



TOWN OF ERIE OPEN SPACE MANAGEMENT PLAN

March 2019

Submitted to:

Town of Erie

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HOW TO USE THIS DOCUMENT

The Town of Erie’s Open Space Management Plan (OSMP) provides a high-level overview of how open spaces in the Town are managed and why. It includes a list of management strategies that may be implemented on each site.

Reading Tips

- Review the Table of Contents to find chapters and sections of interest.
- Refer to other chapters and sections, as needed, depending on the level of detail or kind of information you seek.

This management plan is:	This management plan is NOT:
A guidance document	A set of regulatory requirements
<p>This OSMP provides guidance and a roadmap for sustainable open space management practices that can scale with the Town’s growth over time. It is not a regulatory document. There are no legal requirements included that prescribe how the Town should manage its open space properties beyond compliance with existing laws and policies.</p>	
Dynamic	Static
<p>This OSMP is a living, working document and will be updated every five years to align with its adaptive management principles and the Town’s other long-range land use and fiscal planning efforts.</p> <p>Recommended management methods and actions included in this OSMP will be reviewed and updated as-needed, based on updates to land management science and best practices, shifts in priorities and management objectives, and as the Town’s open space portfolio changes over time.</p>	
A resource for multiple audiences	For internal use only
<p>This OSMP is a resource for both Town residents and staff to learn more about open space management practices employed by the Town at specific sites.</p> <p>This OSMP was written for members of the public to learn more about open spaces in their neighborhoods, how those sites are managed, and why. It includes planning and logistics-level information for use by Town staff to guide day-to-day maintenance activities and annual fiscal planning efforts.</p>	
A suite of recommended options	A checklist to complete
<p>This OSMP includes several options that could be utilized by the Town to achieve its stated open space management objectives. The Town reserves the right to tailor specific management actions implemented based on site-specific information, budgetary and staff considerations, equipment availability, and community input.</p>	

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1 INTRODUCTION



In 2016, the Town of Erie (“Erie” or “the Town”) updated its *Parks, Recreation, Trails and Open Space Master Plan* as an integrated, visionary plan to guide the development of Erie’s parks, recreation, open space, and trails facilities, programs and services for up to ten years. As a companion document to the *Erie Comprehensive Plan* (2015, as amended), the Master Plan responds to and builds on other long-range planning documents and recommends the Town develop management plans for key open space areas such as Coal Creek.

The Town is moving forward with a mission to protect and enhance the natural, cultural, and scenic resources unique to the open spaces of its planning area. This *Open Space Management Plan* (OSMP) is designed to guide the management of undeveloped areas, like Coal Creek, that are slated to be permanently maintained in a natural or agricultural state.

Open space is defined as: protected lands of significant value that are conserved in their natural state, restored, or improved with appropriate native landscaping to retain a natural or natural-appearing condition, or conserved in quality agriculture.

Erie Comprehensive Plan

1.1 Purpose and Intent

This OSMP is different from the Comprehensive Plan and its companion Master Plan because it does not provide land use policies or development design guidelines; it is a roadmap of sustainable practices for maintaining and managing lands the Town has acquired for open space purposes. These open space parcels differ from traditional park developments because infrastructure is focused to provide passive recreational uses that are more aligned to natural areas such as hiking and birdwatching and are non-irrigated.

Taking into consideration this context, the OSMP intends to:

- Define Erie’s mission for open space management and identify objectives and strategies to satisfy its mission;
- Adhere to federal, state, and regional regulations and guidance as applicable;
- Provide sustainable actions to manage natural areas well into the future; and
- Identify a framework and tools to aid in ecological assessments and monitoring.

MISSION STATEMENT

To protect and enhance the natural, cultural, and scenic resources unique to the Town of Erie through:

- Thoughtful land acquisition;
- Appropriate land stewardship; and
- Sustainable management.

in order to:

- Provide exceptional recreational opportunities;
- Preserve open space and wildlife habitat; and
- Connect the community with each other and the natural environment.

1.2 Contents

The OSMP is a resource for the community and Erie staff to understand management practices at specific open space sites. Given its multiple audiences, the OSMP is organized into several chapters that summarize key planning topics, with the detailed information and logistics documented in technical appendices. It is organized into the following sections:

- How to Use This Document
- Glossary of Terms
- Chapter 1 Introduction
- Chapter 2 Adaptive Management Framework and Landscape Typology
- Chapter 3 Management Objectives
- Chapter 4 Strategies and General Management Actions
- Chapter 5 Site-Specific Management Actions
- Chapter 6 Implementation and Additional Considerations
- Appendix A Landscape Typology Technical Manual
- Appendix B Field Data Sheets

The next section of the Introduction describes the OSMP connection to other long-range planning efforts and regional, state, or federal regulations. And the remaining sections highlight the environmental, economic, and social/community considerations such as historic character, scenic qualities, environmentally sensitive areas, recreational and educational value, and reclamation of extractive sites, such as oil and gas well pads.

1.3 Strategic Alignment and Regulatory Context

Like the Master Plan, this OSMP aligns with the vision of the Comprehensive Plan and seeks to implement several of its Guiding Principles. It is also consistent with the following Town planning documents:

- [Erie Comprehensive Plan](#) (2015, as amended)
- [Town of Erie Parks, Recreation, Open Space, and Trails Master Plan Update](#) (2016)
- Town of Erie Historic Preservation Master Plan (2018; draft)
- Erie Municipal Airport Wildlife Hazard Assessment (2013-2014)
- [Town of Erie Natural Areas Inventory](#)
- Town of Erie Parks and Recreation Maintenance and Operations Management Plan (2017)

The following Federal, State, and regional guidance or regulations were considered to ensure the open space activities recommended in this OSMP are consistent with best practices:

Federal

- [Endangered Species Act](#) (ESA; 16 U.S.C. § 1531 et seq.)
- [Healthy Forest Restoration Act](#) (HFRA)
- [National Fire Plan](#) (NFP)
- [Federal Emergency Management Agency](#) (FEMA) Guidance
- [Hazardous Wildlife Attractants on or Near Airports](#) (FAA) Guidance

State

- [Colorado Parks and Wildlife State Wildlife Action Plan \(SWAP\)](#)
- [Colorado Hazard Mapping Program \(CHAMP\)](#)
- Colorado Climate Plan
- [Colorado Oil & Gas Conservation Commission Technical Guidelines for Successful Reclamation \(COGCC\)](#)

Regional

- [Boulder County Community Wildfire Protection Plan \(BCCWPP\)](#)
- [Boulder County Land Use Code: Oil and Gas Development Regulations](#)
- Boulder County Noxious Weed Management Plan
- [Weld County Oil and Gas Goals and Policies](#)

COMPREHENSIVE PLAN VISION

Erie is a community which recognizes the importance of:

- Conserving and enhancing its historic small-town character, the roots from which it grew, preserving the natural environment in which it resides;
- A caring community which offers its residents an environment in which to seek a high quality of life;
- A balanced community with a diverse range of housing, employment, educational, shopping, and recreational opportunities; and
- A vital community which provides financial and social support for quality of life.

COMPREHENSIVE PLAN

GUIDING PRINCIPLES FOR OPEN SPACE

Stewardship of the Natural Environment

- The Town will identify and conserve its natural, scenic, and environmentally sensitive areas including important wildlife habitat, waterways, and visually sensitive areas. Erie will strive to be a clean, sustainable, environmentally-friendly town.

Trails, Parks, and Recreation Opportunities

- The Town will provide a diverse range of recreational opportunities to include facilities and programming for all ages and varying interests, both passive and active. Trails, parks, and recreation opportunities will be connected with and integrate open space into and between neighborhoods and other areas of the community.

Protected Lands Program

- Lands that are permanently protected as open space will be used to maintain the small-town atmosphere that has made Erie an attractive place. Open space will serve a variety of functions, including: Buffering Erie from other towns and cities and shaping growth; Creating view corridors to enable residents to see mountains, plains, and agricultural areas rather than uninterrupted housing and commercial development; Preserving agricultural lands, keeping them in agricultural production; Restoring riparian areas and other areas of natural habitat; Protecting significant archeological and cultural resources; Preserving native plant and animal habitat and travel corridors for wildlife; Providing areas for passive recreation that emphasizes enjoyment of nature; and Distinguishing and linking neighborhoods and other activity areas within Erie through a system of continuous, connected open lands and trails.

Provide Infrastructure and Public Services Efficiently and Equitably

- Erie will coordinate future development and/or provision of capital facility projects and infrastructure, including water, wastewater, fire protection, emergency management services, police protection, schools, parks, and other utilities that affect the quality of life and economic stability of the community.

1.4 Fiscal and Operational Planning

In terms of operational planning, the Town's General Fund revenue and the Property Tax Mill Levies for Trails and Natural Areas Acquisitions are the primary financing mechanisms for acquisitions and land management activities, with grant funding providing little to no component part (refer to the [Town of Erie, CO Comprehensive Annual Financial Report \[2017\]](#)). In 2014, Erie voters reapproved the Trails, Natural Areas, and Community Character Measure, a four mill property tax. Revenue from the tax is intended for the purpose of creating hiking, biking, and walking trails throughout town to connect neighborhoods and the regional trail network; purchasing natural areas to separate Erie from other communities; preserving wildlife habitat; protecting natural areas along Coal Creek and Boulder Creek and conserving scenic landscapes and views. This tax was approved for 10 years and will sunset in 2024. This source of funding flows into the Trails and Natural Areas Fund.

Erie's open space funding can be considered relatively stable given that it does not currently rely on external sources. However, this OSMP identifies several management activities that may have fiscal implications for the Town's operations. Given that Erie's finances are planned and reported annually with forecasts up to five years, the OSMP will be evaluated each year with comprehensive updates every five years. Depending on management costs, the Town may consider supplemental resources from grant funding or volunteer programs such as citizen science activities, which engages the community with the natural environment consistent with the vision of the Comprehensive Plan.

The program for open space acquisitions is addressed in the Comprehensive Plan and Master Plan and are not the primary focus of this OSMP; the real estate purchasing process and related information are summarized in this section to provide context. The documents guide the prioritization of thoughtful and strategic property acquisition to maximize environmental benefits and complement community character and resident needs. In general, Erie acquires real property for its open space portfolio in several ways:

- 1) The Open Space and Trails Advisory Board may approve the expenditure of funds to purchase real property from private landholders;
- 2) The Town may establish an open space fund eligible for tax-deductible contributions of cash or land;
- 3) The Town may offer property tax benefits for conservation easements placed on land with the Town as trustee; and
- 4) Oil and gas operators transition well properties to Town ownership and management following completion of plug and abandonment measures and reclamation actions.

Based on the Town's planned buildout, the acquisition program aspires to provide 71 acres of open space per 1,000 people. A large portion of this goal has already been met for the existing population, which is significant progress toward ensuring open space lands are contiguous to the greatest extent possible and have ecological, economic, and social value for the Town's residents.

1.5 Ecological, Economic, and Social Considerations

During the public engagement process for the Comprehensive Plan, the Town solicited input on the vision for the community, which seeks to balance environmental, economic, and social considerations when building the health and quality of life of its residents. Implementation of the OSMP supports this vision and is another avenue for engaging the Town's residents with its unique natural, cultural, and scenic resources. Erie will seek opportunities to collaborate with local citizens and organizations through public outreach and education, clean-up programs, youth engagement, and volunteer participation (i.e. citizen scientists) to ensure stakeholders are well-informed stewards of the environment.

In general, vibrant open space networks support biodiversity and well-functioning ecosystems, which provide essential ecosystem services. The presence of open space parks in communities has been shown to improve public health, property values, and the economic development of communities. Open space also provides visual breaks between urban environments, creating attractive viewsheds and convenient escapes into nature for residents. Erie recognizes the value of its open spaces, agricultural heritage, and scenic vistas to its growing community. Maintaining functioning ecological systems, preserving travel corridors and habitat for wildlife, protecting cultural and historical resources, and providing people high quality experiences within the natural environment are accomplished through strategic and well-planned open space management. The following information highlights many of the values this OSMP seeks to protect and consider in its implementation.

The Town is situated on an ecological dividing line between the Front Range Fans ecoregion and the High Plains ecoregion. The Front Range Ecoregion is characterized by more urban development in comparison to the higher and drier High Plains Ecoregion, which is occupied by more cropland and rangeland. This dividing line is noticeable along Coal Creek and the high ridge that follows along the north-south corridor of the creek. Erie contains a range of valuable natural resources and landscape attributes that contribute to its visual quality and character, including the viewsheds of Boulder and Coal Creek riparian corridors, majestic mountains, shortgrass prairies, and legacy agricultural lands.

Appropriately functioning natural areas provide myriad of ecosystem services to the Erie community. Ecosystem services refer to the varied benefits people gain from the natural environment and healthy ecosystems (FIGURE 1).

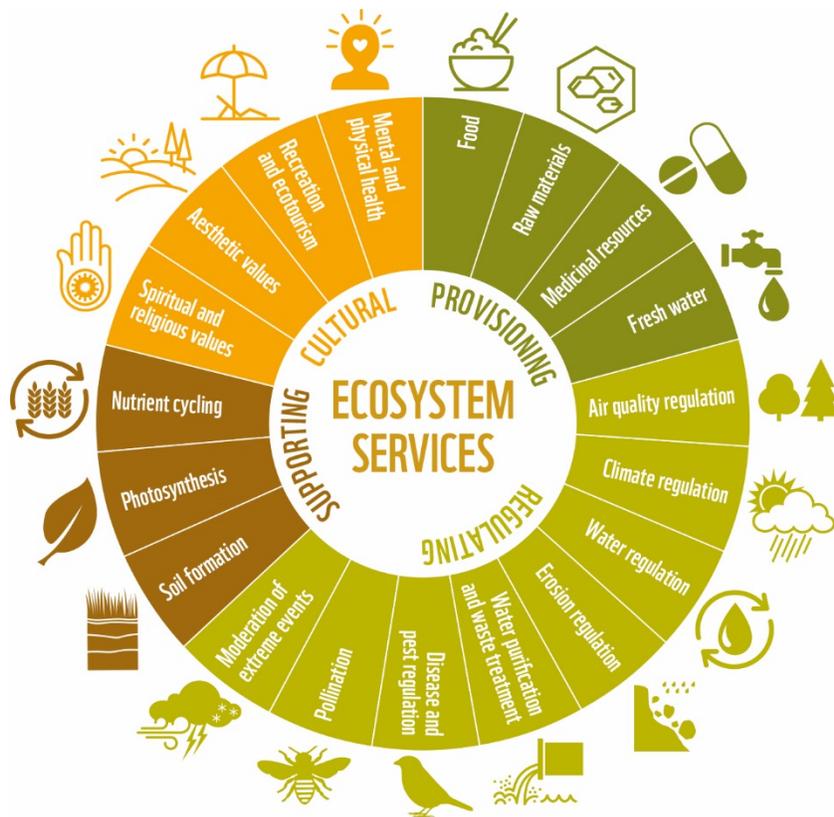


FIGURE 1: ECOSYSTEM SERVICES SOURCED FROM WWF'S LIVING PLANET REPORT, 2018

A fully functioning ecosystem requires far less time and resources to adequately sustain the services it provides. As an ecosystem degrades, function is lost, and extensive modifications may be necessary to lift the ecosystem back into a more intact state. FIGURE 2 describes a state and transition model for an ecosystem, wherein the brown circles represent the same ecosystem, but in different levels of function.

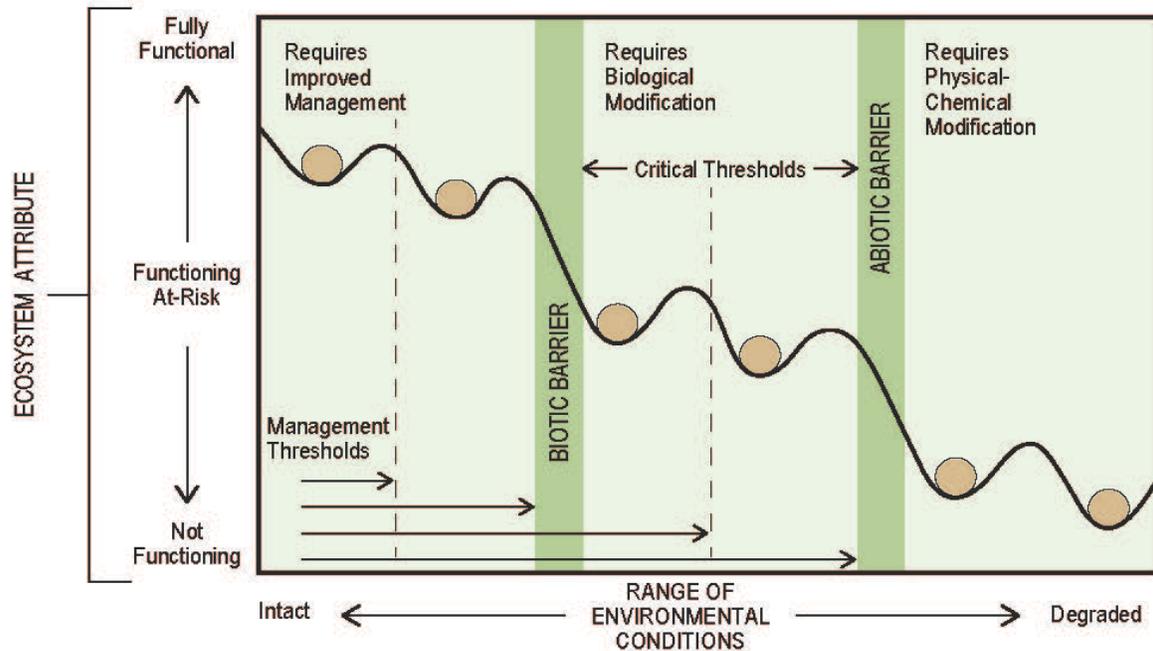
There is a range of environmental conditions that the ecosystem can move through, from intact to degraded (left to right). This in turn, influences the level of function the ecosystem provides (top to bottom). The ecosystems that exist in and

around Erie face increased environmental stressors as more people utilize open spaces and development becomes denser. Examples of environmental stressors include but are not limited to: soil compaction; increased non-native species and weeds; contamination; altered hydrology; and habitat fragmentation. These stressors can move a fully functional, intact ecosystem to a lower level of service if not properly maintained.

Each time the ecosystem transitions to a more degraded state, it requires more effort and resources to restore the ecosystem. If the ecosystem crosses a biotic or abiotic barrier, restoration costs increase substantially, and full recovery may not be possible. An example of a biotic barrier would be the transition from a native species dominated system to an introduced species, such as cheatgrass (*Bromus tectorum*) dominated system. An example of an abiotic barrier could be the introduction or exposure of saline soils that will not support plant life. Proper monitoring and management of the ecosystems around Erie will help ensure residents have highly functioning parks and open spaces and can maximize the ecosystem services offered by those areas for generations to come.

Mature trees (i.e., trees greater than four-inch diameter) provide ecosystem services that are also highlighted in the *Natural Resources and Environment Policy* of the Comprehensive Plan. Mature trees give diverse structure to the landscape, provide wildlife habitat, and provide refuge and amenity to natural area users. Where applicable, large trees will be conserved and incorporated as open space features in future developments.

FIGURE 2: EXAMPLE ECOLOGICAL STATE AND TRANSITION MODEL



The OSMP seeks to minimize impact from development, trails, parks, and facilities on environmentally sensitive areas. The following actions address these areas specifically:

- Identify and preserve Erie’s environmentally sensitive areas including important wildlife habitat, waterways, and visually sensitive areas;
- Develop and adopt a site-specific trail location strategy for Erie’s natural areas to minimize impact to sensitive areas and hazards;
- Establish a strategic land acquisition strategy based on knowledge of significant natural and cultural resources (watershed protection, unique ecological characteristics, and sensitive natural areas deserving protection);
- Limit public access to sensitive areas, such as those managed for significant plant and animal communities, in addition to agricultural production;
- Link natural areas and habitat in corridors of adequate width, both to protect sensitive species and to allow for genetic diversity through species movement; and
- Adhere to policies that protect sensitive areas, such as maintaining a landscape typology database that identifies environmentally sensitive areas; conserving mature trees; and discouraging development in sensitive or hazard areas (i.e., floodplains, geologic hazard, unstable soils, undermined areas, and steep slopes in accordance with the recommendations of the Colorado Geologic Survey, FEMA, and the Office of Mined Lands; *Parks, Recreation, Trails, and Open Space Master Plan Update* (2016).

Erie is currently facing rapid development pressures, which is typical of much of Colorado's Front Range. The Town is currently preparing a *Historic Preservation Master Plan* (HPMP), which will identify key historic and cultural resources within Erie that are protected under federal and state laws and contribute to the Town's historic and aesthetic character. Many of the Town's open space parks include historic infrastructure related to the Town's mining, agricultural, and rangeland history. These landmarks provide unique historic character to Erie's open spaces, and often are key focal points along trails. In addition, maintaining agriculture within open spaces connects the community to local food sources and preserves Erie's rural atmosphere for future generations. Refer to **CHAPTER 6** for more information about how the HPMP may be integrated into this OSMP.

Consistent with the Comprehensive Plan and Master Plan, this OSMP highlights the scenic qualities and rural character of the Town as benefits of its agricultural heritage. Erie's rolling hills, riparian corridors, and western mountain backdrop affords dramatic and stunning views throughout the entire landscape. The OSMP encourages strong visual and physical connections to the surrounding open space and trails network through the following actions:

- Preserve important viewsheds within the community, with a focus on areas with varied topography, such as major landforms and hilltops visible from community gateways and corridors;
- Identify and conserve natural, scenic, and environmentally sensitive areas, including important wildlife habitat, waterways, and visually appealing areas;
- Create and preserve pastoral-scenic views to mountains, plains, and agricultural lands;
- Maintain visual breaks in development and provide a visual separation between individual neighborhoods by increasing the community's open space network;
- Design thoroughfares to follow the natural contours of topographic features, to maximize scenic views, and conserve natural features and vegetation;
- Encourage cluster development patterns to preserve scenic view corridors and preserve natural landscape features, maintaining open space for common use;
- Locate trails along drainage ways to offer access to Erie's most scenic natural creeks;
- Prioritize view corridors, wildlife corridors, and patches of unobstructed or minimally obstructed land (where obstruction refers to overhead utility lines, built structures, and paved surfaces, other than trails);
- Use clusters of native trees and/or shrubs to screen homogeneous expanses of built structures, paved surfaces, or utilities.



Another component of Erie's history and current activities is the extractive industry. The Town is situated within an active oil and gas field, known as the Denver or DJ Basin, and at the same time is committed to protecting its open spaces. Extraction activities continue in open space areas and are expected for years to come in Erie. In many cases, the right to extract minerals under open space properties was leased to third parties, or the mineral rights were otherwise severed from the land, before the Town recognized or purchased the land as open space. Under Colorado state law, whoever holds the right to drill for oil and gas (the mineral owner or lease holder) can extract the minerals and use a portion of the surface above those minerals so long as they make "reasonable accommodation" for the surface owner's activities.

Reclamation of disturbed oil and gas lands is not regulated through a uniform federal act; as a result, returning those lands to their original use prior to disturbance may prove challenging. The Colorado Oil and Gas Conservation Commission (COGCC) has established benchmarks for site reclamation, where "successful reclamation" includes establishment of a self-sustaining native plant community that meets standards for density and forage production, and re-contouring disturbed surface areas to match or blend with the original lands (COGCC 2009). Prominent oil and gas companies in Erie currently implement best reclamation practices in open space areas that include removal of equipment, contaminated soil removal and topsoil replacement, reseeding with native grasses, and monitoring the reclaimed site until it performs according to COGCC standards or those established under an operator's agreement. Upon signatory agreement (from the state inspector or surface rights owner) the land is returned to the surface rights owner for monitoring and long-term management. Despite implementation of best management practices (BMPs), oil and gas reclamation sites are apparent in Erie's open space landscape, as evidenced by sparse vegetation, soil discoloration or deterioration, and high salinity indicators.

Under the OSMP, Erie advises increased protections related to well plug and abandonment activities at the Town's open space properties, to ensure restoration of site stability and ecosystem functions, and return of disturbed lands to their original uses. Mitigation recommendations include:

- Development of operator agreements with oil and gas companies that describe mutually acceptable BMPs and standards for reclamation that appropriately meet Erie's needs for any given open space property (for a specified level of native grass cover, density, vigor, resiliency, and/or diversity);
- Long-term control of highly competitive non-native species and noxious weeds;
- Application of mulch or irrigation if seeds fail due to drought or other extreme conditions;
- Preference for seed mixes composed primarily of site-adapted or species indigenous to the area; and
- Encouragement of interim restoration, which ensures land on a well site that is not being used for production, but has been disturbed, undergoes the reclamation process will production is taking place (recontouring, topsoil replacement, and revegetation).

Open space trails connect neighborhoods within communities and allow for community member interactions, convenient opportunities for exercise, and positive experiences in the natural environment that are essential to human health and well-being. Open space increases physical activity levels, reduces juvenile delinquency, and enhances tourism. Maintaining recreation amenities according to the management actions recommended in this plan can help provide optimal user experiences.

Open space that incorporates educational features and accommodates volunteer programs, such as citizen science, encourage a sense of ownership within the community. Youth engagement and resident participation increases understanding of, and commitment to, environmental stewardship and responsible resource management. For example, a living photolog is a cost-effect management strategy that encourages public participation while helping monitor and inform management actions across open space areas. A photolog is a form of photo sharing and publishing in a similar format of a blog, however, it differs from a blog through the predominant use of and focus on photographs rather than text. Photopoint documentation could easily be incorporated into a volunteer citizen science program and could be established on every open space to assess changes in vegetation communities and wildlife activity. Other public engagement opportunities are discussed in **CHAPTER 5**.

2 ADAPTIVE MANAGEMENT FRAMEWORK AND LANDSCAPE TYPOLOGY



To effectively manage its open space parks, the Town employs various implementation strategies to help administer its programs, monitor progress, and take corrective actions. In general, the implementation process is driven by an adaptive management framework:

- Identifying where the Town conducts management work;
- Highlighting how progress toward achieving management objectives is measured;
- Outlining how corrective actions are taken when performance metrics are not met; and
- Configuring how to monitor, evaluate, and adapt via reporting so actions are documented and available for public consideration.

The following sections describe each of these steps and points of connection with Landscape Typology, which is an important component of OSMP implementation over time.

2.1 Adaptive Management

Erie plans to use an adaptive management framework to achieve its open space goals and increase restoration success for the benefit of the long-term health of open space areas. An adaptive management approach provides a process for acting under uncertain conditions based on the best available science, and re-evaluating and adjusting decisions as more information is acquired. It is a flexible approach that recognizes uncertainties, considers multiple problem-solving strategies, and allows for adjustments to be made along the way. This iterative and interactive process looks for opportunities for more efficient open space management, so Erie can adopt practices that make sense locally while reducing maintenance expenses and responding to potential stressors before they become major issues. Implementation of adaptive management has the potential to reduce uncertainty associated with management actions, provide long-term savings, and improve conservation and management effectiveness (Williams et al. 2009).

Open spaces are complex ecosystems influenced by both people and nature. Any strategy to restore and maintain open space systems needs to address all the factors that affect the health of those lands. An adaptive management program involves a repeating cycle of planning, implementation, monitoring, evaluation, and adjustment (FIGURE 3.). Once land managers evaluate how objectives for open space areas are being achieved, new information gathered from monitoring is used to reassess the situation and develop new strategies, as needed. Then implementation, monitoring, and evaluation occur, and the cycle begins again. Adaptive management provides flexibility in the open space management strategy, allowing adjustments to be made to meet new goals and address challenges as they arise.

Step 1. Plan

Conduct baseline inventories and develop objectives for open space management. The adaptive management process begins with evaluation of open space areas and identification of desired outcomes and milestones specific to different landscape typologies. The general objective is protection and enhancement of natural, cultural, and scenic resources unique to Erie. Land managers can develop site-specific land management strategies and actions to achieve this objective.

Step 2: Implement

Utilize land management strategies to achieve open space objectives. Land managers can implement suitable management strategies based on each open space's special character to achieve objectives through thoughtful land acquisition, proper land stewardship, and sustainable land management.

Step 3: Monitor

Collect data to verify progress toward open space objectives. Monitoring is vital in assessing the progress of open space preservation, maintenance, and establishment, as well as ensuring thresholds of natural variability are not crossed. Monitoring guides, and is guided by, each of the stated goals and objectives of the OSMP.

Since open spaces are adjacent to residential areas, one way to reduce monitoring costs is for involved residents (i.e., citizen scientists) to assist in monitoring efforts. Low-cost tools and technologies can get residents involved in monitoring while raising awareness for the OSMP and objectives.

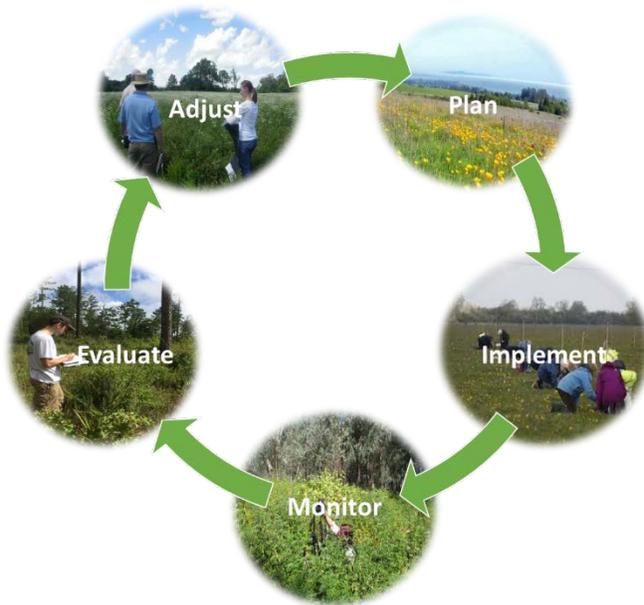


FIGURE 3: ADAPTIVE MANAGEMENT CYCLE FOR ERIE OPEN SPACE

performance of open space areas, based on the outcomes of Step 4. If uncertainties in Step 1 were not resolved, this is the time to redesign or reconsider management approaches based on new findings.

Under an adaptive management framework, no single goal determines success or failure. Rather if certain goals are not being met, additional monitoring is conducted, and decisions are made regarding the need for, and approach to, adjustments. Flexibility is an important component of adaptive management, so potential responses cover a range of possibilities. These potential responses might include additional monitoring, research, consultation with experts, re-evaluation, and restatement of goals and success criteria, and/or active intervention (such as removing invasive plant species).

Step 4: Evaluate

Assess monitoring data to evaluate progress toward open space objectives.

When land managers design the open space strategy and monitoring program, the criteria/targets for success or failure of management efforts will be identified. In this step, land managers evaluate and communicate the data generated by the monitoring plan to create information that can be used to evaluate progress towards achieving open space objectives.

Step 5: Adjust/Adapt

Modify planning and policies to achieve open space objectives.

This final step is what makes adaptive management a useful tool. Evaluation allows managers to adjust their plans and policies to improve the

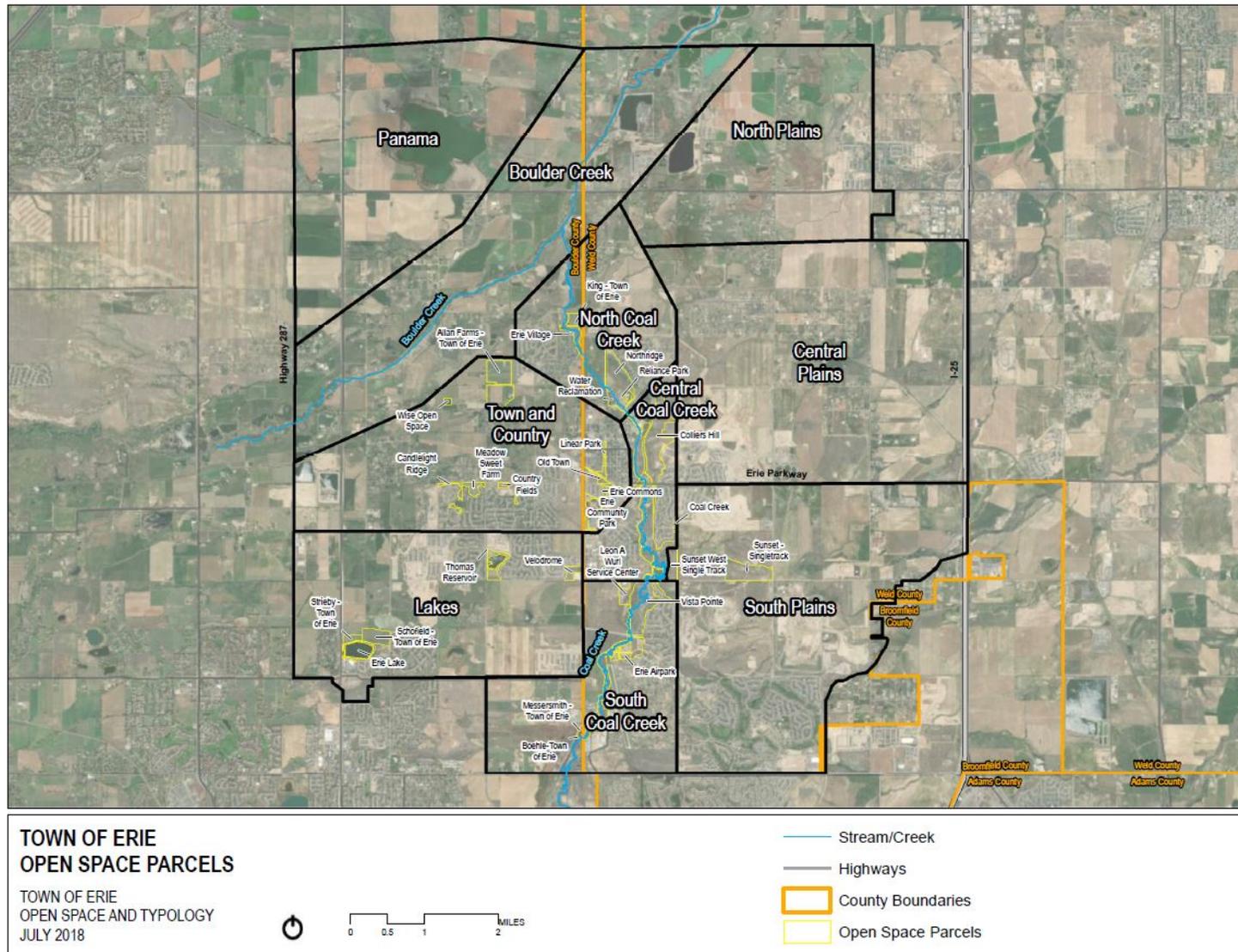
2.2 Management Districts

In terms of where management work is conducted, the Town plans to focus its open space efforts among parcels located within ten distinct Management Districts (Districts) within Erie's planning area. Districts were delineated to reflect the ecological and geological character of the properties within them and will be used as a tool to streamline the Town's maintenance work program and support day-to-day staffing direction. Districts are shown in [FIGURE 4](#) and include:

- **District 1 – Panama:** Includes Panama Reservoir and the surrounding upland agricultural parcels. Generally located east of North 95th Street, west of East County Line Road, south of Oxford Road, and north of Lookout Road.
- **District 2 – Boulder Creek:** Includes a portion of Boulder Creek and the adjacent parcels. Generally located east of North 107th Street, west of County Road 5, south of County Road 16 ½, and north of Jasper Road.
- **District 3 – Town and Country:** Includes upland parcels with agricultural heritage, located among higher-density development. Generally located east of North 107th Street, west of Kattell Street, south of Jasper Road, and north of Erie Parkway.
- **District 4 – Lakes:** Includes the two main water bodies managed by the Town of Erie (Thomas Reservoir and Erie Lake). Generally located east of North 107th Street, west of East County Line Road, south of Erie Parkway, and north of Arapahoe Road.
- **District 5 – North Coal Creek:** Includes parcels located along the northern stretch of Coal Creek. Generally located east of North 119th Street, west of County Road 3, south of State Route 52 (Mineral Road), and north of Evans Street.
- **District 6 – Central Coal Creek:** Includes parcels located along the central stretch of Coal Creek. Generally located east of Kattell Street, west of County Road 3, south of County Road 1 ½, and north of Bonnell Avenue.
- **District 7 – South Coal Creek:** Includes parcels located along the southern stretch of Coal Creek. Generally located east of East County Line Road, west of County Road 3, south of Bonnell Avenue, and north of State Route 7 (West 168th Avenue).
- **District 8 – North Plains:** Includes upland parcels with agricultural heritage. Generally located east of East County Line Road, west of County Road 7, south of County Road 16 ½, and north of State Route 52 (Mineral Road).
- **District 9 – Central Plains:** Includes upland parcels with agricultural heritage. Generally located east of County Road 3, west of Interstate 25, south of County Road 12, north of Erie Parkway.
- **District 10 – South Plains:** Includes upland parcels with agricultural heritage. Generally located east of County Road 3, west of Interstate 25, south of Erie Parkway, and north of State Route 7 (West 168th Avenue).

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FIGURE 4: TOWN OF ERIE MANAGEMENT DISTRICT MAP



2.3 Role of Landscape Typology

Landscape Typology is a process of categorizing parks, open spaces, and other habitats using desktop analysis and field surveys. Collected habitat type data combines semi-quantitative and qualitative data tied to a Geographic Information System (GIS) geodatabase. This multi-disciplinary approach to understanding systems level processes for connectivity and ecological function can be used to prioritize restoration and inform efficiencies in open space management decisions.

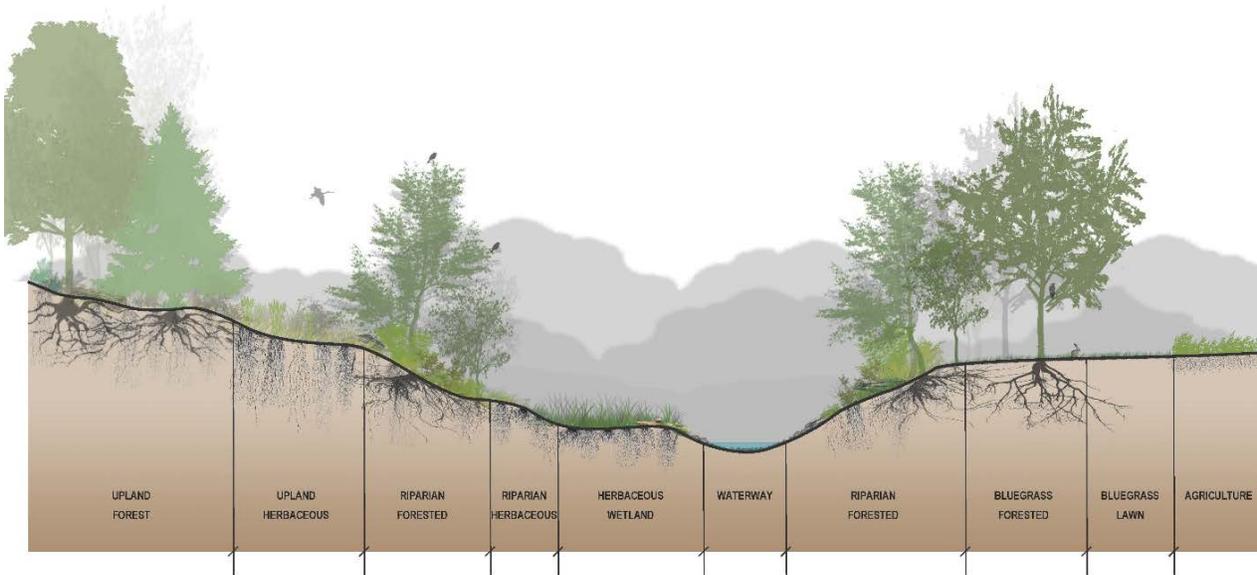
Landscape typology is a process of categorizing parks, open spaces, and other habitats using desktop analysis and field surveys...Landscape typology, in this way is well suited as a baseline for informing management and maintenance actions.

Identification of landscape typologies, habitat sub-types, and associated hydrologic systems, as well as assessing and scoring certain qualitative parameters for each Town of Erie open space will assist in site-specific management decisions. This includes evaluating existing plant communities and wildlife habitat features as well as understanding how the public is utilizing the area and any impacts that may be evident. Landscape typology, in this way, is well suited as a baseline for informing management and maintenance actions. For example, an area of open space consisting of an upland forest typology (FIGURE 5) will be managed quite differently than an area of bluegrass lawn. Furthermore, since landscape typology is inherently linked to the ecological services and principles of the area, this type of baseline information helps provide managers with:

- Data on the area's ecological function;
- Critical ecological thresholds to trigger maintenance actions;
- Understanding of the level of habitat complexity present;
- Opportunities for cost savings for management;
- Prioritization of where to focus increased maintenance activities; and
- Areas for potential restoration.

The Landscape Typology Technical Manual which describes the process for creating the geodatabase and collecting field data, including the full spectrum of landscape types and sub-types as well as data forms, are included in APPENDIX A.

FIGURE 5: EXAMPLES OF LANDSCAPE TYPOLOGY TYPES



2.4 Annual Reporting

The adaptive management framework is a repeating cycle of planning, implementation, monitoring, evaluation, and adjustment, which requires effective reporting. With this understanding, all areas within the management plan will be monitored on regular schedules at least once every three years. A rotating schedule of open space area monitoring is helpful to divide the work load into annual segments as opposed to monitoring all areas in the same year. Area monitoring, evaluation, and adaptation, above all, should be tailored and prioritized based on baseline typologies. Additionally, areas with known degradation and high public use should receive prioritized monitoring and reporting.

3 MANAGEMENT OBJECTIVES



This chapter outlines 13 general management objectives for vegetation communities; wildlife; lakes, ponds, and reservoirs; natural disaster mitigation and response; and infrastructure and amenities. Objectives presented here may be broadly applied to open space properties within Erie’s portfolio, and provide guiding principles to facilitate updates and changes to this plan as the Town grows and diversifies its open space land holdings. This chapter also explains why these objectives matter and how Erie’s open space parcels can benefit from them. Goals and strategies to support the following management objectives are presented here and further discussed in **CHAPTER 5**. To help orient the user of these chapters, **TABLE 1** aggregates the management objectives and provides the specific section numbers as a reference guide.

TABLE 1: QUICK ACCESS USER GUIDANCE FOR TOWN OF ERIE MANAGEMENT OBJECTIVES

Category	Management Objectives	Objectives Description and Rationale	Management Strategies and Actions
Vegetation	1. Enhance Native Plant Communities	Section 3.1	Section 4.1
	2. Protect and Promote Special-Status Plant Species		
	3. Control or Eradicate Invasive and Noxious Weed Species		
Wildlife	4. Enhance Habitat for Wildlife and Pollinators	Section 3.2	Section 4.2
	5. Protect and Promote Special-status Wildlife Species		
	6. Eradicate Non-Native, Invasive Wildlife Species		
	7. Manage Native, Nuisance Wildlife Species		
Lakes, Ponds, and Reservoirs	8. Increase Public Education and Awareness about the Town’s Wildlife	Section 3.3	Section 4.3
	9. Protect Water Quality		
Natural Disaster Mitigation and Response	10. Manage Open Space Areas to Reduce Flood Risks	Section 3.4	Section 4.4
	11. Manage Open Space Areas to Reduce Wildfire Risks		
Public Infrastructure and Amenities	12. Maintain Infrastructure and Amenities for Public Use and Safety	Section 3.5	Section 4.5
Reclaimed Oil and Gas Sites	13. Maintain Reclaimed Oil and Gas Sites	Section 3.6	Section 4.6

3.1 Vegetation

Open space parcels within the Town will be managed to achieve the following plant community-focused objectives:

- Enhance native plant communities;
- Protect and promote special-status plant species; and
- Control or eradicate invasive and noxious weed species.

The rationale for these objectives is detailed in the sections below.

3.1.1 Why Enhance Native Plant Communities?

Plant communities on open space properties will be managed to promote diverse native plant species assemblages in both wetland and upland habitats. Native plant communities promote overall increased ecosystem function by providing habitat and food for native pollinators, birds, and mammals. They support soil development and diverse native soil microbial communities that drive key ecosystem processes, such as nitrogen fixation and decomposition that help cycle nutrients within the environment.

Native plant communities are also often cheaper and easier to manage, because they are adapted to Erie's unique climate and soil conditions and have built-in defenses to native grazers. Additionally, diverse native plant communities populated by multiple types of species are more resilient to short- and long-term environmental change. For example, highly diverse native species assemblages take up resources from the surrounding environment very efficiently, leaving fewer resources available to support the establishment of invasive species or noxious weed species at a site. Managing for native plant communities therefore lowers the overall cost of management by reducing the risk of invasive and noxious weed establishment.

Vegetated buffers are specific managed plant communities located on lands immediately adjacent to wetlands, streams, creeks, rivers, and other waterways. They are directly affected by and impact aquatic environments, are frequently flooded, and therefore support plant communities adapted to life in wet environments. Vegetated buffers provide substantial ecosystem functions and services:

- **Stabilize shorelines and reduce erosion:** Herbaceous and woody plant roots bury deep in the soil and prevent streambanks from eroding, and reduce the quantity of sediment entering streams and wetlands;
- **Reduce flooding:** During storms, buffer areas absorb rainfall and allow rising waters to infiltrate into groundwater. Vegetation slows the flow of water away from these areas. This function reduces the intensity and frequency of floods onto adjacent properties and facilitates underground water storage that can feed streams and wetlands during dry periods.
- **Trap sediment and reduce pollution:** Vegetated buffers help intercept stormwater runoff and filter sediment and pollutants out of flood-flows before they enter wetlands and streams. Many organic pollutants, such as nitrogen and phosphorus, bind to sediment particles. Buffer areas help remove excess nutrients, metals, and other chemicals via plant growth and the biochemical processes in healthy soil microbial communities.

- **Provide habitat:** Buffer areas provide habitat that support diverse species assemblages. In addition, when buffer areas are composed of a large proportion of trees, shrubs, or tall herbaceous vegetation, the canopy will shade wetlands or streams, reducing the water temperature, moderating temperature swings, and increasing the suitability of wetland or stream habitat for aquatic species.

Management strategies and actions to promote plant diversity and the quality and extent of vegetated buffer areas on open space parcels are detailed in **CHAPTER 4**.

3.1.2 Why Protect and Promote Special-Status Plant Species?

Special-status species benefit from federal or state regulatory protection or are designated as global or state conservation priorities. A special-status plant is a designation used in the scientific community for species that are considered sufficiently rare that they require special consideration and/or protection and should be, or have been, listed as rare, threatened, or endangered by the federal and/or state governments (It is possible for a species to be globally common, but be state-listed endangered.). For this reason, these species need urgent conservation actions and require specific recognition and management. Specific management actions for special-status plant species relevant for the Town are presented in **SECTION 4.1.2**.

3.1.3 Why Control or Eradicate Invasive and Noxious Weed Species?

Invasive and noxious weed species are detrimental to the ecological health of habitats located on Erie's open space parcels. Invasive and noxious weed species can limit the biological productivity and ecological functionality of ecosystems. They typically form monocultures and do not promote food and habitat for native wildlife and invertebrates and render open space areas less resilient to change over time. While control and eradication are critical, preventing the occurrence of these species in open space areas in the first place should be a constant priority.

3.2 Wildlife

Erie largely lies in the mixed grass prairie at the edge of the Great Plains. This habitat type is resilient, relatively drought-resistant, and home to many species of wildlife with similar characteristics. In addition to Long's Peak to the west, Erie has opportunities to view songbirds, raptors, and mammals surviving and thriving in close proximity to the Town's residents. Careful coexistence with our native wildlife neighbors requires the understanding and proper management of all areas and habitats.

Although larger-scale wildlife habitats primarily occur along Coal Creek, many other parks, open spaces, and natural areas provide important temporary habitats. This section describes opportunities to manage and improve all of Erie's wildlife habitats, while minimizing conflicts with people and protecting their property.

Open space parcels within the Town will be managed to achieve the following wildlife-focused objectives:

- Enhance habitat for wildlife and pollinators;
- Protect and promote special-status wildlife species;
- Eradicate non-native, invasive wildlife species;
- Manage native, nuisance wildlife species; and
- Increase public education and awareness around the Town's wildlife.

The rationale for each of these objectives are presented in the sections below.

3.2.1 Why Enhance Habitat for Wildlife and Pollinators?

Wildlife Habitat

Healthy wildlife populations and their habitats enrich human communities by providing connection to nature, wildlife-related recreational opportunities, and by serving as an indicator of the health of a community's environment. Functioning wildlife populations can provide important economic services to the human community. Avian and mammalian predators can limit small mammal population expansion into residential and agriculture areas. Bats' insect consumption can reduce populations of insect pests that spread disease to crops and humans. Insect and seed-eating birds are also consumers of insect pests and are important dispersers of native plant species. Scavengers remove decaying carcasses from the landscape, limiting exposure of humans to disease and parasites.

In recognition of the importance of wildlife to Erie, vegetation management will include elements that benefit local wildlife, including special-status species that occur within open space parcels. Wildlife often require specific structural complexity, in addition to enhancement of native vegetation communities, to meet their habitat needs. Bats, owls, bees, and woodpeckers need snags or hollow tree cavities for nesting and day roosting. Downed logs, stumps, and debris or brush piles can provide insect food sources and cover for birds and small mammals. Some species of wildlife rely on specific plant species; for example, Preble's meadow jumping mouse (*Zapus hudsonius preblei*) requires willow species as a component of its habitat. These specific wildlife needs will be integrated into site management actions.

For open space parcels located within 10,000 feet of the Erie Municipal Airport or within the five-mile airspace radius around the Airport, the Town will coordinate with the Airport to ensure habitat enhancement activities are conducted consistent with the Airport's Wildlife Hazard Assessment Plan.

Pollinator Habitat

Pollinators such as bees, butterflies, wasps, moths, and beetles provide a range of ecosystem services including pollination of important agricultural crops and maintaining diversity of native plant species and vegetation communities. The economic benefits of food crop pollination have been estimated to be between \$18 billion and \$27 billion, approximately 15% of which comes from native bees alone (Mader et al. 2011). Pollinator habitat can be created on small, unused parcels of land that is one quarter of an acre or larger, supporting habitat connectivity and pollinator pathways to help maintain their populations and support higher ecological function. By propagating native vegetation

communities, pollinators also contribute to ecosystem services such as nutrient cycling, soil stabilization, and provision of food and habitat to other wildlife species.

Colorado has 946 native bee species. These species vary greatly in size, shape, and color—as well as food source.

Pollinator habitat will be established, where practicable, within the scope of vegetation enhancement and restoration management actions. A Pollinator Management Action Plan

- Colorado State University Extension Office (Arthi and Mason 2017)

that details site preparation, plant species composition and phenology (timing of flowering), appropriate level of protection, and maintenance requirements for pollinator habitat may be completed by the Town to guide the establishment and management of pollinator habitat (see **CHAPTER 6** for more detail).

3.2.2 Why Protect and Promote Special-Status Wildlife Species?

Special-status species are state or federally-listed as endangered or threatened or are included as Colorado species of greatest conservation need (SGCN) in Colorado's 2015 State Wildlife Action Plan (SWAP). SGCN species are grouped into two categories:

- Tier 1 (highest conservation priority) – species that have federal or state listing status, are in need of urgent conservation actions, are species to which the state of Colorado contributes a relatively high level of conservation within their range, that have available conservation implementation actions, and that have high ecological value.
- Tier 2 – species for which it is important to prevent negative population trends or declines in habitat conditions that may lead to listing as threatened or endangered in the future but have a lesser need for urgent conservation actions.

Erie will ensure habitat requirements of special-status wildlife species that occur or potentially occur in the Town are met to the extent practicable in open space parcels.

3.2.3 Why Eradicate Non-Native Invasive Wildlife Species?

Erie recognizes that sustaining native wildlife species populations sometimes requires the control of non-native invasive wildlife species. Non-native invasive wildlife species are those capable of rapidly expanding their population size and spatial extent, sometimes to the detriment of native wildlife. These species can reduce or replace native wildlife populations by outcompeting them for resources, or by preying on native species that have not evolved effective defenses against non-native species. Both cases can disrupt ecosystem food webs if the prey population of other native species is reduced or eliminated or if native predator populations are diminished. Interactions between native and non-native invasive species can result in native species' over-predation on alternate prey sources, overpopulation of native prey populations, and an overall loss of biodiversity.

Non-native, invasive wildlife species targeted for eradication in Erie are American bullfrogs (*Lithobates catesbeianus*) and red-eared Sliders (*Trachemys scripta elegans*).

Why Eradicate American Bullfrogs?

The Town of Erie, in coordination with other agencies and cooperators in the region, is encouraged to implement an American bullfrog (PHOTO 1) eradication program. American bullfrogs are one of the



PHOTO 1: AMERICAN BULLFROG
SOURCE: WIKIMEDIA COMMONS

most ecologically destructive, non-native, invasive vertebrate species in the region (Kraus 2009). Bullfrogs have been documented to eat small fish, young ducklings, sparrows, snakes, wood ducks, and amphibians (Stewart 1967). In particular, they have been documented to eat a Colorado species of concern, the Northern leopard frog (*Lithobates pipiens*) (Leonard et al. 1993), which potentially occurs in Coal Creek. American bullfrogs can also spread the fatal chytrid fungus (*Batrachochytrium dendrobatidis*, or “Bd”), which is responsible for the recent extinction of almost 200 species globally.

Overall, bullfrogs have negative effects on native wildlife due to predation, competition, and transmission of disease.

More than any specific technique, a plan to strategically eliminate isolated populations and disrupt metapopulation dynamics is key for success (Orchard 2011). This requires close collaboration and organization with neighboring land managers whose permanent ponds may provide source populations of American bullfrogs undermining control efforts. The next step is committing to the process of control and eradication, and likely staying with this for three to five years. This level of commitment allows for the removal of existing tadpoles and immigrating bullfrogs, as the metapopulation is being disrupted. Overall, American bullfrogs populate the Front Range and threaten the health of the wetland habitats they encompass.

Why Eradicate Red-eared Sliders?

Native to eastern and central North America, red-eared sliders (PHOTO 2) are a turtle species that have been introduced to aquatic habitats in the west, including Colorado, where they compete with, eat, and spread diseases to native herpetofauna (Jones et al. 2016). Like the American bullfrog, they have been documented to eat frog eggs and frog tadpoles (Cahn 1973, O’Keeffe 2009).



PHOTO 2: RED-EARED SLIDER

3.2.4 Why Manage Native Nuisance Wildlife Species?

Providing habitat for wildlife within and adjacent to human populations can sometimes result in encounters between wildlife and humans or domestic animals that create health and safety risks. To promote wildlife and wildlife habitat enhancement while balancing the needs of the community and the Erie Municipal Airport, the Town will strive to manage native nuisance wildlife species.

Native nuisance wildlife species prioritized for management in the Town of Erie include black-tailed prairie dogs (*Cynomys ludovicianus*; PHOTO 3) and coyotes (*Canis latrans*).

Why Manage Prairie Dog Populations?

Erie recognizes the prairie dog as an essential component of a functioning grassland ecosystem, and that successful maintenance of populations requires minimizing conflicts that occur with humans. Prairie dogs are important prey for native avian and mammalian predators. Through the construction



PHOTO 3: PRAIRIE DOGS

of their burrows and tailings, prairie dogs contribute to ecosystem services such as groundwater recharge, soil erosion regulation and aeration, and provision of forage for herbivores. Prairie dogs can become a nuisance species when they cause expensive damage to agricultural lands and residential landscaping through their vegetation consumption and burrow construction, and because they are susceptible to sylvatic plague outbreaks that, in some cases, can spread to domestic animals and humans via fleas. Erie will ensure black-tailed prairie dog colonies will be maintained on open space parcels and will be actively

managed where they may not cause damage to adjacent private properties or pose a risk to human or domestic animal health.

Why Coexist with Coyotes?

Coyotes are an iconic species of the American west and are admired and despised for their ability to survive. Allowing coyotes to fulfil their role as native, local apex predators in the Town’s parks is beneficial to habitat health. Coyotes provide important ecosystems services and help maintain species diversity. Coyotes provide rodent control as well as population control for other nuisance species including wild turkeys (*Melagris gallopavo*), Canada geese (*Branta canadensis*), white-tailed deer (*Odocoileus virginianus*), and rodents. However, coyotes can also pose a threat to human residents, pets, and livestock, and minimizing human-coyote conflicts is paramount.

3.2.5 Why Increase Public Education and Awareness about the Town of Erie's Wildlife

Education about local wildlife and their need for open space can empower members of the community to actively support wildlife management initiatives, thus building capacity for fulfilling other wildlife management goals. Public education can produce positive management outcomes by reducing human-wildlife conflicts and allowing the community to contribute to wildlife management activities.



PHOTO 4: PASSIVE RECREATION MAY INCLUDE NATURE PHOTOGRAPHY AND DEVELOPING NATURALIST SKILLS

Educating the public about Erie's wildlife resources will provide numerous community benefits. The open space parcels will provide an opportunity for the community to view wildlife in their natural habitat as part of a dynamic ecosystem. Such exposure to, and familiarity with, wildlife at the local scale can foster community interest, pride, and sense of stewardship toward local wildlife species and their ecological needs. Public understanding of wildlife species and their occurrence in easily accessible areas provides wildlife-related recreation opportunities—such as birdwatching, wildlife photography, and developing naturalist skills (PHOTO 4)—to people of diverse ages and abilities. Natural wildlife areas integrated within a populated

area can thus improve the quality of life for people in the community. Erie will educate the public about local wildlife and their habitats in open space parcels.

The success of open space management actions can be enhanced by community cooperation both on, and adjacent to, open space parcels. Incorporating native plant species that wildlife use into landscaping on properties adjacent to open space parcels can increase the habitat availability for species that use them and can provide “stepping stone” habitat for birds and pollinators moving from one open space parcel to another. The public can also be engaged in minimizing conflict with nuisance wildlife, such as prairie dogs and coyotes, when provided with tools to help recognize potential issues and avoid them before they occur.

3.3 Lakes, Ponds, and Reservoirs

Open space parcels within the Town will be managed to achieve the objective of protecting water quality in the Town's managed water resources.

Erie currently manages open space areas along shorelines of Erie Lake and Thomas Reservoir, and both the aquatic and adjacent uplands at Erie Commons Irrigation Pond. The Town's water resources are important assets to the community and provide multiple habitat and recreational benefits.

The 31-acre Erie Lake and 33-acre Thomas Reservoir each store water for the Town. Both are popular fishing spots and Thomas Reservoir is stocked once a year with fish to support recreational fishing opportunities for Town residents and visitors. The two reservoir basins are managed as water resource facilities by the Town's Department of Public Works, Water & Wastewater Division.

Erie Commons Irrigation Pond is used by Parks and Recreation as a non-potable water source for nearby active recreational facilities. Parks and Recreation oversees the water levels in the pond and monitors the pond's water quality.

Management actions adjacent to Erie Lake and Thomas Reservoir will be consistent with management actions taken by Erie Public Works to ensure alignment of goals, objectives, and resources.

3.3.1 Why Protect Water Quality?

Water quality in surface water features is negatively affected by point source and non-point source pollution. Pollution is most often made up of nutrients from fertilizers applied to lawns or agricultural fields but can also include bacteria, like *Escherichia coli* (*E. coli*) from fecal matter of cattle, geese, or dogs, gasoline and oil washing off roads, or heavy metals transported into riverways or lakes via erosion.

Point source pollution comes out of a pipe or other "point" conveyance, while non-point source pollution makes its way into surface water through runoff during storms and in dry-weather conditions, dirt eroding into water and precipitation, among others.

Once water features are polluted, it can limit their use as drinking water sources or recreational sites, and it is expensive and technically challenging to reverse the damage. Taking proactive management actions to boost the capability of the surrounding landscape to prevent transport of pollutants into adjacent water features increases the likelihood of success and keeps maintenance costs down over time. Properly managing water quality can also help limit populations of mosquitos and other disease vectors.

3.4 Natural Disaster Mitigation and Response

Erie strives to promote the safety of its citizens and protection of private property. Open space parcels will therefore be managed to achieve the following natural disaster mitigation and response objectives:

- Manage open space areas to reduce flood risk; and
- Manage open space areas to reduce wildfire risk.

Because these natural disasters have a nexus with land use and management, land use planning and management practices can be tailored to prevent these events from occurring, and minimize the frequency of occurrence, intensity, and duration of these events when they do occur.

3.4.1 Why Manage Open Space Areas to Reduce Flood Risks?

Flooding is the third most common and costly natural disaster in Colorado. Floods can occur when the environment cannot appropriately convey large volumes of fast-moving water through a system or properly allow floodplains to function and slow down flood flows.

Open space areas alongside water features are crucial components of reducing flood risks. While water flows over hardscapes such as pavement and asphalt, floodplains and other open space areas can provide spaces for absorbing water, slowing down flows, and shielding properties via plant uptake and soil infiltration. If open space areas are more low-lying compared to adjacent properties, they can also serve as natural detention basins by storing water for periods of time. Long reaches of Coal Creek are currently incised and do not offer proper floodplain connectivity. Restoration of these areas is a priority for the Town and will assess each opportunity as funding and timing allows.

Overall, restoring, protecting and maintaining the Town's waterways increases nearby property values while enhancing the natural and beneficial flood mitigation functions of these areas.

3.4.2 Why Manage Open Space Areas to Reduce Wildfire Risks?

Wildfires are natural components of many native Colorado habitat types; however, wildfires may pose a risk to Erie's communities located at the wildlife-urban interface (WUI), or those areas where human development abuts natural areas. Open space parcels within the Town can be managed thoughtfully to balance ecological health with community protection and risk management. The Town's wildfire management protocols may be informed by guidelines and best practices outlined in the Boulder County Community Wildfire Protection Plan.

The vegetation management objectives outlined in **Section 3.1** compliment and support the wildfire management objective. For example, cheatgrass (*Bromus tectorum*) is a key combustible fuel plant commonly found on the Town's open space parcels and is also classified as a List C noxious weed in Colorado. This annual grass becomes dry early in the season and is susceptible to ignition from lightning strikes. Because it germinates very quickly, post-fire it can outcompete natives and establish denser and more expansive populations. An annual grass species, the cycle repeats when the grass dies, and its aboveground growth becomes fuel for more fire.

The Town's objective to eradicate noxious weed species from its properties therefore has a co-benefit of addressing the Town's wildfire management objectives similar to several other sections throughout the Management Plan.

3.5 Public Infrastructure and Amenities

Erie's open space properties include limited infrastructure and amenities, which may include trailheads and signage, waste receptacles, benches and picnic tables, parking areas, trails, and dog waste stations.

Open space parcels within the Town will be managed to achieve the following infrastructure and amenities objective:

- Maintain Infrastructure and Amenities for Public Use and Safety.

3.5.1 Why Maintain Infrastructure and Amenities for Public Use and Safety?

Public infrastructure and amenities can be used to connect the community with the natural environment and activate park open spaces. Areas with existing infrastructure and amenities require routine maintenance to provide users exceptional recreation opportunities and experiences.

The Town sees its open space sites as assets around which its vibrant communities can grow. It is vital that Town residents consider their open spaces as peaceful, natural, and safe areas to enjoy Erie's unique native plants and wildlife on their own or with their families.

3.6 Reclaimed Oil and Gas Sites

Within Erie, oil and gas operators manage active sites including habitat surrounding well pads. When the active sites are closed, operators are responsible for plug and abandonment procedures to seal the extraction site, decommissioning the well pad, and implementing reclamation activities to revegetate the well pad to prevent erosion or corruption of the well point seal. Following reclamation, these sites will be transitioned to the Town to implement management activities under this OSMP.

The Town's management objective for reclaimed oil and gas sites is to ensure that the ecosystem functions for the surrounding open space areas are also present on reclaimed oil and gas sites and that there are no threats to human health.

3.6.1 Why Maintain Reclaimed Oil and Gas Sites?

Oil or gas wells are plugged and abandoned at the end of their useful productive life. This typically occurs when there are no longer any resources to extract, or the wellhead becomes a "dry hole." Operators commence plug and abandonment operations by removing well bore casings, tubulars, and other equipment, and placing a cement plug within the borehole per Colorado state regulations. The casing is then cut below grade to support reclamation activities at the surface.

There are special considerations associated with sites containing plugged boreholes that should inform planned site activities. Plugged wellheads can leak oil or vapors, which can negatively affect the local environment if not capped properly or if the integrity of the wellhead is compromised due to human activity.

Former oil and gas properties will be reclaimed prior to transferal to Erie management. Reclamation standards are promulgated by the COGCC and operators are expected to comply with their standards (**Section 1.5**). However, the Town may determine that further reclamation and enhancement activities may be appropriate for a former oil and gas property to improve the ecological function of the site and improve passive recreational opportunities for the enjoyment of the community.

4 STRATEGIES AND GENERAL MANAGEMENT ACTIONS



The purpose of this section is to describe selected strategies and actions the Town will use to achieve its open space management objectives. This section has been organized by management objective type, and generally corresponds to management objectives as presented in **CHAPTER 3**. Actions can satisfy multiple strategies, and strategies can be utilized to achieve multiple objectives, allowing for efficient and effective utilization of Town resources to achieve open space management objectives.

4.1 Vegetation

4.1.1 How to Enhance Native Plant Communities

The Town is committed to enhancing native plant communities located on all open space parcels under its management. General strategies under this objective are to:

- Increase native plant diversity in wetland and upland areas; and
- Maintain a 20-foot vegetative buffer around wetlands and riparian corridors.

Erie will promote the establishment and persistence of native plant communities in its open spaces. Management actions that can be employed to achieve this objective include:

- Seeding;
- Planting;
- Restoration and enhancement;
- Strategic mowing; and
- Restrict driving to roads and trails.

Details for each management action are provided below.

Seeding and Planting

The Town can consult with ecologists to determine the appropriate seed mix and application rates that will yield the highest success per site. Planting established through seedlings or container stock may also be recommended, particularly in riparian buffer areas. Plantings may need temporary irrigation until established. Seeding and planting activities may be completed all at once or in phases, depending on site-specific factors, but should adhere to the Town's engineering standards and specifications (Section 1000, Parks) prior to implementing. These Parks standards and specifications include guidance on site and topsoil preparation, seeding, sodding, and planting specifications, sprinkler systems, park amenities and playground equipment, trails, walkways, and maintenance paths, and parks and trail sign specifications.

Restoration and Enhancement

Restoration and enhancement activities may also be employed, as needed, and include site grading, soil amendments, and restoration of natural hydrologic regimes, to support the growth and establishment of native plant communities.

Strategic Mowing

Strategic mowing is a significant component of enhancing native plant communities and helps support native wildlife strategies covered in [Section 4.2](#). Strategic mowing refers to conducting mowing practices thoughtfully and relative to known ecological and use factors, such as plant reproductive cycles, landscape typology function, wildlife habitat use, site hydrology, recreation, and adjacent land-use. Suggested strategic mowing practices for the Town of Erie to benefit native plants and wildlife may include:

- Limited mowing near wetland and riparian corridors to conserve a 20-foot vegetative buffer;
- Reduction in frequency of mowing and unnecessary mow areas to reestablish native prairie;
- Make an effort to ensure that mow strips are no wider than 3-feet along trails;
- Make an effort to restrict mowing between March 15-August 1 to avoid peak nesting, flowering, and pollination activity;
- Avoid mowing during pollination and seeding period for cool- and warm-season grass species.

These activities may not be applied to all sites managed by the Town, and the scope of these activities will be tailored to site-specific conditions. Additionally, suggested timelines of mowing dates are subject to change given shifts in regional climate patterns influencing plant and wildlife phenology. This is an example of why an adaptive management framework is key and best suited for ecological management.

Restrict Driving to Roads and Trails

Restricting driving practices on open spaces to roads, trails, and designated driving areas will prevent soil compaction and reductions in standing vegetation, preventing the development of bare ground or soil compacted areas.

Overall, these general recommendations have been proven and are supported by several authoritative sources, including the U.S. Department of Agriculture (USDA), The Nature Conservancy (TNC), The Cornell Lab of Ornithology, and the Penn State College of Agricultural Sciences (The Habitat Network 2018, Sullivan and Brittingham 2016).

4.1.2 How to Protect and Promote Special-Status Plant Species

Strategies for protecting and promoting special-status plant species include those stated for native plant communities ([Section 4.1.1](#)).

Management actions specific to protecting and promoting special-status plant species include:

- Educating staff on special-status plant species that may occur in Erie;
- Monitoring open space sites for special-status species presence and habitat quality;
- Enhancing habitat for special-status plant species where applicable; and
- Managing properties to be consistent with the federal Endangered Species Act (ESA), the State of Colorado's Parks & Wildlife (CPW) codes and guidelines, the habitat protection goals of the Colorado SWAP (2015), and state conservation priorities as designated in the Colorado SCGN database.

TABLE 2 lists special-status plant species with ranges that intersect with the Town and may be the focus of management activities. There are no federally-listed Critical Habitats within Erie’s current and proposed open spaces. Only one species is listed in the Colorado State SGCN database and prioritized within the 2015 Colorado SWAP.

TABLE 2: SPECIAL STATUS PLANT SPECIES WITH RANGES WITHIN THE TOWN OF ERIE

Common Name	Scientific Name	Status	SGCN?
Colorado butterfly plant	<i>Gaura neomexicana</i> var. <i>coloradensis</i>	FT, S1, G3	N
Ute ladies'-tresses	<i>Spiranthes diluvialis</i>	FT, S2, G2G3	Y
Western prairie fringed orchid	<i>Platanthera praeclara</i>	FT	N

Key

- FT – Federally Threatened (USFWS)
- S1 – Critically endangered in state (CPW)
- S2 – Endangered or threatened in state (CPW)
- G2 – Endangered throughout its range, threatened throughout its range (Natural Heritage Global Ranks)
- G3 – Threatened throughout its range (Natural Heritage Global Ranks)
- SGCN – Species of Greatest Conservation Need (State of Colorado)

USFWS = US Fish and Wildlife Service

This list of special-status plant species will be periodically reviewed and updated with this planning document to incorporate any changes in regulatory and conservation priorities.

4.1.3 How to Control or Eradicate Invasive and Noxious Weed Species

The Town’s general strategies for invasive and noxious weed species management on its open space properties are to:

- Minimize the presence, establishment, extent, and spread of invasive and noxious weed species on properties to reduce their negative ecological and environmental effects;
- Develop noxious weed management plans for any List A, List B, or List C noxious weed species found on the Town’s open space parcels in accordance with the Colorado Noxious Weed Act;
- Share data with state and local partners on invasive and noxious weed species presence and distribution; and
- Engage with the public to increase awareness of invasive and noxious weed species in their communities to help prevent the spread of new species to the Town.

Management actions that can be employed include:

- Monitoring invasive and noxious plant species occurring on Erie open space;
- Preventing spread of invasive and noxious plant species in Erie’s open space areas; and
- Implementing integrated pest management (IPM) control measures for invasive and noxious weed species present.

Monitoring Invasive and Noxious Plant Species

Invasive and noxious plant species occurring on Erie open space properties and targeted for management actions may include, but are not limited to, those summarized in TABLE 3. This list will be updated as part of this Plan’s adaptive management process (CHAPTER 2) and with regular updates to the Plan.

TABLE 3: INVASIVE AND NOXIOUS WEED SPECIES TARGETED FOR MANAGEMENT ACTION

Class ^a	Common Name	Scientific Name	Growth Form	Growth Site
List A	hairy willow-herb	<i>Epilobium hirsutum</i>	Perennial forb	Riparian corridors, wetlands, ditches
List A	purple loosestrife	<i>Lythrum salicaria</i>	Perennial forb	Streambanks, ditches, wet meadows
List B	Canada thistle	<i>Cirsium arvense</i>	Perennial forb	Rangelands, roadsides and ditches, riparian zones
List B	common teasel	<i>Dipsacus fullonum</i>	Perennial forb	Disturbed uplands and wetlands
List B	diffuse knapweed	<i>Centaurea diffusa</i>	Biennial forb	Disturbed, overgrazed uplands and rangelands
List B	Eurasian watermilfoil	<i>Myriophyllum spicatum</i>	Perennial forb	Submerged in ponds and lakes
List B	hoary cress	<i>Cardaria draba</i>	Perennial forb	Disturbed uplands, roadsides, fields
List B	leafy spurge	<i>Euphorbia esula</i>	Perennial forb	Rangelands, pastures, and riparian zones
List B	musk thistle	<i>Carduus nutans</i>	Biennial forb	Disturbed uplands, ditches, and roadsides
List B	Russian knapweed	<i>Acroptilon repens</i>	Perennial forb	Disturbed uplands, roadsides, and riparian zones
List B	Russian olive	<i>Elaeagnus angustifolia</i>	Perennial shrub or tree	Riparian zones, floodplains, and open areas with moist soils
List B	Scotch thistle	<i>Onopordum acanthium</i>	Biennial forb	Disturbed uplands, ditches, and roadsides
List C	cheatgrass	<i>Bromus tectorum</i>	Annual grass	Rangelands
List C	common burdock	<i>Arctium minus</i>	Biennial forb	Disturbed uplands, ditches, and roadsides
List C	common mullein	<i>Verbascum thapsus</i>	Biennial forb	Disturbed uplands, ditches, and roadsides
List C	field bindweed	<i>Convolvulus arvensis</i>	Perennial forb or vine	Cultivated areas, roadsides, and pastures
List C	poison hemlock	<i>Conium maculatum</i>	Biennial forb	Riparian zones, ditches, disturbed uplands
List C	puncturevine	<i>Tribulus terrestris</i>	Annual forb	Disturbed uplands, roadsides, and cultivated areas
List C	Redstem filaree	<i>Erodium cicutarium</i>	Biennial forb	Dry pasture lands, landscapes, and turfgrass

Notes

^a Colorado Noxious Weed Act regulatory class designation (Colorado Department of Agriculture 2018)

List A Species – Designated for eradication by the state of Colorado

List B Species – Noxious weed management plans will be developed and implemented in consultation with the State of Colorado, the state noxious weed advisory committee, local governments, and key stakeholders, with the goal of stopping the spread of List B species.

List C Species – Noxious weed management plans may be developed and implemented in consultation with the State of Colorado, the state noxious weed advisory committee, local governments, and key stakeholders. Management goal is to provide additional education, research, and biological control resources to jurisdictions that choose to require management of List C species.

Preventing the Spread of Invasive and Noxious Weed Species

As mentioned, prevention is the most effective invasive and noxious plant species management strategy. Adaptive management strategies and appropriate design reduces the capacity for weed species to successfully establish into an appropriately functioning ecosystem. Although prevention, through adaptive management, is the most effective strategy for pest management, pests and invasive species will still need to be dealt with as they appear within the ecosystem.

Integrated Pest Management (IPM)

An IPM approach can be an effective way to control noxious and invasive plant species populations should they be found or begin to populate open space parcels. Control options may include cultural, mechanical, biological, or chemical-based strategies as described below:

Cultural Control

Cultural control is the use of management activities that reduce weed habitat or disrupt mechanisms that support the development of weed habitat due to enhancement of desired conditions. Examples include adjusting irrigation practices to limit water availability, or tilling weeds and replacing them with native plant species.

Mechanical Control

Mechanical control uses physical methods or mechanical equipment and tools to control weeds. Strategic mowing to reduce or prevent weed seed development is the most prevalent for large acreage, while using a string trimmer or hand-pulling and bagging seed heads is better utilized on smaller acreage.

Controlled grazing by goats and other ruminants (PHOTO 5) is another mechanical control strategy that can be more effective than using mechanical equipment, depending on site characteristics. Goats consume seeds as well as foliage when they graze, reducing the ability of grazed areas to reseed themselves, and provide organic fertilizer to grazed lands. Goats can typically reach areas difficult for mowers to access, such as rocky terrain, forests, or wet areas adjacent to streams. Goat grazing is less labor-intensive than mowing, emits lower greenhouse gases, and requires no maintenance or replacement parts.



PHOTO 5: GOATS CAN BE USED AS PART OF A CONTROLLED GRAZING PLAN

Biological Control

Biological controls include the introduction or enhancements of natural enemy populations to target weed species. Biological controls are best used on large expanses of land that can support multiple life cycles of the biological control's population. Erie does not currently utilize biological control strategies on its open space properties but reserves the right to review and reconsider as appropriate.

Chemical Control

Chemical control should be used as a last resort to the aforementioned alternative practices. When chemical control of weeds is necessary, non-restricted use pesticides are suggested, but the target species needing controlled will ultimately determine which pesticide is used. Minimizing the use of toxic products, pesticides, and chemicals meets Erie’s comprehensive sustainable design goals.

The Town has the flexibility to implement these strategies based on site-specific conditions.

4.2 Wildlife

4.2.1 How to Enhance Wildlife and Pollinator Habitat

Erie will rely in part on management strategies used to promote native vegetation; lakes, ponds, and reservoirs; and flood management to improve and maintain wildlife habitat. Additional management strategies and actions specific to wildlife habitat species’ needs, such as maintaining and creating structures and pollinator habitat, will also be implemented.

Strategies that can be employed to enhance wildlife and pollinator habitat (PHOTO 6) include:

- Habitat restoration;
- Pest management; and
- Habitat connectivity.

These strategies and actions are summarized in detail below.

Habitat Restoration

Habitat restoration efforts focus on maximizing habitat quality, availability, and function for wildlife and pollinators. Actions to support habitat restoration efforts include:

- **Vegetated Buffer Establishment:** Buffer strips of trees, shrubs, or grasses planted along open space parcel boundaries help control pollutants and erosion. Buffer establishment around wetlands and riparian corridors, included as a management action to enhance native plant communities, will also benefit wildlife. Management should employ strategic mowing and strive for a vegetative buffer width of 20 feet, where possible.
- **Cover Crop Planting:** Grasses, legumes, and forbs seeded in open areas of parcels help ensure complete vegetation cover for winter wildlife habitat and food availability. Design for minimal weed competition, but the inclusion, where appropriate, of beneficial “weeds” (e.g., milkweed as monarch butterfly [*Danaus plexippus*] host plants). Include overgrown bunch grasses for bumble bee nesting sites.



PHOTO 6: BUMBLEBEE ON A CONEFLOWER

- **Structural Element Maintenance and Creation:** Where feasible and consistent with wildfire management and public safety priorities, natural structural features such as hollow trees, snags, and down wood can be retained or established within appropriate open space parcels to provide wildlife habitat. Additional human-made structures such as bat roosting boxes and bird nest boxes / platforms can be erected in parcels likely to contain species that require them.
- **Streambank and Wetland Restoration:** Streambank and wetland management actions for flood control that reduce erosion and minimize sedimentation improve the quality of wildlife riparian, wetland, and upland breeding and foraging habitat.
- **Native Prairie Restoration:** Management actions to enhance native plant communities and minimize noxious weed species that include native prairie habitat benefit prairie-dependent wildlife species.
- **Pollinator Habitat Creation:** Areas of native vegetation enhancement create a full season, continuous, diverse wildflower bloom that will attract and maintain pollinator species as well as beautify the landscape. Pollinator habitat can be created on small, unused parcels of land that is one quarter of an acre or larger. Plants that attract and benefit pollinator species can be planted and maintained in open space parcels.

Because pollinator habitat is a critical resource for both ecological function and economically important crops, the Town may consider development of a specific Pollinator Habitat Management Plan to guide strategic habitat restoration siting and species-specific promotion. Please see **CHAPTER 6** for more information.

Pest Management

Reduction in noxious and invasive weed populations, or control of competitive invasive wildlife species enhances wildlife habitat. Specific actions to take to achieve pest management include:

- **Strategic Mowing:** Mowing for vegetation and wildfire management will be conducted as practicable before March 15th and after August 1st to protect ground-nesting birds and beneficial insects and restore native prairie habitat. Additionally, no-till areas should be included to preserve bee nest sites.
- **Mechanical Control:** Mechanical methods to control/eradicate invasive and noxious plant species, such as hand-pulling, weed-whacking, or goat grazing, will benefit wildlife and pollinators by minimizing their exposure to lethal and sub-lethal toxicants, such as certain chemical pesticides.
- **Invasive wildlife species eradication:** Bullfrogs and red-eared sliders threaten native wildlife through competition for resources and direct predation. Eradication efforts (discussed in **Section 4.2.3**) promote use of open space parks by native wildlife.
- **Chemical Control:** Limited use of herbicides, pesticides, or insecticides may be used to control noxious weeds, invasive or nuisance wildlife species, or pest invertebrates such as mosquitos, weevils, or emerald ash borer.

Increase Habitat Connectivity

Connectivity for wildlife is important because wildlife travel throughout the year to mate, reproduce, and obtain vital resources (Forman and Alexander 1998). Habitat fragmentation can have multiple negative effects on wildlife. It can affect reproduction, dispersal, genetic isolation, and community structure (Clevenger et al. 2003). Within Erie, the Coal Creek corridor provides connectivity between native patches of habitat. Coal Creek runs south to north on the eastern side of the Town. It provides a natural movement corridor for many wildlife, including deer, coyotes, and potentially mountain lion (*Puma concolor*).

Management actions Erie can take to promote habitat connectivity include:

- Management of native plants and trees along Coal Creek; and
- Design and placement of diverse habitat structures to increase habitat complexity and biodiversity on open space sites.

In addition, future open space acquisitions will be made strategically to optimize wildlife habitat connectivity throughout the Town, in alignment with the vision and goals outlined in the Parks, Recreation, Open Space, and Trails Master Plan Update (2016). Priority considerations for future property acquisitions include connectivity to other open spaces, and proximity to residential areas, and the Erie Municipal Airport.

4.2.2 How to Protect and Promote Special-Status Wildlife Species

Colorado's 2015 SWAP identifies native species of SGCN in Colorado. These species are grouped into two categories, Tier 1 and Tier 2, where Tier 1 is the highest conservation priority. Criteria for Tier 1 include species: that have federal or state status, are in need of urgent conservation actions, that contribute to the overall conservation of Colorado, that have available conservation implementation actions, and high ecological value.

In general, management strategies and actions for protecting and promoting special-status wildlife species include those stated for native plant communities (Section 4.1.1) and general wildlife and pollinator habitat (Section 4.2.1).

Management strategies specific to special-status wildlife species promotion include:

- Educating staff on the special-status wildlife species that may occur in Erie;
- Monitoring open space sites for special-status species presence and habitat quality;
- Enhancing habitat for special-status species where applicable; and
- Managing properties to be consistent with the federal ESA, CPW codes and guidelines, the habitat protection goals of SWAP (2015), and state conservation priorities as designated in the Colorado State SCGN database.

TABLE 4 lists special-status wildlife species that occur or potentially occur in the Town of Erie.

TABLE 4: SPECIAL-STATUS WILDLIFE SPECIES WITH POTENTIAL TO OCCUR IN THE TOWN OF ERIE

Common Name	Scientific Name	State Wildlife Action Plan Priority Tier	Federal Status	State Status
Fish				
Plains topminnow	<i>Fundulus sciadicus</i>	1	--	--
Common shiner	<i>Luxilus cornutus</i>	1	--	ST
Amphibians				
Northern leopard frog	<i>Lithobates pipiens</i>	1	--	SC
Reptiles				
Milksnake	<i>Lampropeltis triangulum</i>	2	--	--
Common gartersnake	<i>Thamnophis sirtalis</i>	2	--	SC
Birds				
Burrowing owl	<i>Athene cunicularia</i>	1	--	ST
American bittern	<i>Botaurus lentiginosus</i>	2	--	--
Swainson's hawk	<i>Buteo swainsoni</i>	2	--	--
Mountain plover	<i>Charadrius montanus</i>	1	--	SC
Northern harrier	<i>Circus cyaneus</i>	2	--	--
Bobolink	<i>Dolichonyx oryzivorus</i>	2	--	--
Prairie falcon	<i>Falco mexicanus</i>	2	--	--
Bald eagle	<i>Haliaeetus leucocephalus</i>	2	--	SC
Loggerhead shrike	<i>Lanius ludovicianus</i>	2	--	--
Lazuli bunting	<i>Passerina amoena</i>	2	--	--
American white pelican	<i>Pelecanus erythrorhincus</i>	2	--	--
Mammals				
Black-tailed prairie dog	<i>Cynomys ludovicianus</i>	2	--	SC
Hoary bat	<i>Lasiurus cinereus</i>	2	--	
Little brown myotis	<i>Myotis lucifugus</i>	1	--	
Olive-backed pocket mouse	<i>Perognathus fasciatus</i>	1	--	
Preble's meadow jumping mouse	<i>Zapus hudsonius preblei</i>	1	FT	ST

Key

FT - Federally Threatened

ST - State Threatened

SC - State Special Concern

1 - Species of Greatest Conservation Need (SGCN) Tier 1

2 - SGCN Tier 2

Management actions to support special-status species' general habitat requirements (Cornell Lab of Ornithology 2018 and Hammerson 1999) include:

- Maintenance or restoration of native prairies, woodlands, wetlands, and streams in open space parks to promote maximum ecological function, habitat quality, and habitat access;
- Installation or maintenance of structural habitat elements, such as large woody debris, boulders, and bat boxes, to enhance habitat quality;
- Monitoring for, and recommended eradication, of bullfrogs and red-eared sliders to reduce competition with native special-status wildlife (see [Section 4.2.3](#));
- Management of healthy prairie dog populations (see [Section 4.2.4](#));
- Strategic mowing to be protective of species nesting behavior; and
- Monitoring of population numbers, site use, and behavior.

4.2.3 How to Eradicate Non-Native Invasive Wildlife Species

Eradicate American Bullfrogs

Successful American bullfrog eradication depends on the development of a plan to strategically eliminate isolated populations and prevent subsequent colonization from other areas (Orchard 2011). This strategy requires close collaboration with neighboring land managers whose permanent ponds may provide source populations of American bullfrogs to areas where they have been eradicated, thus undermining control efforts. Complete eradication can require at least three to five years of ongoing removal of immigrating bullfrogs and existing tadpoles. Open space parcels that provide habitat for native wildlife, especially Northern leopard frogs, will be prioritized for American bullfrog control. Parcels with low connectivity to other water bodies should also be targeted. Overall, American bullfrog removal is a multi-year, geographically strategic effort.

Management actions that can be employed to achieve this objective are summarized in [TABLE 5](#).

TABLE 5: BULLFROG ERADICATION ACTIONS

Technique	Description
Dipnet and Hand-capture	Use hands and/ or a long-handled net to capture individual frogs and tadpoles. Best accomplished at night while spot-lighting individual frogs.
Seine	Drag a seine through smaller water bodies, with less densely-populated vegetation, attempting to catch all life stages of bullfrogs. This technique is not target-specific and native bycatch should be promptly returned to the water body.
Firearms	This technique must comply with local and wildlife ordinances to ensure public safety. Firearms allow quick dispatch of adult bullfrogs on or near shorelines that may otherwise be out of reach of dip nets and hand-capture.
Electro-fishing (Electro-frogging)	Adapted from electro-fishing, use a manufactured attachment specifically designed to stun and/ or kill frogs. Use at night with spotlights to target individual bullfrogs.
Impaling (Gig and/ or Hawaiian Sling)	A traditional method of take for bullfrogs is impaling with a pronged-gig or Hawaiian sling. Use a spotlight at night to target individual. The sling should be used on frogs observed under the surface of ponds/ wetlands.
Chemical Treatments	Use with caution and consideration of bycatch. Chemicals are most often non-discriminatory and kill all wildlife within a target water body. Chemical treatments for bullfrogs are largely experimental at this time; however, some pesticides are known to kill bullfrogs

Eradicate Red-eared Sliders

Introduced red-eared sliders should be managed in open space parcels where they are deemed a threat to native special-status species. It is recommended Erie eliminate red-eared sliders from all Erie properties, prioritizing sites with high native species diversity.

Management actions that can be employed to achieve this objective include:

- Lethal Control:** In water bodies, use baited hoop-net traps placed with 25% of the trap above the water. Trapped turtles will be able to breathe in the traps until collected and euthanized by Erie staff or contractor.
- Public Education:** Town residents will be encouraged to avoid releasing pet red-eared sliders to ponds and water bodies, and instead to relocate them to other homes as pets. Releasing pets to the wild can transmit diseases to native wildlife and should always be avoided.

4.2.4 How to Manage Native, Nuisance Wildlife Species

Control Prairie Dog Populations

Black-tailed prairie dog populations should be maintained in open space parcels as a component of a functional ecosystem to the extent they do not become a nuisance on the open space parcels or adjacent areas.

Strategies to support control and management of prairie dog populations include:

- Determine zones of core prairie dog habitat, reduction, or exclusion;
- Manage black-tailed prairie dogs and their towns in consideration of public health; and
- Manage for healthy ecosystems considering associated plants and wildlife.

Because both prairie dog and human populations are dynamic and constantly changing, regular monitoring will be needed to allow management directives to respond to changing needs. As feasible, management actions will prioritize preventative and non-lethal control methods depending on the site-specific likelihood they will conflict with open space management goals and the human community.

TABLE 6 provides a description of prairie dog management actions. It shows a list of options; not all actions may be necessary at each site and the actions utilized should respond to the specific needs of both that site and that prairie dog town.

TABLE 6: BLACK-TAILED PRAIRIE DOG MANAGEMENT ACTIONS

Management Actions	Description
Inventory and Monitoring	Routinely assess population health by mapping towns and monitoring activity.
Fumigation	Tightly regulated chemicals used to euthanize prairie dogs.
Relocation to Support Other Prairie Dog Populations	Trapping from high-density prairie dog populations and moving to low density or former populations. General public and ecosystem impacts should be considered.
Relocation to Support Black-footed Ferret Management	Prairie dog towns growing at unsustainable rates for available resources could be trapped and donated to the National Black-footed Ferret Center in Carr, CO.
Barriers	Exclusion barriers (often 24" high and 12" to 24" deep) provide grassland habitats to recover from grazing pressure by prairie dogs. Barriers may also be used to protect private landowner property.
Plague Management	Sylvatic plague may be transmitted to prairie dogs, pets, and people from infected fleas within a prairie dog town. To prevent this, dusting with an insecticide powder may be necessary.
Education and Outreach	Educating the public about prairie dogs, their towns, and associated plants and wildlife will empower people to make better decisions in reducing conflict and appreciating this iconic species. Reinforcing the need for prairie dog population health will contribute to overall area ecosystem health.

CPW enforces wildlife regulations, including those for black-tailed prairie dogs. Control of the species through chemical treatments is tightly regulated by Colorado's Department of Agriculture. Local ordinances and rules may apply with Boulder and Weld counties regarding protection or development of prairie dog towns. Chemical treatments will be applied when deemed necessary, and implemented in compliance with all relevant federal, state, and county regulations.

Coexist with Coyotes

Coyotes will be managed to balance the needs of the community with the proper ecological function of the Town's open space parcels. Erie will work in partnership with the community to address nuisance coyote individuals or populations as needed.

"Hazing is a method that makes use of deterrents to move an animal out of an area or discourage an undesirable behavior or activity. Hazing can help maintain a coyote's fear of humans and deter them from backyards and play spaces."

Strategies that will be employed by the Town to achieve this objective include:

- Humane Society

- Habitat modification and management;
- Implement lethal control (only when necessary); and
- Increase public education and outreach around coyotes.

For example, one option to work with the community and increase awareness is to establish a coyote outreach and education team or task force that plans and implements public engagement events to ensure nuisance coyotes are reported and corrective actions are implemented as-needed. The Town may also consider working with this team to prepare a comprehensive Coyote Management Plan that provides specific targets and thresholds based on best practices in wildlife management, community input, and site-specific data. The Coyote Management Plan would also identify when it is necessary to implement lethal control and how that is funded, conducted, and reported.

The next sections expand upon the three strategies listed above.

Habitat Modification and Management

These native dogs act immensely different than the pets we bring into our homes. As such, using knowledge of their biology is imperative to benefit habitats and our protection.

- **Habitat/Food:** Coyotes are opportunistic omnivores. Coyotes generally eat rodents such as mice, voles, rabbits, and prairie dogs. Coyotes will also opportunistically eat roadkill, berries, and fruit.
- **Life History:** Coyotes are generally crepuscular (active at dawn and dusk). In urban/suburban environments they generally shift to nocturnal behavior to avoid humans. Home ranges vary, but research indicates they occupy two to five square miles. Transient coyotes can occupy larger home ranges. Coyotes breed once a year and usually give birth to four to seven pups in April or May. Coyote dens can range from open spaces to rock outcrops and underbrush (The Humane Society of the United States).

Open space parcels located within neighborhoods or near key recreational areas will be maintained to limit the attractiveness of the site to coyotes. This may include the following management actions:

- Strategic mowing to create visual buffer between residences and open spaces; and
- Keeping brush piles and shrubs away from high-use residential areas.

Implement Lethal Control Actions (only when necessary)

The Town works with its internal and external partners to implement lethal control when coyote individuals or populations threaten the health and safety of the community.

As stated in Colorado Statute 33-6-107(9) and Wildlife Commission Regulations (WCR) 312(C), WCR 323, WCR 1000(A)(6), WCR 17122(C), WCR 17123(A) , and WCR 17141(A), if coyotes are causing damage to crops, real or personal property, or livestock - a person (or any employee or agent of the landowner) may hunt, trap, or take coyotes on private lands owned or leased by the person without securing a license to do so.

However, the Town's municipal code prohibits the lethal take of wildlife in any parks or recreation facilities by members of the public (Municipal Code 7-6-5(O)); Town residents should therefore rely upon Town staff, CPW, USDA, or other licensed contractors to implement lethal control measures against coyotes. This has an added benefit of ensuring the correct coyote individuals are dispatched and that population levels remain sufficient to ensure proper food web dynamics on open space sites. As lethal control methods can be costly and controversial among the public, it is always best to coordinate with Town management staff when an issue arises.

Increase Public Education and Outreach Around Coyotes

Education is important to allow residents to make appropriate decisions regarding their safety and managing their property and pets. Education involving food attractants, taking precautions with pets, and creating tolerance of normal coyote behavior, are all important aspects to share with the public and are examples of an indirect coyote management strategy. The following public education and engagement management actions are recommended to help raise awareness of coyotes in the Town of Erie and throughout its open space areas:

- 1.** Designate a Town of Erie staff member to lead a coyote outreach and education team.

Through an organized public outreach and education effort, Erie can monitor as well as inform the public of the current state of coyote presence in the Town. With the help of a dedicated staff lead, the Town can develop coyote education and outreach materials as well as create and host a coyote reporting platform for residents. The reporting platform could consist of a coyote hotline or online reporting form that the public can access to report and view any coyote-human interactions or known den sites.

2. Coordinate with CPW on a community-based coyote hazing program:

Because coexistence among coyotes and humans is the goal, the most successful coyote hazing programs are those that involve residents and volunteers. Hazing is a method that makes use of deterrents to move an animal out of an area or discourage an undesirable behavior or activity. Hazing can help maintain a coyote's fear of humans and deter them from backyards and play spaces. Erie staff will be coordinating with CPW who will lead the community hazing program within the Town.

The purpose of creating and training a volunteer hazing team in Erie are to accomplish the following goals:

- Reverse the habituation of coyotes to people;
- Discourage coyotes from entering public areas;
- Discourage coyotes from approaching people and pets;
- Empower residents by giving them tools to use when they encounter a coyote, thereby reducing their fear of coyotes; and
- Increase awareness about coyote behavior among residents and involve the community in coyote management efforts.

3. Reduce and remove food attractants.

Residents, businesses, and the Town should eliminate intentional or unintentional coyote feeding whenever possible. When food attractants are plentiful in a neighborhood, there are increased risks of coyote-human interactions. For this reason, food attractants should be properly managed and/or eliminated. Common sources of residential food attractants are bird feeders, especially those that are unkempt and placed low to the ground, unsecured compost piles, unattended pet food and water bowls, unsecured garbage cans, and fallen/rotting fruits.

Because of the scientific, legal, political, and administrative complexities associated with coyote management, the Town may seek to develop a comprehensive Coyote Management Plan in the future to provide holistic guidance on how to minimize human-coyote conflict. Please see **CHAPTER 6** for more on the specifics of a Coyote Management Plan.

4.2.5 How to Educate and Engage the Public about Local Wildlife Species and Habitats that Occur in Open Space Parcels

As a key wildlife stewardship and management strategy, the Town will employ public education and engagement actions to empower residents with knowledge and to help appropriately manage wildlife in and around their homes. Erie will develop a variety of educational resources that provide guidance for community contribution to local wildlife conservation and management.

Management actions that can be employed to achieve this objective include:

- Installing interpretive kiosks or displays at trailheads or other open space access points;
- Hosting wildlife-related information and links to additional resources on the Parks & Recreation Department website; and
- Distributing the general wildlife recommendations captured in **TABLE 7** to residents.



PHOTO 7: POLLINATOR HABITAT WITH EDUCATIONAL SIGNAGE SOURCED FROM BUREAU OF LAND MANAGEMENT

Providing illustrations and descriptions of common wildlife species that may be encountered in the respective parcels along open space public access points is a helpful way to educate residents and users of the area (PHOTO 7). As appropriate, these displays could also contain web-based resources with links to local, state, and federal websites that provide additional information about wildlife. It is recommended that display content

include contact information for the Parks & Recreation Department, and a weather-protected message board for posting relevant open space area announcements or public events as needed. The wildlife recommendations for property owners in TABLE 7 could also be posted or provided as an educational one-pager.

TABLE 7: WILDLIFE RECOMMENDATIONS FOR PROPERTY OWNERS

Wildlife in your Backyard	Wildlife Conservation and Management Tips
Habitat Enhancement	
Pollinators (Insects: including butterflies, moths, and bees)	<ul style="list-style-type: none"> ● Avoid pesticide use ● Strategic mowing ● Keep flowering plants throughout the season ● Reduce use of cool season grasses ● Plant native, low water plants
Birds	<ul style="list-style-type: none"> ● Reduce use of cool season grasses ● Plant native plants and shrubs, low water plants ● Plant fruiting shrubs ● Plant winter cover (evergreen trees/shrubs) ● Avoid mowing and trimming between March 15 - August 1
Conflict Avoidance and Minimization	
Coyotes	<ul style="list-style-type: none"> ● Mow on the outer edge of property to reduce/eliminate cover for hiding ● Pick up and secure trash and other food attractants ● Learn to safely and properly haze
Prairie Dogs	<ul style="list-style-type: none"> ● Keep pets away from prairie dog towns (prairie dogs can transmit plague to dogs) ● Consider preventative flea treatment for pets

4.3 Lakes, Ponds, and Reservoirs

Erie Parks & Recreation Department is charged with the management of uplands and shorelines adjacent to Thomas Reservoir and Erie Lake, and with monitoring and management of water quality in a department irrigation pond located between Coal Creek and Sunset West Single Track. Lake, pond, and reservoir actions may be implemented in coordination with the Town of Erie Public Works and Water Department.

Management strategies protective of water quality include:

- Restoration to enhance vegetation communities on shorelines and adjacent uplands;
- Shoreline stabilization efforts to limit erosion into waterbodies;
- Monitoring for invasive aquatic plant species; and
- Implementation of water quality management actions.

Management actions that may be employed by the Town of Erie Parks & Recreation Department to achieve this objective include:

- Limiting the use of fertilizers on lawns and agriculture fields;
- Educating the community about the importance of proper fertilizer application; and
- Avoiding mowing near wetland and riparian corridors to conserve vegetated buffers.

Erie will monitor water retention facilities for visible water quality impacts and notify applicable responsible parties as needed.

4.4 Natural Disaster Mitigation and Response

4.4.1 Floodplain Management: How to Manage Open Space Areas to Reduce Flood Risks

While open space parcels provide varied opportunities for recreation and agriculture, they also serve the important function of maintaining undeveloped areas and floodplains that mitigate flood damage to nearby homes and infrastructure (CWCB 2013).

Flood management strategies that can be employed to achieve this objective may include:

- Managing debris;
- Floodplain reconnection or preservation;
- Restoring degraded and damaged streams;
- Maintaining stream health and channel stability;
- Limiting infrastructure within floodplains; and
- Educating staff on federal and county flood policies and ordinances with respect to development and restoration projects to ensure regulatory compliance.

Management actions supporting each strategy are detailed below.

Managing Debris

Routine maintenance consists of trash and debris cleanup, trash rack cleaning, and sediment build-up removal, as relevant, within stream channels and floodplain areas. Keeping banks clear of large, loose branches and thick debris will help maintain unobstructed flows. Additional or more frequent maintenance may be necessary pre- and post-storm or after intense rain events.

Preserving and reconnecting Floodplains

Floodplains have the capacity to store and control floodwaters, thus diminishing water velocity and reducing erosion and flood damage. Whenever possible, it is important to maintain floodplains by limiting development and heavy use in these areas as urban development typically increases the amount of water (runoff) entering a stream (USGS 2014). Additionally, any urban structures located within a floodplain should be considered for relocation to a flood-free area, if possible.

To preserve floodplains, it is key to know where floodplains are located. This can be accomplished by mapping the floodplain and floodways across the sites. Floodplain expansion or reconnection may also be an option through restoration or design, where appropriate. Additionally, acquiring floodplain land within existing open space is another method to assure land will not be developed and will continue to mitigate flood risks.

Restoring Degraded and Damaged Streams and Floodplains

When stream corridors are degraded, they are not able to perform to their fullest potential. Degraded streams tend to succumb to increased erosion and/or sedimentation while harboring poor water quality. These factors weaken stream systems and their ability to function during a flood event.

Monitoring and identifying degraded stream areas and any sources of stress is the first step towards resolving the problem. Signs such as cut banks, incised channels, slumped material or sedimentation, vegetation die-off, and water quality issues should be tracked. Subsequent restoration through thoughtful adjacent land-use management, shoreline erosion control best management practices, and proper revegetation will help to restore healthy, functioning floodways.

Where possible, restoration activities to increase floodplain vegetation or to reconnect streams with floodplains will be completed to enhance the capacity of open space area floodplains to absorb and support high water flows.

Maintaining Stream Health and Channel Stability

Maintaining stream health and channel stability are crucial to not crossing an ecological threshold to a more degraded state like the damaged systems just described. As discussed in **CHAPTER 1**, a fully functioning ecosystem requires far less time and resources to adequately sustain. As an ecosystem degrades, function is lost, and extensive modifications may be necessary to lift the ecosystem back into a more intact state (**FIGURE 2** in **CHAPTER 1**).

For the most part, a stable, healthy channel will maintain its own morphologic pattern, profile, dimension, and stability. However, like the signs of a degraded system, any changes in hydrology, biology, or ecology should incite an immediate management response/action before a threshold is surpassed.

Conversely, any management actions that would negatively affect the physical function of an otherwise healthy/stable stream should be avoided or performed with caution. Examples of actions that could potentially damage a healthy system include but are not limited to the following:

- Mowing or removing wetland plants and adjacent stream buffer vegetation;
- Changes in water discharge;
- Nearby construction or new infrastructure installations;
- Improperly installed stormwater BMPs;
- Changes in adjacent land-use;
- Adjacent application of pesticides; and
- Heavy recreational use.

Limiting Infrastructure within Floodplains

The Town will ensure compliance with federal and county flood policies and ordinances with respect to development and restoration projects in floodplains. Built infrastructure should be avoided within or nearby the floodplain. If possible, reallocation of structures adjacent to stream corridors should be considered as well as limiting future development in those areas. If building cannot be avoided in these areas, it is recommended that the structure be elevated above a specific flood elevation, waterproofed (i.e. dry or wet flood proofing), or protected by a berm, levee, or floodwall structure. There are also temporary flood proofing measures (i.e. sandbag berms) that can be implemented every time there is a risk of flooding; however, it is recommended that more permanent measures replace temporary interventions as soon as reasonably possible.

Educating Staff on Federal and County Flood Policies and Ordinances

Management activities on open space properties located in regulatory floodplains as designated by the Federal Emergency Management Agency (FEMA), Boulder County, and Weld County will be implemented in accordance with all applicable regulations and ordinances. Implemented management activities will not increase flood risk.

Any restoration and enhancement projects completed on open space sites within floodplains will comply with these regulations, and increased flood risk management will be a key objective of any planned project. For example, Coal Creek is currently hydrologically isolated from its natural floodplain due to its severely incised channel, which increases the risk of flood and secondary risk factors, such as erosion and channel collapse. Restoration efforts to reconnect the natural floodplain to Coal Creek would reduce flood risk and increase riparian system resilience to flooding. If anything, increasing the health and connectivity of the Town's open space areas through adaptive management would allow for enhanced flood mitigation as an ecosystem service.

A future strategy Erie could implement is the development of a flood preparedness plan that codifies these recommended management actions and identifies a clear disaster response process for the Town to ensure public safety. Please see **CHAPTER 6** for more information.

4.4.2 Wildfire Management: How to Manage Open Space Areas to Reduce Wildfire Risks

Open space parcels within the Town of Erie will be managed to protect communities and infrastructure, manage fuels, and promote ecological health in the face of wildfires.

Wildfire management strategies that can be employed to achieve this objective include:

- Protecting communities and infrastructure;
- Managing fuels;
- Promoting ecological health in the face of wildfires; and
- Public education.

Management actions to support each strategy are detailed below.

Protecting Communities and Infrastructure

Open space parcels located adjacent to neighborhoods or other private property where wildfire is a concern should include defensible space along its borders to provide a fire break between the park and surrounding properties. Defensible space will be managed to limit the presence of combustible fuel and will be planted with native vegetation. Defensible spaces may range in width from five to eight feet, depending on the character of the property and nature of adjacent land uses.

Managing Fuels

Within open space parcels, fuels will be managed to reduce fire risk in areas near communities, infrastructure, and natural resources. The Town will leverage its vegetation management efforts, such as establishing native communities and removing invasive species from open space properties, to limit the presence and distribution of fuels.

Depending on the type of ecological community present on the open space parcel, specific fuel management practices may be employed, which include:

- Strategic thinning of forest understory snags and brush;
- Controlled burning of fire-adapted prairie and forest systems ([PHOTO 8](#));
- Strategic mowing to create firebreaks; and
- Wood mastication of small trees and shrubs.

Fuel management actions such as thinning the density of trees, controlled burns, and removing fuels (vegetation) are three fire management best practices that promote ecological health in forested habitats. In agricultural lands, grasslands, and shrublands, strategic mowing can help control the fuel (vegetation) volume and direct any fires to the ground, creating a safe zone or fire break between homes and forested areas. Grass cuttings may be left to contribute to nutrient cycling in these systems. Wood mastication actions, or chipping of small trees and shrubs, may also be employed to reduce fuels, though leaving woody debris is important for providing habitat for native species. Woody debris removal may be prioritized when close to structures or within defensible space. This allows woody debris to burn under natural circumstances and preserves the natural function of the system while limiting risks to the community and Town resources.



PHOTO 8: CONTROLLED PRAIRIE BURN AT MILITARY BASE SOURCED FROM WIKIMEDIA COMMONS

The Town recognizes the need to balance the risk of wildfire management actions such as controlled burns, which has been shown effective in reducing catastrophic wildlife and enhancing ecosystem health, with the hazards of implementing these types of activities in the first place. When performed safely and away from key infrastructure and homes, prescribed fires can be the most economical and effective way to reduce vegetation buildup while maintaining the health and resiliency of the ecosystem. While it is difficult to mitigate all risks associated with using these wildfire management actions, it is important that they be implemented in coordination with nearby communities and emergency management plans and responders.

Promoting Ecological Health in the Face of Wildfires

Many ecological communities in the Intermountain West are fire-adapted, meaning they depend on natural wildfire events to clear dead aboveground plant material, add nutrients to the soil, and promote seed sprouting for certain species. Fuel management actions outlined above have the dual effect of promoting ecosystem health in fire-adapted systems. Fuel management provides wildlife habitat, opens the canopy to allow more light and precipitation to reach the forest floor, and adds nutrients to the soil to be taken up by healthy vegetation and support soil nutrient cycling processes. Many plant species need fire to germinate, meaning prescribed burns can be an effective action to achieve enhancement of native plant communities.

Public Education

Wildfires are often caused by human activities. To reduce the incidence of accidental wildfire ignitions, Erie will promote fire BMPs to the public to encourage safe use of recreational fire in open space areas. Information will be available to the public on safe campfire, barbeque, and grill practices at parks within the Town. During fire season, more restrictions on recreational fire use may be promulgated and communicated to the public via web alerts and park signage.

4.5 Public Infrastructure and Amenities

4.5.1 How to Maintain Infrastructure and Amenities for Public Use and Safety?

Infrastructure and amenity management strategies that can be employed to achieve this objective include:

- Foster a sense of public safety on open space sites;
- Enhance passive recreational opportunities on sites;
- Limit or prevent the presence of hazardous items or activities in open space areas;
- Maintain a clean and inviting space for all Town residents and visitors to enjoy.

It is recommended Erie achieve maintenance of public infrastructure and amenities at parks by dedicating resources to implementing management and maintenance activities. All areas under this management plan should be routinely inspected for litter, vandalism, and hazards. These inspections should also verify all service-providing amenities (lights; water fountains; fences and gates; etc.) are in good working order. Any evidence of damage or inoperable services shall be reported and/or attended to immediately.

Management actions the Town can take to support the above strategies include:

- Proper Trash Removal and Disposal of Waste;
- Proper Maintenance of:
 - Hardscapes
 - Primitive Trails
 - Picnic Areas and Benches
 - Fencing and Signage
- Control of Hazardous Weeds

Management actions are detailed below.

Proper Trash Removal and Disposal of Waste

Trash and recycle receptacles, where provided, are to be routinely inspected and emptied when 50 to 75% full or if strong unpleasant odor is evident. Dog waste stations are to be routinely inspected, waste removed, and bag dispensers stocked. Additional attention should be given to highly trafficked parcels and recreational areas.

Maintenance of Hardscapes

Parking areas, trailheads, paved trails, and other hardscape surfaces should be kept free of glass, debris, litter, and tripping hazards. Attention should be paid to Americans with Disabilities Act (ADA) accessibility requirements and accessible areas. Any ADA-designated areas should be clearly marked.

Additionally, all paved trails and hardscapes adjacent to non-woody vegetation should have a three-foot wide mowed buffer strip on all sides. Woody vegetation should be kept at a minimum of two feet from trail edges to comply with the Town's park standards and specifications.

To ensure the safety of pedestrians, joggers, and cyclists utilizing the Town's community amenities, preserving passing and stopping lines of sight will be a priority guiding vegetation management actions along hardscape trails and walkways. Lines of sight are dependent on site-specific factors, such as grade and trail curve radius, and the speed with which users travel on the path. Lines of sight will be determined on a case-by-case basis. The Town will manage vegetation within these line-of-sight preservation areas in accordance with industry best practices and applicable American Association of State Highway and Transportation Officials (AASHTO) guidelines.

Any snow accumulation on park roads, trails, or parking lots will be plowed and cleared of hazards according to the Town's snow policy, which is organized into three priority levels (refer to the Town's Department of Public Works website). The goal is to provide snow and ice control services on primary and secondary routes. The major factors affecting snow removal include the following:

- Storm intensity;
- Storm duration;
- Snow accumulation;
- Time of day;
- Temperature; and
- Traffic conditions.

At the direction of the Public Works Director and only in instances when snowstorms leave large accumulations that are expected to remain for several days, Residential Streets are plowed down the center of the street (one pass). The Town applies ice slice to roadways to improve traction and accelerate ice melt. Snow plow operators are instructed to apply varying amounts of ice slice depending on road and weather conditions (ice slice is effective at 30 degrees and above). Typically, ice slice is applied at intersections, curves and hills. Snow covered areas (ramps, bridges, stairs, etc.) inaccessible to machinery will be cleared manually. Ice accumulation will be treated with sand and/or environmentally safe chemicals.

The Town also uses Meltdown Apex, a form of liquid magnesium chloride. This is used as a pre-treatment to minimize the amount of ice bonding to road surfaces in the early stages of a snow event, as well as aid in ice control throughout an event.

Maintenance of Primitive Trails

Primitive trails located in open space areas will be managed to maintain their structure and function as outlined in the Town of Erie's *Parks, Recreation, Open Space, and Trails Master Plan Update* (2016). Trails will be maintained with the goal of keeping trail surfaces free of debris and weeds, and trail corridors will be mowed at a minimum of three times per year at a minimum width of 10 feet in alignment with Town of Erie's *Parks & Recreation Maintenance & Operations Management Plan* (2017).

Maintenance of Picnic Areas and Benches

Picnic areas (including grills, trash receptacles, picnic tables, etc.) and benches are to be clean and free of debris, hazards, and vegetation that would prevent use. Grills and grill racks will be securely anchored to prevent theft. Areas that contain grills should be on a concrete pad to reduce risk of accidental brush fire. Grills will be periodically cleaned of grease build up and debris to ensure safe operational use. Access to picnic areas, tables, benches, and grills will be maintained in accordance with ADA requirements.

Fencing and Signage

Fence lines shall be maintained in good and aesthetically appealing condition. Where fences adjoin private property boundaries, vegetation around fences should be inspected approximately two to three times per year and kept trimmed.

Signs and kiosks should be kept clear, clean, and legible. Signs, particularly along trails, should be regularly checked to make sure they are still standing and have not been altered or moved to misdirect people on the trail. Additional trail system sign guidance will continue to be updated by the Town during its trail system master planning process.

Any maps or other handouts should be kept protected from the elements and well-stocked.

Control of Hazardous Weeds

Areas under this management plan as it relates to hardscape maintenance should be managed for noxious and hazardous weeds, such as puncture vine (*Tribulus terrestris*), poison ivy (*Toxicodendron radicans*), and thistles (*Carduus* spp., *Cirsium* spp., *Onopordum* spp.). Hazardous weeds are a constant threat to trail and open space users and can involve multiyear, integrated pest management approaches to control, if allowed to establish near infrastructure or amenity areas. Controlling these undesirable plants will help increase the survival and abundance of more desirable, native species and result in a more pleasurable experience for open space users. Overall, a targeted weed monitoring and control strategy will help improve the overall aesthetic and ecological function of Erie's Parks and Open Space areas.

4.6 Reclaimed Oil and Gas Sites

Erie may manage and maintain reclaimed oil and gas sites, so they are reincorporated into the open space landscape. Well pads do not present imminent threat to human health or the environment, but given the industrial history of well pads, public access is not encouraged. The primary objective for Erie should be that reclaimed oil and gas sites are not be recognizable when looking across the landscape and they should contribute to the overall ecological function of the open space area.

Strategies:

- Maintain the integrity of plugged and abandoned wells; and
- Improve site ecological function to complement completed reclamation activities.

Actions:

- Review and approve reclamation activities of the operator before assuming management responsibility, including soil testing;
- Noxious and invasive plant species control;
- Soil remediation, if conditions or test results indicate a potential problem;
- Native plant community enhancement or revegetation; and
- Discourage public access.

5 SITE-SPECIFIC MANAGEMENT ACTIONS



This Chapter provides an overview of the environmental, economic, and community values associated with each open space park, their key resources, a summary of their baseline landscape typology, and recommended site-specific management actions that will be taken to support achievement of the Town’s open space management objectives. During regular site visits, Town staff may note adjacent land uses and potential encroachment risks to inform prescribed management actions. As noted in **CHAPTER 4**, site-specific management actions can satisfy multiple strategies, and strategies can be utilized to achieve multiple objectives, allowing for the efficient and effective utilization of Town resources to achieve open space management.

In addition, each site has been designated a maintenance level. Maintenance levels identify each parcel’s level of maintenance action priority. **TABLE 8** summarizes those maintenance levels proposed for Erie’s OSMP. These levels are deemed reasonable, provide applicable standards for the Town’s Parks and Recreation Department, and are informed by the service level classifications found in the National Recreation and Park Association (NRPA)’s *Park Maintenance Standards* (1986) publication. These levels generally align with Maintenance Modes for some Erie open space sites as designated in the Town’s *Parks & Recreation Maintenance & Operations Management Plan* (2017) but provide additional and complementary recommended actions and are prescribed to all open space sites within the current portfolio.

TABLE 8: MAINTENANCE LEVEL DEFINITIONS

Level	Priority	Description
A	High	Intensive, routine maintenance and monitoring required to provide safe spaces with aesthetic appeal and ecological function.
B	Intermediate	Maintenance and monitoring reduced to threshold compliance. Areas generally left in a natural state with minimal amenities requiring scheduled service.
C	Low	Maintenance applications for undeveloped or restricted areas. Maintenance not required unless functional threshold is crossed. Periodic monitoring recommended.

5.1 District 1: Panama

- There are currently no open space parks or parcels managed by the Town of Erie within the Panama District.

5.2 District 2: Boulder Creek

- There are currently no open space parks or parcels managed by the Town of Erie within the Boulder Creek District.

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5.3 District 3: Town and Country

5.3.1 Allan Farms

Total Area: 79.6 acres

Maintenance Level: C

Description: Large agriculture and crop field located north of the Lower Boulder Ditch within an agricultural and residential landscape context.

Environmental, Economic, and Community Value

- Air quality improvements
- Habitat for plants, pollinators, and wildlife
- Stormwater capture and filtration
- Flood risk reduction
- Crop production

Key Resources

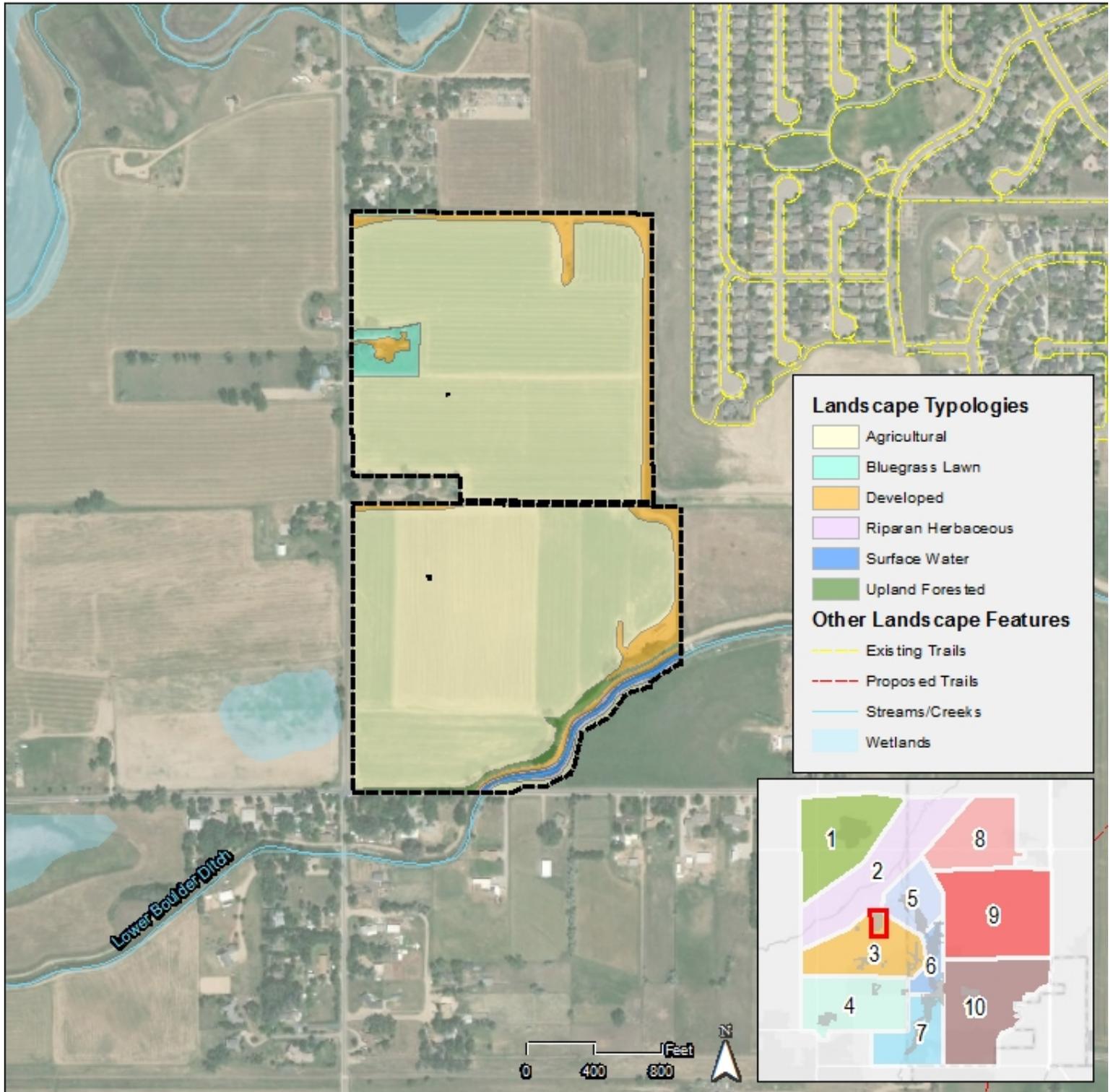
- Lower Boulder Ditch flows along the southern border
- Contains oil, gas, and utility rights-of-way and infrastructure
- Land currently leased for farming
- Kenosha Farms residential housing development located on eastern border
- Agricultural land

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Allan Farms	Upland Forested	NA	1.0
	Riparian Herbaceous	Non-native	0.6
	Bluegrass Lawn	NA	1.4
	Surface Water	Un-armored drainage channel	0.6
	Agricultural	Crop production	70.4
	Developed	NA	5.6
Total Acres			79.6

Management and Maintenance Actions

- Well pad monitoring
- Herbicide applications limited to well pads
- Weed control maintained by lessee
- Remove and property dispose of trash and debris
- Maintenance actions should be revised and increased anytime property is not leased and managed by lessee



5.3.2 Candlelight Ridge & Meadow Sweet Farm

Total Area: 18.1 acres

Maintenance Level: Candlelight Ridge (B); Meadow Sweet Farm (B)

Description: Small open space parcels surrounded by residential development and Meadow Sweet Farm Park to the east. Town trails exist on the perimeter of Candlelight Ridge and intersect Meadow Sweet Farm.

Environmental, Economic, and Community Value

- Open to the public for recreational use
- Public health benefits
- Enhances adjacent property values
- Provides pollinator habitat
- Habitat connectivity
- Migratory bird stopover point

Key Resources

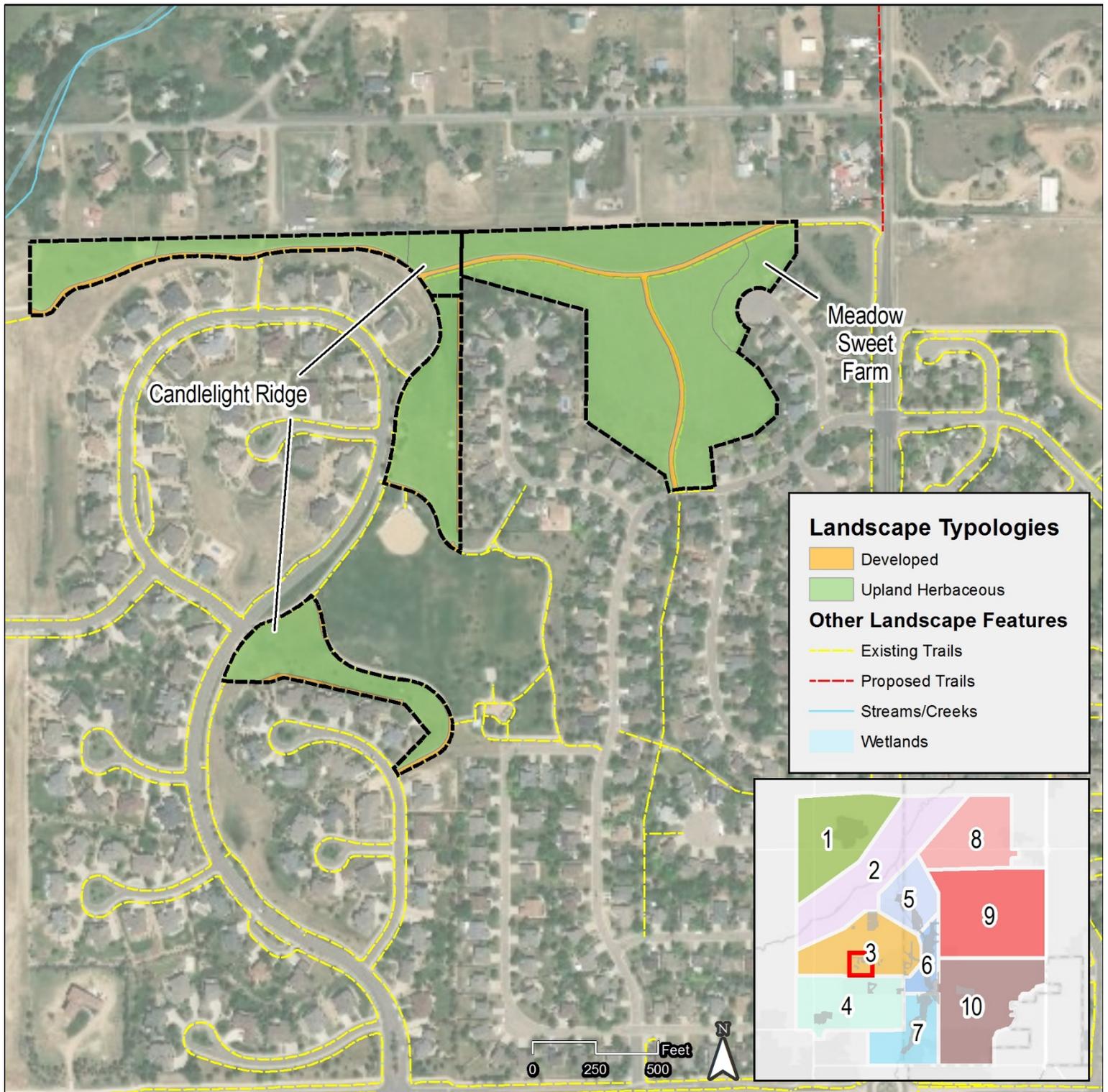
- Walking trails
- Adjacent to residential developments
- Unauthorized trails (Candlelight Ridge)
- Native prairie habitat (Meadow Sweet Farm)

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Meadow Sweet Farm	Upland Herbaceous	Native mixed-grass prairie	9.0
		Non-native herbaceous	0.9
	Developed	NA	0.6
Candlelight Ridge	Upland Herbaceous	Native mixed-grass prairie	0.8
		Non-native herbaceous	5.9
	Developed	NA	0.9
Total Acres			18.1

Management and Maintenance Actions

- Mowing
- Weed control
- Remove and properly dispose of trash and debris
- Native seeding, if needed
- Employ snow and ice control on trails consistent with Town of Erie snow removal policy and procedures
- Maintain trails and hardscapes



5.3.3 Country Fields Parks

Total Area: 6.6 acres

Maintenance Level: B

Description: Three small isolated parcels surrounded by open space and residential development.

Environmental, Economic, and Community Value

- Stormwater capture and filtration
- Flood risk reduction
- Open to the public for recreational use
- Provides wildlife habitat connectivity by connecting open space parcels
- Migratory bird stopover point

Key Resources

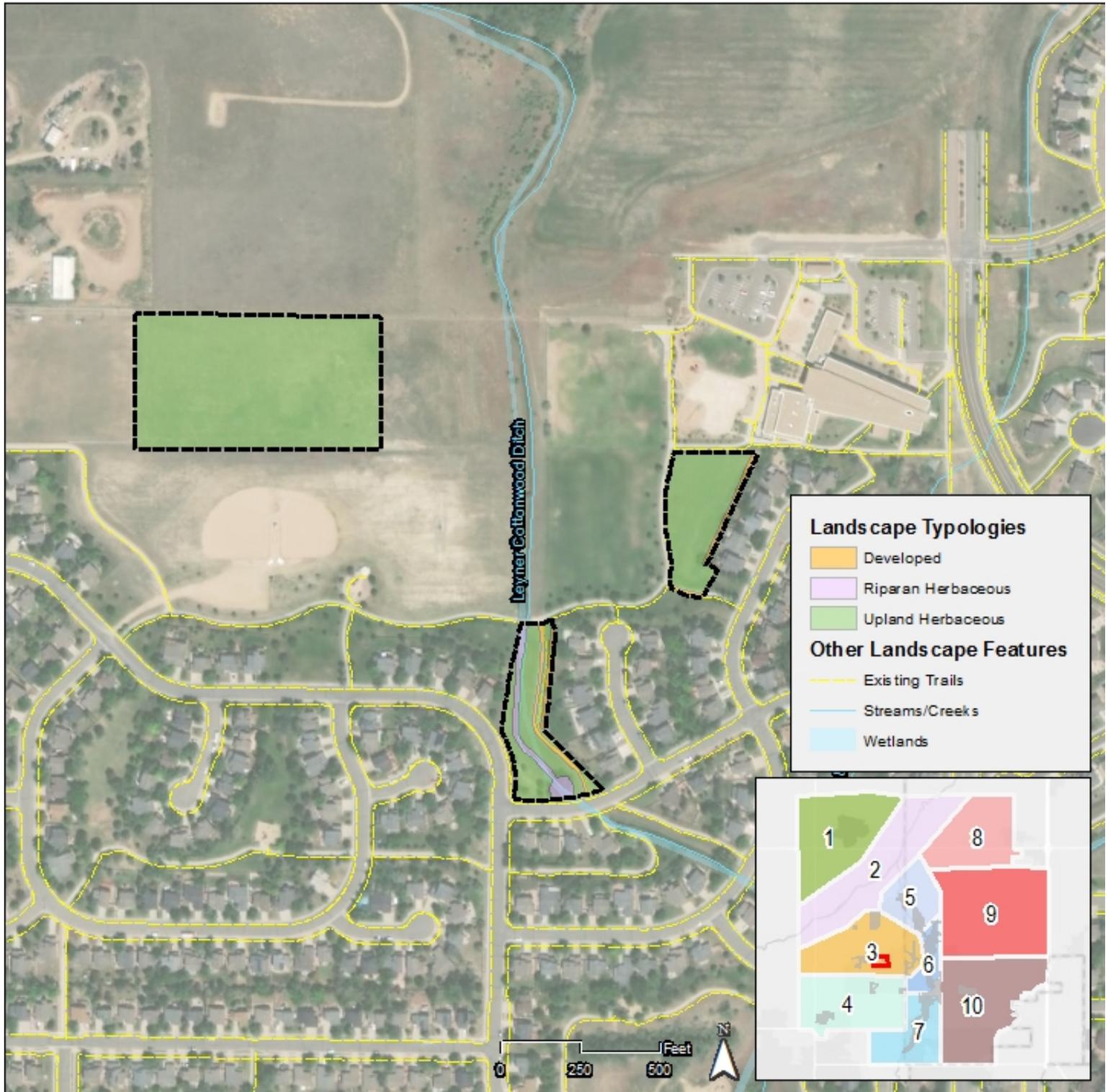
- Adjacent to Red Hawk Elementary School
- Leyner Cottonwood Ditch runs north-south through southernmost parcel
- Walking trails
- Picnic areas and recreational fields
- Electricity
- Portable restrooms

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Country Field Park	Upland Herbaceous	Native mixed-grass prairie	1.1
		Non-native herbaceous	5.0
	Riparian Herbaceous	Non-native	0.2
	Developed	NA	0.2
Total Acres			6.6

Management and Maintenance Actions

- Mowing
- Native seeding, if needed
- Weed control
- Limited herbicide applications
- Regularly remove and properly dispose of trash and debris
- Install and maintain fencing and signage
- Maintain trails and hardscapes



5.3.4 Erie Community Park

Total Area: 13.0 acres

Maintenance Level: A

Description: Large open space consisting of native prairie habitat with connected parks and trails, and adjacent to baseball fields.

Environmental, Economic, and Community Value

- Biodiversity benefits
- Provides public health and recreational benefits
- Wildlife habitat connectivity
- Migratory bird stopover point
- Neighborhood amenity and enhances property values

Key Resources

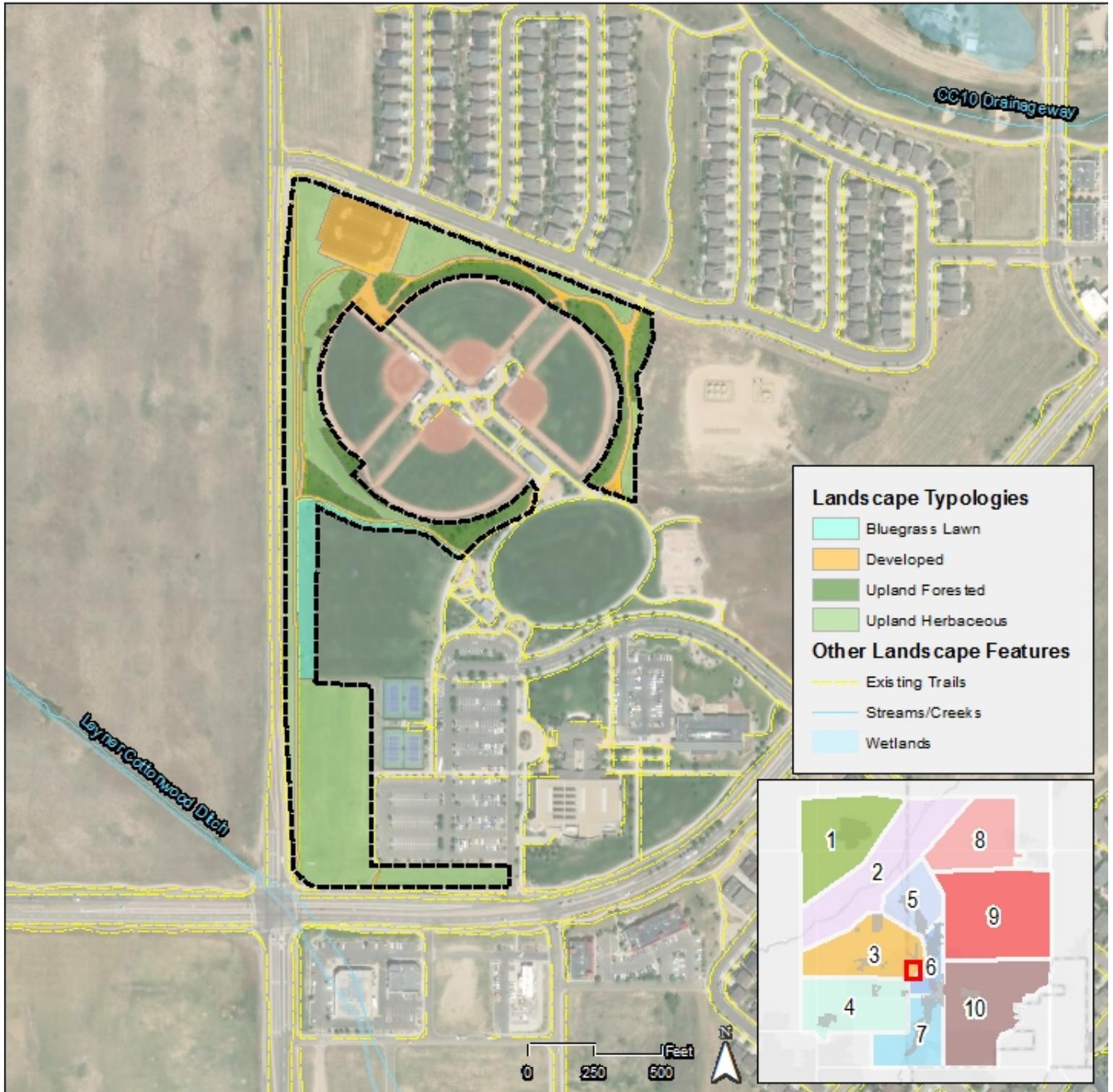
- Cultural resources onsite adjacent to baseball fields
- Adjacent to other undeveloped and open space areas
- Trails and walkways
- Parking lots onsite
- Unidentified pumping station adjacent to eastern park border
- Access via Maxwell Road to the north, E County Line Road to the west, and Erie Parkway to the south

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Erie Community Park	Upland Herbaceous	Native mixed-grass prairie	7.1
	Upland Forested	NA	2.5
	Bluegrass Lawn	NA	0.8
	Developed	NA	2.6
Total Acres			13.0

Management and Maintenance Actions

- Strategic mowing
- Implement erosion control BMPs
- Weed control
- Native seeding, if needed
- Maintain trails and hardscapes
- Regularly remove and property dispose of trash and debris
- Limit driving onsite to avoid compaction and creation of bare vegetation areas
- Formal park areas should be maintained in accordance with Erie Parks and Recreation Maintenance and Operations Management Plan (2017)



5.3.5 Erie Commons, Old Town, and Linear Park

Total Area: 23.8 acres

Maintenance Level: Erie Commons (B); Old Town (B); Linear Park (B)

Description: Erie Commons, Old Town, and Linear Park consist of multiple smaller, adjacent parcels surrounded by residential and commercial development, Coal Creek and the CC10 Drainageway.

Environmental, Economic, and Community Value

- Open to the public for recreational use
- Habitat connectivity
- Neighborhood amenity that enhances adjacent property values
- Flood risk reduction
- Stormwater capture and filtration
- Migratory bird stopover
- Pollinator corridor (Linear Park)
- Provides diverse wildlife habitat

Key Resources

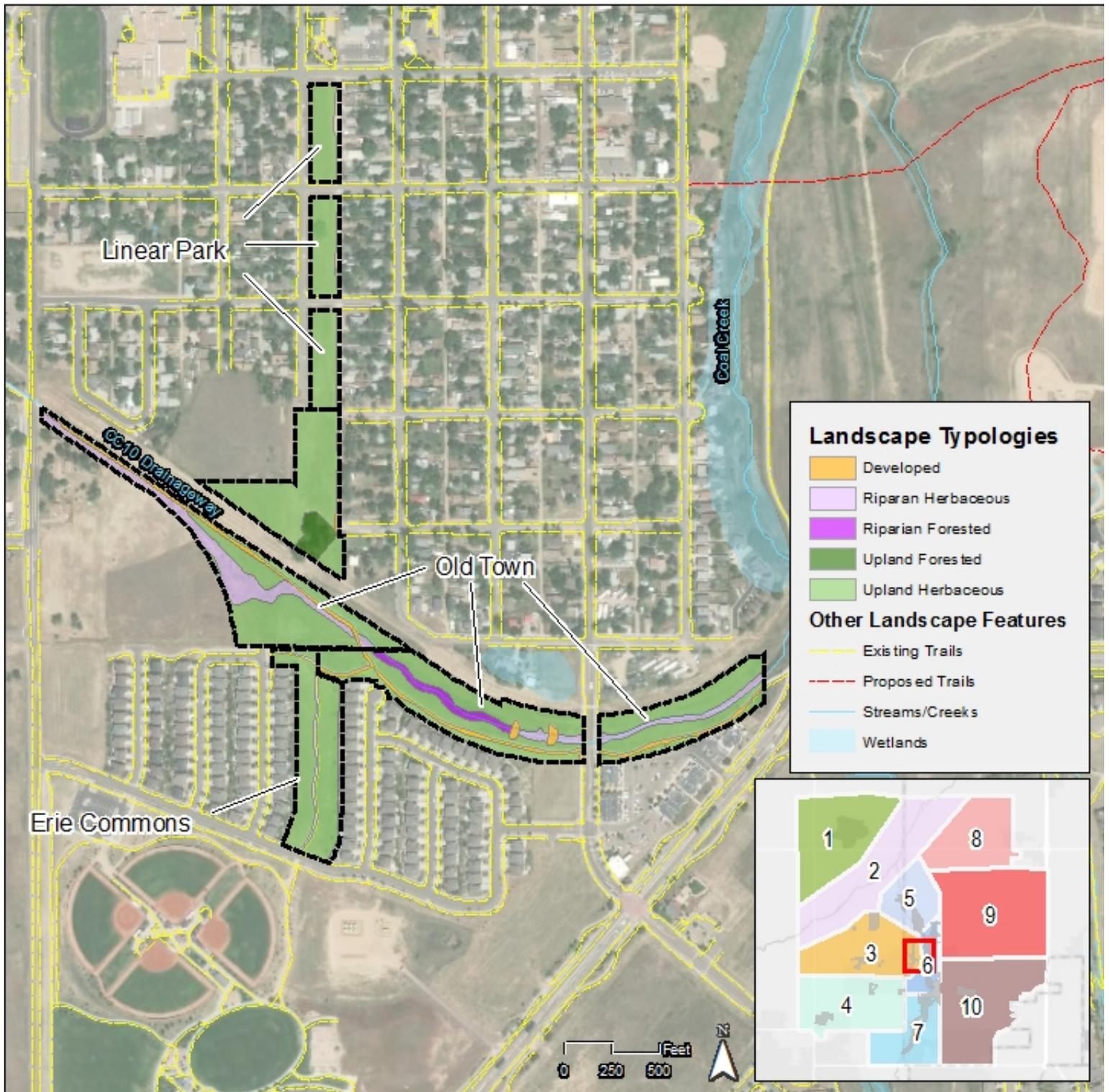
- Walking trails and proposed trail expansions
- Adjacent to Coal Creek and drainages
- Adjacent to Erie Community Park
- Riparian and wetland habitat
- Access via E County Line Road, S Briggs Street, and Erie Parkway
- Cottonwood groves

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Old Town	Upland Herbaceous	Native mixed-grass prairie	6.1
		Non-native herbaceous	6.5
	Upland Forested	NA	0.4
	Riparian Forested	Willow	0.5
	Riparian Herbaceous	Native	2.1
	Developed	NA	1.3
Linear Park	Upland Herbaceous	Non-native herbaceous	2.9
	Developed	NA	0.4
Erie Commons	Upland Herbaceous	Native mixed-grass prairie	3.1
	Developed	NA	0.4
Total Acres			23.8

Management and Maintenance Actions

- Strategic mowing
- Implement erosion control BMPs
- Native seeding, if needed
- Weed control
- Trash and debris disposal
- Bullfrog monitoring and control
- Native plantings in riparian areas, if needed
- Irrigate new plantings, if needed
- Maintain trails and hardscapes
- Employ snow and ice control on hardscapes consistent with Town of Erie snow removal policy and procedures



5.3.6 Wise Open Space

Total Area: 3.5 acres

Maintenance Level: C

Description: Small, mostly forested parcel surrounded by agricultural land and comprised of introduced forbs and grasses. No public access.

Environmental, Economic, and Community Value

- Air quality improvements from forested area
- Biodiversity benefits associated with forested area
- Stormwater capture and filtration
- Flood risk reduction
- Wildlife habitat connectivity
- Migratory bird stopover
- Enhances adjacent property value
- Crop production

Key Resources

- Small creek/ditch located along southern border
- No public access enhances conservation opportunities
- Jasper Road located to the south
- Agricultural land
- Upland forest

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Wise Open Space	Upland Forested	NA	2.5
	Agricultural	Crop production	1.0
Total Acres			3.5

Management and Maintenance Actions

- Trash and debris disposal
- Native seeding, if needed
- Strategic mowing
- Retain decayed woody elements (wildlife)
- Weed control
- Limited insecticide applications
- Monitor for special-status wildlife species
- Monitor for nuisance wildlife



5.4 District 4: Lakes

5.4.1 Erie Lake, Schofield, and Strieby

Total Area: 69.5 acres

Maintenance Level: Erie Lake (A); Schofield (B); Strieby (C)

Description: Erie Lake is a large park containing Erie Lake with residential and commercial development to the south, east, and west, and Strieby Park and Schofield Park to the north. Strieby is a small open space parcel with residential and agricultural structures onsite. Schofield is a large park with residential development to the east, Strieby Park to the west, Erie Lake to the southwest, Prince Lake Number 2 to the north, and additional open space to the south.

Environmental, Economic, and Community Value

- Flood risk reduction
- Serves as overflow area between Prince Lake Number 2 and Erie (Schofield)
- Open to the public for recreational use (Erie Lake)
- Migratory bird stopover
- Complex provides wildlife habitat and supports habitat connectivity
- Fishing
- Water rights
- Onsite and adjacent farm use

Key Resources

- Erie Lake (water resource, extractive resource and recreational resource)
- Adjacent to Prince Reservoir No. 2 (Schofield)
- Handicap-accessible pier (Erie Lake)
- Agricultural Land
- Portable restrooms
- Walking trails throughout all three parks
- Cultural resources onsite
- Access via N 107th Street to the west
- Buildings onsite

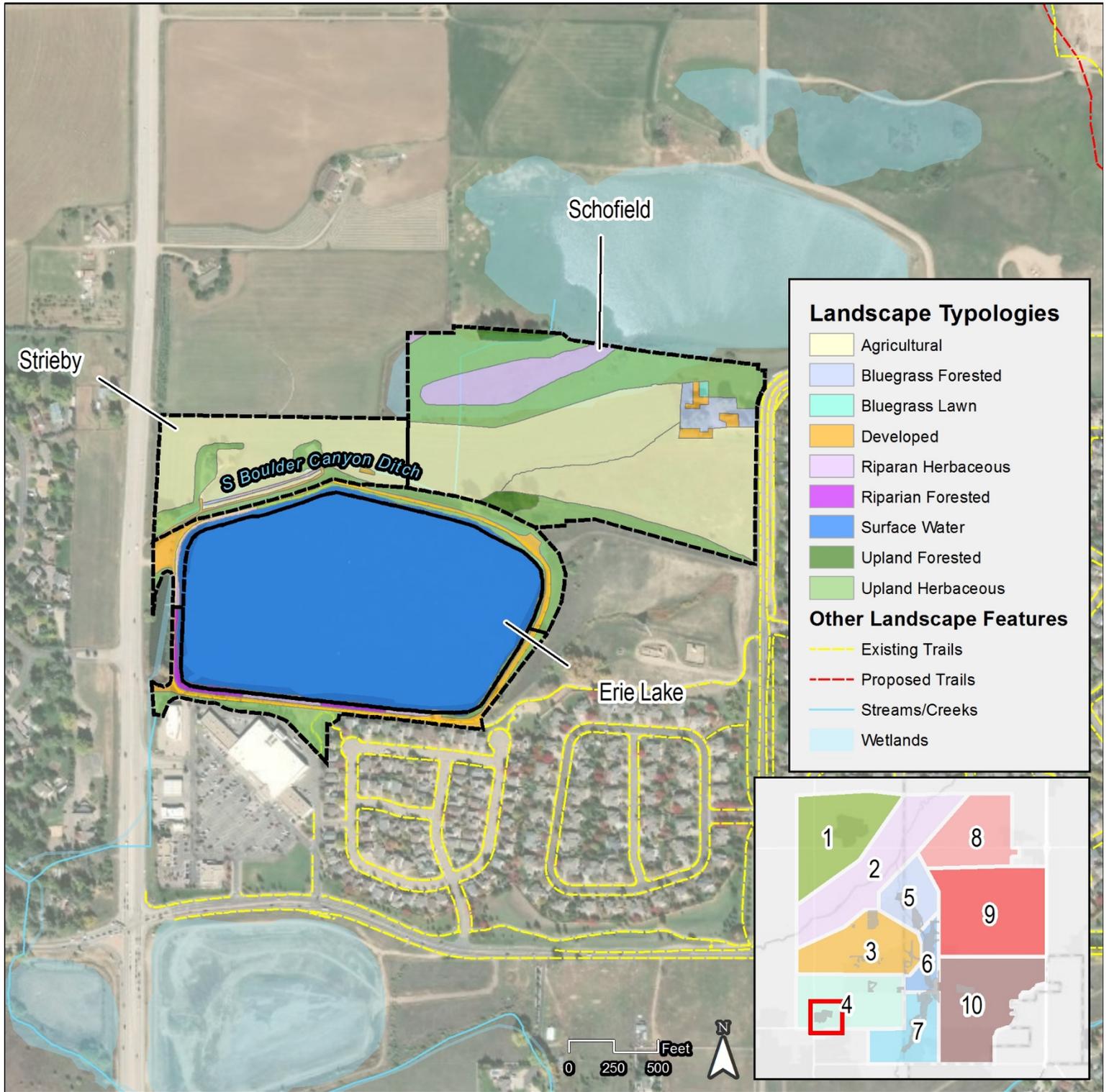
Typology Summary

Erie Maintained Greenspace (according to Town of Erie Green Space Map)			
Name	Typology	Vegetation Type	Area (ac)
Striebly	Upland Herbaceous	Non-native herbaceous	1.6
	Riparian Herbaceous	Non-native	0.1
	Agricultural	Crop production	6.9
	Developed	NA	0.2
Schofield	Upland Herbaceous	Native mixed-grass prairie	8.0
	Upland Forested	NA	0.7
	Riparian Herbaceous	Native	2.4
	Bluegrass Lawn	NA	0.1
	Bluegrass Forested	NA	0.8
	Agricultural	Crop production	7.2
	Developed	NA	0.3
Erie Lake	Upland Herbaceous	Non-native herbaceous	3.6
	Riparian Forested	Willow	0.5
		Non-native	0.6
	Surface Water	Armored	27.1
	Developed	NA	2.2
Total Acres			69.5

Management and Maintenance Actions

- Strategic mowing
- Planting along shorelines
- Strategic use of soil amendments
- Weed control
- Native seeding, if needed
- Repairs to building structures
- Implement erosion control BMPs (Erie Lake)
- Monitor and treat for harmful algal blooms* (Erie Lake)
- Remove and properly dispose of trash and debris
- Install and maintain fencing and signage
- Maintain trails and hardscapes
- Employ snow and ice control on hardscapes consistent with Town of Erie snow removal policy and procedures
- Prairie dog management
- American bullfrog eradication (Erie Lake)
- Monitor for special-status species

*Actions implemented in coordination with Erie Public Works and Water Department



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5.4.2 Thomas Reservoir

Total Area: 17.7 acres

Maintenance Level: A

Description: Large open space parcel with recreational amenities containing Thomas Reservoir. The parcel is bordered by agricultural land to the north and south, and residential development to the east and west.

Environmental, Economic, and Community Value

- Open to public for recreational use
- Fishing areas
- Handicapped access
- Diverse habitat for native plants, pollinators, and wildlife
- Flood risk reduction
- Migratory bird stopover
- Enhances adjacent property values
- Stormwater capture and filtration
- Habitat connectivity

Key Resources

- Thomas Reservoir
- Native mixed-grass prairie
- Pollinator garden
- Parking lot
- Walking trails
- Portable restrooms, picnic tables, and shelters
- Access via N. 119th Street

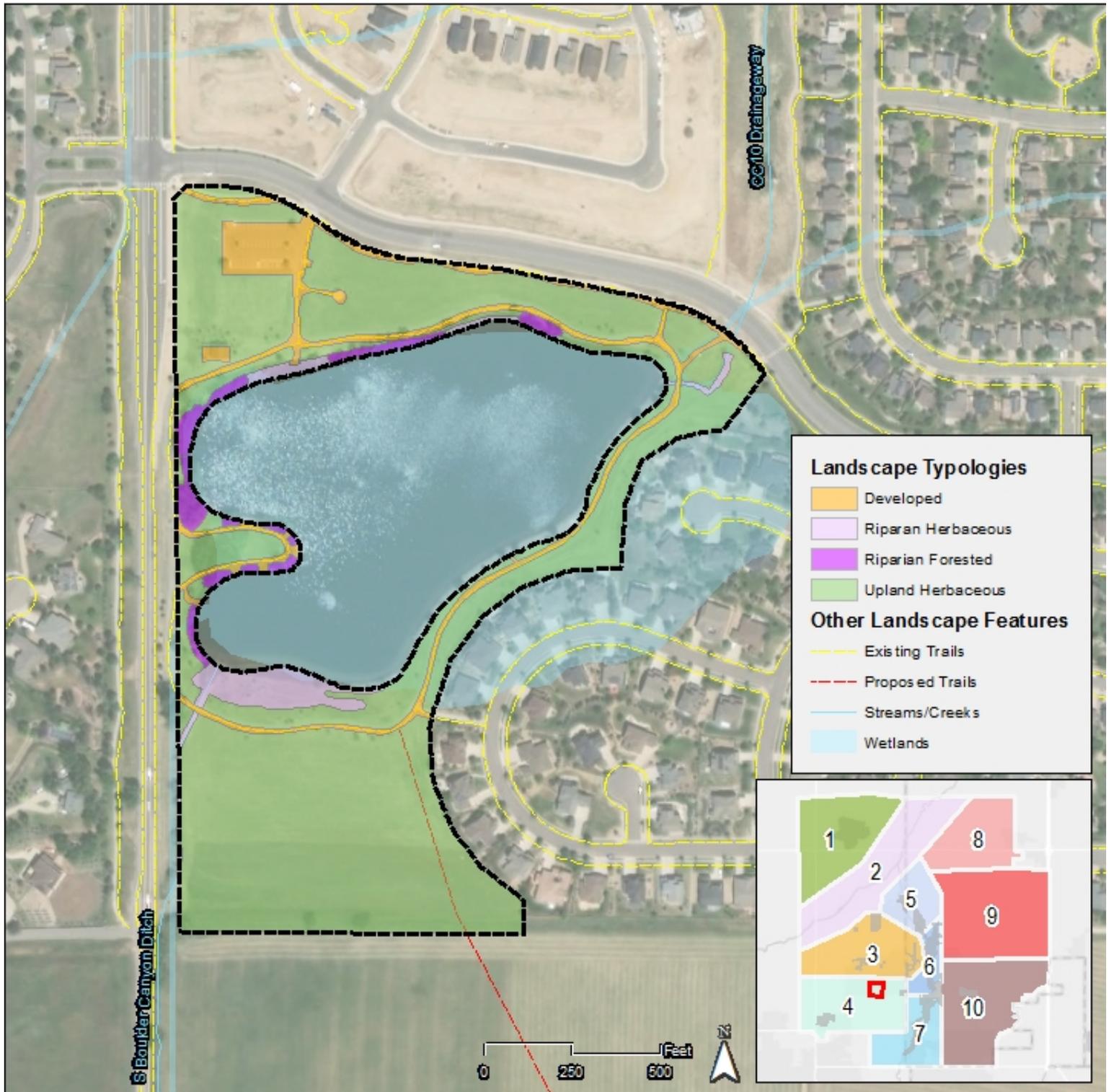
Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Thomas Reservoir	Upland Herbaceous	Native mixed-grass prairie	14.1
	Riparian Forested	Cottonwood	0.3
		Mixed Woodland	0.1
		Willow	0.3
	Riparian Herbaceous	Native	0.9
	Developed	NA	2.0
Total Acres			17.7

Management and Maintenance Actions

- Strategic mowing
- Native seeding, if needed
- Weed control
- Repairs to shelters and recreational infrastructure
- Implement shoreline erosion control BMPs
- Monitor and treat for harmful algal blooms, as appropriate*
- Install, operate, and maintain aerators, as appropriate*
- Regular removal of trash and debris
- Install and maintain fencing and signage
- Maintain trails and hardscapes
- Employ snow and ice control on hardscapes consistent with Town of Erie snow removal policy and procedures
- Monitor nuisance wildlife
- Red-eared slider eradication
- American bullfrog eradication
- Monitor for special status species

*actions implemented in coordination with Erie Public Works and Water Department



5.4.3 Velodrome

Total Area: 10.4 acres

Maintenance Level: C

Description: Open space parcel bordered by St. Luke Orthodox Christian Church to the north, residential development to the west, commercial development to the east, and agricultural land to the south.

Environmental, Economic, and Community Value

- Diverse habitat for native plants, pollinators, and wildlife
- Habitat connectivity
- Open to public for recreational use
- Flood risk reduction
- Enhances adjacent property values
- Stormwater capture and filtration
- Migratory bird stopover

Key Resources

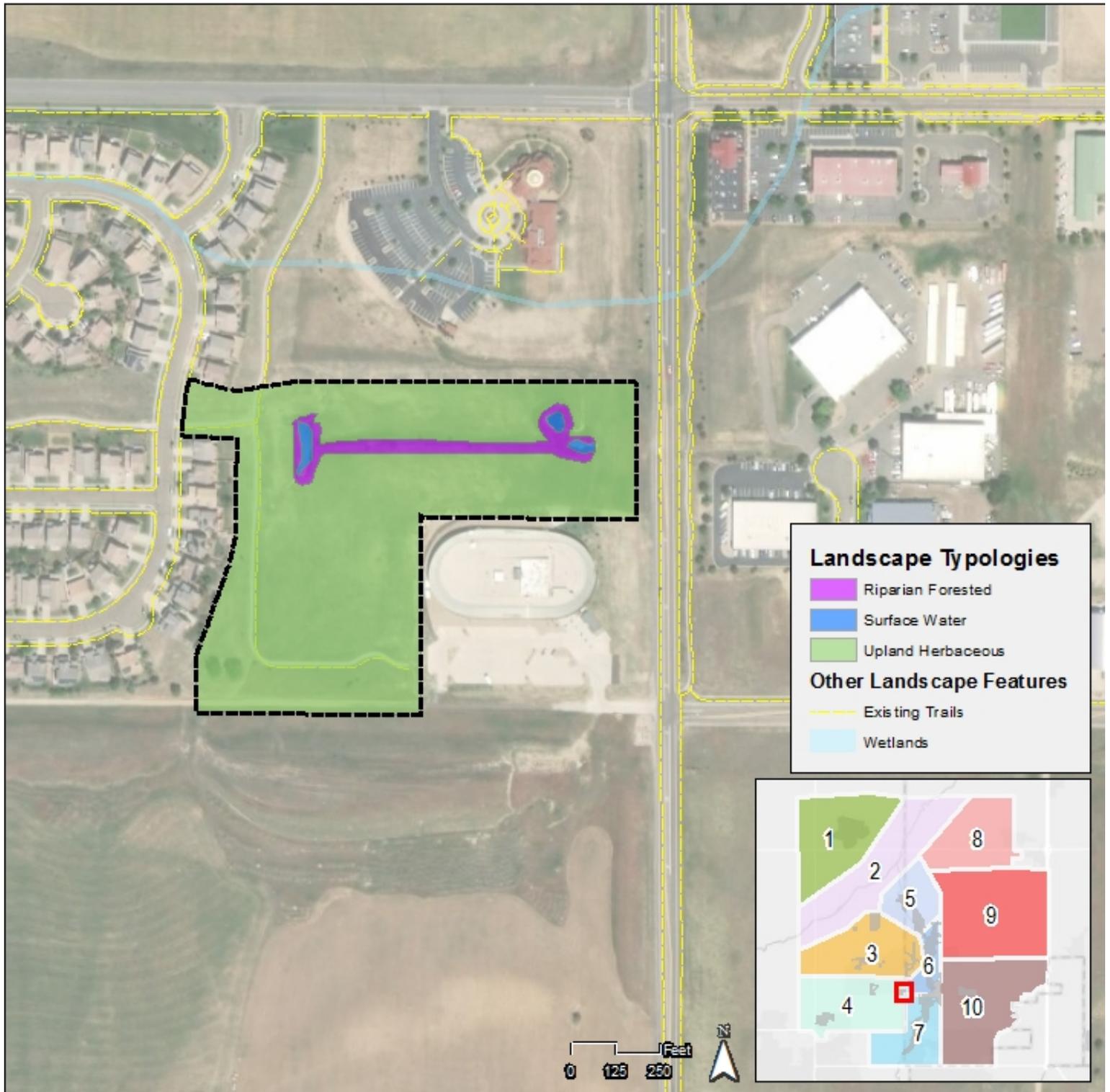
- Walking trails
- Native mixed grass prairie
- Riparian forest
- Access via E County Line Road and Bonnell Avenue
- Drainage ditch

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Velodrome	Upland Herbaceous	Native mixed-grass prairie	9.8
	Riparian Forested	Shrub Willow	0.6
	Surface Water	Un-armored open water	0.1
Total Acres			10.4

Management and Maintenance Actions

- Strategic mowing
- Weed control
- Regular removal of trash and debris
- Install and maintain fencing and signage
- Monitor for nuisance wildlife
- Monitor for special-status species



5.5 District 5: North Coal Creek

5.5.1 Erie Village & King

Total Area: 34.6 acres

Maintenance Level: Erie Village (B); King (C)

Description: Erie Village consists of a large open space parcel containing Coal Creek. King is an agricultural parcel that shares its border with Erie Village to the east, open space to the north and west, and residential development to the south.

Environmental, Economic, and Community Value

- Air quality improvements
- Migratory bird stopover
- Enhances adjacent property values
- Stormwater capture and filtration
- Habitat connectivity
- Crop production
- Firebreak area

Key Resources

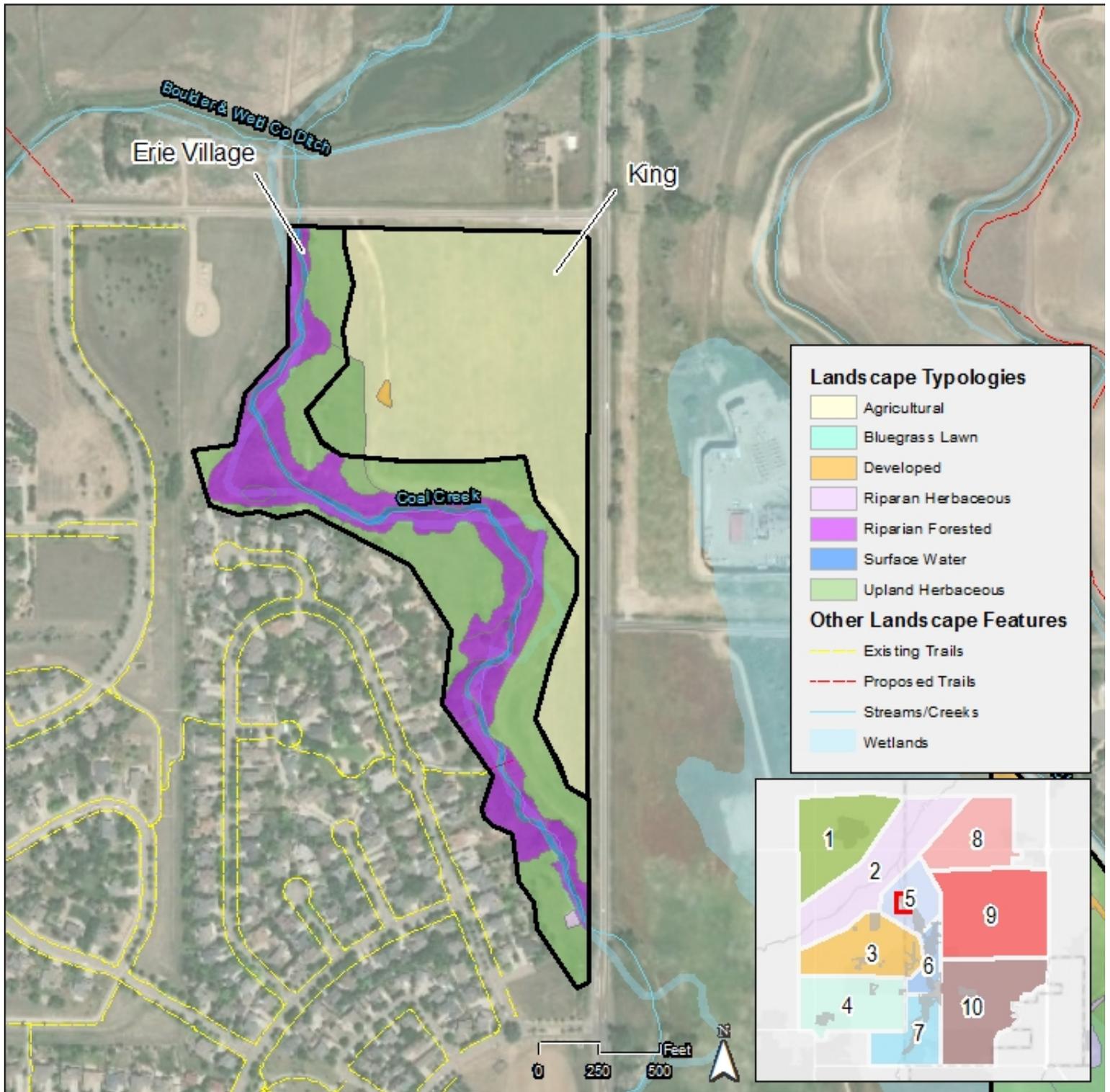
- Coal Creek
- Agricultural land
- Access via E County Line Road and Kenosha Road
- Adjacent residential and agricultural areas
- Special-status species habitat
- Possible oil and gas area to the west

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
King	Upland herbaceous	Non-native herbaceous	0.9
	Agricultural	Crop production	15.0
	Developed	NA	0.1
Erie Village	Upland Herbaceous	Native mixed-grass prairie	8.6
		Non-native herbaceous	1.4
	Riparian Forested	Shrub willow	4.9
		Mixed woodland	2.4
	Riparian Herbaceous	Native mixed-grass prairie	0.04
	Surface Water	Un-armored stream	1.2
	Developed	NA	0.1
Total Acres			34.6

Management and Maintenance Actions

- Native seeding and planting, if needed
- Irrigate new plantings, if needed
- Weed control
- Add wildlife habitat structural elements to support site use
- Monitor for nuisance wildlife
- Strategic use of soil amendments and conditioners (King)
- Implement erosion control BMPs
- Strategic mowing
- Prairie dog maintenance
- Remove trash and debris



5.5.2 Northridge

Total Area: 52.0 acres

Maintenance Level: C

Description: Northridge is a very large open space parcel located in North Coal Creek District. Northridge has limited access and largely consists of non-native prairie species. Northridge would benefit from habitat restoration.

Environmental, Economic, and Community Value

- Flood risk reduction
- Stormwater capture and filtration
- Scenic qualities
- Firebreak area
- Oil and gas well pad reclamation
- Habitat connectivity

Key Resources

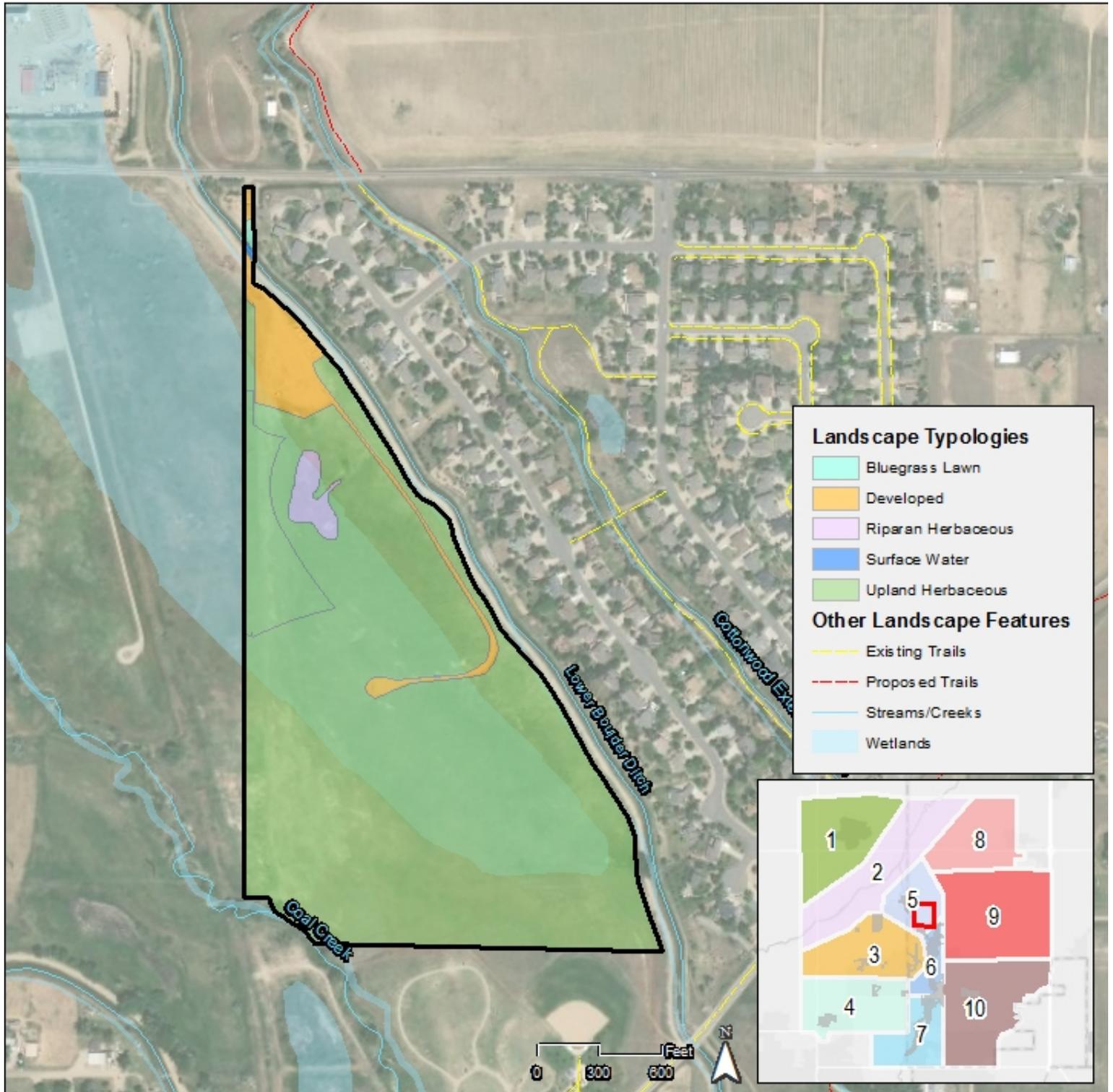
- Drainage channel
- Grassland
- Extractive resources/well pads
- Adjacent to Coal Creek, Lower Boulder Ditch, and Cottonwood Extension Ditch
- High tension wire at the southern end of the Northridge property
- County Road 10 ½ north of Northridge property

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Northridge	Upland Herbaceous	Native mixed-grass prairie	3.1
		Non-native herbaceous	44.8
	Riparian Herbaceous	Non-native	0.8
	Bluegrass Lawn	NA	0.1
	Surface Water	Un-armored drainage channel	0.04
	Developed	NA	3.2
Total Acres			52.0

Management and Maintenance Actions

- Native prairie restoration
- Native seeding
- Native plantings in riparian areas
- Irrigate new plantings
- Strategic use of soil amendments and conditioners
- Add wildlife habitat structural elements to support site use
- Strategic mowing
- Weed control
- Implement erosion control BMPs
- Remove trash and debris
- Install and maintain fencing and signage
- Monitor for nuisance wildlife
- Prairie dog management



5.5.3 Reliance Park & Water Reclamation

Total Area: 24.5 acres

Maintenance Level: Reliance Park (A); Water Reclamation (C)

Description: Reliance Park offers several recreational opportunities to the public, featuring a dog park and baseball fields, and is adjacent to the Water Reclamation Open Space parcel that includes over five acres of native riparian habitat.

Environmental, Economic, and Community Value

- Stormwater capture and filtration
- Flood risk reduction
- Open to the public for recreational use
- Diverse habitat for native plants, pollinators, and wildlife
- Migratory bird stopover
- Enhances adjacent property values
- Handicapped access
- Provides wildlife habitat connectivity by connecting open spaces

Key Resources

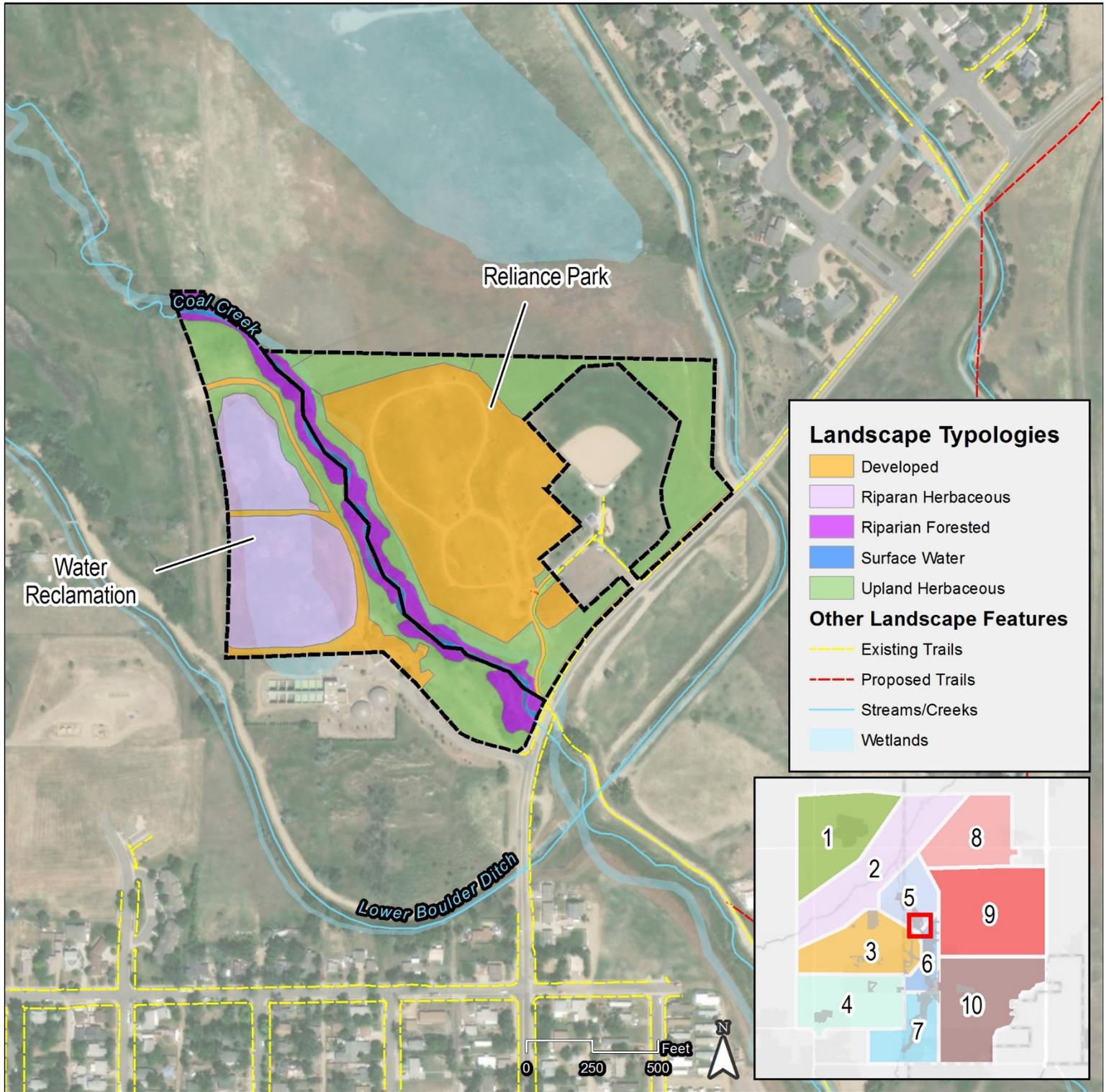
- Dog park
- Playground
- Recreational fields
- Lower Boulder Ditch to the east
- Coal Creek to the west
- Parking lot
- Portable restrooms
- Electricity
- Forested habitat
- Water treatment plant to the west
- Access via County Road 1 ½

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Water Reclamation	Upland Herbaceous	Non-native herbaceous	2.7
	Riparian Herbaceous	Native	4.5
	Riparian Forested	Mixed woodland	1.3
	Surface Water	Un-armored stream	0.2
	Developed	NA	1.2
Reliance Park	Upland Herbaceous	Native mixed-grass prairie	4.5
		Non-native herbaceous	0.8
	Riparian Forested	Mixed woodland	0.01
		Shrub willow	0.8
	Surface Water	Un-Armored Stream	0.2
	Developed	NA	8.3
Total Acres			24.5

Management and Maintenance Actions

- Strategic mowing
- Native seeding, if needed
- Native plantings in riparian areas
- Irrigate new plantings, if needed
- Weed control
- Maintain dirt path along Coal Creek for fire access at Water Reclamation
- Monitor for nuisance wildlife
- Install and maintain fencing and signage
- Implement erosion control BMPs
- Add wildlife habitat structural elements to support site use
- Regularly remove and properly dispose of trash and debris
- Maintain trails and hardscapes
- Employ snow and ice control on hardscapes consistent with Town of Erie snow removal policy and procedures



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5.6 District 6: Central Coal Creek

5.6.1 Central Coal Creek

Total Area: 161.3 acres

Maintenance Level: B

Description: Central Coal Creek is the largest parcel in the Town of Erie OSMP. It encompasses various habitat types and provides a system of connected walking trails, multiple drainageways, and scenic qualities. It extends generally from Garfield Road in the South to County Road 1 ½ in the North.

Environmental, Economic, and Community Value

- Habitat connectivity
- Open to public for recreational opportunities
- Diverse habitat for native plants, pollinators, and wildlife
- Flood risk reduction
- Enhances adjacent property values
- Stormwater capture and filtration
- Water resources
- Oil and gas well pad reclamation
- Special-status species habitat
- Migratory bird stopover

Key Resources

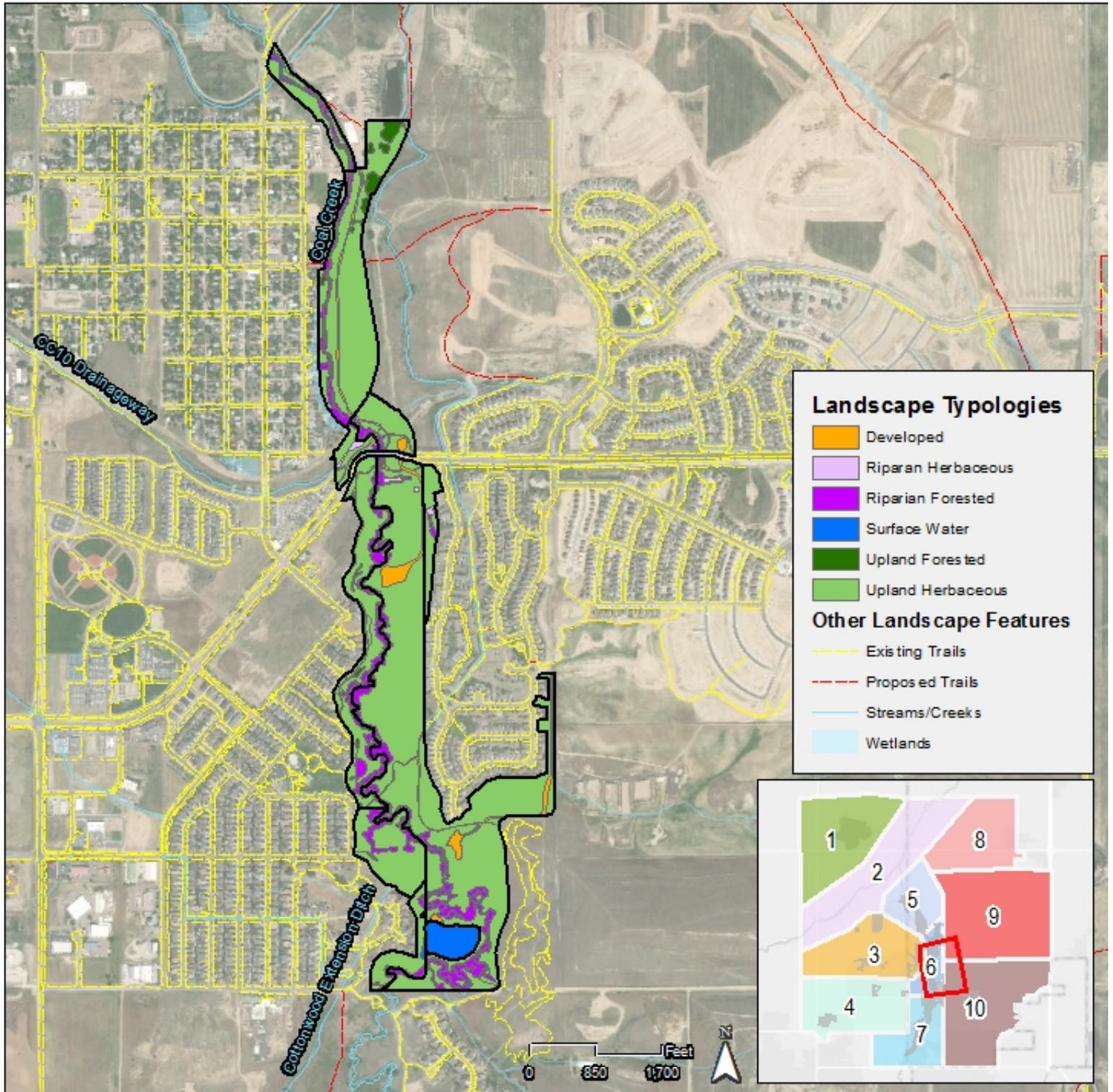
- Coal Creek
- Region trail and neighborhood access trails
- Adjacent residential and agricultural areas
- Parking lots
- Drainage ways
- Irrigation ponds
- Riparian forests
- Native prairie habitat
- Extractive resources/well pad

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Coal Creek	Upland Herbaceous	Native mixed-grass prairie	88.2
		Non-native herbaceous	33.3
		Shrubs	0.3
	Upland Forested	NA	2.4
	Riparian Forested	Cottonwood	0.6
		Mixed woodland	0.3
		Shrub willow	20.5
		Willow	0.1
	Riparian Herbaceous	Native	0.6
	Surface Water	Un-armored stream	3.5
		Un-armored drainage channel	0.03
		Un-armored open water	0.7
		Armored open water	4.0
	Developed	NA	6.9
		Total Acres	161.3

Management and Maintenance Actions

- Strategic mowing
- Native seeding, if needed
- Native plantings in riparian areas, if needed
- Irrigate new plantings, if needed
- Weed control
- Regularly remove and properly dispose of trash and debris
- Employ snow and ice control on trails consistent with Town of Erie snow removal policies and procedures
- Install and maintain fencing and signage
- Monitor and treat harmful algal blooms
- Implement erosion control BMPs
- Add wildlife habitat structural elements to support site use
- Native prairie restoration
- Monitoring for American bullfrog
- Streambank restoration
- Maintain trails and hardscapes



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5.6.2 Colliers Hill

Total Area: 99.4 acres

Maintenance Level: B

Description: Colliers Hill encompasses a large open space parcel with lots of potential for future use and access. It consists mostly of upland mixed-grass prairie habitat and is located East of Colliers Blvd and South of Erie Parkway.

Environmental, Economic, and Community Value

- Habitat connectivity
- Provides high points and mountain views
- Diverse habitat for native plants, pollinators, and wildlife
- Area used for recreation by adjacent residents
- Flood risk reduction
- Migratory bird stopover
- Stormwater capture and filtration
- Water resources
- Social trails
- Oil and gas well pad reclamation
- Special-status species habitat
- Former burn areas
- Enhances adjacent property values

Key Resources

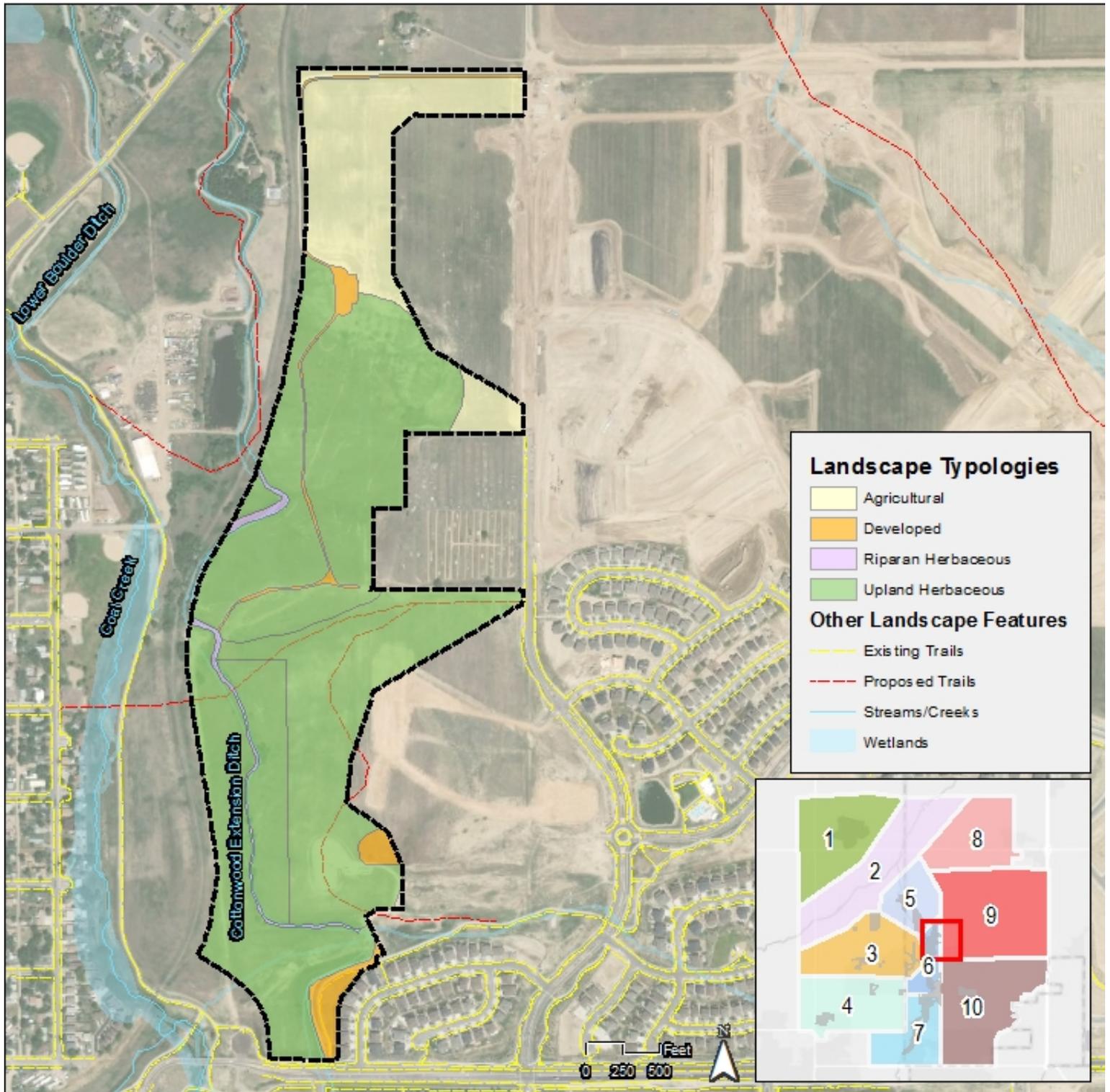
- Cottonwood Extension Ditch
- Adjacent to Coal Creek
- Drainage ways
- Existing and proposed walking trails
- Adjacent to residential areas
- Native prairie habitat
- Agricultural land
- Adjacent Town cemetery
- Abandoned railroad and associated berm
- Colliers Blvd to the east and Erie Parkway to the south

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Colliers Hill	Upland Herbaceous	Native mixed-grass prairie	54.2
		Non-native herbaceous	22.4
	Riparian Herbaceous	Native	0.8
		Non-native	0.4
	Agricultural	Crop production	17.4
	Developed	NA	4.2
Total Acres			99.4

Management and Maintenance Actions

- Strategic mowing
- Weed control
- Native seeding, if needed
- Remove and properly dispose of trash and debris
- Enhance public access
- Turn current social trails into an actual trail system
- Install and maintain fencing and signage
- Implement erosion control BMPs
- Add wildlife habitat structural elements to support site use
- Native prairie restoration
- Prairie dog management
- Monitor nuisance wildlife
- Streambank restoration to address cutbank in ditch



5.7 District 7: South Coal Creek

5.7.1 South Coal Creek

Total Area: 58.5 acres

Maintenance Level: B

Description: Large riparian park located adjacent to the Erie Municipal Airport and within a rural residential and agricultural landscape context. Park is located along E County Line Rd between Bonnell Ave and E Baseline Rd.

Environmental, Economic, and Community Value

- Habitat connectivity
- Open to public for recreational use
- Diverse habitat for native plants, pollinators, and wildlife
- Flood risk reduction
- Enhances adjacent property values
- Stormwater capture and filtration
- Water resources
- Special-status species habitat
- Migratory bird stopover

Key Resources

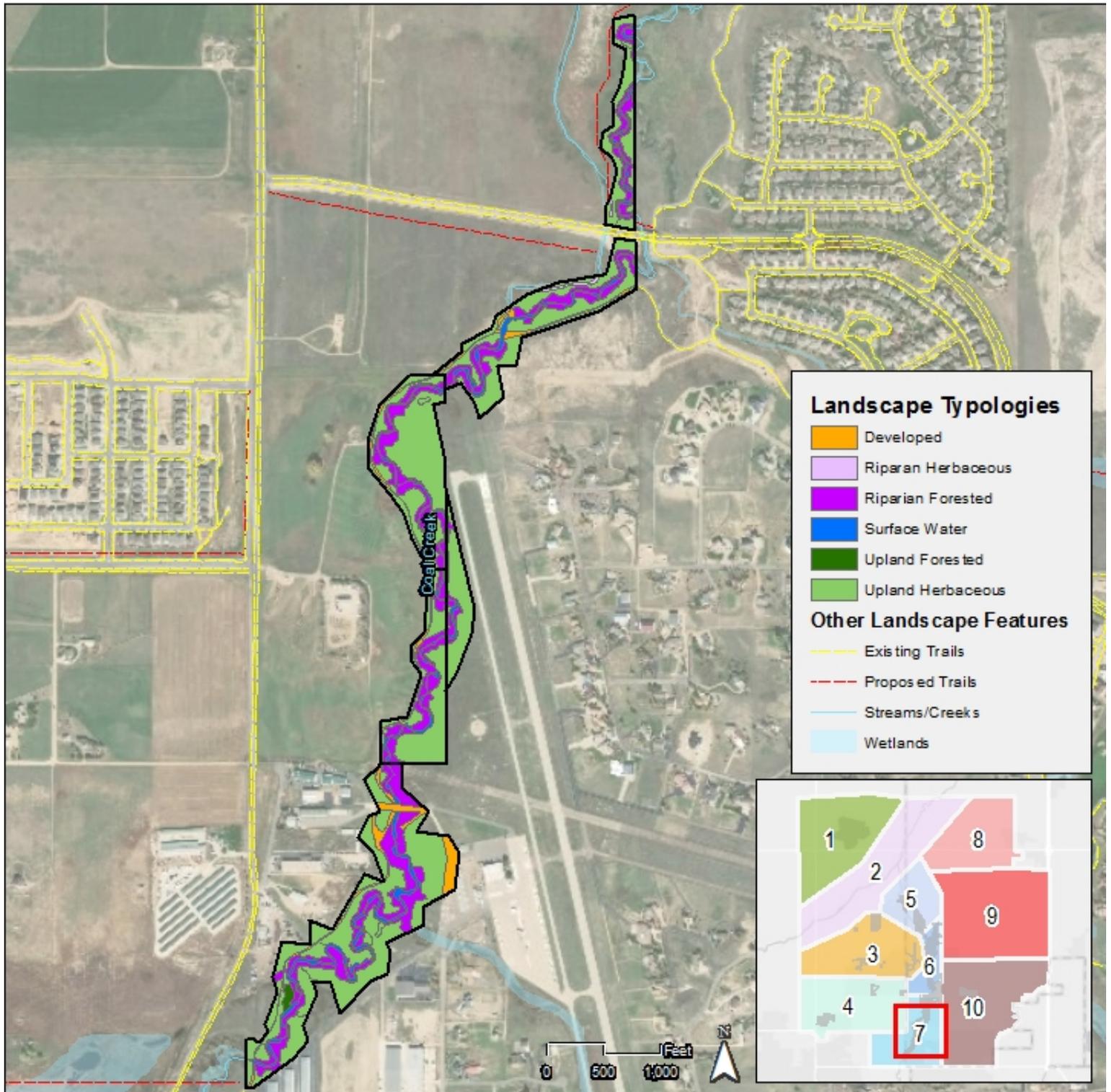
- Coal Creek
- Riparian forests
- Native prairie habitat
- Regional trail
- Constructed underpass
- Adjacent residential and agricultural areas
- Adjacent to Erie Municipal Airport

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Coal Creek	Upland Herbaceous	Native mixed-grass prairie	22.0
		Non-native herbaceous	13.4
		Shrubs	0.8
	Upland Forested	NA	0.2
	Riparian Forested	Cottonwood	0.4
		Shrub willow	13.6
		Willow	0.7
	Riparian Herbaceous	Native	0.2
	Surface Water	Un-armored stream	4.2
	Developed	NA	3.1
Total Acres			58.5

Management and Maintenance Actions

- Strategic mowing
- Weed control
- Native seeding, if needed
- Native riparian planting, if needed
- Irrigate new plantings, if needed
- Monitor for special-status wildlife species
- Streambank restoration
- Maintain trails and hardscapes
- Monitoring for American bullfrog
- Trail debris removal
- Remove and properly dispose of trash
- Retain decayed woody debris as wildlife habitat elements
- Employ snow and ice control on trails consistent with Town snow removal policies and procedures
- Implement erosion control BMPs
- Native prairie restoration



5.7.2 Vista Pointe & Leon A. Wurl Service Center

Total Area: 125.1 acres

Maintenance Level: Vista Pointe (B); Leon A. Wurl Service Center (C)

Description: Vista Pointe is comprised of two large parcels located along Coal Creek. It is situated between a large residential area on the east and agricultural open space to the west.

Leon A. Wurl Service Center is comprised of the open space lands adjacent to the maintenance facility utilized by Erie Parks & Recreation and Public Works. It is located west of Vista Pointe and just south of Bonnell Ave.

Environmental, Economic, and Community Value

- Habitat connectivity
- Open to public for recreational opportunities
- Diverse habitat for native plants, pollinators, and wildlife
- Flood risk reduction
- Enhances adjacent property values
- Stormwater capture and filtration
- Water resources
- Special-status species habitat
- Migratory bird stopover

Key Resources

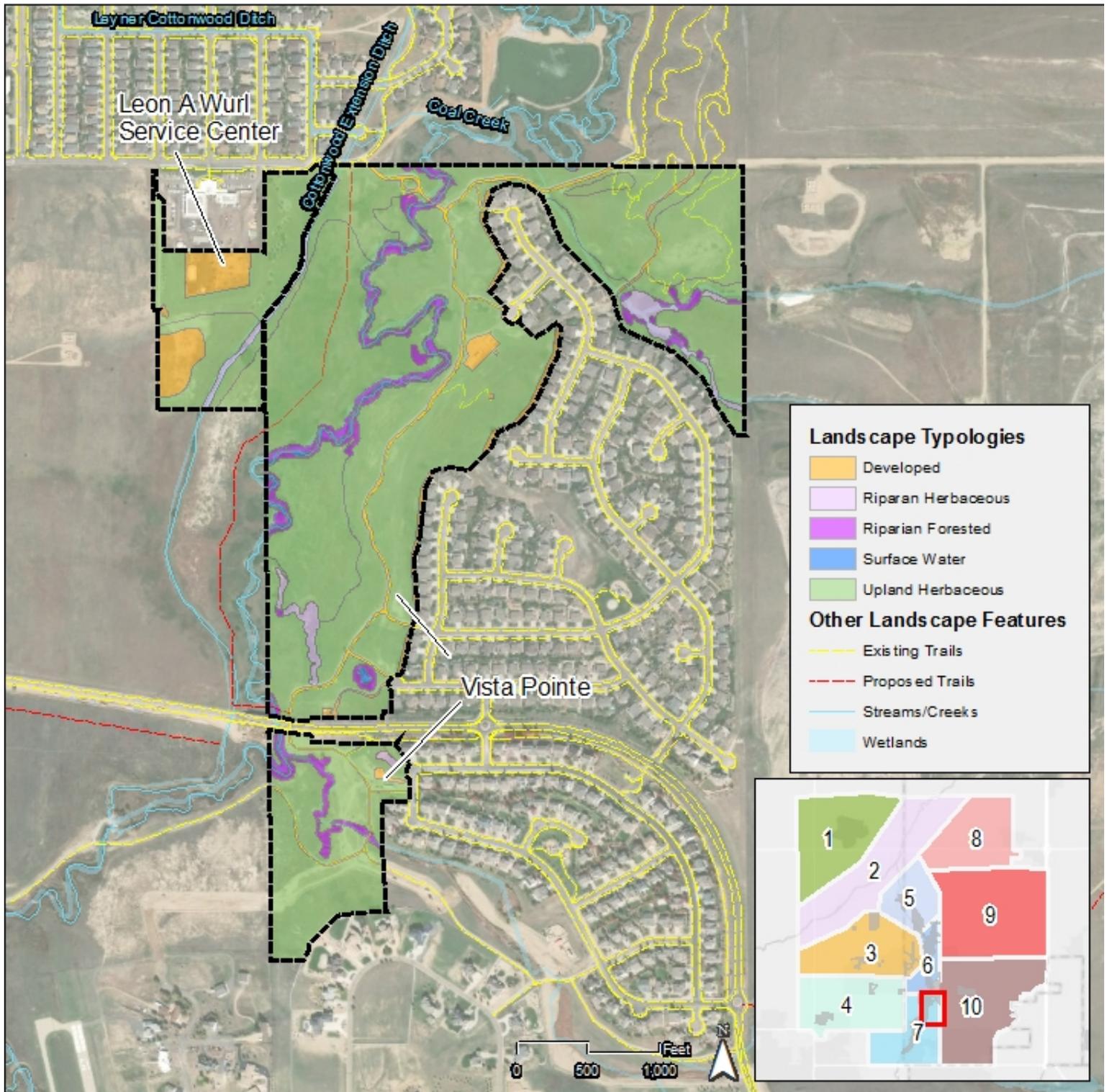
- Coal Creek (Vista Pointe)
- Cottonwood Extension Ditch (Leon A. Wurl Service Center)
- Riparian forests
- Native prairie habitat
- Diverse bird populations
- Adjacent to former prairie dog town (Vista Pointe)
- Regional trail and neighborhood access trails
- Adjacent to maintenance storage facility and restrooms (Leon A. Wurl Service Center)
- Public overflow parking lot (Leon A. Wurl Service Center)
- Oil and gas located directly to the west (Leon A. Wurl Service Center)
- Coyote activity (Vista Pointe)
- Detention basin located in southwest corner (Vista Pointe)

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Leon A. Wurl Service Center	Upland Herbaceous	Native mixed-grass prairie	8.1
		Non-native herbaceous	3.9
	Riparian Herbaceous	Native	0.4
	Developed	NA	3.4
Vista Pointe	Upland Herbaceous	Native mixed-grass prairie	65.2
		Non-native herbaceous	30.2
	Riparian Forested	Willow	3.8
		Cottonwood	1.3
	Riparian Herbaceous	Native	2.6
	Surface Water	Un-armored streams	1.3
		Un-armored open water	0.1
	Developed	NA	4.8
Total Acres			125.1

Management and Maintenance Actions

- Strategic mowing
- Weed control
- Native seeding, if needed
- Native riparian planting, if needed
- Irrigate new plantings, if needed
- Implement erosion control BMPs
- Monitoring for American bullfrog
- Maintain trails and hardscapes
- Prairie dog management
- Coyote management
- Special-status species monitoring
- Streambank restoration
- Remove and properly dispose of trash and debris
- Employ snow and ice control on hardscapes consistent with Town of Erie snow removal policies and procedures



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5.7.3 Erie Airpark

Total Area: 9.3 acres

Maintenance Level: C

Description: Small, three-parcel park located just north of Erie Municipal Airport, south of Vista Pkwy and west of the Vista Pointe subdivision. It located south of and adjacent to South Coal Creek Park.

Environmental, Economic, and Community Value

- Habitat connectivity
- Open to public for recreational opportunities
- Diverse habitat for native plants, pollinators, and wildlife

Key Resources

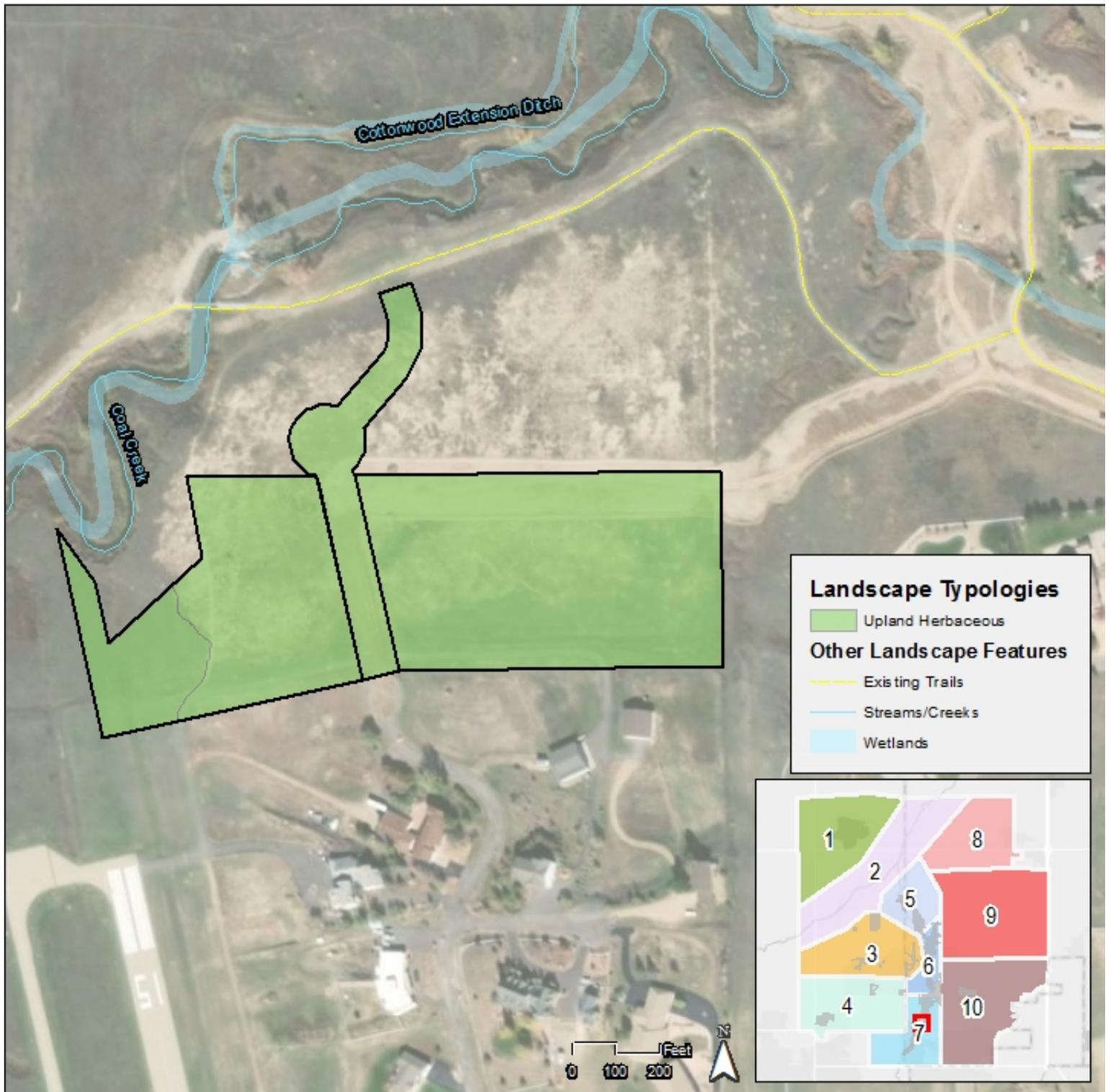
- Riparian corridor
- Native prairie habitat
- Active prairie dog town
- Walking trails
- Residential area to the east
- Erie Municipal Airport to the south
- Adjacent to Coal Creek

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Erie Airpark	Upland Herbaceous	Native mixed-grass prairie	8.3
		Non-native herbaceous	1.0
Total Acres			9.3

Management and Maintenance Actions

- Strategic mowing
- Native seeding, if needed
- Native riparian planting, if needed
- Irrigate new plantings, if needed
- Weed control
- Prairie dog management
- Special-status species monitoring
- Remove and properly dispose of trash
- Trail debris removal



5.7.4 Messersmith & Boehle

Total Area: 4.1 acres

Maintenance Level: Messersmith (C); Boehle (C)

Description: Two small, adjacent parcels located on Coal Creek just east of E County Line Rd and northwest of Erie Municipal Airport. Agricultural and residential land uses present in surrounding landscape.

Environmental, Economic, and Community Value

- Habitat connectivity
- Diverse habitat for native plants, pollinators, and wildlife
- Flood risk reduction
- Migratory bird stopover
- Enhances adjacent property values
- Stormwater capture and filtration
- Water resources
- Special-status species habitat

Key Resources

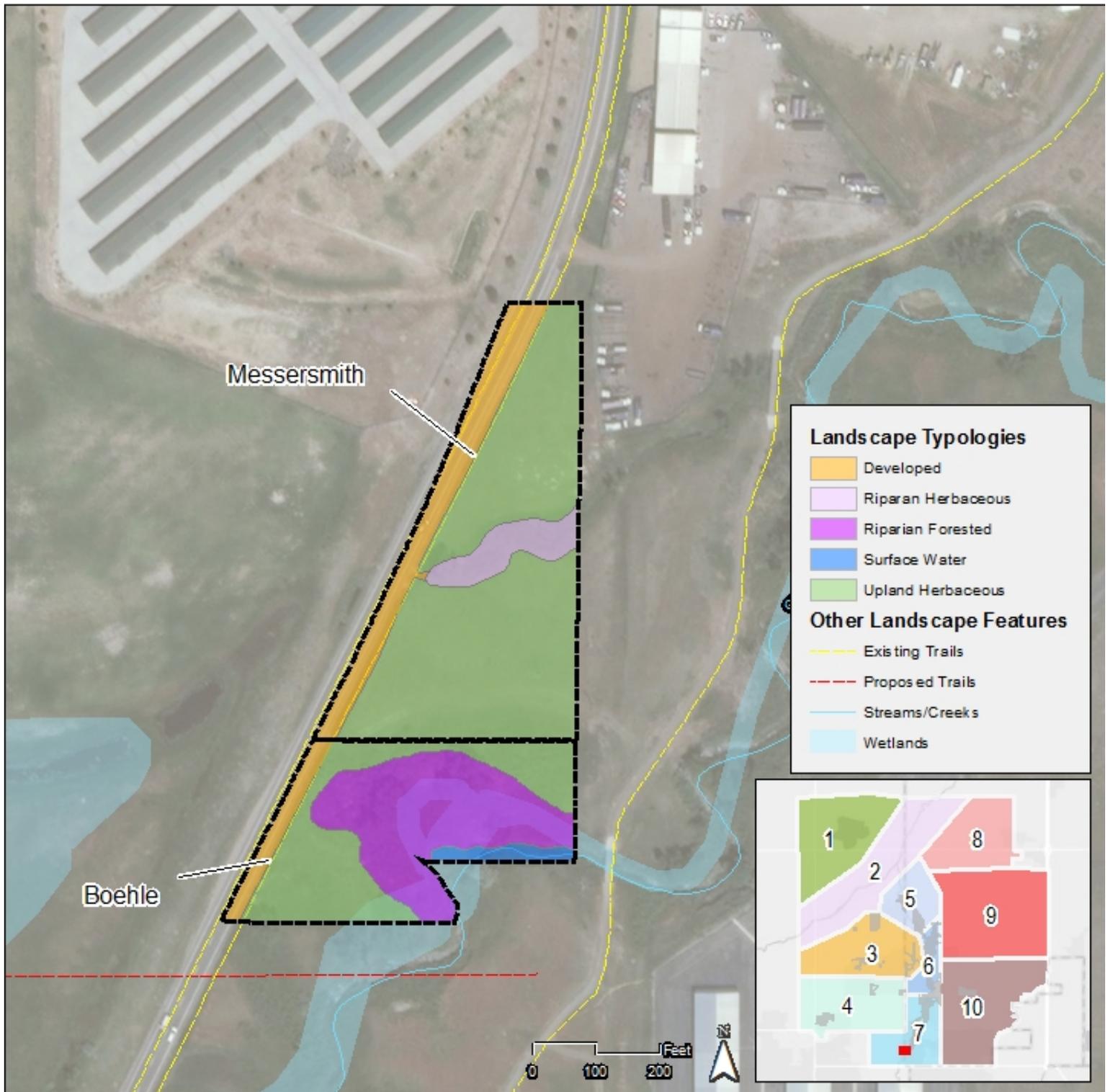
- Coal Creek
- Riparian forests
- Native prairie habitat
- Adjacent residential and agricultural areas
- Adjacent to Erie municipal airport

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Messersmith	Upland Herbaceous	Native mixed-grass prairie	1.8
	Riparian Herbaceous	Native	0.2
	Developed	NA	0.4
Boehle	Upland Herbaceous	Non-native herbaceous	0.7
	Riparian Forested	Mixed woodland	0.8
	Surface Water	Un-armored	0.1
	Developed	NA	0.1
Total Acres			4.1

Management and Maintenance Actions

- Strategic mowing
- Native seeding, if needed
- Native riparian planting, if needed
- Irrigate new plantings, if needed
- Weed control
- Special-status species monitoring
- Remove and properly dispose of trash and debris
- Monitor for nuisance wildlife



5.8 *District 8: North Plains*

- There are currently no open space parks or parcels managed by the Town of Erie within the North Plains District.

5.9 *District 9: Central Plains*

- There are currently no open space parks or parcels managed by the Town of Erie within the Central Plains District.

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5.10 District 10: South Plains

5.10.1 Sunset East & Sunset West - Singletrack

Total Area: 72.1 acres

Maintenance Level: Sunset East (B); Sunset West – Singletrack (B)

Description: Two upland parcels; Sunset East is located at intersection of Weld County Rd 6 and County Rd 5, and Sunset west is located at the western terminus of Weld County Rd 6. Both parks are popular for recreational mountain biking.

Environmental, Economic, and Community Value

- Habitat connectivity
- Open to public for recreational opportunities
- Diverse habitat for native plants, pollinators, and wildlife
- Historic mining activity to the south of the site (Columbine Mine)

Key Resources

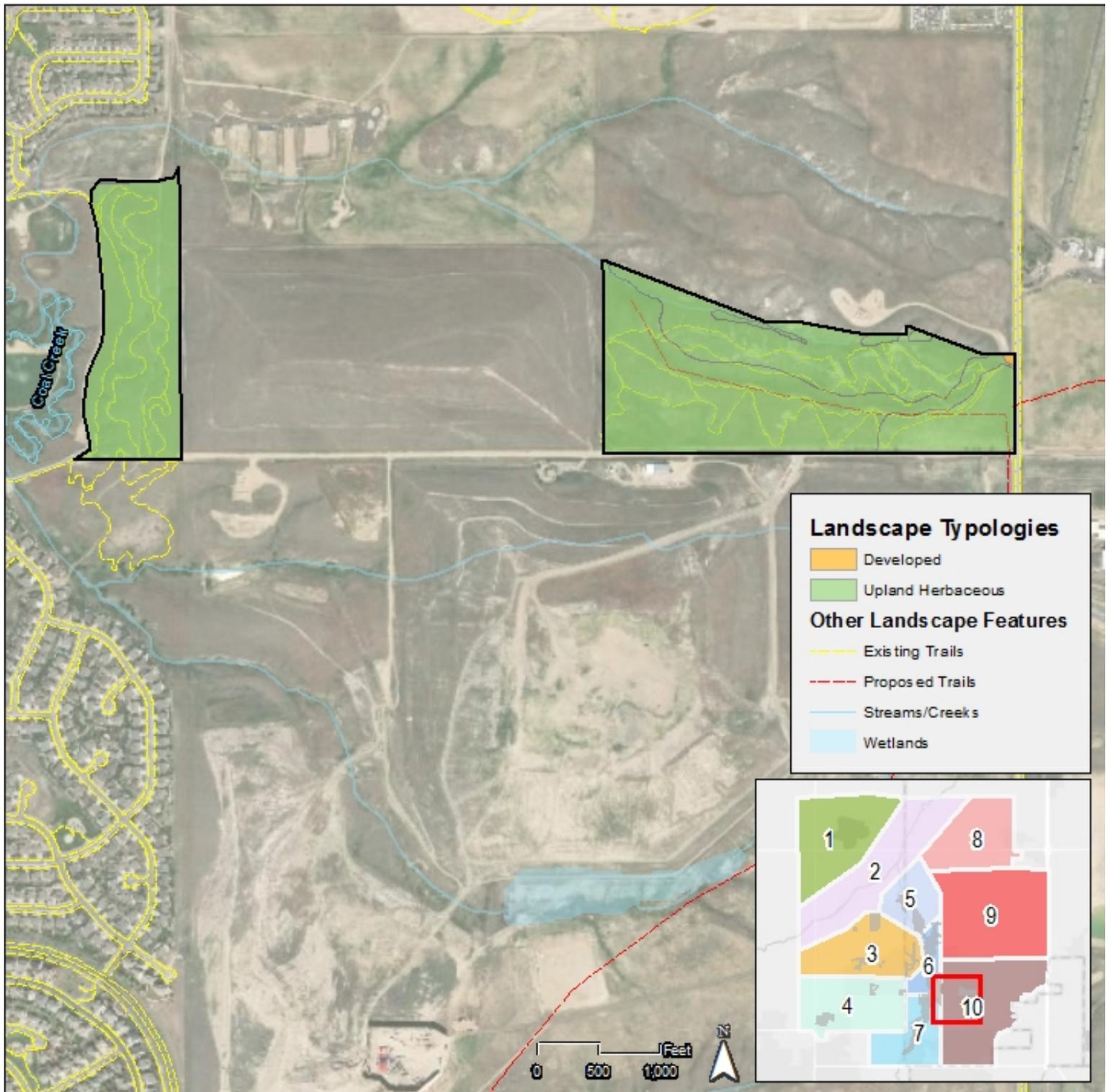
- Native prairie habitat
- Regional trail and walking trails
- Recreational bike trails
- Active prairie dog town
- New parking lot (2018)
- Historic mining activity to the south
- Adjacent to new development (2020 – 2022)
- Pipeline expansion
- Adjacent to Coal Creek and irrigation pond (Sunset West)

Typology Summary

Erie Maintained Greenspace			
Name	Typology	Vegetation Type	Area (ac)
Sunset East Singletrack	Upland Herbaceous	Native mixed-grass prairie	22.0
		Non-native herbaceous	27.3
	Developed	NA	1.1
Sunset West Singletrack	Upland Herbaceous	Native mixed-grass prairie	21.6
	Developed	NA	0.1
Total Acres			72.1

Management and Maintenance Actions

- Strategic mowing
- Native seeding, if needed
- Install and maintain fencing and signage
- Monitor for nuisance wildlife
- Remove and properly dispose of trash and debris
- Upland restoration
- Weed control



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6 IMPLEMENTATION AND ADDITIONAL CONSIDERATIONS



Open space management priorities and practices may be adjusted over time as Erie grows, as the climate changes, and as national or local environmental policies are modified or advanced. In the future, the Town may choose to invest more resources into management of open space parcels in response to these changes. This chapter highlights some potential investments and the benefits they could bring to the Town's citizens and administration.

6.1 Open Space Web Portal

To facilitate public engagement with residents and visitors, the Town may develop a public-facing web mapping gateway to highlight and promote the Town's open space parks and recreational opportunities. The website will include a fully interactive map of all the Town's open space parks. Users can click on a park to learn more about it, including:

- Park size and length and type of trails onsite;
- Habitat types present;
- Recreational opportunities available (i.e. hiking, biking, swimming, fishing, etc.);
- Schedule management or maintenance activities;
- Photos and videos showing fun and positive uses of the park; and
- Citizen science opportunities.

The website should be dynamic, with information regularly maintained to include up-to-date information on large-scale management activities, wildfire activity, and wildlife presence. The goal of the site would be to showcase the Town's open space park resources to its residents and visitors to facilitate increased visitation and park use.

6.2 Advanced Data Management and Reporting Tools

The landscape typology geodatabase developed for the Town allows advance analytics to be performed to help determine the function of open space areas and help with prioritization of financial and personnel resources. The open space areas should be monitored using the landscape typology methodology on a three-year rotation, so the geodatabase can be maintained with relevant data. If the Town should choose, this custom geodatabase can also be integrated with the web portal to leverage resources and support advanced data reporting and transparency.

6.3 Allocation of Administrative Maintenance Zones

Each management district and specific open space parcel will require a suite of management actions that depend on site-specific attributes. However, the amount of time and resources associated with site maintenance will depend on the level of public access and public-facing infrastructure and amenities located on each site. Additionally, in some cases large parcels may only experience intense public use on certain areas of the site, such as trails and parking areas, while the majority of the site off-trail will be largely wild open space with no public access or amenities, requiring minimal maintenance work.

As the Town’s open space portfolio grows, the Town may consider organizing each open space parcel to have individual maintenance zones. In this case, each parcel may have multiple maintenance zones with different management actions and public use options (TABLE 9). Maintenance zones will inform Town management objectives and public access policies, in turn it can help improve efficiency by focusing efforts where it is needed most. Specifically, proposed maintenance zones may be used to:

1. Identify high public use areas;
2. Protect ecologically sensitive areas;
3. Designate the level of maintenance intensity required within each zone; and
4. Track the acreage associated with each maintenance zone across the Town’s open space parcel portfolio.

Additionally, if the Town determines an average cost per acre associated with each management zone, this method can be used to support budget forecasting for annual maintenance activities, or as part of the parcel acquisition due diligence process to estimate maintenance cost of a potential purchase analyzed against the value of the site to the Town. Maintenance zones can be a valuable planning and evaluation tool that can scale as the Town’s open space portfolio grows.

TABLE 9: PROPOSED MAINTENANCE ZONE DESCRIPTIONS

Rating	Allocation	Public Use	Description
Zone 0	Closed	None	Access restricted due to lack of public amenities, wildlife refuge, leased lands, safety concern, etc.
Zone 1	Protected	Limited	Areas with high conservation value. Access limited to designated trails and amenities.
Zone 2	Nature Escape	Moderate	Off-trail access permitted for passive recreation activities such as fishing, wildlife viewing, etc.
Zone 3	Recreation Area	Substantial	Developed areas which receive heavy use and provide access to recreation, picnic areas, trails, etc.

6.4 Resource-Specific Management Plans

The Town is currently developing a Trails Master Plan that will be informed by and supplement this Open Space Management Plan. The Town may choose to invest in development of resource-specific management plans as dictated by community needs and resource availability. Four management plan opportunities have been identified in the current OSMP: noxious weeds, pollinator habitat, coyotes, and prairie dogs. The latter two may be completed in coordination due to the food web dynamics between coyotes and prairie dogs; there may be an opportunity to leverage coyote management to support prairie dog management objectives.

For all resource management plans, public education and outreach will be a large component. The Town recognizes the value of transparency and public engagement in stewarding its natural resources.

6.4.1 Noxious Weed Management Plans

The State of Colorado requires public agencies to develop eradication and management plans for any plant species included on the State of Colorado’s Noxious Weed Act List (A, B, or C) found within their jurisdictions. The Town may find noxious weed species in open space parks during routine monitoring events. In those cases, plans will be developed to identify species-specific IPM actions and implementation directives, and implemented consistent with relevant federal, state, and local laws, and in alignment with the Town’s vision, guiding principles, and open space management mission.

6.4.2 Pollinator Habitat Management Plan

This OSMP includes general objectives focused on the establishment and promotion of pollinator habitat, and broad management strategies and actions to achieve them. A Pollinator Habitat Management Plan effort would expand upon information provided in this OSMP by including guidelines for pollinator habitat plant composition, site selection and preparation, plant establishment and management methods, and monitoring recommendations.

A Pollinator Management Action Plan may include:

- Identify possible pollinator corridors to assist with pollinator movement in the area;
- Target sites for pollinator habitat creation and management within specific parks;
- A Plant Species Composition Plan that will benefit a diverse pollinator community (i.e., at least 12 species of flowering plants, three of which are in bloom at any one time during the early, mid, and late periods of the growing season);
- Site-specific methods for vegetation community establishment;
- Operations and Maintenance activities for the practices;
- Monitoring Plan, including specific dates and data to be recorded; and
- A public educational component.

6.4.3 Coyote Management Plan

Coyotes are a native species but often clash with local communities. The Town seeks to promote peaceful coexistence between the human and coyote residents of Erie. As the Town grows and the incidence of human-coyote conflicts increase, Erie may develop a holistic Coyote Management Plan to help guide and manage the delicate human-coyote relationship.

A Coyote Management Plan is a comprehensive document that will allow Erie to prevent and minimize coyote-human conflicts, utilizing the following five strategies:

- Strategy 1: Public Education and Awareness
- Strategy 2: Coyote Hazing Effort
- Strategy 3: Active Enforcement of Wildlife Laws and Local Codes
- Strategy 4: Best Management Practices to Deter Coyotes
- Strategy 5: Lethal Control

The Town will work closely with its various departments, including state and federal partners, and with residents to develop a comprehensive plan that is implementable, enforceable, and respectful of stakeholder needs and interests.

6.4.4 Prairie Dog Management Plan

Prairie dogs are a native species, but can be a nuisance for farmers, ranchers, and homeowners. They are also vectors for diseases that can affect other native wildlife species or even people, such as sylvatic or bubonic plague. As the Town grows and incidence of conflicts between residents and prairie

dog populations increase, Erie may develop a holistic Prairie Dog Management Plan to help guide the deployment of resources toward prairie dog population management strategies and actions. The goal is to find a balance between healthy prairie dog communities and societal needs.

The plan will codify a framework for prioritizing sites for management actions and which actions should be deployed under what circumstances. The plan may identify high-priority sites for prairie dog town eradication or culling, insecticide application, or trapping for relocation. The plan will provide a transparent process by which Town residents can interface with Erie staff to address problems in their communities. It will also codify the relevant rules and regulations with which Erie prairie dog management policies will comply.

6.5 Advanced Restoration Activities

The Town may choose to invest in advanced restoration projects to help achieve its management objectives. For example, a large-scale stream restoration project on Coal Creek could help reconnect the stream to its floodplain. This would support improved ecological function, reduce erosion and sedimentation into the stream, and improve flood attenuation capabilities of the floodplain. Advanced restoration projects will be identified, considered, and funded on a case-by-case basis.

6.6 Historic Preservation and Cultural Resources

Erie's Historic Preservation Advisory Board is developing a Historic Preservation Master Plan (HPMP). The goal of the HPMP is to ensure identification, designation, and protection of cultural resources as well as to create a strategic plan aligned with the Town's most current community planning and development efforts.

The HPMP draft has been released for public comment and is still under development. After the HPMP is finalized, the Town will update the OSMP to include any historic and cultural resources that were identified on open space parcels, and any associated management actions and maintenance activities required to preserve and maintain those resources.

6.7 Integration with Sustainability Initiatives

As the Town of Erie grows, there may be opportunities to integrate open space management activities with current or future sustainability initiatives. Businesses, organizations, municipalities, and community groups may define sustainability differently. But in general, sustainability refers to balancing the use of economic, social, and environmental resources to prevent overexploitation and ensure each can recover quickly in a changing climate. Some entities choose to take sustainability beyond damage control by implementing regenerative strategies that restore, renew, or revitalize their sources of energy and materials.

The Town may consider how the following sustainability-related actions, policies, or programs may help advance its open space goals:

- Identify opportunities to site community gardens at or adjacent to open space preserves to provide educational and passive recreational opportunities that foster environmental stewardship, healthy food systems, and waste reduction.

- Develop a Strategic Plan to Reduce Waste and set a goal to achieve 75 percent waste diversion in the community by 2025. One example objective is to install compost bins at park and open space facilities and partner with local farmers or businesses to use the material for agriculture, community gardening, or commercial and residential landscaping. The Town may also consider partnering with composting facilities for disposal of organic waste generated by management actions at open space sites.
- Adopt a Pollinator Habitat Ordinance that encourages siting for butterfly gardens, beekeeping operations, and other activities to promote ecological health while protecting public safety.
- Adopt a Renewable Energy Ordinance that identifies where alternative fuel generators, distributed energy resources, and energy storage facilities can be sited in locations that protect wildlife and community character while providing alternative energy sources that can be more reliable during severe storm events than the traditional grid and transmission system.
- Promote the WaterWise Landscaping Best Practices Manual to help residential and commercial property owners create attractive landscapes while installing native plants or pollinator habitat, using water efficiently, and mitigating stormwater and wildfire risk.
- Prepare and implement a Green Building Program that incentivizes property owners to use resource efficient construction materials, conserve water, and install energy efficient appliances and infrastructure in new and remodeled buildings.
- Adopt a policy that requires each new Town building be developed to Leadership in Energy and Environmental Design (LEED) gold rating or higher and each new recreational park to meet the Sustainable SITES Initiative set by the U.S. Green Building Council.
- Identify opportunities to partner with utilities to install electric vehicle charging stations at Town facilities such as parks and nature centers and consider how those stations may be powered by onsite renewable energy such as solar panels and batteries. Electric vehicles not only improve air and water quality for humans and wildlife, they reduce noise nuisances and sediment contamination from oil and grease.
- The Town landfill will one day be closed and capped, potentially adding a new and unique site to the open space portfolio and/or for renewable energy generation, storage, and distribution.
- Livestock waste from adjacent rangelands may be utilized as natural fertilizer on open space properties with highly managed vegetation.
- Conduct or update a wildlife corridor study that identifies opportunities to install crossings under or over long, linear capital improvement program projects so wildlife can move through the urban-open space interface safely.
- Identify locations to offer grazing leases for goats or cows to maintain vegetation height and reduce hazards while protecting habitat.

6.8 Climate Change

Climate change is the defining environmental challenge of our time. As long-term climate patterns shift, Erie's ecological character may change in overt or subtle ways. The OSMP adaptive management framework allows the Town to be nimble in its response to climate change impacts on open space properties.

Climate change affects average seasonal temperatures and long-term precipitation patterns, which have cascading effects on several open space property components under the Town's management jurisdiction, including:

- Plant community composition;
- Riparian and wetland function;
- Pollinator activity and alignment with plant flowering times; and
- Wildlife site use patterns, behaviors, and migratory patterns.

Climate change not only threatens the ecological function of Erie's open space sites, but also the integrity of natural biological resources throughout Colorado. In recognition of this, the state of Colorado released the Colorado Climate Plan in (2018), which provides state-level policies and strategies to mitigate and adapt to climate change. While the state-level commitment to tackling climate change is currently a voluntary program, it is likely that policies will be enacted in the future to guide markets to address emissions levels at the national, state, and/or local levels.

The Town of Erie will continue to align its management policies with best practices in terms of carbon sequestration and water resources management to increase the resiliency of the Town's natural resources to the effects of climate change. As policies change, there may be an opportunity to integrate the management of Town open space parcels with carbon offset markets and water markets, introducing a new revenue stream to the Town that can be invested into further enhancing the Town of Erie's natural resources and heritage for the benefit of many generations to come.

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GLOSSARY OF TERMS



Please refer to the key terms below, which you will find throughout the document. The first instance of each term is bolded in-text.

Adaptive Management: is a framework for taking corrective action under uncertain conditions based on the best available science, and re-evaluating and adjusting decisions as more becomes available. It helps users recognize uncertainties, consider multiple problem-solving strategies, and adjust along the way.

Biodiversity: or biological diversity is the variability among living organisms, including diversity within species, between species, and of ecosystems.

Coyote Hazing: makes use of deterrents to move an animal out of an area or discourage an undesirable behavior or activity. Hazing can help maintain a coyote's fear of humans and deter them from backyards and play spaces.

Ecosystem Services: are direct or indirect benefits to society provided by wildlife or ecological systems. Ecosystem services are divided into four broad categories: supporting, provisioning, regulating, and cultural.

Floodplains: are low-lying areas adjacent to waterbodies that have the capacity to slow and control floodwaters, thus diminishing water velocity and reducing erosion and flood damage.

Integrated Pest Management (IPM): is an effective and environmentally sensitive approach to pest management that relies on a combination of common-sense practices. IPM programs use current, comprehensive information on the life cycles of pests and their interaction with the environment.

Landscape Typology: is a process of categorizing parks, open spaces, and other habitats using desktop analysis and field surveys. Collected habitat type data combines semi-quantitative and qualitative data tied to a Geographic Information System (GIS) geodatabase. This multi-disciplinary approach to understanding systems level processes for connectivity and ecological function can be used to prioritize restoration and inform efficiencies in open space management decisions.

Native Plants: are plants indigenous to a given area in geologic time.

Non-native Species: are species that have been introduced into new areas that have not historically been part of their native range. 'Exotic,' 'alien,' 'nonindigenous,' and 'introduced' are all synonymous terms referring to non-native species.

Noxious Weed: is a specific term that signifies statutory regulations under the State of Colorado's Noxious Weed Act. The State of Colorado mandates that populations of List A species must be eradicated, and List B species populations must be contained and suppressed. List C should be monitored and controlled as soon as reasonably possible. Finally, List A through C species should have noxious weed management plans prepared.

Nuisance Wildlife: is wildlife that cause damage to personal private property or pose a risk to the health and safety of humans and domestic wildlife (Colorado Parks and Wildlife 2018).

Open Space: is protected land of significant value that are conserved in their natural state, restored, or improved with appropriate native landscaping to retain a natural or natural-appearing condition, or conserved in quality agriculture.

Reclamation: implies that the site is habitable by organisms that were originally present or others that approximate the original inhabitants. Reclamation typically involves some measure of ecological improvement but falls short of restoration.

Restoration: is the practice of renewing and restoring degraded, damaged, or destroyed ecosystems and habitats in the environment by active human intervention and action.

Revegetation: is the process of establishing plants in areas devoid of vegetation or where existing vegetation needs to be enhanced.

Riparian: is derived from Latin *ripa*, meaning river bank, and relates to areas adjacent to rivers and streams, which may include wetlands.

Special-status Species: are state or federally-listed as endangered or threatened or are included as Colorado species of greatest conservation need (SGCN) in Colorado's 2015 State Wildlife Action Plan (SWAP).

Strategic Mowing: refers to conducting mowing practices thoughtfully and relative to known ecological and use factors, such as landscape typology, wildlife habitat use, site hydrology, recreation, and adjacent land-use.

Vegetated Buffers: are native plant communities located on the lands immediately adjacent to wetlands, streams, creeks, rivers, and other waterways. Vegetated buffers should be managed to occupy a 20-foot buffer area, where possible.

Viewsheds: An area that is visible from a certain vantage point, especially when considered valuable or worth preserving for aesthetic reasons.

APPENDIX A: LANDSCAPE TYPOLOGY TECHNICAL MANUAL



LANDSCAPE TYPOLOGY GEODATABASE TECHNICAL MANUAL

The Landscape Typology mapping and existing conditions data are stored in a geographic information system (GIS) database, or geodatabase. This allows projection of mapped typologies onto the regional park system, review of the spatial arrangement of typologies, as well as rapid assessment of typology characteristics generated during evaluation of typologies on the ground. This geodatabase system can be used by planners and maintenance crews to quickly identify areas of interest and potential for restoration.

Development of the geodatabase required creating a list of key qualitative and quantitative parameters that would be assessed in the field for each landscape typology identified. These parameters include ecological values such as plant diversity and wildlife habitat, as well as park-use aspects such as user defined trails and improper uses. Assessments regarding opportunities for restoration or improvement are also included. These parameters are integrated into the geodatabase, along with information about each typology. Additional characteristics, including adjacent hydrologic systems, are also included in the geodatabase. Typologies are mapped as discrete polygons, and each contain a set of values for the list of parameters. The steps to perform preliminary landscape typology mapping, field validation, and post processing are detailed below and captured in [FIGURES 1-A through 3-A](#).

Preliminary Landscape Typology Mapping (ArcGIS)

1. From the Town of Erie Open Space Management Parcels layer, copy and paste the park of interest into the Typology shapefile.
2. Use the latest available imagery to ensure accurate preliminary mapping.
3. Non-vegetated surfaces, such as buildings and impervious surfaces, should be cut from the shape and categorized as 'Developed.' Athletic fields should be removed; however, only the infield or dirt area should be removed from baseball fields, which must be done manually. Outfields should be categorized as bluegrass lawn.
4. Typologies should be mapped generally to the 1/6-acre scale at minimum for riparian areas and 1/4-acre scale for upland areas (if the area is smaller than 1/6-acre or 1/4-acre respectively it should be included with the adjacent landscape type). This is flexible if the area represents valuable habitat that is justified in mapping but is lower than the acreage thresholds. To map typologies, use the "Cut" tool to trace the boundary of the typology. Once the polygon is cut from the original polygon, change the Landscape Type, Hydrologic System, and Habitat Type based on the typology spectrum found at the end of this appendix.
5. The geodatabase must not have any blank values for typologies, hydrology, subtypes, or GIS acres, and ideally for other general information as well within the attribute table.
6. The completed database should be reviewed to ensure no polygons are missing typology information, and all appropriate fields are entered. This also involves making sure that only possible combinations of typology, hydrology, subtype are present in each row. Incorrect

combinations of typologies and subtypes are possible when typologies are changed. For example, an upland forested polygon should never contain a hydrologic system or subtype, whereas a riparian forested polygon should always have a hydrologic system and subtype associated with it.

7. Check acreages to ensure no polygons under 1/6-acre in riparian areas and 1/4-acre in upland areas exist unless they are justified.
8. Once the preliminary mapping is complete, the landscape types and subtypes need to be field verified. This involves using the data form provided at the end of this appendix. Using the data form, the landscape type and subtype at representative points needs to be verified and scores for each parameter need to be assigned.

Field Verification

1. Create field maps to allow the field verifier to make written changes to the polygon shapes on paper.
2. Field verify the preliminary mapped polygons. A point should be collected for every landscape type and subtype for each park. Identify locations where points can be collected close together for different landscape types to save time in the field. Point data should be collected in representative areas, so the scores can be applied to adjacent polygons of the same subtype. The in-person polygon updates will later be applied to the geodatabase in the office.
3. Once the verifier is in the field, he/she will locate the area of interest and ensure the point location is representative of that habitat type and subtype. Once a representative point location has been chosen, a data form will need to be completed to verify the habitat type and subtype.
4. Begin by filling out the information at the top of the form (park, location code, typology, habitat subtype, observer, and date). If any pollinators are observed (bees, birds, other insects) list them in the appropriate section. When filling out the vegetation cover by strata it is important to note that the total can exceed 100% cover because it is based on a multi-layered ecosystem; however, a single stratum cannot exceed 100% cover. For example, tree canopy cover at 45% with 65% coverage by grass species would total 110% cover.
5. After completing the total vegetation cover by strata section, identify the two dominant species within each strata and list their percent cover in the appropriate boxes. Noxious weed species should be listed in the solely noxious weeds section, even if they are a dominant species, to easily identify them within the geodatabase.



PHOTO 1-B: EXAMPLE OF BLUEGRASS LAWN

6. When completing the general qualitative parameters section, it is important to note that some parameters do not apply to all landscape types. Each landscape type is measured based on its intended state. For example, a bluegrass lawn (traditional park space) like the picture to the left, is not intended to have high diversity so “Diversity of Species” would be marked N/A based on the guidance provided through the parameter explanations on the field datasheet. Additionally, visual water quality parameters do not apply to upland habitat types (upland herbaceous, upland

forested, bluegrass lawn, and bluegrass forested), therefore the “Visual Water Quality” parameter should be marked N/A as noted in the parameter explanations on the field datasheet.

7. When scoring the sustainability parameters, noxious weed population and annual/invasive weed population, a high score translates to a low concern for that category. If there are no noxious weeds present, the “Noxious Weed Population” parameter should be marked 4. In the picture to the right a social trail has formed through a drainage channel. This should result in a score of 2 in the “Direct Human Impacts” parameter because the trail shows signs of moderate landscape degradation.



PHOTO 2-B: EXAMPLE OF DIRECT HUMAN IMPACTS

8. The stream characteristic parameters section should only be filled out when assessing riparian landscape types (riparian forested and riparian herbaceous) adjacent to streams. Note that these scores are based on the stream reach in the immediate vicinity of the point being assessed.

Post-Processing

1. Once data collection is complete, total scores and percentages need to be calculated. When calculating total scores and percentages, parks lacking certain parameters must be considered. For instance, if a landscape type does not have surface water, the water quality parameter does not apply and needs to be factored out of the total possible score the landscape type can receive. The total possible score a landscape type can achieve with all parameters included is 64. For each arbitrary parameter, subtract 4 from the total possible score. For example, upland forested habitats should be scored out of 48 because they do not include stream characteristics.
2. Update Landscape Typology polygon delineations based on the changes made to the field maps and point data collected in the field verification steps.
3. Enter point data into the geodatabase by editing the points layer and placing a new point in the location the data was collected. Fill in all appropriate attributes but leave values as “<Null>” for scores that do not apply to that specific landscape type.
4. Assign point scores to the polygon they are in and any polygons of the same landscape type and subtype within a 1,500-foot radius. Scores should only be applied to adjacent polygons if the point data is representative of that landscape type and subtype.
5. Merge all typologies per park to the lowest subtype level e.g. one row in the geodatabase for riparian forested, stream unarmored, mixed woodland and another for riparian forested, stream unarmored, cottonwood per park. To ensure accuracy of scores, it is also imperative that two typologies with different scores not be merged even if they represent the same subtype.

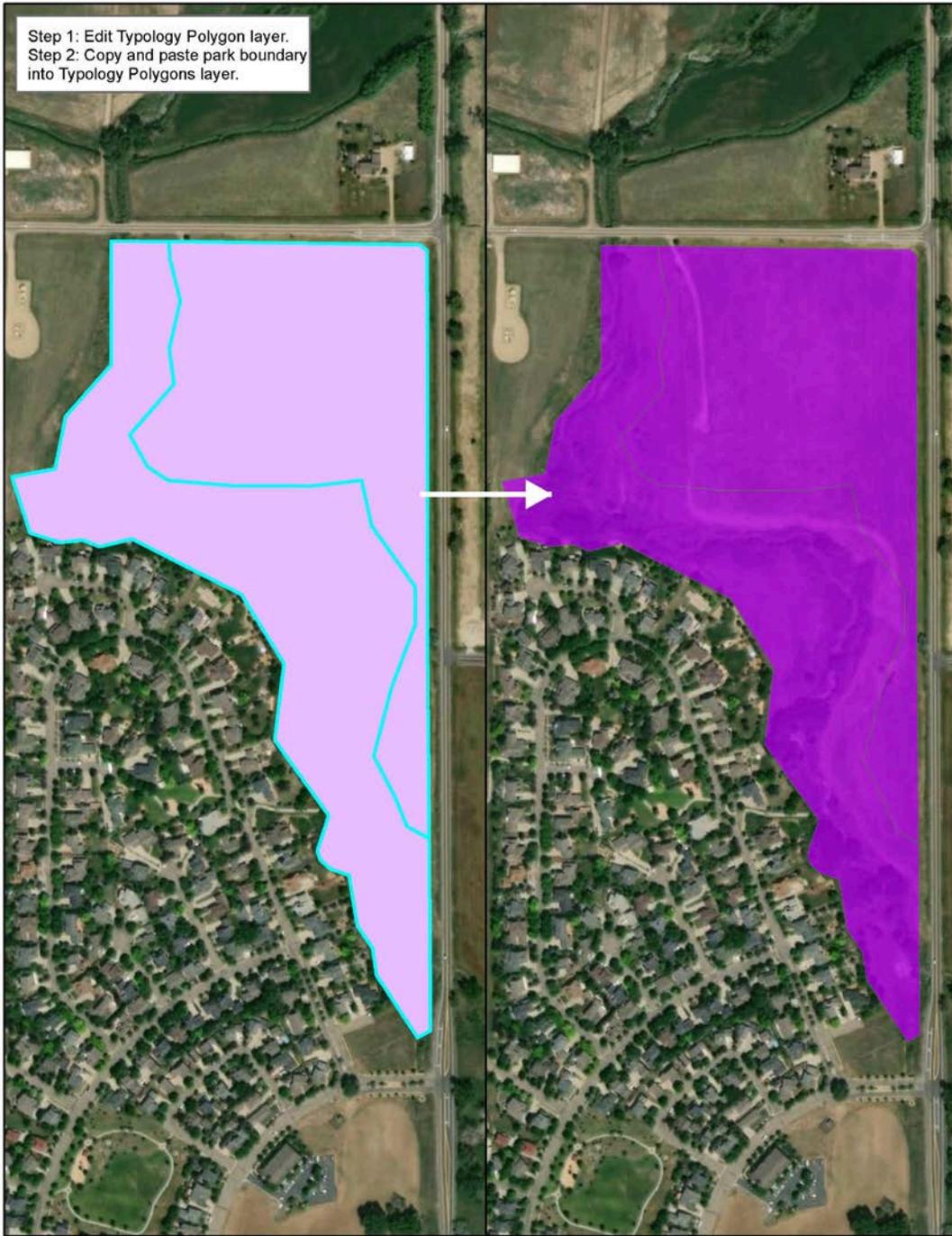


Figure 1-A: Geodatabase Steps 1 & 2

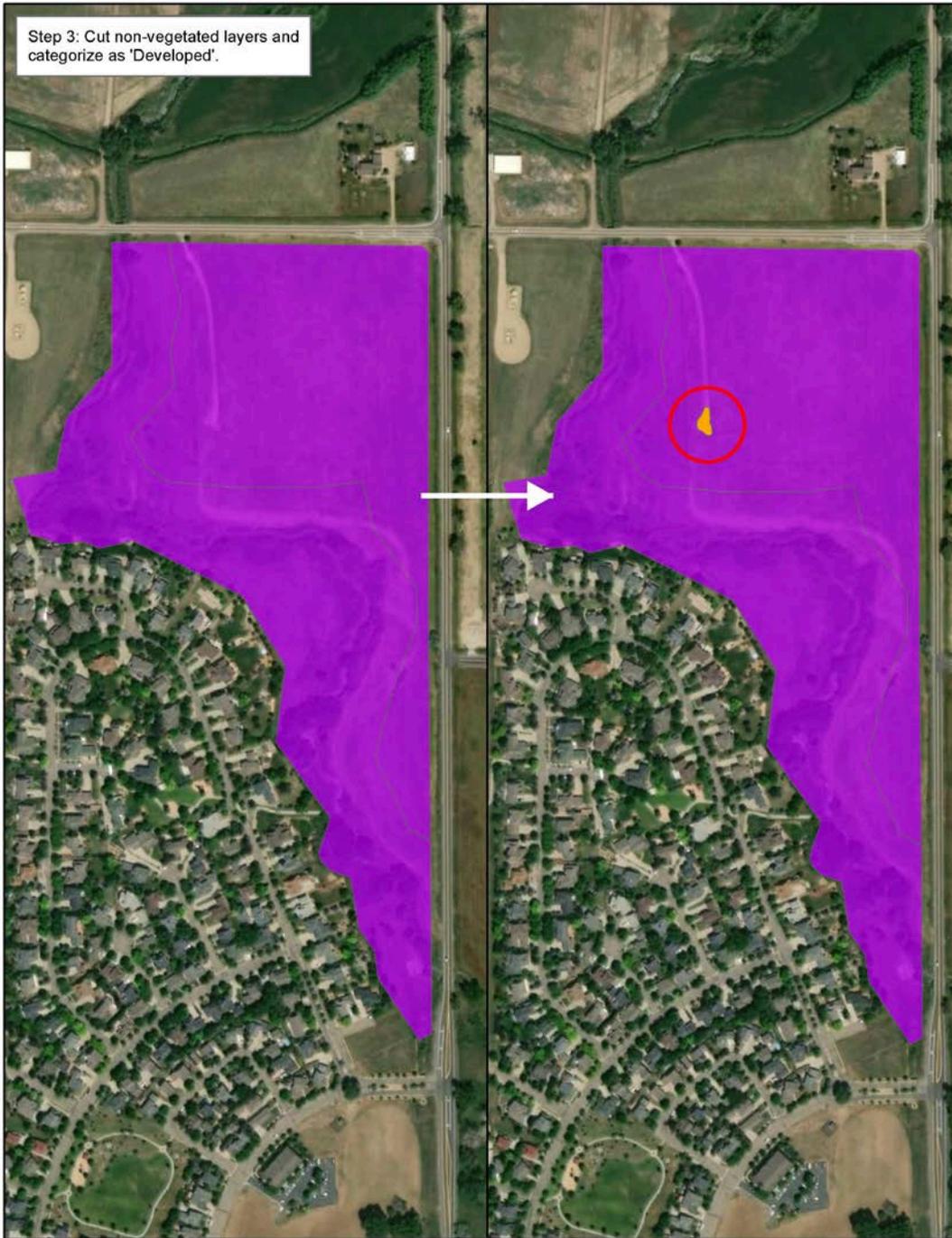


FIGURE 2-A: GEODATABASE STEP 3

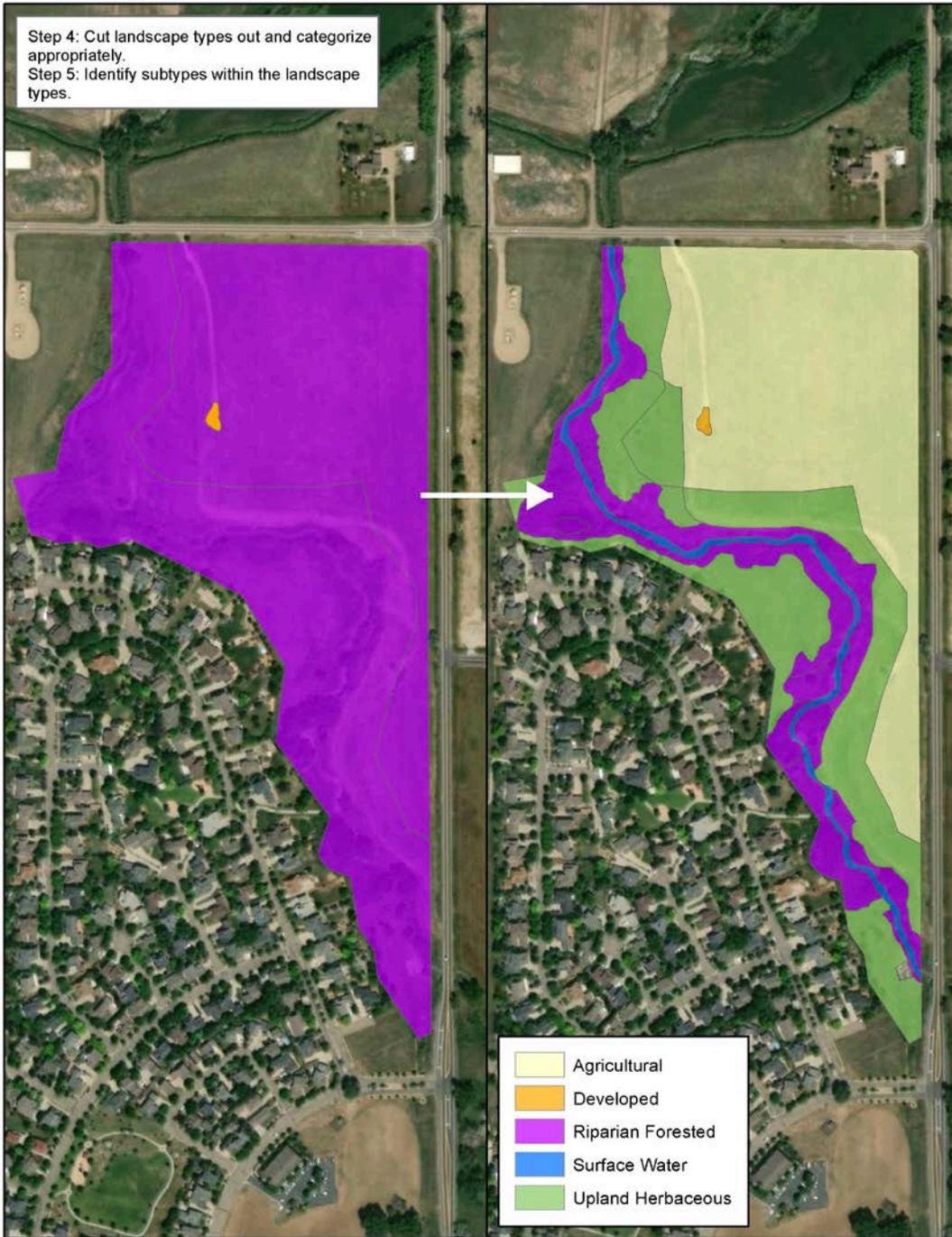


FIGURE 3-A: GEODATABASE STEPS 4 & 5



LANDSCAPE TYPOLOGIES																			
Divisions	Upland Systems		Riparian Systems				Hydrologic Systems				Agricultural Systems	Traditional Park Spaces							
Landscape Type	Upland Forested	Upland Herbaceous	Riparian Forested		Riparian Herbaceous		Herbaceous Wetland	Surface Water			Agricultural Field	Bluegrass Forested	Bluegrass Lawn	Parkway**					
Characterization	Forest dominated ecosystem comprised of minimum 35% total canopy cover of trees and native herbaceous, shrub or mixed understory (non-bluegrass dominated).	Grass and forb dominated ecosystem. Trees represent less than 35% of total canopy cover.	Riparian woodland or shrubland ecosystems associated with streams, lakes, and ponds. Tree canopy cover greater than 35% total cover with herbaceous understory.		Riparian grass and forb ecosystem associated with stream, lake, or pond buffer areas with less than 35% total cover by trees and shrubs. For lakes, this area extends from the shoreline outward at least 30 feet. For streams, this area extends from the ordinary high water mark to areas that transition to upland vegetation, typically 10-20 feet.		Herbaceous dominated wetland with groundwater inflows and organic soil accumulation.	All surface water, including streams, drainage ditches, and open water ponds and lakes, including and below the ordinary high water mark.			Commodity crops planted in rows and regularly harvested, hay field, or grass pasture.	Tree canopy cover greater than 35% with bluegrass lawn understory.	Irrigated bluegrass fields largely free of trees or facilities.	Tree lawns and vegetated medians along boulevards, could be native or horticultural species.					
GIS Attributes	Hydrologic System	NA	NA	Drainage Channel	Stream Armored (Visible rip-rap or other stabilization features)	Stream Unarmored (Minimal to no stabilization features)	Open Water	Drainage Channel	Stream Armored (Visible rip-rap or other stabilization features)	Stream Unarmored (Minimal to no stabilization features)	Open Water	NA	Drainage Channel (Irrigation ditch or other constructed conveyance channel that would not exist if not man-made.)	Streams (armored and un-armored stream channels that would naturally drain an area.)	Open Water (Pond or lakes that are generally non-wetland areas.)	NA	NA	NA	NA
	Habitat Sub-Type	NA	Native short-grass prairie; Native mixed-grass prairie; Shrubs (Greater than 35% total cover); Non-native herbaceous (Greater than 50% total cover of non-native species)	Cottonwood (Greater than 50% total cover by cottonwood); Mixed woodland (diverse, no single species greater than 50% total cover); Willow (Greater than 50% total cover by willow); Non-native (Greater than 50% total cover by non-native trees)		Native (Greater than 50% total cover of native species)	Non-native (Greater than 50% total cover of non-native species)	Native (Greater than 50% total cover native species); Non-native (Greater than 50% total cover non-native species)	Concrete-lined; Armored; Un-armored	Concrete-lined; Armored; Un-armored	NA	Irrigated; Dryland	NA	NA	NA	NA	NA	NA	NA
Maintenance Activity	Weed control, Debris removal, Tree management	Weed control, Debris removal, Irrigation, Mowing	Weed control, Debris removal; Tree management		Weed control, Debris removal, Mowing		Weed control, debris removal	Weed control, Debris removal	Weed control, Debris removal	Weed control, Debris removal	NA	Mowing, Irrigation, Weed control, Overseeding, Facility maintenance, Tree management	Mowing, Irrigation, Weed control, Overseeding	Mowing, Irrigation, Weed control, Overseeding					
Feature Attributes	Ecological*	Regulating Services (erosion protection, water purification) Supporting Services (nutrient cycling, primary production, wildlife habitat)	Regulating Services (erosion protection, water purification) Supporting Services (nutrient cycling, primary production, wildlife habitat)	Regulating Services (erosion protection, water purification) Supporting Services (nutrient cycling, primary production, wildlife habitat)		Regulating Services (erosion protection, water purification) Supporting Services (nutrient cycling, primary production, wildlife habitat)		Regulating Services (erosion protection, water purification) Supporting Services (nutrient cycling, primary production, wildlife habitat)	Some Pollution Mitigation or attenuation. Patches of medium to low quality habitat	Freshwater stream services and habitat. Riparian services and habitat. Wildlife movement.	Freshwater habitat. Wildlife stopover and foraging. Stormwater conveyance and mitigation.	Some Pollution Mitigation or attenuation. Patches of medium to low quality habitat surrounding row crops. Regulating Services (erosion protection) Supporting Services (nutrient cycling, primary production)	Regulating Services (erosion protection, water purification)	Regulating Services (erosion protection, water purification)	Regulating Services (erosion protection, water purification)				
	Aesthetic	Native landscape aesthetic with heterogeneous topography, plant community, and increased structural diversity. Provides wildlife habitat and tree canopy viewscape.	Native landscape aesthetic with heterogeneous topography and plant community. May exhibit wildlife habitat elements.	Native herbaceous buffer for stream systems. Woodland areas provide functional riparian habitat and greater structural vegetation appearance.		Native herbaceous buffer for stream systems. Functional herbaceous cover provides stream system support and visual enhancement.		Urban wildlife refugia within park and open spaces. Enhance habitat function and visual diversity on landscape.	Linear water conveyance	Urban stream systems with ecological functions and water conveyance. Freshwater systems provide visual and functional complexity.	Pond or lake systems with ecological functions and water storage. Freshwater systems provide visual and functional complexity.	Agricultural systems provide some ecological benefits and natural visual elements to the landscape	Passive park space with groves of trees	Urban turf grass park areas with active and passive recreation	Passive lawn and treed space for visual enhancement along roadways				
	Citizen Usage	Low	Low	Low		Low		Low	Moderate	Moderate	Moderate	NA	High	High	Medium to Low				

*Ecological services presented are illustrative and do not capture the full suite of services offered by these habitat types.
 **Parkway not included in evaluation of typologies

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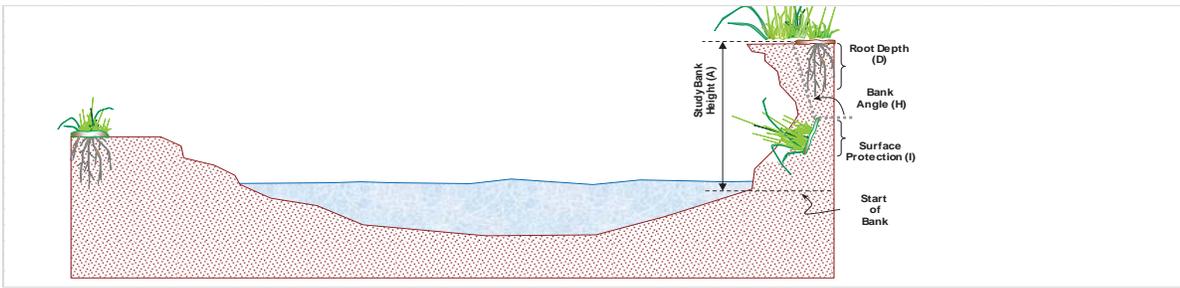
APPENDIX B: FIELD DATA SHEETS



LANDSCAPE TYPOLOGY FIELD DATA SHEET										
Park/Open Space:		Typology:			Habitat Subtype:			Sample ID:		
Observer		Date:		Irrigation: None/Potable/Non-Potable				Photo - Y / N		
Landscape Description:										
Pollinators?	Total Vegetation Cover by Strata		Dominant Species				Noxious Weeds			
		%	1	Cover	2	Cover	1	2	%	
	Tree	%		%		%			%	
	Shrub	%		%		%			%	
	Forb	%		%		%			%	
	Grass	%		%		%			%	
GENERAL QUALITATIVE PARAMETERS			Excellent	Good	Fair	Poor	N/A	COMMENTS		
A. Biodiversity										
A1. Plant Diversity			4	3	2	1	X			
A2. Habitat Diversity			4	3	2	1	X			
B. Wildlife Habitat										
B1. Prairie Dog Habitat			4	3	2	1	X			
B2. Species of Concern			4	3	2	1	X	List species:		
C. Overall Aesthetic			4	3	2	1	X			
D. Ecological Connectivity			4	3	2	1	X			
Sustainability										
E. Direct Human Impacts			4	3	2	1	X			
F. Indirect Human Impacts			4	3	2	1	X			
MAINTENANCE QUALITATIVE PARAMETERS			None	Minor	Moderate	Major	N/A	COMMENTS		
G. Noxious Weed Population Description			4	3	2	1	X			
G1. List A Species Observed			Y / N				List species:			
H. Visual Water Quality (excluding upland typologies)			4	3	2	1	X			
I. Annual / Invasive Weed Population Description			4	3	2	1	X			
J. Ground Disturbance			4	3	2	1	X			
K. Opportunities for Restoration (Describe in comments)			Y / N							
Total Score										
STREAM CHARACTERISTICS (Stream Areas Only)			Excellent	Good	Fair	Poor	N/A	COMMENTS		
L. Root Depth (Feet)			4	3	2	1	X			
M. Root Density (Percent)			4	3	2	1	X			
N. Surface Protection (Percent)			4	3	2	1	X			
O. Bank Angle (Degrees)			4	3	2	1	X			
P. Bank Height			Feet							
Q. Flow Regime			Intermittent		Ephemeral		Perennial		N/A	
R. Bank Material (Type)			Bedrock		Boulders		Riprap		Gravel	
			Sand		Silt/Clay		Concrete		N/A	
Possible Ecosystem Services:										
Possible Ecosystem Services: (Circle Two Most Significant)										
Erosion Control Nutrient Cycling Flood attenuation Soil Fertility/Formation Pollination Waste Reduction/Detoxification										
Water filtration/purification Infiltration Primary production Local climate regulation Recreation Aesthetic experience										

LANDSCAPE TYPOLOGY FIELD DATA SHEET		
GENERAL QUALITATIVE PARAMETERS		
A. Biodiversity		
A1. Plant Diversity (N/A for traditional park spaces)		
4	Excellent	Landscape contains high species richness (number of species per unit area) and evenness (relative abundance of the different species making up the richness of an area) relative for that specific habitat type.
3	Good	Landscape contains intermediate levels of species richness and evenness relative for that specific habitat type.
2	Fair	Landscape contains low levels of species richness and evenness relative for that specific habitat type.
1	Poor	Landscape contains a monoculture of either a native or nonnative species.
N/A	N/A	Not applicable
A2. Habitat Diversity (N/A for traditional park spaces)		
4	Excellent	Landscape contains high quality habitat to support multiple wildlife types. Multiple wildlife habitat features are present such as cover, food sources, breeding areas, and protective elements.
3	Good	Landscape contains good quality habitat to support multiple wildlife types. Wildlife habitat features are present but not abundant.
2	Fair	Landscape contains moderate habitat to support some wildlife. Habitat features are limited, and wildlife present not likely to be diverse.
1	Poor	Landscape contains little to no wildlife habitat. Landscape is either degraded or habitat is not present to support wildlife.
N/A	N/A	Not applicable
B. Wildlife Habitat		
B1. Prairie Dog Habitat		
4	Excellent	(0%) There is no evidence of prairie dogs.
3	Good	(0-10%) There is no evidence of an active prairie dog colony, but there are holes and/or other indicators of a former prairie dog colony. (A TES survey may need to be done)
2	Fair	(10-50%) There is evidence of an active prairie dog colony, but it is not widespread.
1	Poor	(50-100%) There is extensive evidence of an active prairie dog colony.
N/A	N/A	This is not suitable habitat for prairie dog colonization.
B2. Species of Concern (IPaC and/or CNHP should be reviewed prior to field effort to support this evaluation)		
4	Excellent	Known or observed presence of Species of Concern
3	Good	High quality habitat features with sufficient opportunities to support Species of Concern.
2	Fair	Medium quality habitat features with moderate opportunities to support Species of Concern.
1	Poor	Low quality habitat features with need for improvements to support Species of Concern.
N/A	N/A	This is not suitable habitat for species of concern.
Overall Aesthetic		
4	Excellent	Landscape is not immediately adjacent to development. The landscape contains visually appealing structural and landscape diversity and complexity associated with topography, unobscured scenic views, and vegetation (trees, shrubs, planting beds and ground cover). If occurring, park facilities complement the overall design of the landscape.
3	Good	Landscape is immediately adjacent to development on 1 or 2 sides but is integrated into the surrounding spaces and neighborhood. The landscape contains some structural and landscape diversity and complexity; however, scenic views may be obscured and vegetation is not visually appealing. If occurring, park facilities complement the overall design of the landscape.
2	Fair	Landscape is immediately adjacent to development on 2 or more sides and is not integrated into the surrounding spaces and neighborhood. The landscape is lacking adequate structural and landscape diversity and complexity. Scenic views, if existent, are obscured. Some planting beds and trees are present. If occurring, the park facilities do not complement the overall design of the landscape.
1	Poor	Landscape is completely surrounded by development and/or is not integrated into the surrounding spaces and neighborhood. The landscape does not contain visually appealing structural and landscape diversity and complexity associated with topography and vegetation. Scenic views do not exist. If occurring, the park facilities do not complement the overall design of the landscape.
N/A	N/A	Not applicable
Ecological Connectivity		
4	Excellent	The park is highly connected to other elements of the larger park system and/or is in close proximity to trails; presence of outfalls or confluences in riparian or open water systems; similar park features (i.e. trees, shrubs, open water areas); and/or there is a general absence of barriers such as walls, roads, large urbanized areas, and dams.
3	Good	The park is moderately connected to other elements of the larger park system and/or is in relative proximity to trails; similar park features (i.e. trees, shrubs, open water areas); and/or there is a relative absence of barriers such as walls, roads, large urbanized areas, and dams. May have presence of outfalls or confluences in riparian or open water systems.
2	Fair	The park is somewhat connected to other elements of the larger park system and/or has minimal proximity to trails; similar park features (i.e. trees, shrubs, open water areas); and/or there are moderate barriers such as walls, roads, large urbanized areas, and dams. May lack presence of outfalls or confluences in riparian or open water systems.
1	Poor	The park is disconnected to other elements of the larger park system and/or has no proximity to trails; similar park features (i.e. trees, shrubs, open water areas); and/or there are moderate to significant barriers such as walls, roads, large urbanized areas, and dams. Lacks presence of outfalls or confluences in riparian or open water systems.
N/A	N/A	Not applicable
Sustainability		
Direct Human Impacts		
4	Excellent	No user degradation.
3	Good	The landscape contains few trampled vegetated areas showing no clear unauthorized trails, small amounts of trash scattered around the receptacles from passive littering, and little to no evidence of vandalism. Evidence of user degradation is less than 10% of the landscape.
2	Fair	The landscape contains defined unauthorized trails, exposed bare ground is forming in high traffic areas, trash scattered around the receptacles from passive littering, and vandalism is evident on structures within the landscape. Evidence of user degradation is between 10% and 30% of the landscape.
1	Poor	The landscape contains extensive user degradation including many unauthorized trails and parking areas, exposed bare ground, high amounts of trash scattered throughout the landscape from both active and passive littering, and extensive evidence of vandalism. Evidence of user degradation is greater than 30% of the landscape.
N/A	N/A	Not applicable
Indirect Human Impacts		
4	Excellent	No indications of surrounding land uses impacting ecological connectivity or functions.
3	Good	Few indications of surrounding land uses impacting ecological connectivity or functions, including oil & gas well pads, active agriculture fields, confined feed lot operations, water treatment plants, etc.
2	Fair	Several indications of surrounding land uses impacting ecological connectivity or functions, including oil & gas well pads, active agriculture fields, confined feed lot operations, water treatment plants, etc.
1	Poor	Many indications of surrounding land uses impacting ecological connectivity or functions, including oil & gas well pads, active agriculture fields, confined feed lot operations, water treatment plants, etc.
N/A	N/A	Not applicable
MAINTENANCE QUALITATIVE PARAMETERS		
Noxious Weed Population Description		
4	None	No noxious weeds present.
3	Minor	The site is composed of less than 2% noxious weeds.
2	Moderate	The site is composed of between 2% and 10% noxious weeds.
1	Major	The site is composed of greater than 10% noxious weeds.
N/A	N/A	Not applicable
Note: If Class C weed, score as determined. If Class B = -1 (i.e. Minor becomes Moderate). If Class A = -2 (Minor becomes Major)		
Visual Water Quality (excluding upland typologies)		
4	None	High water clarity characterized with no visible suspended solids, no evident algal blooms, dense and undisturbed riparian buffer, adequate hydraulic flow, and no trash or debris.
3	Minor	Visible suspended solids within the water table, evidence of algal blooms, riparian buffer with little evidence of impairment, adequate hydraulic flow, and little trash and/or debris evident within system.
2	Moderate	Visible suspended solids within the water table, evidence of algae blooms, impaired riparian buffer, no hydraulic flow, and trash and/or debris evident within system.
1	Major	Poor water clarity characterized with high levels of suspended solids, increased presence of algal blooms, no riparian buffer, no hydraulic flow, and high volume of trash and/or debris.
N/A	N/A	Not applicable
Annual / Invasive Weed Population Description		
4	None	No annual or invasive weeds present.
3	Minor	The site is composed of less than 25% annual or invasive weeds.
2	Moderate	The site is composed of between 25% and 50% annual or invasive weeds.
1	Major	The site is composed of greater than 50% annual or invasive weeds.
N/A	N/A	Not applicable
Ground Disturbance		
4	None	0-10 percent bareground
3	Minor	11-25 percent bareground
2	Moderate	26-50 percent bareground
1	Major	51-100 percent bareground
N/A	N/A	Not applicable
Total Score		
	48 - 36	High quality landscape features with limited need for improvement or changes to maintenance required.
	35 - 23	Medium quality landscape features with moderate need for improvements and maintenance requirements.
	22 - 10	Low quality landscape features with high need for improvements and maintenance requirements.
	less than 10	Poor quality landscape features with immediate need for improvement and maintenance intervention.

STREAM CHARACTERISTICS			
Root Depth (Feet)			
4	Excellent	Average root depth is greater than or equal to 3 ft deep	Represents average depth of roots of riparian vegetation. Choose an area that appears representative of the stream segment, or where roots are visible. Determine root depth by observing areas of visible roots or removing soil to expose roots. Measure representative roots and determine average in feet.
3	Good	Average root depth is between 1 ft to 3 ft deep	
2	Fair	Average root depth is between 0.5 ft to 1 ft deep	
1	Poor	Average root depth is less than or equal to 0.5 ft deep	
N/A	N/A		
Root Density (Percent)			
4	Excellent	100 to 80 percent of the stream bank is occupied by roots of riparian vegetation	Represents the proportion of the stream bank above bankfull that is occupied by roots of riparian vegetation. Choose an area that appears representative of the stream segment, or where roots are visible. Assess areas of visible roots or use excavation and determine proportion of roots relative to soils, and calculate as a percentage.
3	Good	55 to 79 percent of the stream bank is occupied by roots of riparian vegetation	
2	Fair	15 to 54 percent of the stream bank is occupied by roots of riparian vegetation	
1	Poor	Less than 14 percent of the stream bank is occupied by roots of riparian vegetation	
N/A	N/A		
Surface Protection (Percent)			
4	Excellent	100 to 80 percent of the stream bank is occupied by protective materials	Represents the proportion of the stream bank surface, at or below bankfull, that is occupied by roots, woody material, rocks, or other protective material. Choose an area that appears representative of the stream segment. Assess areas of visible roots, or use excavation, and determine proportion relative to soils. Calculate as a percentage.
3	Good	55 to 79 percent of the stream bank is occupied by protective materials	
2	Fair	15 to 54 percent of the stream bank is occupied by protective materials	
1	Poor	Less than 14 percent of the stream bank is occupied by protective materials	
N/A	N/A		
Bank Angle (Ratio)			
4	Excellent	Slope gradient is less than or equal to 4:1 (14 degree angle)	The measurement of the angle of the bank from the lower bank, approximately at the waterline, to the top of the stream bank. Choose a representative area and measure the angle of the bank from the waterline to the top of the stream bank. Approximate the angle of the bank or use an inclinometer.
3	Good	Slope is between 4:1 and 2:1 (14 degrees to 27 degrees)	
2	Fair	Slope is between 2:1 and 1:1 (27 degrees to 45 degrees)	
1	Poor	Slope is greater than or equal to 1:1 (45 degree angle) or is a cut slope	
N/A	N/A		
Bank Height			
Feet (actual)	Choose an area that appears representative of the segment of stream being assessed. Determine the upper limit of the stream bank and measure the vertical distance to bankfull, in feet.		Represents the difference between the upper limit of the stream bank and the toe (start of the bank) at bankfull. The top of the stream bank is generally the upper level of riparian vegetation. The start of the bank may be below waterline.
Flow Regime			
Perennial	Water flowing continuously year-round		Classification of streams based on parameters such as magnitude, frequency, duration, timing, and rate of change of flow. Identify flow regime as either perennial, ephemeral, or intermittent.
Intermittent	Water flowing seasonally (wet season); Normally dry during summer		
Ephemeral	Typically shallow; Normally dry with brief periods of flow in response to rainfall		
N/A			
Bank Material (Type)			
Bedrock	Naturally occurring solid rock foundation		Choose a representative area of the stream segment and visually assess bank materials, or excavate soils if needed, and indicate most dominant material.
Boulders	Large rounded stones		
Riprap	Course aggregate with angular shapes		
Gravel	Fine to course aggregate up to 1 inch in diameter		
Sand	Course well drained soil		
Silt/Clay	Fine soils		
Concrete	Channel completely lined with cement		
N/A			



AGRICULTURAL FIELD DATA SHEET											
Park/Open Space:			Observer:			Sample ID:		Date:			
Typology:			Habitat Subtype: IRRIGATED DRYLAND								
Landscape Description:											
Pollinators				CROP				Weeds			
Types (cir. 1)	Species (List)							1	Cove	2	Cover
Insects									%		%
Birds									%		%
Insects & Birds									%		%
None									%		%
GENERAL QUALITATIVE PARAMETERS			Excellent	Good	Fair	Poor	N/A	COMMENTS			
A. Crop Consistency			4	3	2	1	X				
Percent Underperforming:					Buffers Width:						
Cause for Diminished Score:			Soil (Erosion/Compaction/Fertilization)			Water (Too Much/Too Little)					
MAINTENANCE QUALITATIVE PARAMETERS			None	Minor	Moderate	Major	N/A				
B. Noxious Weed Population Description			4	3	2	1	X				
C. Annual / Invasive Weed Population Description			4	3	2	1	X				
Other Comments, including wildlife species seen:											

AGRICULTURAL FIELD DATA SHEET		
GENERAL QUALITATIVE PARAMETERS		
Crop Consistency		
4	Excellent	Crop growth and layout observed to be consistent on 90-100% of the agricultural field.
3	Good	Crop growth and layout observed to be consistent on 80-90% of the agricultural field.
2	Fair	Crop growth and layout observed to be consistent on 70-80% of the agricultural field.
1	Poor	Crop growth and layout observed to be consistent on less than 70% of the agricultural field.
N/A	N/A	Not applicable
MAINTENANCE QUALITATIVE PARAMETERS		
Noxious Weed Population Description		
4	None	No noxious weeds present.
3	Minor	The site is composed of less than 5% noxious weeds.
2	Moderate	The site is composed of between 5% and 20% noxious weeds.
1	Major	The site is composed of greater than 20% noxious weeds.
N/A	N/A	Not applicable
Annual / Invasive Weed Population Description		
4	None	No annual or invasive weeds present.
3	Minor	The site is composed of less than 25% annual or invasive weeds.
2	Moderate	The site is composed of between 25% and 50% annual or invasive weeds.
1	Major	The site is composed of greater than 50% annual or invasive weeds.
N/A	N/A	Not applicable
Total Score		
	10-12	High quality agricultural field
	8-10	Medium quality agricultural field
	6-8	Low quality agricultural field
	less than 6	Poor quality agricultural field