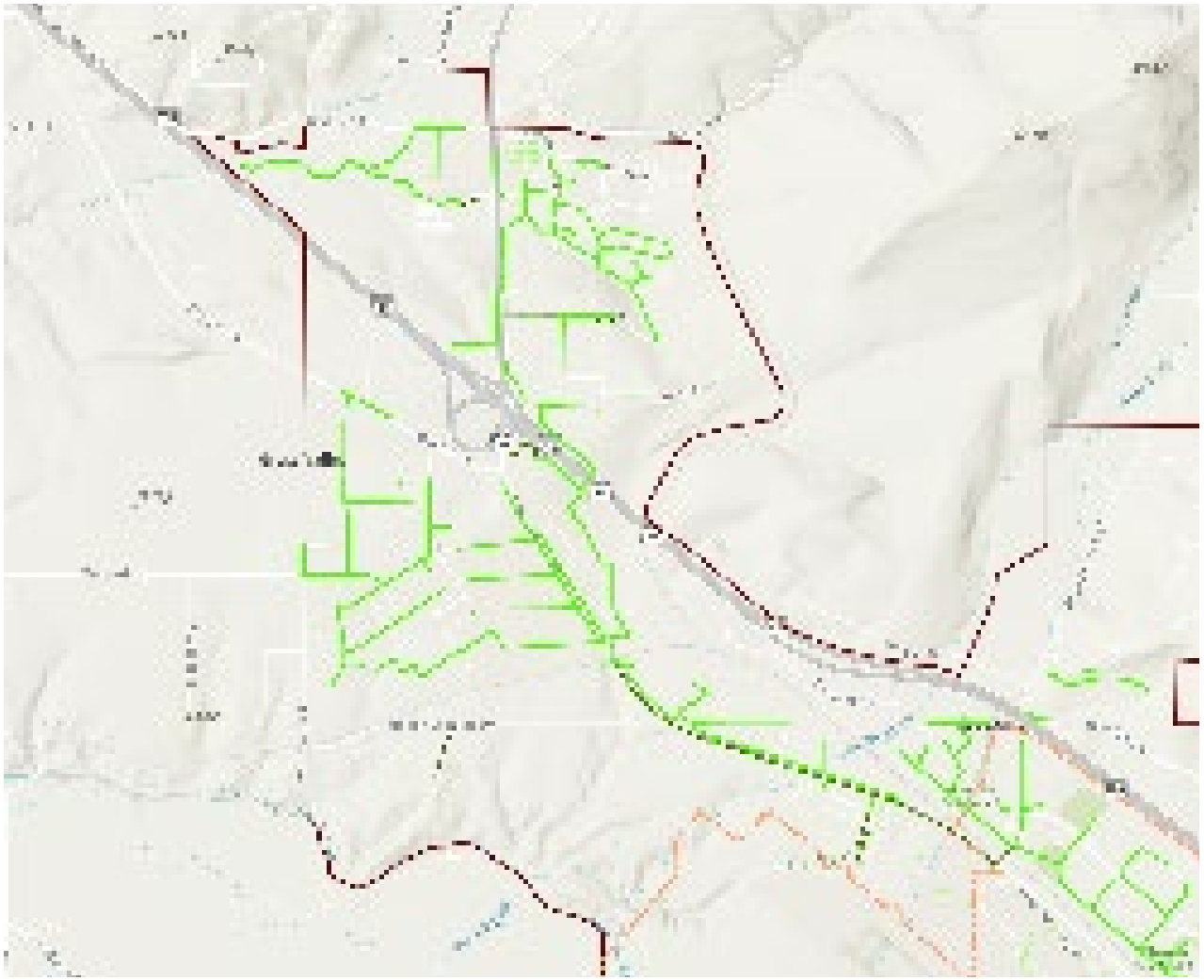
Water Main

Owned By

City

Other

City Sewer Service



City Sewer

City of Missoula Public Utility Map

City Limits

Utility Service Area