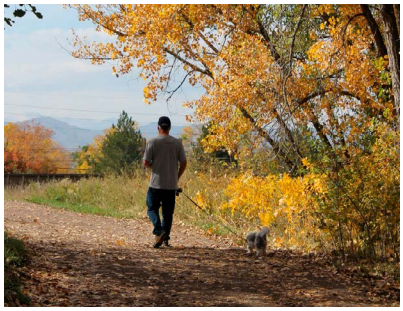
MARKEL AND WOTTGE OPEN SPACE PLAN REPORT

DECEMBER 12, 2023



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MARKEL AND WOTTGE OPEN SPACE PLAN REPORT

ACKNOWLEDGMENTS

THE MARKEL FAMILY

Dr. Bill Markel & Jean Markel

THE WOTTGE FAMILY

Bernhard Wottge & Pam Wottge

CITY AND COUNTY OF BROOMFIELD

Guyleen Castriotta, Mayor

CITY COUNCIL MEMBERS

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LAND ACKNOWLEDGMENT

We acknowledge that the land upon which we reside is the ancestral home of the Arapaho, Cheyenne, and Ute peoples. We further recognize that their connection to this place, both today and for countless generations, stewards the natural and cultural resources that we value so deeply. By acknowledging this connection, we strive to learn from, honor and respect these indigenous ties in our open space landscapes.

-Developed by the Open Space and Trails Advisory Committee in collaboration with the Arapaho, Cheyenne and Ute Nations

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SECTION 1: EXECUTIVE SUMMARY

Great horned owl on nest located in the Wottge Open Space.
Source: City and County of Broomfield

EXECUTIVE SUMMARY

OVERVIEW AND PURPOSE OF THE PLAN

The City and County of Broomfield (Broomfield) is a community planned with a balance of residential and commercial land use, with generous open space, parks, and natural areas. The Open Space, Parks, Recreation and Trails (OSPRT) Master Plan was adopted by the Broomfield City Council in 2005. The Plan set a goal to reach 40% Open Lands for the community, which include open spaces, park/recreation areas, and other natural areas. Currently Broomfield has over 8,600 acres of Open Lands, compromising about 36% of the Broomfield community. Other key features of the OSPRT Plan includes an interconnected trail system, and a goal for safe and equitable access to open space and trails throughout the community.

The Open Space, Parks, Recreation and Trails Plan is being updated. This is the definition of Open Space noted in the DRAFT plan:

Open Space means a parcel of land intentionally protected from development and/or set aside for unstructured, passive recreation and the appreciation of natural surroundings. Open Space may contain but is not limited to trailheads and trails, waterbodies, wetlands, wildlife viewing areas, agricultural lands, fishing facilities, and other facilities that support uses compatible with site resources and conditions.

This project includes the planning and concept design of two open space parcels, the Markel property and the Wottge property. The Open Space Plan project supports one of Broomfield's goals of having integrated open space within the community for everyone to enjoy without having to drive long distances. Access to the Broomfield Trail, and to other regional trails, was also a priority in the planning and eventual concept design. The design team was tasked with evaluating the natural resources present on both properties, including the existing flora and fauna, overall habitat value, and wetland vegetation. Water resources on each property were also assessed for potential recreational and ecological value. An extensive public outreach process was also completed throughout the project timeline in an effort to gather and incorporate opinions, concerns, and comments from the local community.

The resulting Open Space Concept Site Plans incorporate all of the data and public input gathered into comprehensive plans to be used in future design and plan implementation.

KEY PROJECT OBJECTIVES

This project included six Key Objectives

1. Develop Conceptual Plans that are inspiring, practical, and achievable and can be utilized by Broomfield to determine future phases of design, funding, and implementation.
2. Provide strong community connections to the Broomfield Trail, other regional trails, local neighborhoods, adjacent greenways, and nearby schools.
3. Provide recommendations for passive recreational amenities to maintain the open space aesthetic and functionality of both properties.
4. Provide a comprehensive existing conditions and natural resources assessment and site analysis of the Markel and Wottge properties, which will provide Broomfield with valuable data as a resource moving forward with design and implementation.
5. Engage the local community and stakeholders in the planning and concept design process, and integrate feedback into the Conceptual Plans.
6. Preserve and interpret the unique history of each property.

THE PLANNING AREA

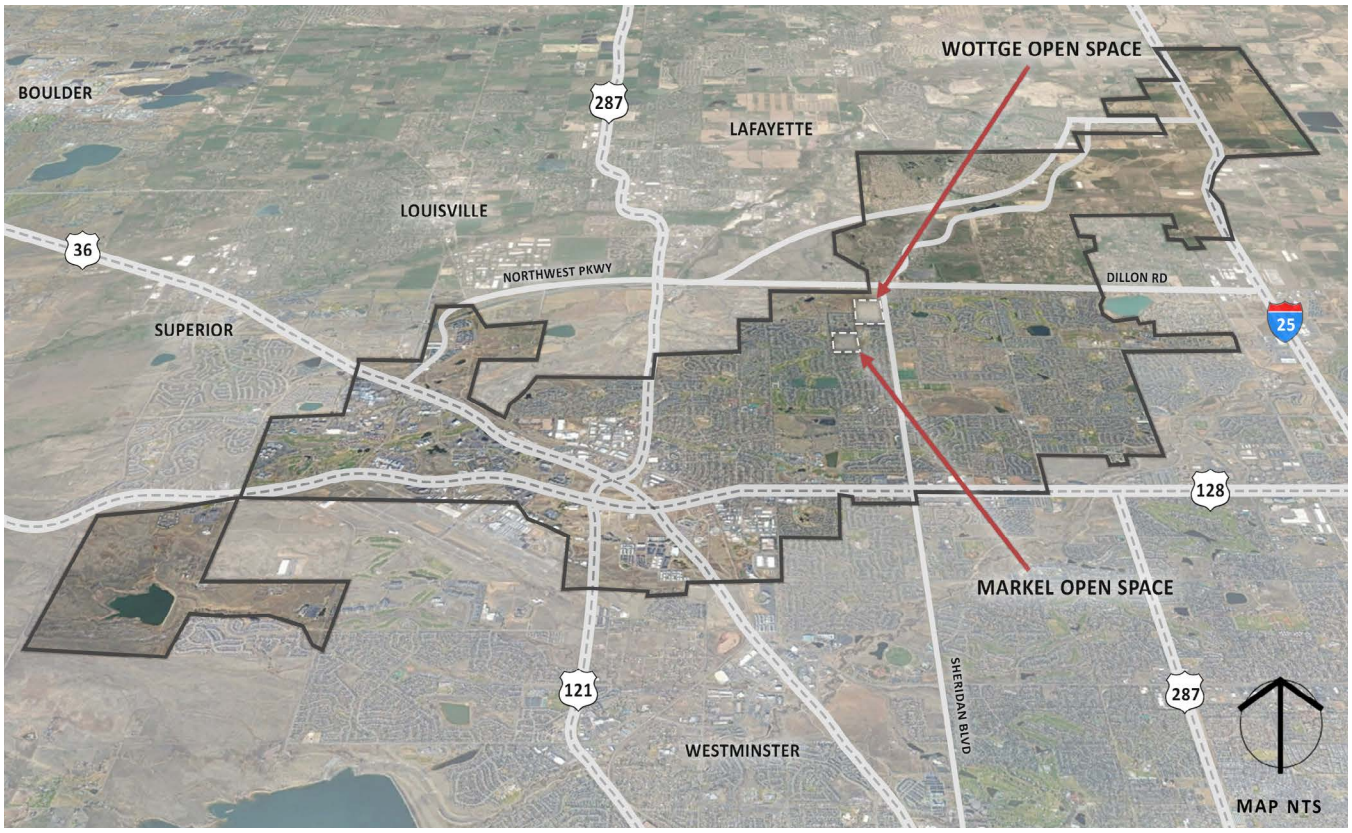
The Markel property is located at the northeast corner of the intersection of Aspen Street and West 136th Avenue. The Wottge property is located at the southwest corner of the intersection of West Dillon Road and Sheridan Boulevard. Both properties are located within the City and County of Broomfield.

The Markel property was originally purchased by Dr. Bill Markel and his wife Jean in 1958, and was used as a family home and farm for many decades. In 2008, Broomfield purchased 32 acres, including a 6 acre parcel that would become open space after the existing oil and gas well would be removed, from the Markels to preserve the historic and open space qualities of the property and provide trails and other open space related amenities in the future.

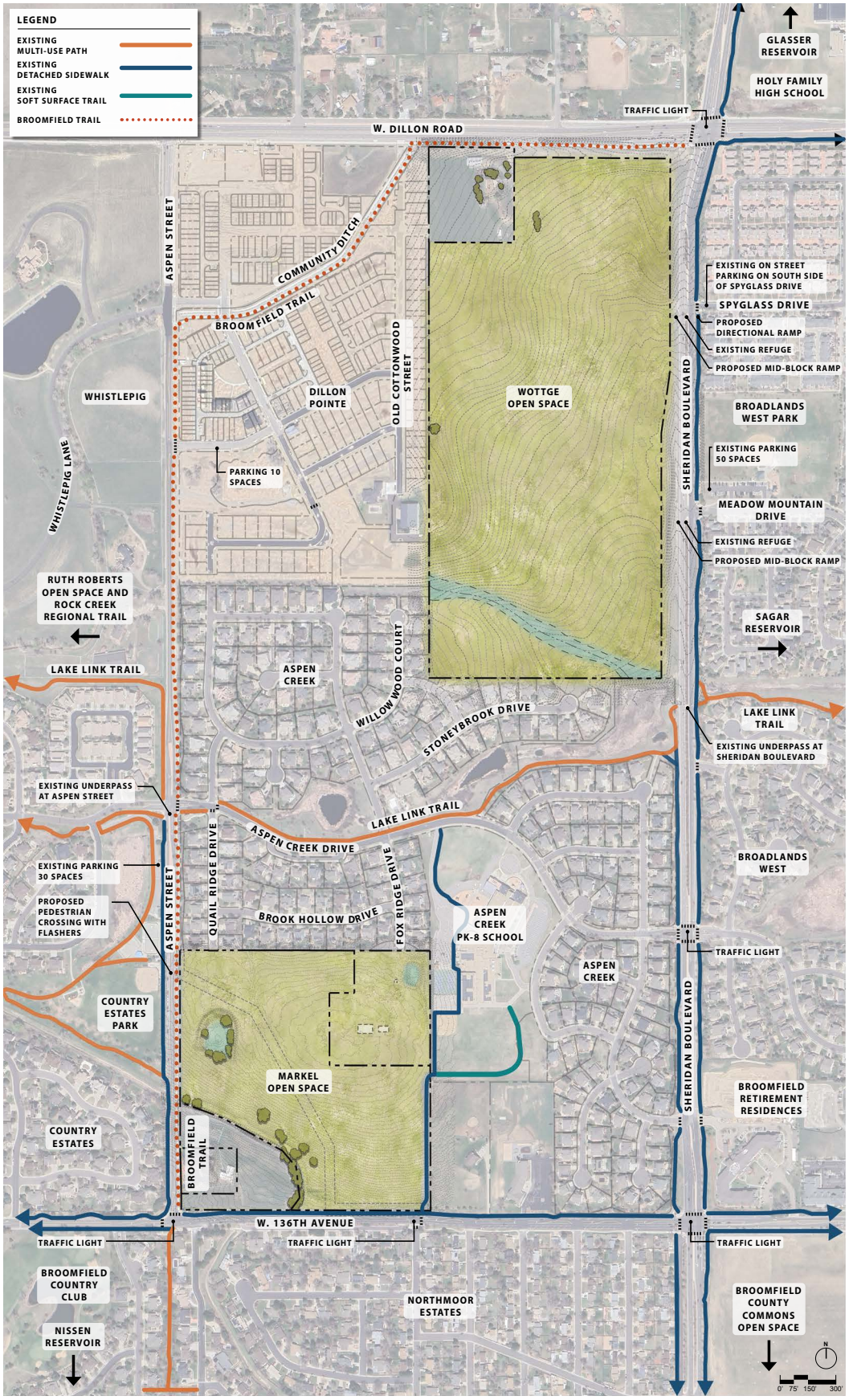
Similarly, the Wottge property was originally purchased by the Wottge family in 1955 and was primarily used as a family home, for agricultural purposes and dairy farming. Broomfield purchased 66 acres of the Wottge farmstead and has continued to grow winter wheat in the large open area of the property. Broomfield intends to maintain the agricultural use of the Wottge Open Space for as long as it is practical and may restore the site with native grasses in the future. Other goals include providing trail connections from the property to adjacent regional trails, the Broomfield trail, and adjacent neighborhoods.

The overall Project Area, containing the two parcels, is approximately 98 acres in size and is situated at approximately 5,300-5,400 feet in elevation. Markel Open Space slopes gently from the southwest to the northeast. The Wottge Open Space slopes gently from west to east, with little elevation change.

Vicinity Map



Location Map with Existing and Proposed Street Crossings



THE PLANNING PROCESS

Specifically, the planning process included five key steps:

1. **Project Kickoff**

   Kickoff Meeting with City and County of Broomfield – Introduce the project team to Broomfield staff and identify project goals and priorities as a group.

   Desktop Review – Gather and review relevant existing reports and community plans, mapping, property boundary and easement information, and floodplain data.

2. **Site Inventory and Analysis**

   Natural Resource Assessment and Report – A detailed assessment of the natural resources of the Markel and Wottge properties was completed in fall of 2022. Data collected included vegetation communities, plant and wildlife species observed, significant wildlife habitat areas, potentially sensitive areas (i.e. raptor nests), and water resources.

   Wetland Delineation and Report – A wetland delineation was also completed to determine locations and extents of wetlands on both properties. A report was then developed summarizing findings compliant with the US Army Corps of Engineers (USACE) requirements.

   Overall Site Analysis – Collect information on existing view corridors, access to adjacent parks/trails/neighborhoods, site topography, and any existing infrastructure. Opportunities and Constraints were developed for each property as a key first step in the site planning process.

Markel Open Space Opportunities and Constraints

3. Draft Alternative Designs

These comprehensive assessments were then developed into draft conceptual site plans, in close coordination with Broomfield staff. Initial alternative designs were presented to the local community at a Public Open House in February 2023.

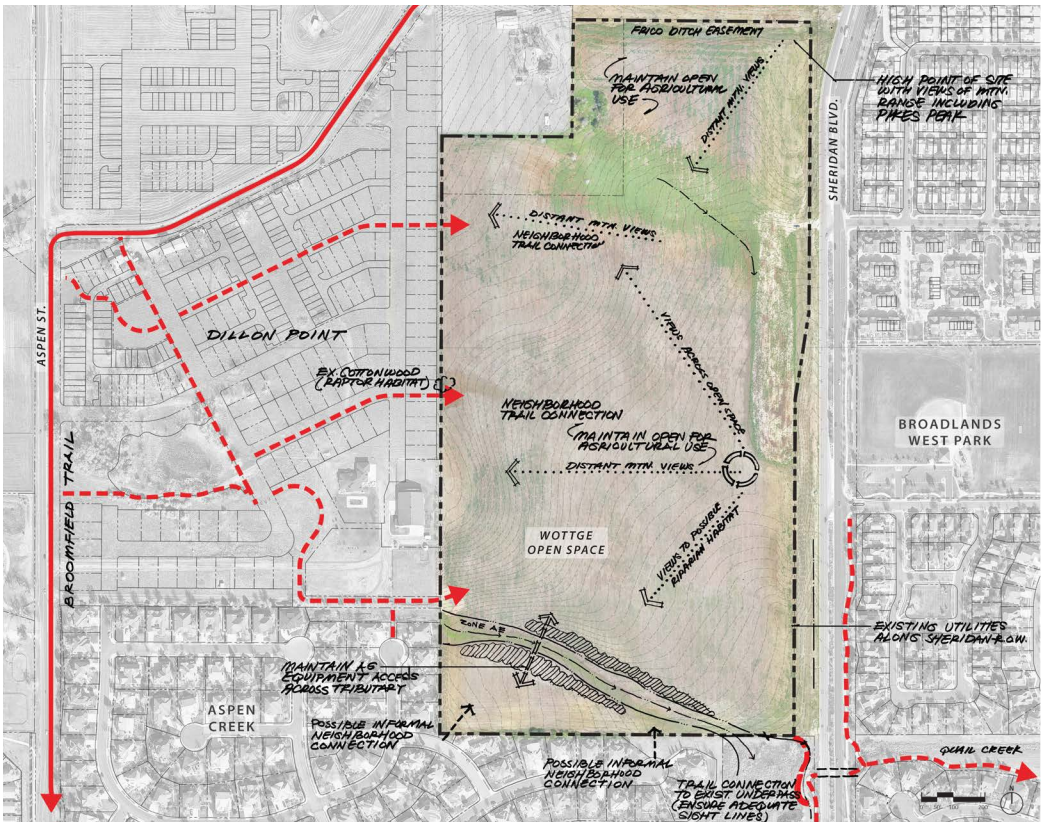
4. Public Outreach and Stakeholder Engagement

Public outreach events and stakeholder and Open Space and Trails Advisory Committee (OSTAC) presentations were completed from November 2022 – September 2023. A variety of outreach strategies were implemented to engage as many community members as possible including in-person events and online surveys. The public outreach and stakeholder engagement process included:

- Public Pop-Up Event: November 12th, 2022
- Survey #1: Oct 15th - Nov 14th, 2022
- OSTAC Meeting #1: December 8th, 2022
- Public Open House: February 16th, 2023
- Survey #2: Feb 16th - March 5th, 2023
- OSTAC Meeting #2: June 22nd, 2023
- Public Pop-Up Event: July 29th, 2023
- Final OSTAC Meeting and Presentation of Final Proposed Plans: September 28th, 2023

5. Final Conceptual Design

After public comments were collected and stakeholder review was completed, final conceptual site plans were developed for the Markel and Wottge Open Spaces. These plans and this report were presented to OSTAC for final approval on September 28th, 2023.



Wottge Open Space Opportunities and Constraints

KEY OPEN SPACE PLAN FEATURES

Highlights of the Plans include:

Markel Open Space

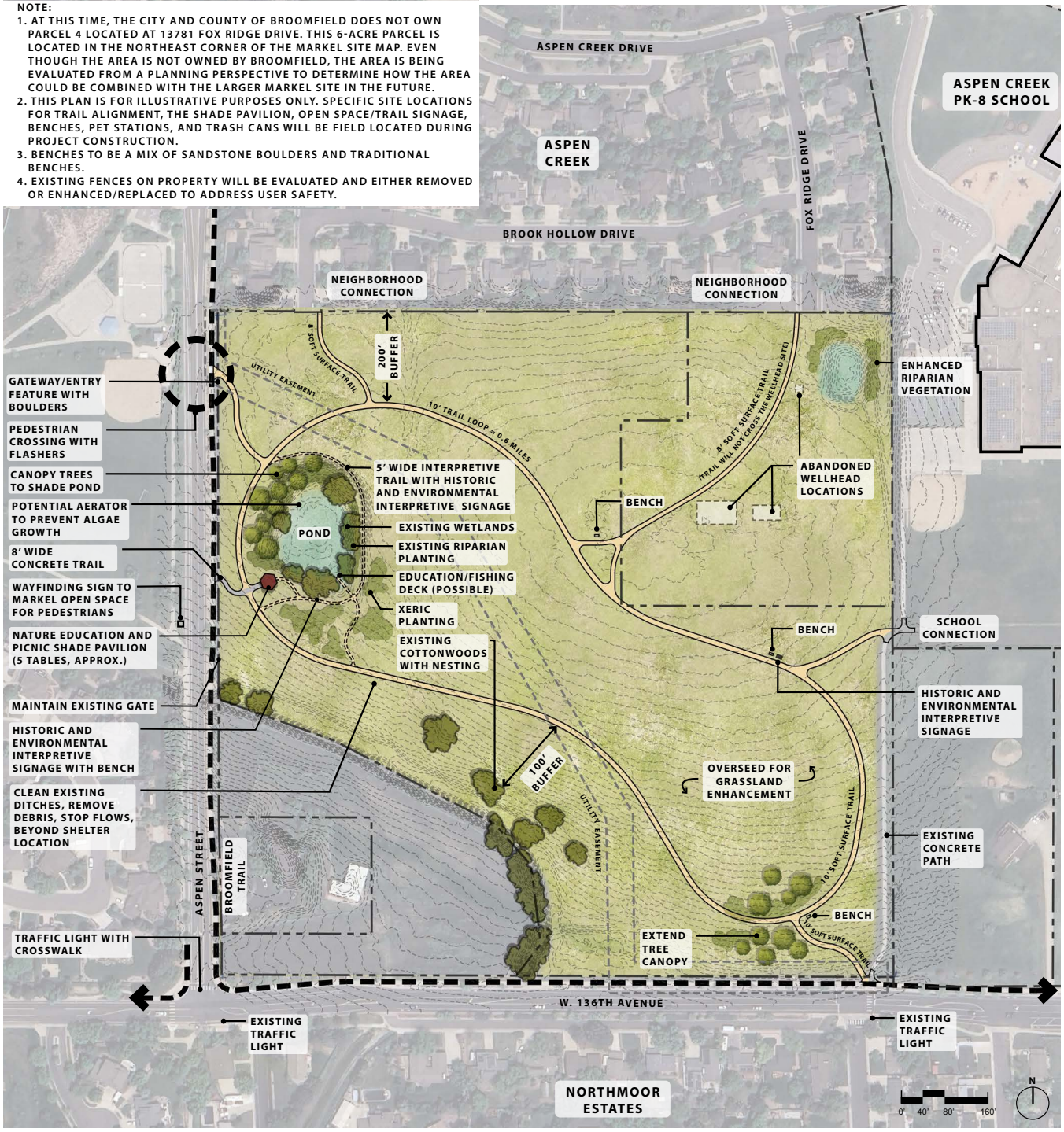
- Creation of a new shade pavilion with picnic tables to be used for nature education
- Pedestrian crossing with flashers at Aspen Street, providing a direct trail connection from Country Estates Park and the future Broomfield Trail, to Aspen Creek Elementary School
- Interpretive trail and signage around the existing pond, providing educational opportunities, and safe access to the pond for fishing
- 0.6-mile, 10’ wide soft surface loop trail within the property, with one 8’ foot concrete path to the new shade pavilion
- 8’ wide trail connections to Open Space from Aspen Creek Neighborhood
- Additional shade on trail with new trees
- Seating along looped trail with a mix of stone/ boulder and traditional benches
- Enhancement of the grassland and riparian habitat with native vegetation
- Limited Water and Irrigation
- Potential aeration system at pond to decrease algea growth
- Maintenance to existing lateral ditches within Open Space to improve water delivery
- Protection of existing raptor habitat

Wottge Open Space

- Construction of a small pavilion with picnic tables with views across the Open Space
- 0.8-mile, 10’ wide soft surface loop within the property
- Addition of two safer pedestrian connections across Sheridan Boulevard
- Accessible concrete trail connecting Dillon Pointe and the Broomfield Trail to the Open Space and to the Lake Link Trail
- Additional trail at intersection of Dillon Road and Sheridan Boulevard, connecting Broomfield Trail and Holy Family High School to Open Space
- Seating along looped trail with a mix of stone/ boulder and traditional benches
- Preservation of existing agricultural field
- Enhancement of native vegetation along riparian zone, and restoration of native grasses south of concrete trail to create a natural buffer from neighborhood to the south
- Fencing and gateway feature at northeast corner of property
- Grove of native trees and shrubs along West Dillon Rd
- Limited Water and Irrigation
- Protection of existing raptor habitat

MARKEL OPEN SPACE PLAN

NOTE:
1. AT THIS TIME, THE CITY AND COUNTY OF BROOMFIELD DOES NOT OWN PARCEL 4 LOCATED AT 13781 FOX RIDGE DRIVE. THIS 6-ACRE PARCEL IS LOCATED IN THE NORTHEAST CORNER OF THE MARKEL SITE MAP. EVEN THOUGH THE AREA IS NOT OWNED BY BROOMFIELD, THE AREA IS BEING EVALUATED FROM A PLANNING PERSPECTIVE TO DETERMINE HOW THE AREA COULD BE COMBINED WITH THE LARGER MARKEL SITE IN THE FUTURE.
2. THIS PLAN IS FOR ILLUSTRATIVE PURPOSES ONLY. SPECIFIC SITE LOCATIONS FOR TRAIL ALIGNMENT, THE SHADE PAVILION, OPEN SPACE/TRAIL SIGNAGE, BENCHES, PET STATIONS, AND TRASH CANS WILL BE FIELD LOCATED DURING PROJECT CONSTRUCTION.
3. BENCHES TO BE A MIX OF SANDSTONE BOULDERS AND TRADITIONAL BENCHES.
4. EXISTING FENCES ON PROPERTY WILL BE EVALUATED AND EITHER REMOVED OR ENHANCED/REPLACED TO ADDRESS USER SAFETY.



WOTTGE OPEN SPACE PLAN

NOTES:

1. A POTENTIAL TRAILHEAD WITH PARKING MAY BE CONSIDERED BASED ON FUTURE DEMAND AND PUBLIC FEEDBACK. THIS CONCEPT WOULD BE EVALUATED THROUGH A FUTURE PLANNING PROJECT SEPARATE FROM THIS CURRENT PLANNING PROCESS.
2. A POTENTIAL SIGNALIZED PEDESTRIAN CROSSING (PEDESTRIAN HYBRID BEACON (PHB) ALSO KNOWN AS A HAWK SIGNAL) OR A SIGNALIZED TRAFFIC CROSSING AT MOUNTAIN MEADOW DRIVE AT SHERIDAN BOULEVARD WILL BE EVALUATED BY BROOMFIELD TRANSPORTATION STAFF. THIS WILL INCLUDE TRAFFIC/PEDESTRIAN/AND BICYCLE COUNTS AND QUALITATIVE INFORMATION TO BE COLLECTED AND ANALYZED FOR A MINIMUM OF THREE YEARS AFTER THE COMPLETION OF THE WOTTGE IMPROVEMENTS. THE PURPOSE OF THIS ANALYSIS IS TO DETERMINE IF A PHB OR TRAFFIC SIGNAL IS WARRANTED.
3. AS PART OF THIS PROJECT, A PEDESTRIAN REFUGE WILL BE CONSTRUCTED IN THE MEDIAN OF SHERIDAN BOULEVARD AT MOUNTAIN MEADOW DRIVE AND SPYGLASS DRIVE. THIS WILL BE A NON-FLASHING, AND UNSIGNED CROSSING.
4. SIGNAGE WILL BE ADDED AT MEADOW MOUNTAIN DRIVE TO DIRECT PEOPLE TO THE SHERIDAN UNDERPASS TO THE SOUTH OF BROADLAND PARK.
5. THIS PLAN IS FOR ILLUSTRATIVE PURPOSES ONLY. SPECIFIC SITE LOCATIONS FOR TRAIL ALIGNMENT, THE SHADE PAVILION, OPEN SPACE/TRAIL SIGNAGE, BENCHES, PET STATIONS, AND TRASH CANS WILL BE FIELD LOCATED DURING PROJECT CONSTRUCTION.
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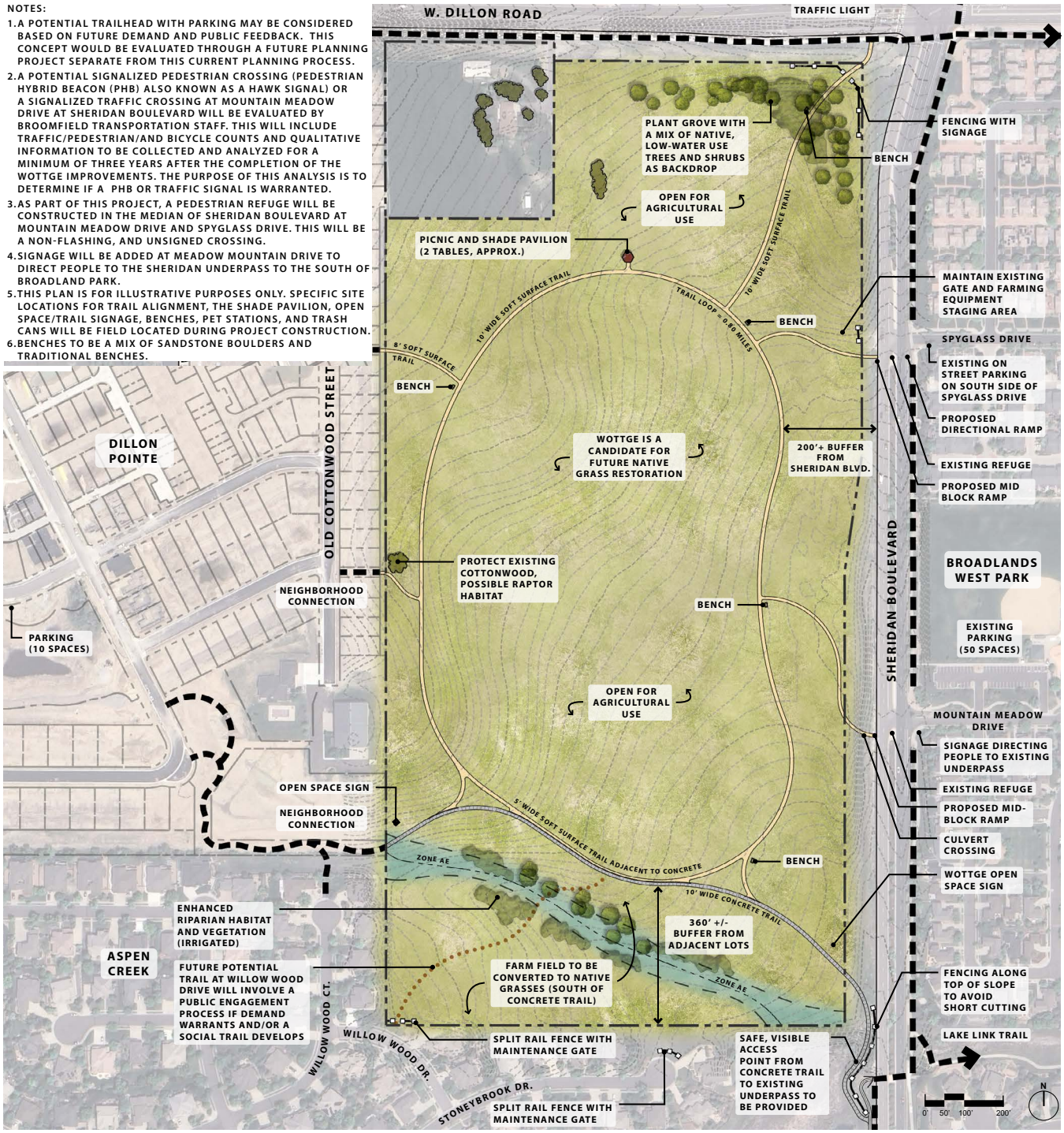
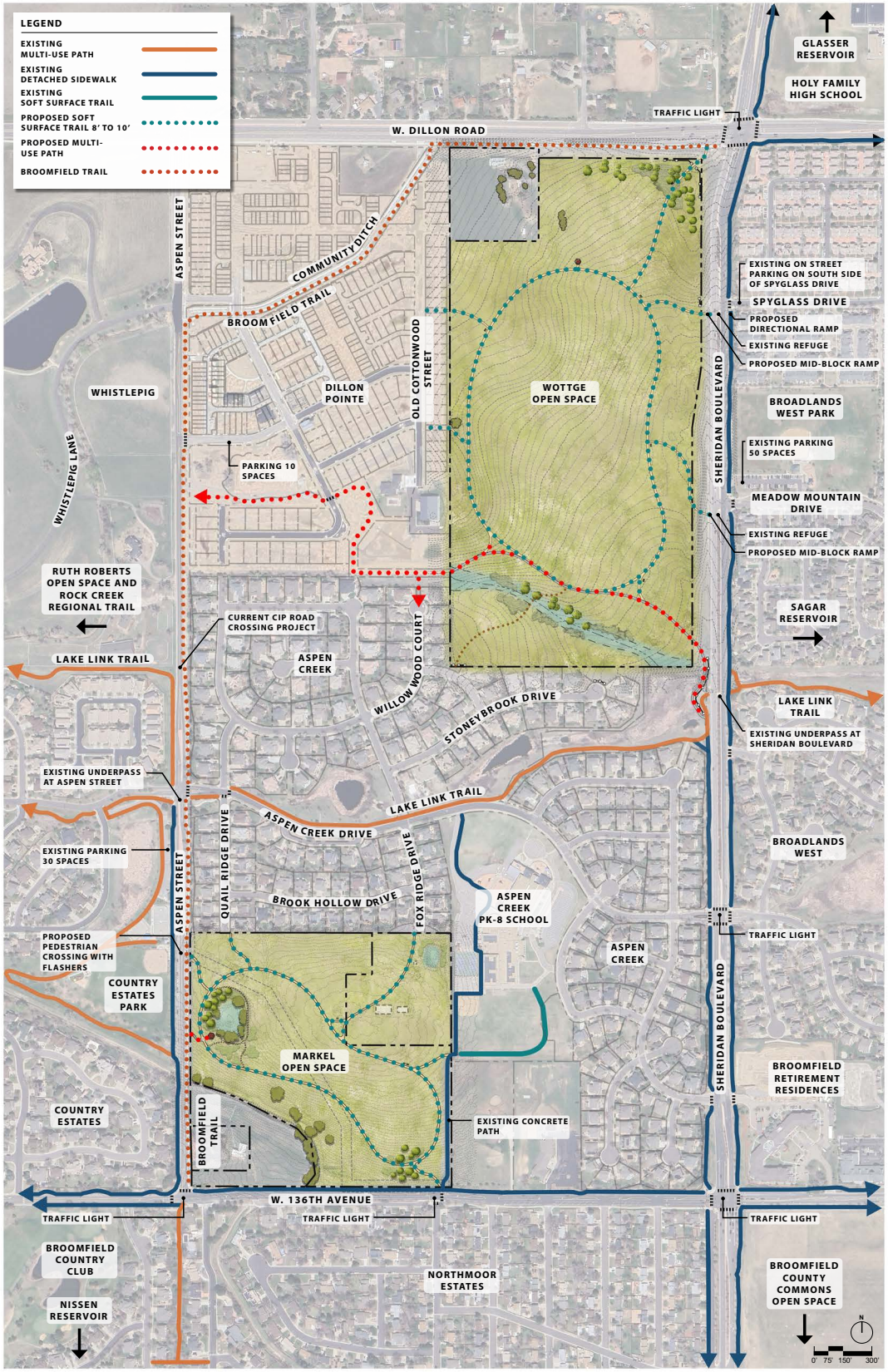


ESTIMATED CAPITAL COST

The total estimated capital cost of conceptual plan improvements is estimated at $800,000 for the Markel Open Space, and $1,250,000 for the Wottge Open Space. The Wottge and Markel Open Space projects aim to enhance habitat and natural beauty by using low-water use native plants requiring minimal irrigation. In Wottge, this covers 10.42 acres, including riparian and native planting. In Markel, it's 0.62 acres, comprising riparian plantings and native trees. Broomfield Water License Fees will be based on actual water usage during the detailed design phase.

OVERALL OPEN SPACE PLANS



SECTION 2: EXISTING CONDITIONS

Property History

- Markel Open Space History
- Wottge Open Space History
- Natural Resources
  - Hydrology
  - Vegetation Communities
  - Noxious Vegetation
  - Wildlife

Opportunities

- Ecological Restoration Opportunities
- Trail and Neighborhood Connections

Drainage at Wottge Open Space

Hay baling at Markel Open Space

PROPERTY HISTORY

MARKEL OPEN SPACE HISTORY

Dr. Bill Markel and his wife Jean moved to Broomfield in 1958 after Dr. Markel left the Army Medical Corps. Broomfield was then described as a "brand new community," and it turned out to be exactly what they were looking for. The Markels purchased their current property and what is now open space in 1968. People told them they were moving "to the end of the world."

Bill and Jean enjoyed the property for many years with their four children and the approximately fifty exchange students they hosted over several decades. When they decided to sell part of their original property, they contacted the Broomfield Open Space and Trails Department as a potential buyer because they wanted the land to remain as open space.

Markel Open Space has a pond that the Markels had built around the time they bought the property. The pond is lined with tall cottonwoods that provide shade and beautiful colors in the fall. The Markels are happy that people will continue to enjoy the property for years to come the way they and their children did.

Cutting grass for hay baling with a horse-drawn rig

Broomfield Open Space and Trails purchased the 26-acre parcel of the Markel Property in June 2008. Since Broomfield's purchase of the property, citizens have contacted the Open Space and Trails department to express interest in using the existing pond. Historically the property has been used as pasture land for horses. Currently, the site does not have any trails to provide public access, man-made amenities, and has a plugged and abandoned oil and gas well site on the northeast corner of the property. The plugged and abandoned well site is to be added to the Broomfield-owned open space once the oil and gas company receives final approval of its grassland restoration on the parcel from the Colorado Energy and Carbon Management Commission.

Original dock Dr. Markel built for his children and grandchildren

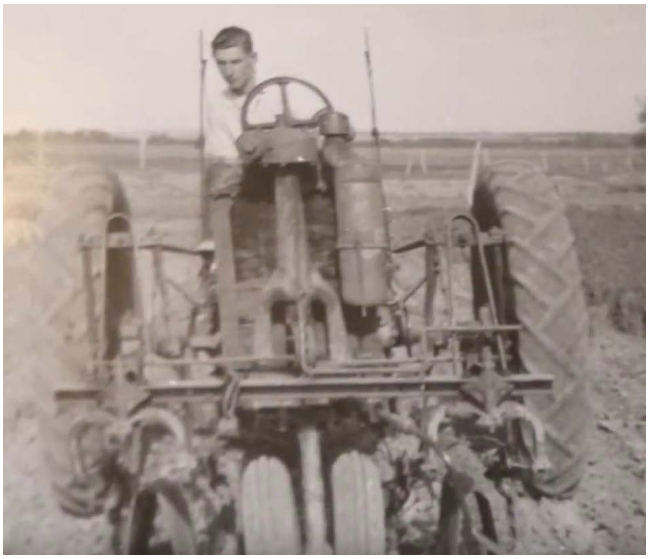
WOTTGE OPEN SPACE HISTORY

Bernhard "Ben" Wottge moved to Colorado from Germany with his family when he was eight years old. His parents purchased land here in Broomfield in 1955, and it became their second start for farming. They planted crops like alfalfa hay, barley, and corn. After a period of drought, they bought cows and added a dairy to their farmstead. The property included a farmhouse, two bin granaries, and a dairy barn among other buildings.

Wottge family farming on property *(photo courtesy of the Wottge Family)*

Ben and his four siblings decided to sell part of the 80 acre property after their parents passed away. Ben had heard of the Broomfield Open Space and Trails Department buying a different property at the time and felt that preserving the Wottge land as open space would be a wonderful idea. Ben and his wife Pam continue to live on five acres of the farm while the remaining land has now been designated as the Wottge Open Space. He still plants grass hay on his land while winter wheat is farmed on the open space parcel.

The property has several large cottonwood trees that have been home to a great horned owl nest in past years. The expansive field provides habitat for a number of bird and small mammal species, as well as a migration corridor for wildlife.



Ben Wottge farming *(photo courtesy of the Wottge Family)*

The 66-acre parcel of the Wottge Property was purchased by Broomfield Open Space and Trails in 2003 to maintain views of the mountains as well as preserve a piece of land that connects Broomfield to its agricultural history. The property currently does not have any trails to provide for public access. The majority of the site is used for agricultural purposes, and no man-made amenities exist on the property.

A Colorado Cultural Resource Survey was completed on both the Markel and Wottge Open Space properties in July of 2023. The survey concluded that no cultural resources were observed within either property. Refer to Appendix 4 for the full Survey document.

NATURAL RESOURCES

DHM Design Ecological Services staff completed a detailed site assessment to evaluate existing ecological conditions, wetlands, opportunities, and constraints as they relate to current and future management of the natural resources of the Markel and Wottge Open Space properties. The Plan's open space design is intended to harmonize the relationship between passive recreation and ecological function. The evaluation takes into consideration this overarching goal and describes the natural resources that are present on the properties including vegetation communities, aquatic resources, and wildlife habitat.

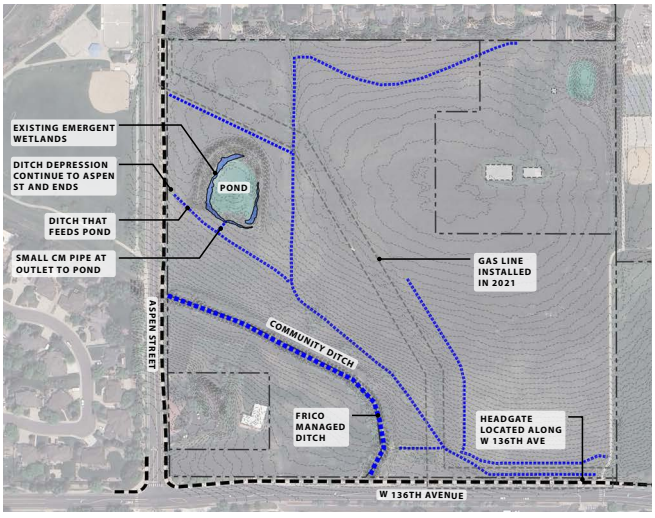
The summary below is a brief overview of the data collected and recommendations. The full Natural Resources Report can be found in Appendix 2 of this document, as well as the Wetland Delineation Report in Appendix 3.

Aerial View of Wottge property looking South

Hydrology

Markel Open Space

The man-made Markel Pond is the primary hydrological feature within the Markel Open Space. This section of Community Ditch is located within the Middle Big Dry Creek Catchment of the Big Dry Creek-South Platte River Watershed. Community Ditch travels north approximately 15 miles and ends in a housing subdivision located north of Erie and just west of Interstate 25. The Markel Pond is fed by an unnamed irrigation lateral that connects the FRICO managed Community Ditch to the pond from the south side of the pond. The City and County of Broomfield indicated the pond is filled typically twice annually by releasing waters from Community Ditch.



Markel water resources plan

Markel Pond and wetlands along pond edge

Wottge Open Space

An unnamed drainage on the Wottge Open Space flows from the adjacent Dillon Pointe project to the west through the southeast part of the parcel. The water source of the drainage is likely precipitation captured in a small pond on the neighboring property, which is then conveyed onto the Wottge Open Space. This drainage flows west to east and merges with Quail Creek on the east side of Sheridan Boulevard. Quail Creek continues to flow east where it eventually flows in Plaster Reservoir, east of Lowell. Community Ditch also flows along the northern boundary of the Wottge Open Space in an underground culvert.

Vegetation Communities

Upon field review and aerial imagery analysis, four (4) main vegetation communities were found on the open space properties. All four communities were observed on the Markel property, and three (not including the Emergent Wetland Marsh) were found on the Wottge property. The communities include:

- Forested Riparian
- Intermountain Shrubland and Grassland
- Agricultural Areas / Disturbed Areas
- Emergent Wetland Marsh (Only found on Markel property)
    - One wetland type consisting of approximately 0.16 acres was identified and delineated during the field assessment (completed September 2022) for the Wottge and Markel Open Spaces. The wetland type observed was the seasonally flooded palustrine persistent emergent wetlands, located around the Markel Open Space Pond and in the depression in the northeast corner of the Markel Property. No wetlands were delineated on the Wottge Open Space.
    - The extent of the wetlands around the Markel Open Space Pond are limited by where the hydrology of the pond permits the establishment of emergent wetland vegetation. The extent is strongly reliant on the hydrology of the pond and therefore the extent of wetlands inward towards the middle of the pond may vary seasonally. The wetlands around the pond were dominated by narrowleaf cattail, forming dense monocultures in the wetland buffers along the banks of the pond. In other areas, higher quality wetland benches are found, consisting primarily of hydrophytic graminoids, including Nebraska sedge, Baltic rush (Juncus arcticus), showy milkweed, western goldenrod, and scattered false indigo bush.

Forested Riparian

Intermountain Shrubland and Grassland

Agricultural Areas / Disturbed Areas

Emergent Wetland Marsh

Table 1 - Vegetation Community Types and Areas Found on the Markel and Wottge Open Spaces

Property	Vegetation Types	Detailed Types	Acreages
Markel	Forested Riparian	Narrowleaf or plains cottonwood dominant communities	0.40
	Emergent Wetland Marsh	Cattail and sedge communities	0.16
	Intermountain Shrubland and Grassland	Crested wheatgrass and smooth brome - dominant communities	26.5
	Agricultural Areas / Disturbed Areas	Winter wheat, alfalfa, kochia, and other weedy species	3.71
Wottge	Forested Riparian	Narrowleaf cottonwood or Siberian elm-dominant areas	0.26
	Intermountain Shrubland and Grassland	Smooth brome - dominant communities	0.43
	Agricultural Areas / Disturbed Areas	Winter wheat, alfalfa, kochia, and other weedy species	20.4

Noxious Vegetation

A total of six species classified as noxious weeds in Colorado were observed within the two properties including: musk thistle (*Carduus nutans*), Chicory (*Cichorium intybus*), Canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*), Russian olive (*Elaeagnus angustifolia*), and perennial sowthistle (*Sonchus arvensis*). Additionally, many non-native weedy species were observed on site, including: kochia (*Kochia scoparia*), curly dock (*Rumex crispus*), barnyard grass (*Echinochloa crus-galli*), smooth brome (*Bromus inermis*), crested wheatgrass (*Agropyron cristatum*), white goosefoot (*Chenopodium album*), flixweed (*Descurainia sophia*), alfalfa (*Medicago sativa)*, prostrate knotweed (*Polygonum aviculare*), and Russian thistle (*Salsola tragus*). These species are known to be aggressive and are considered to be an ecological threat.
The City and County of Broomfield noxious weed management plan should be referred to for more information and weed treatment options.

Existing vegetation on Wottge Property

Wildlife

Historically the shortgrass prairies found in Broomfield would have supported herds of bison and pronghorn, prairie dog colonies, deer and elk, and even gray wolves and grizzly bears. As habitat decreased with the introduction of large-scale agriculture, these populations of animals were driven away from the Broomfield area. Some of these species still inhabit this area today, and they can be found in the preserved open lands scattered along the Front Range of Colorado. Maintaining and preserving these open spaces and natural areas is critical to the survival of this wildlife.
Even though both the Markel and Wottge properties are surrounded by busy roads and neighborhoods, the preserved riparian, wetland, and grassland systems support a diversity of wildlife. These Open Spaces provide habitat to a number of species, including: coyote (*Canis latrans*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis)*, raccoon (*Procyon lotor*), cottontail rabbit, bats, squirrels, mice, voles, shrews, and a variety of amphibians and reptiles. On two separate occasions, a coyote was seen on both the Markel and Wottge properties in September of 2022.

Cottontail Rabbit

Coyote (image courtesy of Walter "Ski" Szymanksi)

Raccoon

Striped Skunk

Red Fox

Mule Deer

Bull Snake

Painted Turtle

The two parcels also provide important foraging, breeding, and nesting habitat for migratory birds. A total of eleven species were documented during surveys conducted, most of which are likely year-round residents.

The cottonwood riparian habitats provide a variety of nesting substrates including shrubby understory and cottonwood and green ash trees. Abundant insects and seeds are present for birds. A high density of resources supports a larger number of individuals in a smaller space, which is typically true for riparian woodlands in Colorado. Many species may not nest or breed in riparian areas but still use them for foraging grounds or cover during inclement weather. Species seen using the riparian woodlands on the properties included mourning dove (*Zenaida macroura*), American kestrel (*Falco sparverius*), northern flicker (*Colaptes auratus*), and hairy woodpecker (*Picoides villosus*).

Hairy Woodpecker

The open grasslands present on the site are critical habitat for bird species, as native prairies are the most altered ecosystems in North America and are disappearing along the Front Range. As a result, grassland bird species have experienced a steep population decline. Species documented in grassland areas of the two properties included barn swallow (*Hirundo rustica*), Say's phoebe (*Sayornis saya*), western kingbird (*Tyrannus verticalis*), and Swainson's hawk (*Buteo swainsoni)*.

Swainson's Hawk

During the three site visits conducted for the project, several raptors were seen perched within the parcels or soaring overhead, likely foraging in the open grasslands. A pair of Swainson's hawks were seen circling the Wottge Open Space. American kestrels were seen or heard on both properties. All three species require open habitat for foraging with large trees for nests.

A raptor stick nest was located on the Markel Open Space along Community Ditch on the south side of the property. This nest was confirmed to be occupied by a pair of great horned owls during the summer months by the City and County of Broomfield and was inactive in the summer of 2023.

Great horned owl on the nest located in the Markel Open Space near Community Ditch.
Source: City and County of Broomfield

OPPORTUNITIES

ECOLOGICAL RESTORATION OPPORTUNITIES

Opportunities for habitat restoration, wildlife habitat enhancement features, and wildlife conservation measures are present on both the Markel and Wottge Open Spaces. Although located in a suburban environment, the two Open Spaces provide essential habitat for wildlife present in the area and could be improved and protected for plants and wildlife native to the Front Range of Colorado.

Markel Open Space

A combination of habitat restoration/enhancement, wildlife habitat enhancement features, and habitat conservation measures can be implemented on the Markel Open Space.

a. Habitat Restoration or Enhancement

i. Pond and Wetlands – The only pond and wetlands present on either property provide important habitat, recreational opportunities, and educational value.

1. *Short-term Goals:*
    a. Treat noxious weed populations surrounding the pond
    b. Protect the existing wetlands and riparian zones
    c. Propose a designated trail and possible education/fishing deck to limit disturbance of the vegetation around the pond
2. *Long-term Goals:*
    a. Enhance wetland and riparian areas by increasing vegetative diversity
    b. Promote native species restoration, including pollinator plantings

ii. Grasslands – Prior to disturbance, the site was likely short- or mid-grass prairie which is characteristic of the drought-prone eastern plains of Colorado. The site currently does not resemble the typical vegetative cover for this area and presents an opportunity for enhancement of the current vegetation.

1. *Short-term Goals:*
    a. Plant native shrubs, forbs, and pollinator species that can compete with existing vegetation
    b. Treat noxious weeds
2. *Long-term Goals:*
    a. Enhance and restore native prairie communities by increasing vegetative diversity
    b. Promote native species restoration, including pollinator plantings
    c. Create interpretive signage about the role of short-grass prairie ecosystems in Colorado

b. Wildlife and Habitat Conservation

i. Reduce human-coyote interactions with trailhead signage
ii. Raptor nest protections when nests are active
iii. Remove unnecessary fencing
iv. Preserve open land and minimize habitat fragmentation
v. Maintain large cottonwood trees for raptor and bat habitat

Wottge Open Space

A combination of vegetation restoration/enhancement, wildlife habitat enhancement features, and habitat conservation measures can be implemented on the Wottge Open Space.

a. Habitat Restoration or Enhancement

i. Wetland Creation – The Wottge Open Space contains a wet drainage that runs from the southwest corner to the southeast corner and is fed by precipitation accumulating in a pond on an adjacent property to the west, Dillon Pointe.

1. *Short-term Goals:*
    a. Treat noxious weed populations within potential wetland creation sites
2. *Long-term Goals:*
    a. Enhance wetland and riparian areas by increasing vegetative diversity
    b. Promote native species restoration

ii. Grasslands – The site currently is planted with winter wheat, and portions of the site will continue to be used for agricultural purposes in the future. It is recommended that short-grass prairie ecosystems be restored through active measures in areas that will not continue to be used for agriculture.

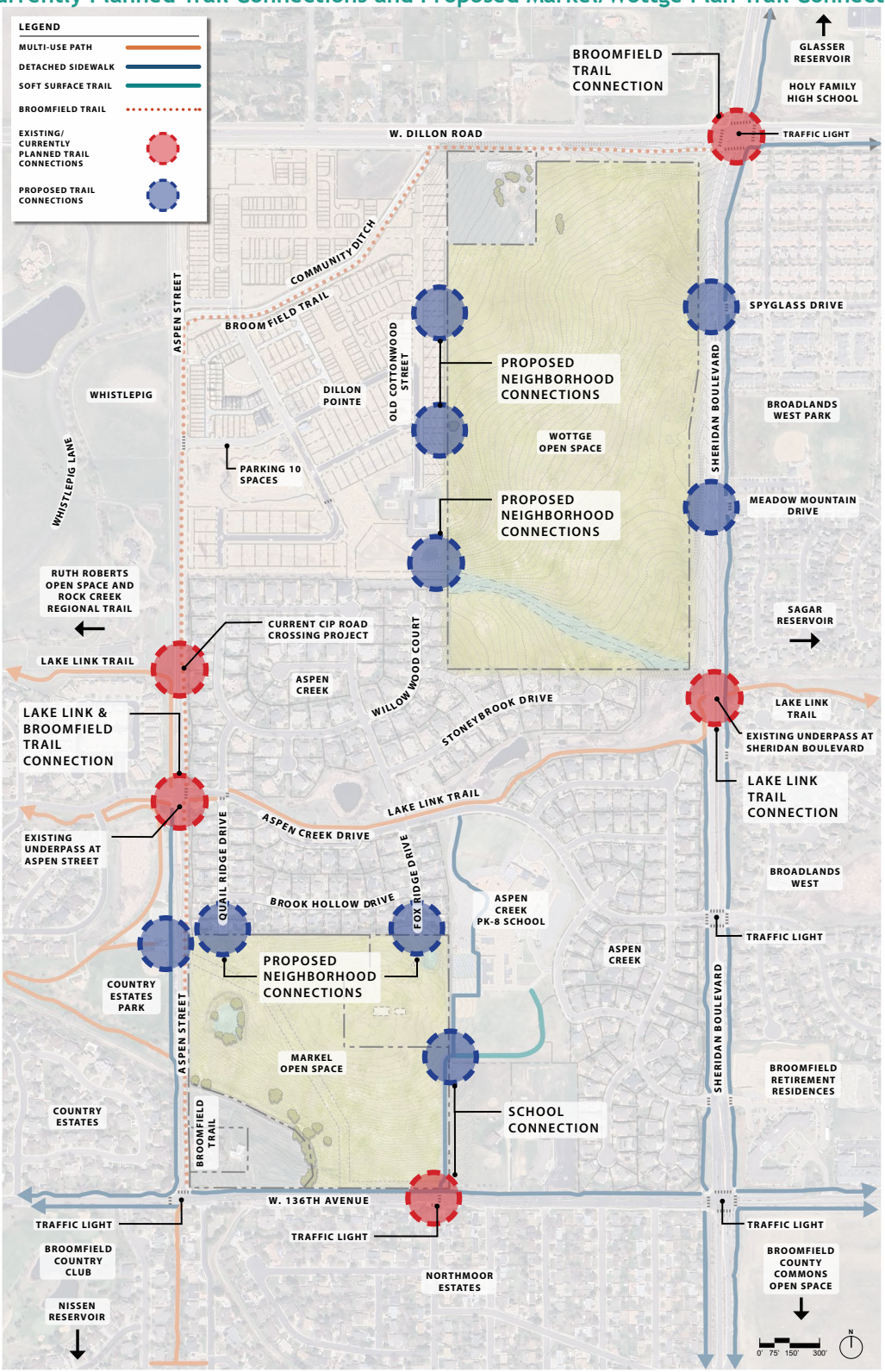
1. *Short-term Goals:*
    a. Plant native shrubs and forbs that can compete with existing vegetation
    b. Treat noxious weeds
2. *Long-term Goals:*
    a. Enhance and restore native prairie communities by increasing vegetative diversity
    b. Promote native species restoration
    c. Create interpretive signage about the role of short-grass prairie ecosystems in Colorado
    d. Plan for maintenance and management of the site

Aerial view of the Wottge Open Space possible native restoration area located in the southwest corner

TRAIL AND NEIGHBORHOOD CONNECTIONS

A critical goal for this project is to connect the open space properties to existing and proposed trails, neighborhoods, parks, and schools. The plan below shows potential opportunities where trails within the open spaces can connect to existing local trails and sidewalks. Key crossings are also indicated to improve residents' access to the sites from the neighborhoods across streets.

Existing/Currently Planned Trail Connections and Proposed Markel/Wottge Plan Trail Connections



SECTION 3: PUBLIC AND STAKEHOLDER ENGAGEMENT

Public Open House at the Aspen Creek K-8 School, February 16, 2023

PUBLIC AND STAKEHOLDER ENGAGEMENT

SUMMARY

An important goal for this project was to engage the local community and stakeholders throughout the planning process for the Markel and Wottge Open Space Plans. A wide range of engagement techniques were used to help ensure that diverse community voices were equally heard and represented throughout the project; These engagement techniques included an interactive project website, online and in-person surveys, pop-up events at local parks, and an open house at Aspen Creek K-8 School in close proximity to both open space properties.

The goal for public engagement for this project was to identify the specific needs of residents and to understand their perspective on issues and expectations. The public process provided an opportunity to generate new ideas, discover what is important to the community, promote the properties as an asset, and attempt to align user and management interests and goals. Below is a brief summary of the public engagement process. A more detailed summary of the public process and stakeholder engagement can be found in Appendix 1 of this Report.

PHASE 1: INITIAL SITE ASSESSMENTS

- **Site inventories** conducted at both properties where the project team and Broomfield staff reviewed existing site conditions and potential connections to adjacent walks and multi-use trails.
- Natural Resources data collected and assessed and a Natural Resources Assessment and Wetland Delineation Report were developed.



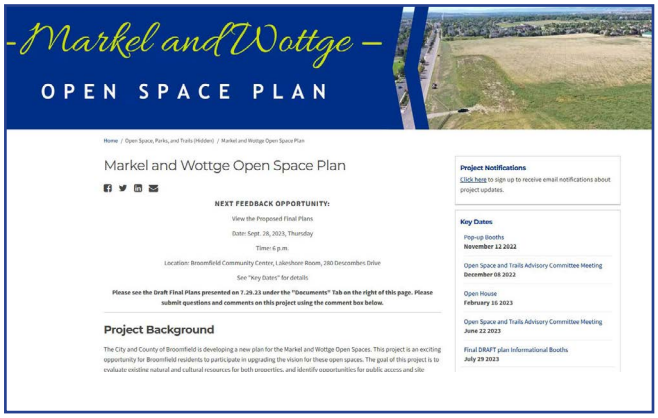

Project team on site at Markel and Wottge properties

Incorporation into Opportunities and Constraints Plans and Reports:

- Potential trail connections drafted
- Natural Resources shown on each plan, and recommendations for future restoration and enhancement noted as concepts
- Natural Resource and Wetland Reporting developed for incorporation into initial phase of design

PHASE 2: INITIAL PUBLIC OUTREACH

- **Broomfield Voice website page** created for the project. Contains open Q&A box for the community where the project team publicly responded to comments. Website also provided a project background narrative, project notifications, key dates, and overall project schedule, and was updated regularly throughout the project timeline.



Broomfield Voice website for Markel and Wottge Open Space Plan

- **Initial Public Survey** (Oct 15 - Nov 14, 2022), made available online. Survey received 450 total responses, with 442 of those being Broomfield residents. The survey consisted of 6 multiple choice questions and 1 open-ended response.

Q2. How often do you visit Broomfield Open Spaces?		% of survey respondents
Daily	124	28%
Weekly	194	43%
Monthly	100	22%
Yearly	11	2%
Rarely	17	4%

Q6. What additional amenities would you like to see in the Open Spaces?		% of survey respondents
Shade Trees	293	65%
Shade structures	182	40%
Habitat Improvements	165	37%
Wildlife Viewing Areas	161	36%
Trailhead Parking	152	34%
Picnic Tables	108	24%
Fishing	53	12%

Initial Public Survey Results:

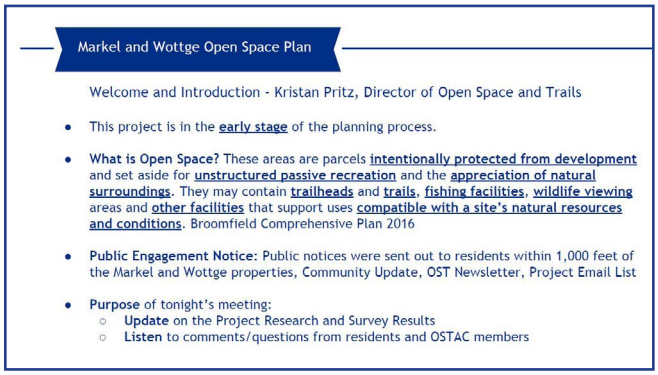
- Top two activities enjoyed in Broomfield Open Spaces are walking and mountain views
- Over half the respondents also enjoy hiking, wildlife viewing, and biking
- Most requested additional amenities desired were shade trees and shade structures (while maintaining mountain views)
- Respondents also desired habitat improvements and wildlife viewing areas
- 75% of open-ended comments indicated they would like the spaces to remain as natural as possible with limited structures or development
- 72% of respondents use Broomfield trails at least once a week, and prefer the trails to be majority soft surface
- 34% of the total survey respondents desired developing a parking lot as an amenity, but 9% of the open comments spoke against developing a new parking lot
- Many of the open-ended comments in the survey referenced utilizing surrounding parking lots to access the Open Spaces

- Two **Pop-up Booths** on Saturday, November 12th, 2022 were set up at parks adjacent to each Open Space. Broomfield staff and the project team attended to note comments and answer questions.
  - Initial opportunities and constraints boards were presented to the local community for feedback and comments.
  - The majority of attendees were residents that lived nearby, with about 25 attendees total.
  - Feedback received was very similar to that of the Initial Public Survey.
  - Residents who attended that have properties bordering the Open Spaces requested the proposed trails be further from the adjacent homes; this request was accommodated and incorporated in the updated draft plans by the project team.

Pop-Up Booth at Country Estates Park, Nov. 12, 2022

Pop-Up Booth at Broadlands West Park, Nov. 12, 2022

- Presented Results from Phase 2 Initial Outreach at the December 8th, 2023 **Open Space and Trails Advisory Committee**. Additional citizen feedback from the meeting included:
  - Ensure safe access to the Open Spaces
  - Desire to utilize existing parking spaces at nearby parks to access Open Spaces, and ensure safe crossings of busy roads
  - Maintain mountain views if shade structures are built and shade trees are planted
  - Improve habitat for wildlife
  - Concern regarding a parking lot at the Wottge Open Space and additional traffic
  - Creating connections to existing trails is important



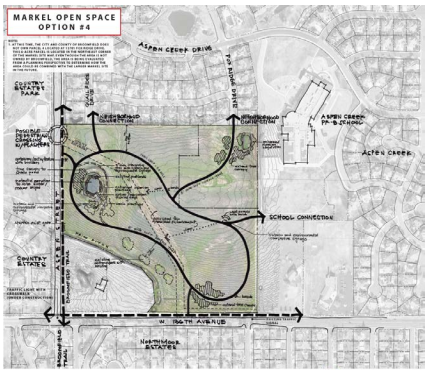
Slides from the OSTAC presentation, Dec 8th, 2022

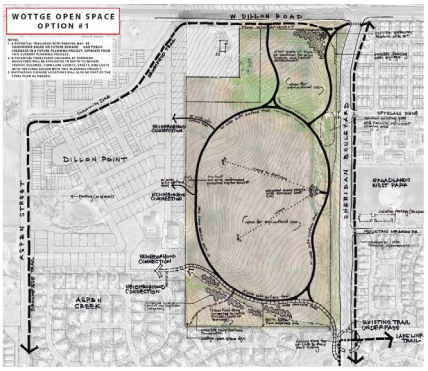
Feedback incorporation into Initial Open Space Plans:

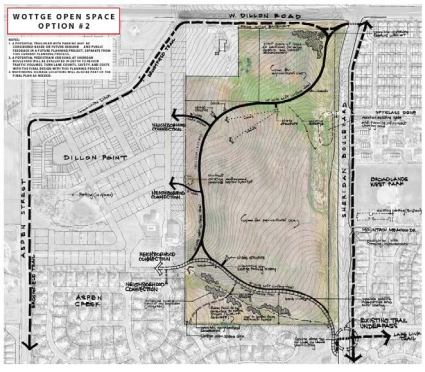
- Activities: Trails offering opportunities for walking, hiking, wildlife viewing, and biking were proposed on all four initial Open Space Plans.
- Amenities: A combination of shade pavilions were strategically located on the initial Open Space Plans to limit impacts to mountain views.
- Habitat Improvement/Wildlife Viewing: The Natural Resource reporting identified specific locations for habitat enhancements for wildlife and vegetation, and these areas were noted on all of the initial Open Space Plans.
- Environment: All four initial Open Space Plans minimized structures, maintained mountain views, and proposed habitat improvements.
- Trails: 2 trail alternatives were proposed on all four initial Open Space Plans, including loop trails and more direct trail options. Originally, Plans for Markel included soft-surface and concrete trails, but the concrete trail option was removed as a result of the comments received during the Initial Public Survey. The Wottge property Plans included an accessible concrete trail on the south side of the property combined with a soft-surface trail, and two different options for trails throughout the property including a loop, and a more direct trail along Sheridan.
- Trailhead Parking at Wottge: Due to initial feedback received against having a parking lot, and the concern that it would increase traffic congestion, no parking lots were proposed on the Initial Open Space Plans. It was noted on the Wottge Plans that a potential parking lot could be implemented at a future time if it is deemed necessary. On-going traffic assessment and pedestrian circulation assessment will continue to be conducted by Broomfield.

PHASE 3: FIRST ITERATION OF FEEDBACK

- Phase 2 feedback is then analyzed and incorporated into the first edition of **Alternative Designs**. Two potential designs for each property were created and included various elements of the amenities that residents indicated that they desired on the initial survey.







- **The Second Public Survey** was presented along with the initial alternative designs at an **Open House** held on February 16th, 2023 at Aspen Creek K-8 School. Residents were asked if they support or do not support the proposed elements of each presented design. Over 80 Broomfield residents attended the Open House and took the survey at that time. The second survey was also made available online from February 16th (beginning at the Open House) until March 5th, 2023. The survey received a total of 159 responses.

1. What design do you most support? (select one)
   ❑ Design 1 ❑ Design 2
2. What elements do you support in the design that you selected?
   - ❑ Overall trail layout
   - ❑ Gateway feature (boulders, potential art feature, signage)
   - ❑ Picnic/Shade/Nature Education Pavilions
   - ❑ Low-water use pollinator plantings for habitat enhancement
   - ❑ Benches
   - ❑ Interpretive Signs for nature, history and agricultural information
   - ❑ Plan to review the on-site parking if and when that is necessary in the future through a separate public engagement process
3. What elements do you NOT support about the design that you selected?
   - ❑ Overall trail layout
   - ❑ Gateway feature (boulders, potential art feature, signage)
   - ❑ Picnic/Shade/Nature Education Pavilions
   - ❑ Low-water use pollinator plantings for habitat enhancement
   - ❑ Benches
   - ❑ Interpretive Signs for nature, history and agricultural information
   - ❑ Plan to review the on-site parking if and when that is necessary in the future through a separate public engagement process
4. Do you have any additional comments?
   - ❑ No
   - ❑ Yes: _____

5. What design do you most support? (select one)
   ❑ Design 3 ❑ Design 4
6. What elements do you support in the design that you selected?
   - ❑ Overall trail layout
   - ❑ Gateway feature (boulders and signage)
   - ❑ Low-water use pollinator plantings for habitat enhancement
   - ❑ Wildlife Viewing/Education/Fishing deck at pond
   - ❑ Benches
   - ❑ Interpretive signs for nature, history and agricultural information
   - ❑ Pedestrian crossing with flashers across Aspen Street
7. What elements do you NOT support about the design that you selected?
   - ❑ Overall trail layout
   - ❑ Gateway feature (boulders and signage)
   - ❑ Low-water use pollinator plantings for habitat enhancement
   - ❑ Wildlife Viewing/Education/Fishing deck at pond
   - ❑ Benches
   - ❑ Interpretive signs for nature, history and agricultural information
   - ❑ Pedestrian crossing with flashers across Aspen St
8. Do you have any additional comments?
   - ❑ No
   - ❑ Yes: _____

- Broomfield staff and the project team attended the Open House to present the various Open Space Alternative Plans, to take note of comments and concerns, and to answer questions.

Open House at Aspen Creek K-8 chool, Feb 16, 2023

- Project Staff continue to meet in person with residents to respond to their concerns and questions and incorporate their feedback into the designs, as requested by residents.

Second Public Survey Results:

Feedback received for Markel Alternative Designs:

- The Loop trail (Design #4) was strongly favored by the survey respondents.
- Supported design elements included a gateway feature, low-water use pollinator plantings for habitat enhancement, wildlife viewing/ education/fishing deck at pond, interpretive signage, and a Pedestrian crossing with flashers across Aspen Street. The pedestrian crossing question, while residents were in favor of, did receive the least amount of unanimity, with residents stating concerns about pedestrian and traffic safety in the open comments section.

Feedback received for Wottge Alternative Designs:

- The Loop trail (Design #1) was strongly favored by the survey respondents.
- Supported design elements included a gateway feature, picnic/shade/nature education pavilions, the use of low-water use pollinator plantings for habitat enhancement, benches, and interpretive signage.
- 59 respondents were against the idea of reviewing parking in the future, while 41 respondents supported consideration of future parking if and when necessary through a separate public engagement process.

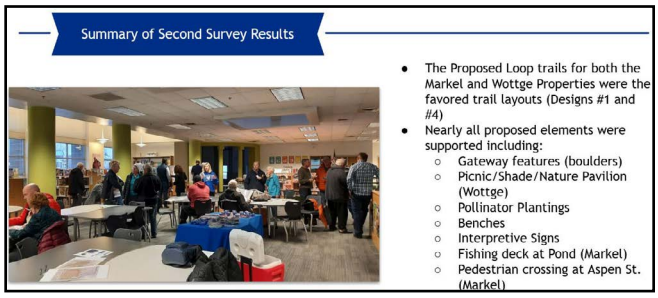
Additional site visits to review proposed designs with existing conditions.

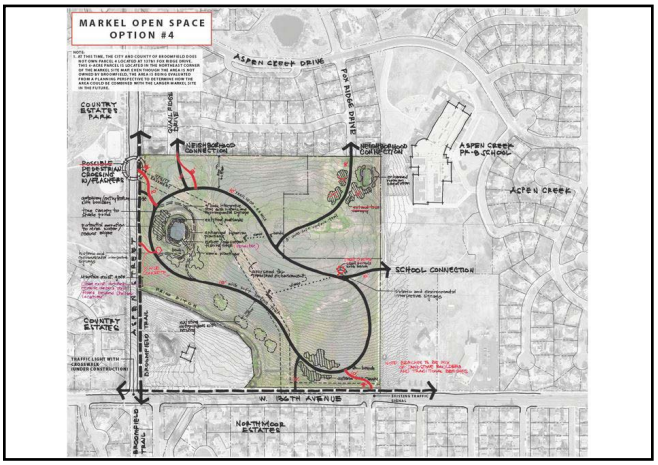
Incorporation into Draft Final Open Space Plans:

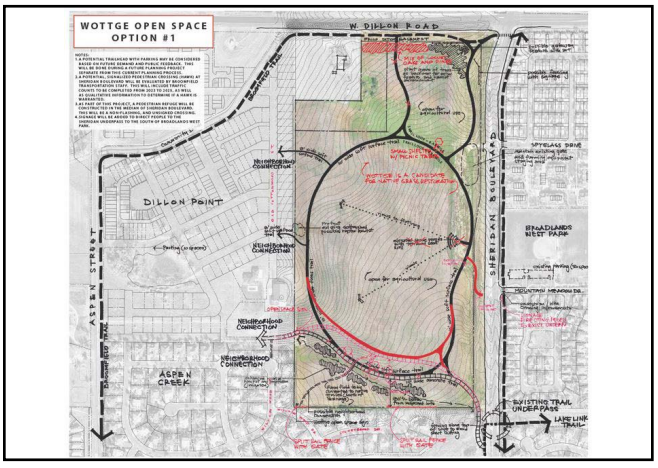
- The Loop trails (#1 for Wottge and #4 for Markel) were selected as the overall trail layout for the properties. All proposed elements, including the gateway features, pollinator plantings, benches, interpretive signage, and a potential deck at the Markel pond are incorporated into Draft final plans. The specific location of each element has been adjusted in the final plans with consideration to the comments received from neighboring property owners through meetings between the property owners and project staff, as requested by the property owners.

PHASE 4: SECOND ITERATION OF FEEDBACK

- Open House, Second Survey responses, and other comments received during Phase 3 were analyzed and incorporated into the draft final designs.
- Presented Results from Phase 3 second public survey and Open House and proposed changes to the Final Designs at the June 22, 2023 **Open Space and Trails Citizen Advisory Committee**. **Presentation slides** made available to the public on the Broomfield Voice website.

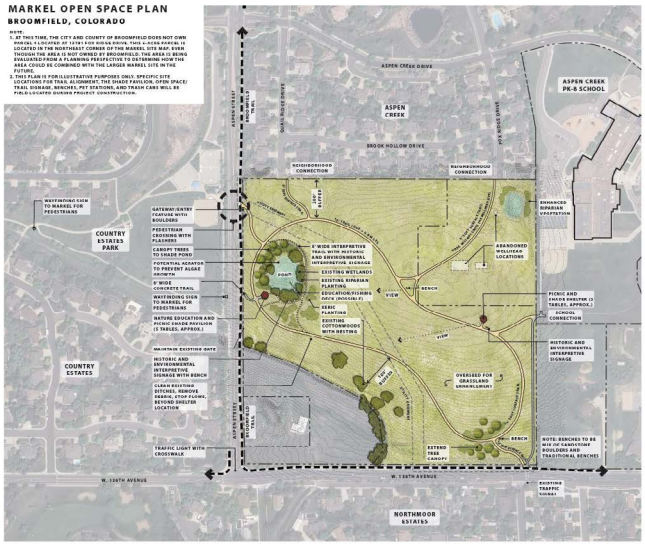


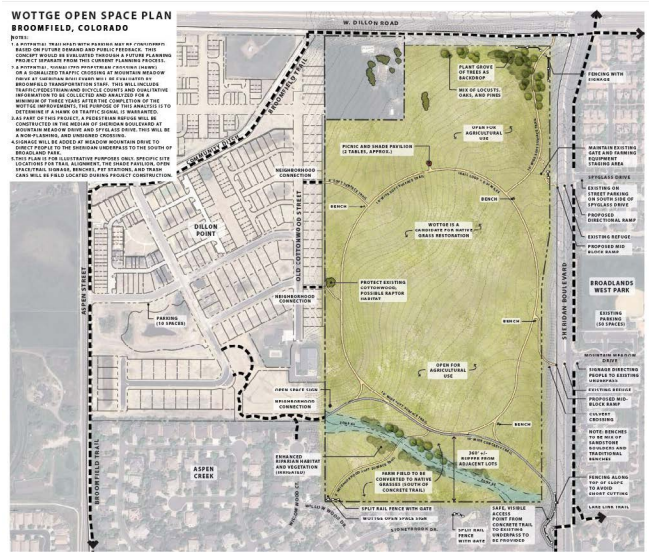




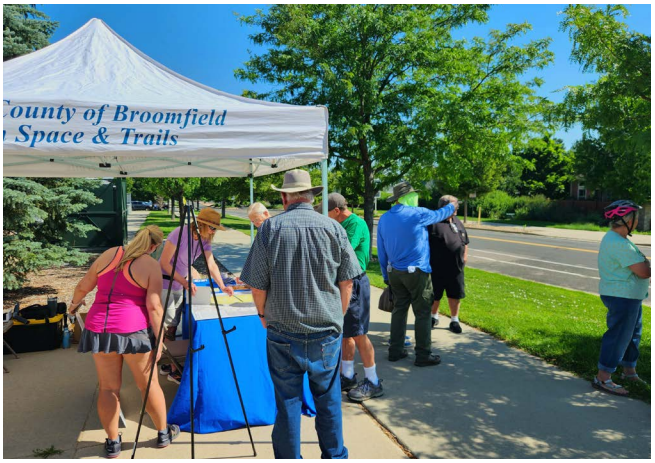
Slides from OSTAC presentation showing proposed edits to DRAFT Final Plans

- Additional citizen feedback from the OSTAC meeting included:
  - Ensure safe access to the Open Spaces
  - Maintaining mountain views
  - Creating connections to existing trails and underpasses is important
  - Address safety improvements to the Sheridan Blvd underpass
- A second **public Pop-Up event** to present the DRAFT final plans presented at Informational Booths held on July 29, 2023 at Country Estates Park and Broadlands West Park from 9:30 a.m. - 11:30 a.m.





DRAFT Final Plans presented at the second Pop-Up, July 29, 2023



Pop-Up Booth, July 29, 2023

Feedback received at the Pop-Up Event:

- Overall, attendees liked the presented Plans
- Attendees felt like the process has been very transparent and feel they have been able to voice their comments and be heard by project staff
- Attendees appreciated that their suggestions were taken into consideration and added to the Plans

Summary of Requested Changes to Plans from July 29, 2023 Pop-Up:

- Markel Open Space:
  - Speed flashers with happy-sad face proposed by proposed new pedestrian crossing on Aspen Street
  - Desire for additional wayfinding from Markel to Wottge properties; Preference from neighbors to direct circulation along Aspen Street and not through the neighborhoods
  - Pond enhancements (algae reduction, trash pick up, etc.)
  - Comments on the Broomfield Voice project page requested removal of the eastern shade pavilion
- Wottge Open Space:
  - At the point where the crusher fines trail aligns with the 10-foot concrete trail, make the crusher fines trail 5 feet wide.
  - Move the North South Trail along Sheridan Blvd. further east to maintain about a 200-foot buffer from Sheridan's asphalt.
  - Push the trail that runs east west with the picnic pavilion farther to the north parallel to the most southern trees on the L-Shaped Wottge property.
  - Pull the 10-foot wide trail that connects from the .85 mile trail to Dillon Road to the west.
  - Add a bench along the trail by the trees at the northeast corner of the site.
  - Trail in southwest corner of Plan is to be marked "Future Potential Trail connection if demand warrants and/or a social trail develops".

Incorporation into Final Open Space Plans:

- All of the requested changes to the plans from the second Pop-Up event and OSTAC Meeting were incorporated into the Final Open Space Plans for each property.

PHASE 5: FINAL DESIGN

- The feedback and analysis conducted throughout all four first phases are incorporated into the final designs. The project team then creates a project timeline to begin work on the properties.
- **Presented results of the second Pop-Up event, and the Final Open Space Plans and Final Open Space Plan Report to OSTAC** (Sept 28, 2023)

SECTION 4: CONCEPTUAL OPEN SPACE PLANS AND ESTIMATED COSTS

Key Elements

Markel Open Space Plan

- Trails
  - Multi-Use Trails
  - Trail Connections and Crossings
- Passive Recreation
- Outdoor Education
- Interpretation
- Natural Resource Protection and Restoration

Wottge Open Space Plan

- Connection to History and Culture
- Trails
  - Multi-Use Trails
  - Trail Connections and Crossings
- Proposed Mid-Block Ramp at Mountain Meadow Drive and Spyglass Drive
- Passive Recreation
- Potential Trailhead Parking
- Gateway at northeast corner
- Natural Resource Restoration

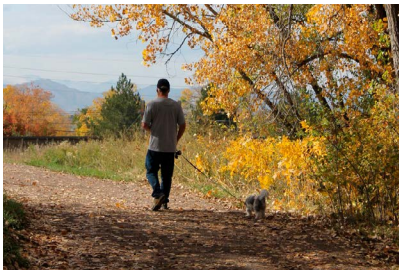
Estimate of Probable Cost

Implementation Plan










CONCEPTUAL OPEN SPACE PLANS AND ESTIMATED COSTS

KEY ELEMENTS

This section highlights key proposed amenity improvements and the overall character for the Markel and Wottge Open Space Plans. Improvements detailed in the Plans are derived from the key objectives, site analysis, natural resource assessments, public and stakeholder outreach and engagement, and input from Broomfield staff in the planning process. Recommendations focused on three key elements:

1. Protect and enhance the existing natural resources and habitat
2. Creating connections to the Broomfield Trail and other local trails
3. Enhancing user experience with passive recreation and educational amenities

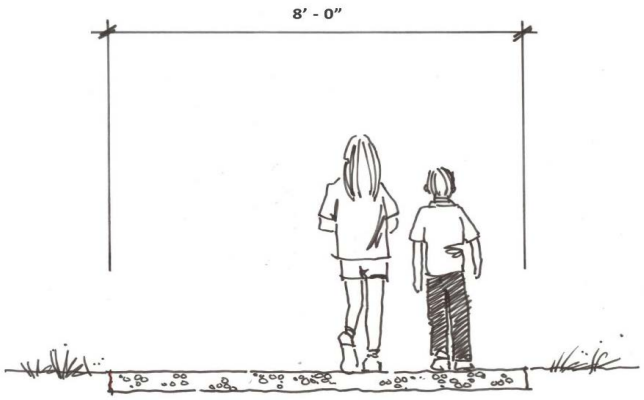
> *"Open space means a parcel of land intentionally protected from development and/or set aside for unstructured, passive recreation and the appreciation of natural surroundings. Open Space may contain but is not limited to trailheads and trails, waterbodies, wetlands, wildlife viewing areas, agricultural lands, fishing facilities, and other facilities that support uses compatible with site resources and conditions."*
>
> *-Open Space, Parks, Recreation and Trails Plan (DRAFT)*

Markel Pond in Autumn

MARKEL OPEN SPACE PLAN

Trails

Multi-Use Trails - The majority of the proposed trails within the Markel Open Space are crushed gravel (crusher fine) trails. This trail type is designed for walking and bike use, and can accommodate wheelchairs. The main looped trail is proposed to be 10' wide in order to allow comfortable two-way traffic. The shorter trails connecting the main loop trail to pedestrian crossings and existing paths are proposed at 8' wide. Typically, trail grades should not exceed 5%, including the one concrete trail connection from Aspen Street to the shade pavilion near the pond. Final trail designs should adhere to AASHTO Guide for the Development of Bicycle Facilities, OSPRT Master Plan, and Americans with Disabilities Act (ADA) requirements.



SOFT SURFACE CRUSHER FINES TRAIL

Trail Connections and Crossings - Proposed trails at the Markel Open Space connect the property to adjacent trails, parks, schools, and neighborhoods. Two proposed trails connect the Open Space to the future Broomfield Trail along Aspen Street. These western connections also safely direct visitors to and from Country Estates Park, via a pedestrian crossing with flashers mid-block on Aspen Street. This is an important crossing for students traveling east/west to Aspen Creek Elementary School. The Lake Link Trail is also easily accessible from the Open Space via the sidewalk along Aspen Street, both at the proposed mid-block crossing and the existing underpass just north of the Markel property.

Smaller, soft surface trails connect the Aspen Creek neighborhood to the Open Space, and a wider trail on the southeast corner of the property links the traffic light and pedestrian crossing at W. 136th Avenue to the looped trail. The main loop trail connections at Aspen Street and W. 136th Avenue will also have gateway features such as boulders, native plantings and signage to designate the entrances to the Open Space.

Passive Recreation

Proposed amenity improvements to the Markel Open Space include trails, benches (traditional and boulder seating), a shade pavilion with five (5) picnic tables, and interpretive signage. All of these additions encourage passive visitor use where users casually move through the Open Space, with limited impact to the overall natural resources. Examples of passive recreation that might occur at the Markel Open Space include walking, running/jogging, wildlife viewing, fishing, picnicking, and bicycling.

Tom Frost Reservoir Picnic and Education Pavilion

Outdoor Education

There are numerous unique features of the Markel property that have the potential to serve as the basis for educational programming elements for diverse audiences. These would include the pond, wetlands, ditch systems, grasslands, wildlife, and history related to the site. The shade pavilion provides a wonderful opportunity for educational classes or presentations, as it overlooks the pond and adjacent grasslands. An interpretive trail and a potential fishing deck at the pond also offer educational opportunities to learn about the importance of wetlands and water resources.

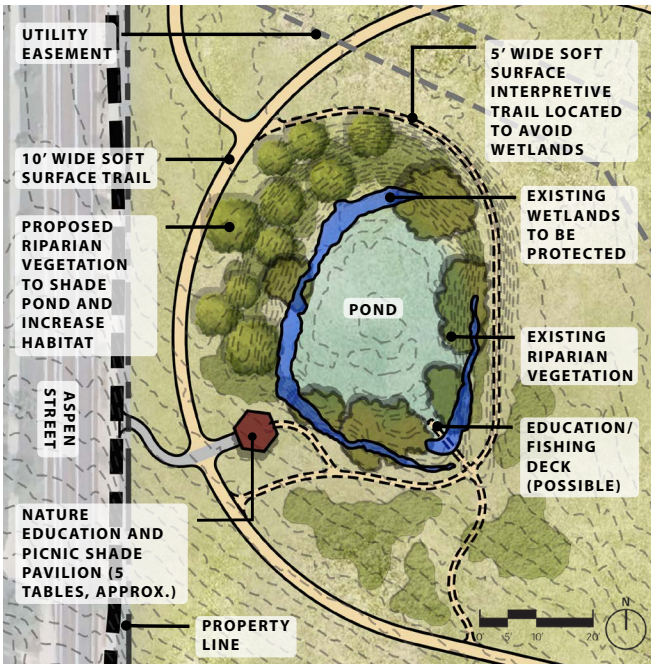
Interpretation

The property that the Markel Open Space sits within has a unique story to tell. Communicating a larger story and engaging with interpretive opportunities throughout the Markel Open Space will provide a more meaningful experience for visitors. Interpretive elements should be designed and located throughout the property in key locations. Specific display topics could include:

- Short-grass prairie ecosystem and the critical habitat it provides for local wildlife
- Markel Family Farm history
- Importance of wetlands and riparian vegetation, water quality
- Insects and macro invertebrates in wetlands and riparian areas
- Irrigation system and practices
- Pollinator habitat

Natural Resource Protection and Restoration

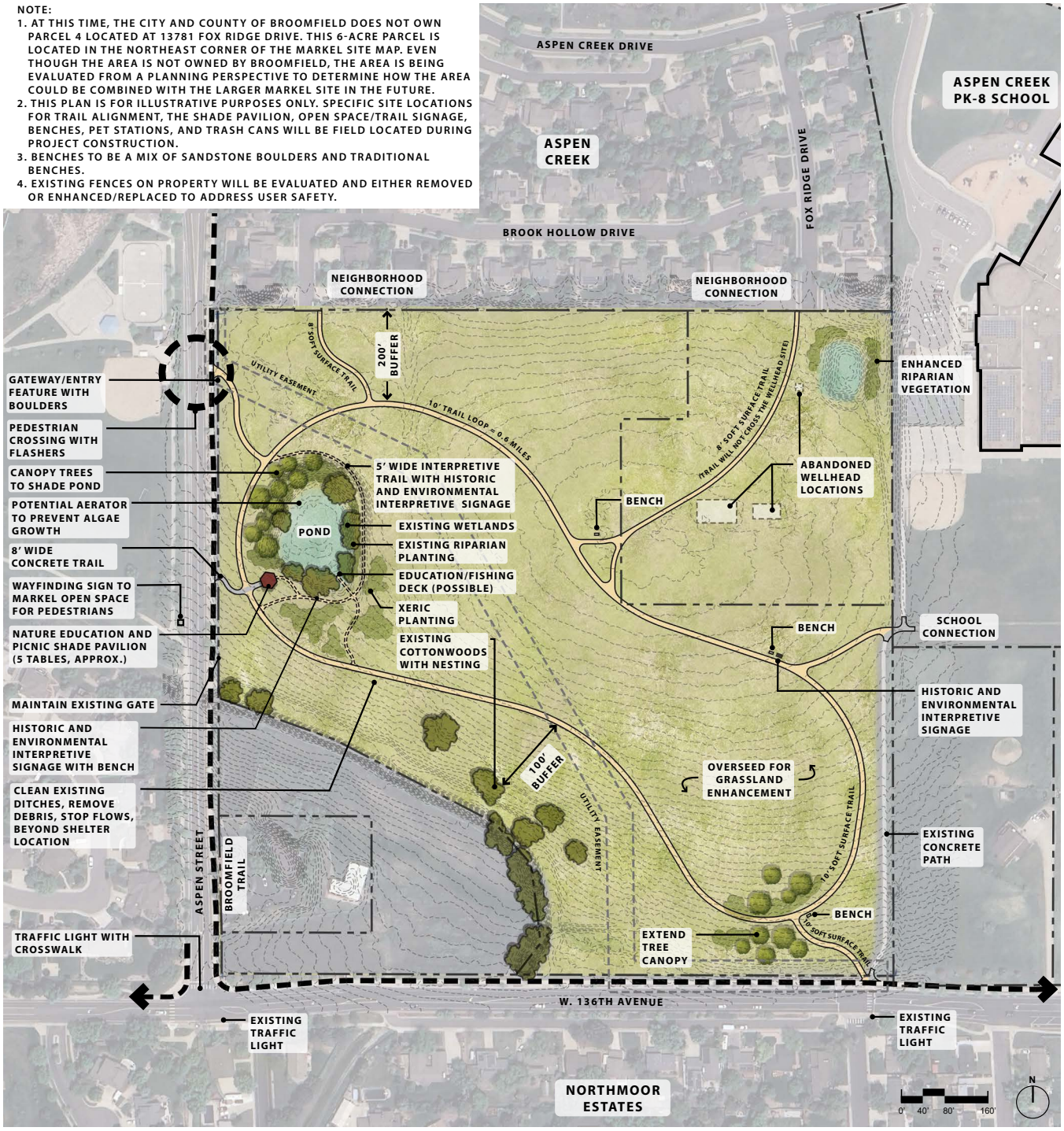
The high diversity of vegetative communities and wildlife habitat at the Markel property is unique for an open space within a suburban area, and thus these features should be protected from disturbance. This includes the pond and associated wetland community. In order to protect the wetlands a path has been proposed to direct foot traffic away from the sensitive vegetation, and access points are strategically placed in locations to not impact the existing wetlands. A potential aeration system has also been proposed to limit algae growth at the pond. The large, mature cottonwoods on the property are also proposed to be protected as they provide critical habitat for avian wildlife, including nesting raptors. It is also recommended to enhance the grassland community on site with continued weed management, and adding a diversity of native plant species to support the grassland functionality, and promote wildlife habitat.



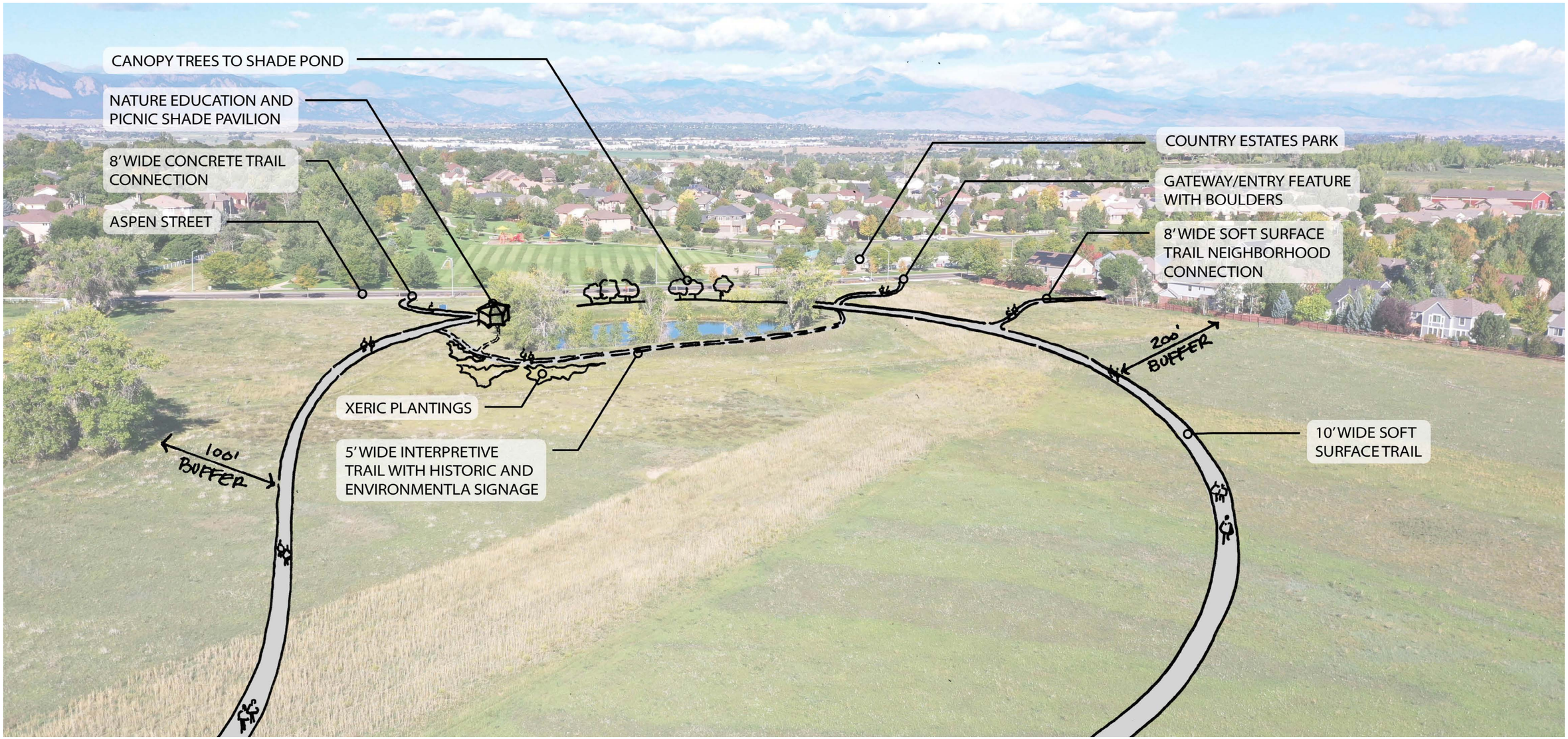
Proposed improvements around the Markel pond protect and enhance the existing wetlands and riparian vegetation.

MARKEL OPEN SPACE PLAN

NOTE:
1. AT THIS TIME, THE CITY AND COUNTY OF BROOMFIELD DOES NOT OWN PARCEL 4 LOCATED AT 13781 FOX RIDGE DRIVE. THIS 6-ACRE PARCEL IS LOCATED IN THE NORTHEAST CORNER OF THE MARKEL SITE MAP. EVEN THOUGH THE AREA IS NOT OWNED BY BROOMFIELD, THE AREA IS BEING EVALUATED FROM A PLANNING PERSPECTIVE TO DETERMINE HOW THE AREA COULD BE COMBINED WITH THE LARGER MARKEL SITE IN THE FUTURE.
2. THIS PLAN IS FOR ILLUSTRATIVE PURPOSES ONLY. SPECIFIC SITE LOCATIONS FOR TRAIL ALIGNMENT, THE SHADE PAVILION, OPEN SPACE/TRAIL SIGNAGE, BENCHES, PET STATIONS, AND TRASH CANS WILL BE FIELD LOCATED DURING PROJECT CONSTRUCTION.
3. BENCHES TO BE A MIX OF SANDSTONE BOULDERS AND TRADITIONAL BENCHES.
4. EXISTING FENCES ON PROPERTY WILL BE EVALUATED AND EITHER REMOVED OR ENHANCED/REPLACED TO ADDRESS USER SAFETY.



PERSPECTIVE SKETCH OF MARKEL OPEN SPACE



View looking northwest across the Markel Open Space

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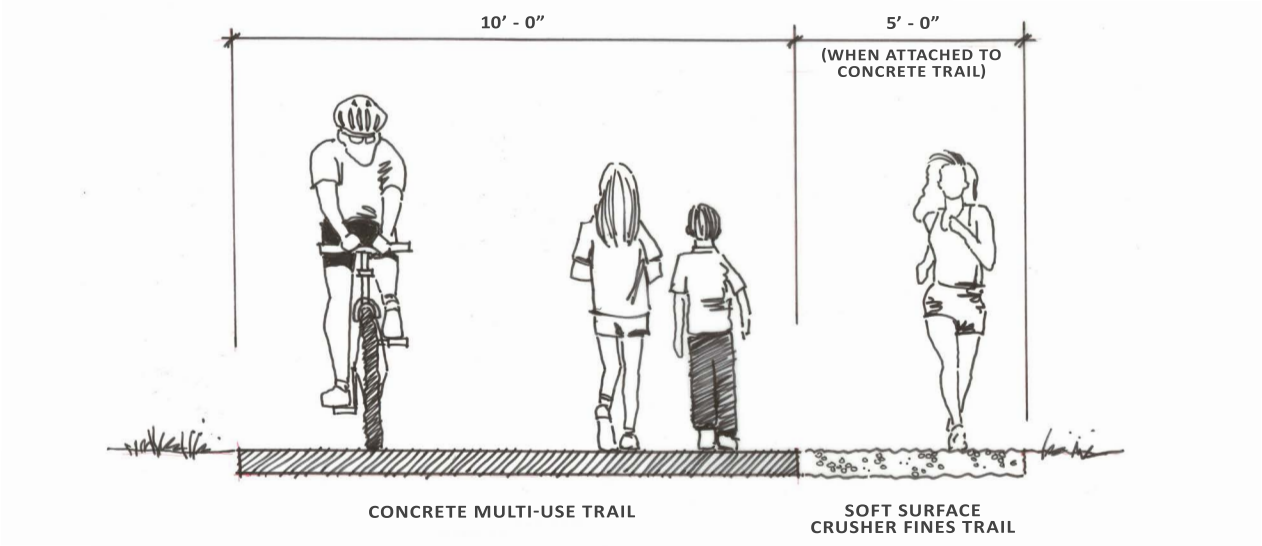
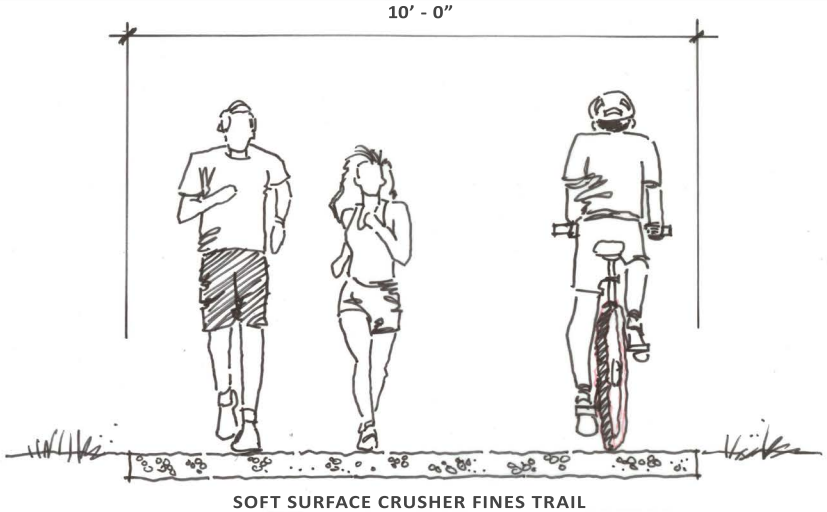
Connection to History and Culture

The history of the Wottge family and property are an important piece of Broomfield's story as an agricultural community starting in the late 1800's. Many farms in the community have transformed into residential and commercial properties, but the Wottge property is unique in that a very large area still remains open land to this day. The majority of the Open Space property will continue to be farmed, with the possibility of grassland restoration in the future, both of which maintain an open viewshed across the property.

Trails

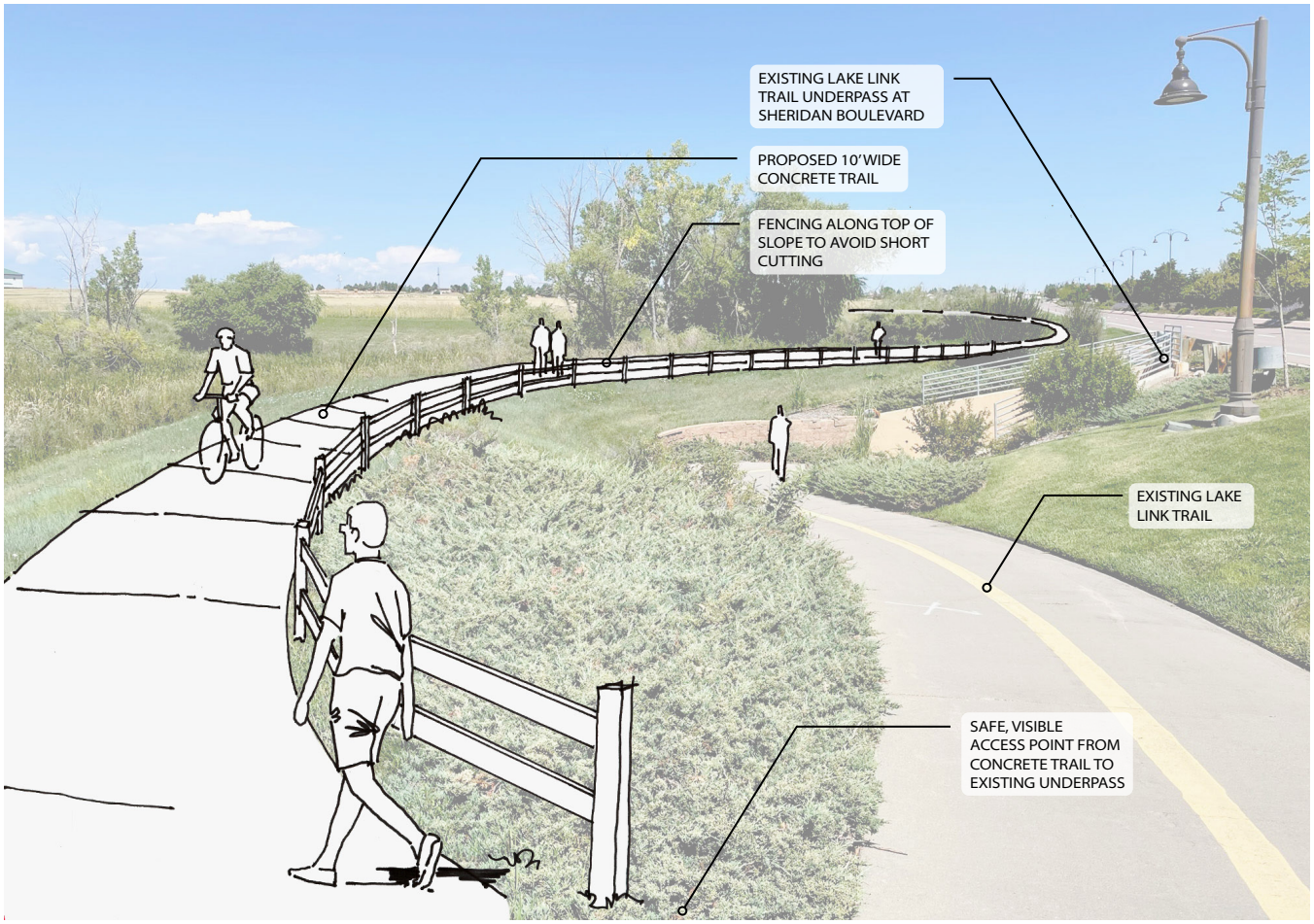
Multi-Use Trails - A large looped trail is the main improvement feature on the Wottge Open Space, allowing users to move through the property and connect to adjacent neighborhoods and trails. The soft-surface, main loop trail is 10' wide to allow for multiple users and comfortable two-way traffic. Most connecting trails to the loop are 8' wide, and are also a soft-surface material. On the south side of the Open Space, a 10' wide concrete trail is proposed to create an accessible trail connection, and a 5' wide soft-surface trail will run along side the concrete. Typically grades for all proposed trails should not exceed a 5% grade, and final designs should adhere to AASHTO Guide for the Development of Bicycle Facilities, OSPRT Master Plan, and Americans with Disabilities Act (ADA) requirements.





Trail Connections and Crossings - The Wottge Open Space serves as a critical connection for adjacent neighborhoods and trails. On the south side of the Open Space, a concrete trail is proposed to create an accessible connection to the Dillon Pointe neighborhood and future Broomfield Trail to the west, and the Lake Link Trail at the Sheridan underpass to the east. The trail connection to the existing underpass at Sheridan Boulevard follows the top of the pond embankment to the west, connecting to the existing trail while maintaining accessibility, sight distance (visibility) lines. Additional wood rail fencing would be provided for added safety and to avoid shortcutting.

Smaller trails connect to the Dillon Pointe neighborhood to the west, and to the pedestrian crossings proposed at Sheridan Boulevard. One northeastern trail provides a path to the intersection of Dillon Road and Sheridan Boulevard, where the Broomfield Trail connects to the Holy Family High School and Wildgrass neighborhood to the north. At this northeast intersection, open space fencing and signage are to be installed to provide a gateway into the Open Space. A possible future, soft-surface trail is shown at the southwest corner of the Open Space. This trail will not be built with this project. However, if a social trail develops and/or trail user demand warrants consideration of building this trail, a separate planning process with public engagement would occur to evaluate the trail concept.



Proposed concrete trail will connect the underpass at Sheridan Boulevard to the Wottge Open Space.

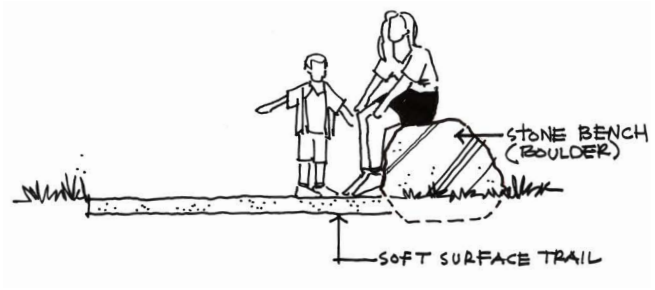
Proposed pedestrian refuge at median of Sheridan Blvd at Mountain Meadow Drive and Spyglass Drive to allow crossing to Wottge Open Space.

Proposed Mid-Block Ramp at Mountain Meadow Drive and Spyglass Drive - Potential pedestrian crossings at Sheridan Boulevard and Mountain Meadow Drive and Spyglass Drive will continue to be evaluated by Broomfield to determine if a HAWK Light or a Traffic signal is needed. If the HAWK Light is the preferred alternative, it would be located slightly north of Mountain Meadow Drive to provide a pedestrian connection across Sheridan Boulevard. At a minimum, access across Sheridan via ramps, a refuge and a trail connection to the Wottge Open Space is proposed at Mountain Meadow Drive. A similar treatment is planned at Spyglass Drive. Flashing crossing lights are not proposed for these areas given traffic engineering consultation.

Pedestrian HAWK Light at Industrial Lane and Shep's Crossing.

Passive Recreation

Amenities proposed at the Wottge Open Space include trails, benches, a small shade pavilion with two (2) picnic tables, and interpretive signage. All of these additions encourage passive visitor use where users casually move through the Open Space, with limited impact to the overall natural resources. Examples of passive recreation that might occur at the Wottge Open Space include walking, running/ jogging, wildlife viewing, picnicking, and bicycling.



Potential Trailhead Parking

A potential trailhead with parking may be considered at the Wottge Open Space property based on future demand and public feedback. The design would likely be similar to other trailhead parking areas that have around 20 spaces. This concept would be evaluated through a future planning project separate from this current planning process.

Gateway at northeast corner

When entering the Wottge Open Space from the northeast corner of the site, at the intersection of Sheridan Boulevard and West Dillon Road, visitors will pass through a unique gateway with boulders, native landscaping, and welcoming signage.

Natural Resource Restoration

Large, open areas, such as the field found at the Wottge Open Space, provide important habitat for local wildlife. As such, these open expanses should be maintained where appropriate on the property, and possibly over time, restored to a native grassland prairie system.

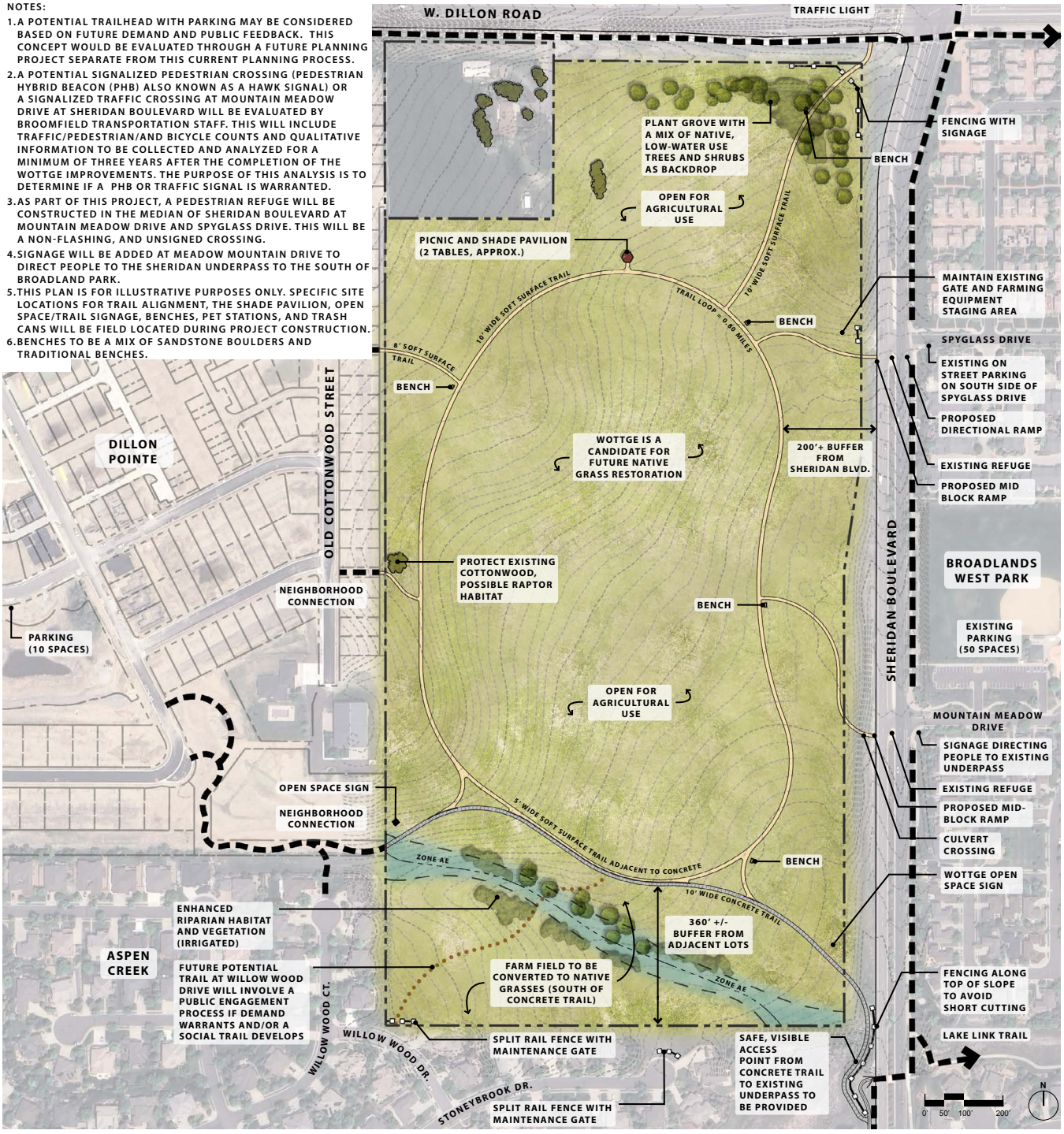
One drainage on the southern end of the property supplies water to this portion of the site, allowing for the opportunity to plant native forbs, shrubs, and trees to create a more diverse riparian habitat. In the more saturated locations along the drainage, there is the possibility to install wetland plants to also increase the diversity of this area. This riparian area will also provide a buffer between the Open Space and the houses to the south.

A proposed grove of trees and shrubs is located on the northern end of the Open Space, along Dillon Road, providing shade for visitors and habitat for wildlife.

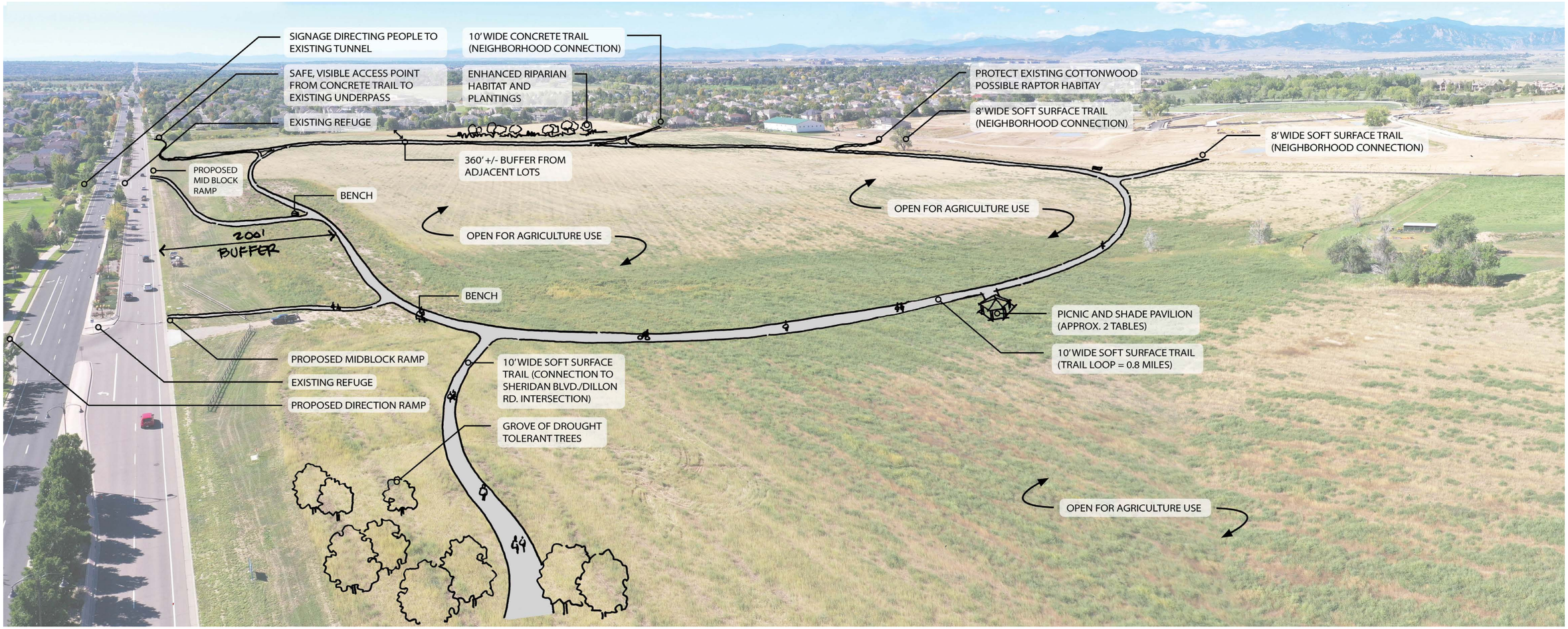
WOTTGE OPEN SPACE PLAN

NOTES:

1. A POTENTIAL TRAILHEAD WITH PARKING MAY BE CONSIDERED BASED ON FUTURE DEMAND AND PUBLIC FEEDBACK. THIS CONCEPT WOULD BE EVALUATED THROUGH A FUTURE PLANNING PROJECT SEPARATE FROM THIS CURRENT PLANNING PROCESS.
2. A POTENTIAL SIGNALIZED PEDESTRIAN CROSSING (PEDESTRIAN HYBRID BEACON (PHB) ALSO KNOWN AS A HAWK SIGNAL) OR A SIGNALIZED TRAFFIC CROSSING AT MOUNTAIN MEADOW DRIVE AT SHERIDAN BOULEVARD WILL BE EVALUATED BY BROOMFIELD TRANSPORTATION STAFF. THIS WILL INCLUDE TRAFFIC/PEDESTRIAN/AND BICYCLE COUNTS AND QUALITATIVE INFORMATION TO BE COLLECTED AND ANALYZED FOR A MINIMUM OF THREE YEARS AFTER THE COMPLETION OF THE WOTTGE IMPROVEMENTS. THE PURPOSE OF THIS ANALYSIS IS TO DETERMINE IF A PHB OR TRAFFIC SIGNAL IS WARRANTED.
3. AS PART OF THIS PROJECT, A PEDESTRIAN REFUGE WILL BE CONSTRUCTED IN THE MEDIAN OF SHERIDAN BOULEVARD AT MOUNTAIN MEADOW DRIVE AND SPYGLASS DRIVE. THIS WILL BE A NON-FLASHING, AND UNSIGNED CROSSING.
4. SIGNAGE WILL BE ADDED AT MEADOW MOUNTAIN DRIVE TO DIRECT PEOPLE TO THE SHERIDAN UNDERPASS TO THE SOUTH OF BROADLAND PARK.
5. THIS PLAN IS FOR ILLUSTRATIVE PURPOSES ONLY. SPECIFIC SITE LOCATIONS FOR TRAIL ALIGNMENT, THE SHADE PAVILION, OPEN SPACE/TRAIL SIGNAGE, BENCHES, PET STATIONS, AND TRASH CANS WILL BE FIELD LOCATED DURING PROJECT CONSTRUCTION.
6. BENCHES TO BE A MIX OF SANDSTONE BOULDERS AND TRADITIONAL BENCHES.



PERSPECTIVE SKETCH OF WOTTGE OPEN SPACE



View looking southwest across the Wottge Open Space

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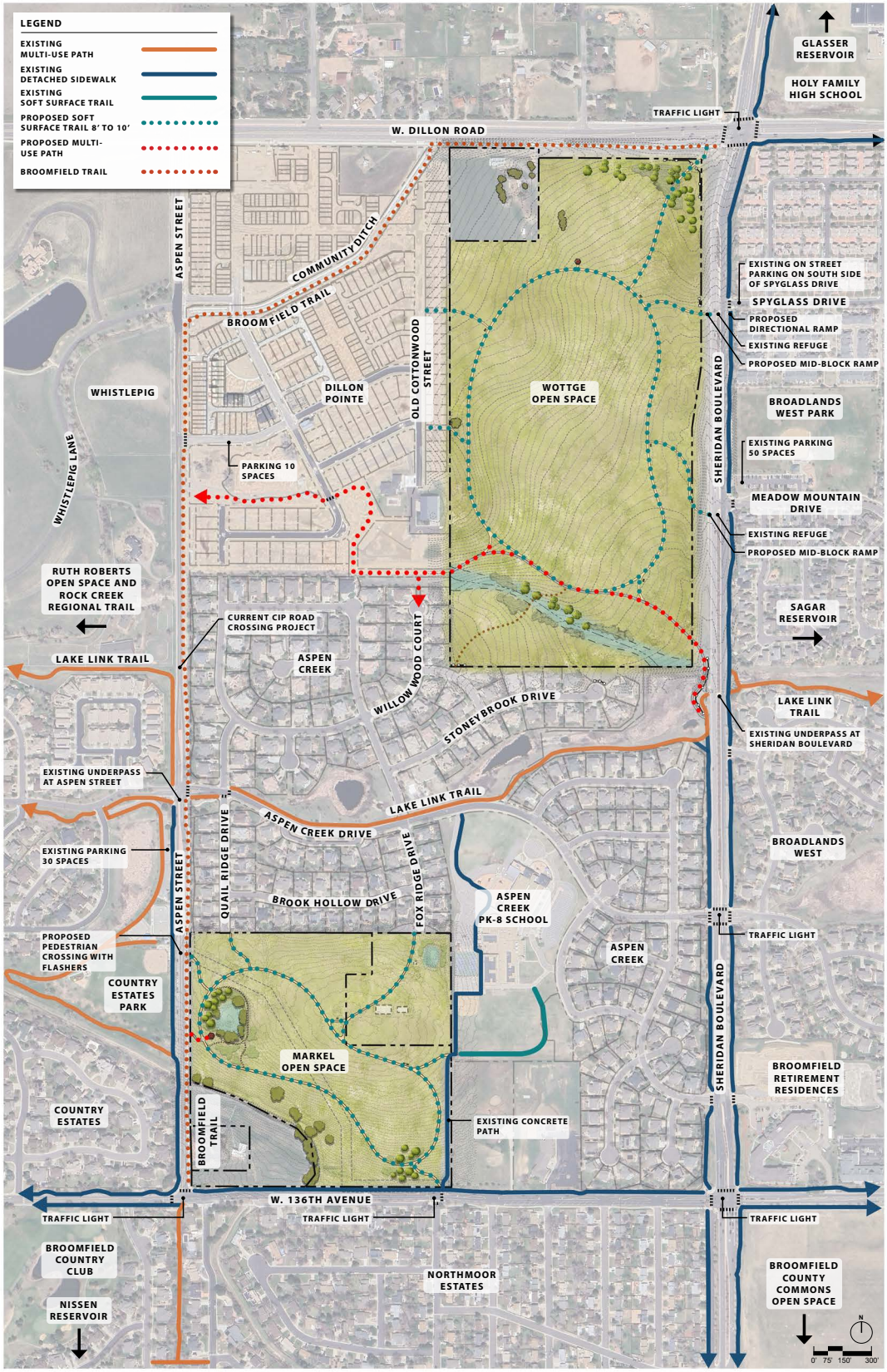
OVERALL OPEN SPACE PLANS



ESTIMATE OF PROBABLE COST

Conceptual level cost estimates have been prepared for both the Wottge and Markel Open Spaces. The estimated cost for improvements to the Wottge Open Space is $1,250,000, encompassing all on-site enhancements and the pedestrian crossing improvements at Sheridan Parkway, as indicated on the plan. It's important to note that this estimate does not include the potential HAWK crossing or any other signal improvements.

For the Markel Open Space, the estimated cost for improvements is $800,000, covering all on-site enhancements and the construction of a pedestrian crossing at Aspen Street, as specified in the plan. In total, the combined cost for both projects is projected to be $2,150,000. These cost projections encompass both future detailed design and construction expenses. This cost also includes the current planning costs.

The Wottge and Markel Open Space projects aim to enhance habitat and natural beauty by using low-water use native plants requiring minimal irrigation. In Wottge, this covers 10.42 acres, including riparian and native planting. In Markel, it's 0.62 acres, comprising riparian plantings and native trees. Broomfield Water License Fees will be based on actual water usage during the detailed design phase.

The 2023 Revised Amendment 1 Capital Improvement Program (CIP) budget has allocated $2,220,006 for these two projects. The projects can be executed either concurrently or independently, offering flexibility in implementation. Additionally, there is room for phasing the work scope, allowing for the possibility of completing the trails and landscape improvements separately from the construction of the pavilions.

The cost estimates were prepared in September 2023. Given the current trend of rapid inflation in construction prices, funding adequacy may change in the near future. In this case, phasing of improvements would be considered to allow for the completion of the two projects, and/or a request for additional monies from the Open Space Fund could be made.

It is also important to note that volunteer projects for site clean-ups, pollinator planting days, installation of habitat improvements such as bluebird or bee boxes will also be a part of the approach to enhancing these two open space properties.

IMPLEMENTATION PLAN

Below are recommendations for next steps for the implementation of the Conceptual Site Plans for Markel and Wottge Open Spaces:

1. Complete design and construction documentation for the proposed improvements.

2. Continue to manage weeds on site based on the Broomfield Noxious Weed Management Plan, with particular focus on locations noted in the Natural Resources Assessment Report. Additional treatment needs to be coordinated with Open Space maintenance staff.

3. Traffic study for proposed pedestrian crossing improvements at both properties to be completed by Broomfield and information coordinated with final designs.

4. Develop an interpretive signage program for the various signage proposed on both Open Space properties.

Markel Pond Clean-up Volunteer Event held on August 29, 2023 with the Broomfield Community Foundation Youth Advisory Council

APPENDIX 1 - PUBLIC OUTREACH SUMMARY

Markel and Wottge Public Planning Process Report:

Procedures and Results of Public Outreach

Life Cycle of Public Engagement:

Phase 1: Initial Site Assessment

- Site Inventories Conducted
- Natural Resources Assessed and Reports Created

Phase 2: Initial Public Outreach

- Broomfield Voice Page Conducted, contains open Q&A box that project team publicly responded to
- Initial Public Survey (Oct 15 -Nov.14)
- Two Pop-up Booths on Nov. 12
- Presented Results from first outreach of Phase 2 at Dec. 8 Open Space and Trails Citizen Advisory Committee, more citizen comments and response at meeting

Phase 3: First Iteration of Feedback:

- Phase 2 feedback analyzed and incorporated into first edition of Alternative Designs, 2 potential designs for each property are created
- Second Survey created that allows residents to comment on each aspect of each design, with a section for open comments for each property.
- Open House: Results from Phase 2 Outreach and the 4 alternative designs are presented at an Open House at Aspen Creek Elementary School on February 16. (80 attendees). The 2nd Survey was launched on this date so residents could provide comment on the 4 alternative designs.
- Second Survey is available for public comment in person at the Feb 16 Open House and remains open through March 5. Received 159 responses.
- Project Staff continue to meet in person with residents to respond to their concerns and questions and incorporate their feedback into the designs, as requested by residents.

Phase 4: Second Iteration of Feedback:

- Open House, 2nd Survey responses, and other comments received during phase 3 are analyzed and incorporated into the draft final designs for each property.
- Proposed Changes to the Final Designs presented at the June 22 Open Space and Trails Citizen Advisory Committee and made available to the public on the Broomfield Voice Page.
- A public engagement event to present the DRAFT final plans presented at Informational Booths was held on July 29 2023 at Country Estates Park and Broadlands West Park from 9:30 a.m. - 11:30 a.m.

Phase 5: Final Design

- The feedback and analysis conducted throughout all four first phases are incorporated into the final designs.
- The Draft Final Designs are presented at the September 28, 2023 Open Space and Trails Citizen Advisory Committee and made available to the public on the Broomfield Voice Page.
- The project team then creates a project timeline to begin work on the properties.

Summary of Feedback Received from the Initial Survey:

The initial survey for the Markel and Wottge properties was made available at www.broomfieldvoice.com/markelwottgeplan from Oct.15-Nov. 14 2022. The survey received 450 total responses, with 442 of those being Broomfield residents. The survey consisted of 6 multiple choice questions and 1 open ended response. 172 respondents left open comments.

Initial Survey Results:

Activities:

- Top two activities enjoyed in Broomfield Open Space are Walking (90%) and Mountain Views (83%).
- Over half of the respondents also indicated that they enjoy Hiking, Wildlife Viewing, and Biking.

Incorporation into Initial Plans: Trails were proposed on all four plans, with 2 trail alternatives for each property, one with a loop trail (maximizing potential for walking), and one with a shorter one way trail (minimizes total amount of trails while still allowing walking through the property.

Amenities:

- The most requested additional amenity desired in Open Spaces:
    - Shade Trees (65%) with many open ended comments requesting the preservation of existing trees as well as the planting of new trees.
- 40% of respondents also indicated that they would like shade structures, though 83% of respondents desired to maintain mountain views
- Many open ended comments spoke against building structures, so mountain views should be considered with any shade structure development.
- 37% desired habitat improvements and 36% desired wildlife viewing areas
    - 54% of respondents indicated they enjoy viewing wildlife
    - Many open ended comments mentioned seeing wildlife in these areas and a strong desire to minimize development to retain the habitat and wildlife viewing.

Incorporation into Initial Plans: The natural resources assessment conducted in Phase 1 of the project was analyzed and locations for trees, shrubs, and other vegetation were identified and proposed across all four initial plans. A combination of shade structures (a larger pavilion or fewer smaller shade structures) were proposed between the plans and a response on the use and location of shade pavilions was requested in the second survey. All proposed shade structures were positioned such that they would not interfere with mountain views. The Natural Resources report created in Phase 1 assessed all wildlife observed on the property as well as any wildlife that has the potential to be found on the property. Using this data, the natural resources report proposed opportunities for habitat enhancements for this wildlife which were presented across all four plans. The Raptor Management Plan, a separate project, also proposes habitat improvements for both properties for raptor populations.

Environment:

- The majority (75%) of open ended comments indicated that they would like the spaces to be as natural as possible, with references to:
    - maintenance of mountain views,
    - minimization of structures,
    - minimization of development,
    - planting of trees and improvement of wildlife habitat, and
    - preservation of the Markel pond.

Incorporation into Initial Plans: All four plans minimized structures, maintained mountain views, and proposed habitat improves. For each site, 2 alternative plans were proposed: one with a loop trail (more total trail mileage and changes to the land), and one with a shorter distance of trails. All proposed changes were developed in accordance with the definition of Open Space as defined by the Broomfield Draft Open Space, Parks, Recreation and Trails Master Plan: "Open Space means a parcel of land intentionally protected from development and/or set aside for unstructured, passive recreation and the appreciation of natural surroundings. Open Space may contain but is not limited to trailheads and trails, waterbodies, wetlands, wildlife viewing areas, agricultural lands, fishing facilities, and other facilities that support uses compatible with site resources and conditions."

Trails:

- 72% of survey respondents use Broomfield trails at least once a week
- Comments related to trails:
    - trails should be as natural as possible (soft surface and/or dirt single track),
    - trails should not cut through the center of the property to maintain as much open space as possible,
    - some comments against having trails run alongside their properties or behind their fences (also noted at pop-ups).
- 2022 OSPRT Plan Refresh, 2019 Bicycle Pedestrian Assessment, 2018 Community Survey, and 2005 OSPRT Master Plan generally support the creation of trails and an integrated trail system throughout Broomfield.

Incorporation into Initial Plans: All four plans proposed trails in accordance with the definition of Open Space as defined by the Broomfield Comprehensive Plan of 2016 (see above). For each site, 2 alternative plans were proposed: one with a loop trail (more total trail mileage and changes to the land), and one with a shorter distance of trails. All proposals included soft surface materials when possible (the southern portion of a trail on the Wottge property necessitates concrete, but a soft surface shoulder to this concrete trail was proposed on both plans. Initial plans of Markel included a concrete trail by the FRICO ditch (required by FRICO) and this trail was shifted away from the ditch and the concrete trail removed from the design proposals due to these received comments. Trail widths were minimized as much as possible, in accordance to the City and County of Broomfield Trail

standard for minimum trail widths. All trails that were slated to be near properties were shifted to have be at least 100 ft away from adjacent property owners, with greater distance given when possible.

Trailhead Parking at Wottge:

- Of the 172 open-ended comments, 42 specifically referenced parking.
    - Of these 42 open-ended comments, 39 comments or 23% of those that provided open-ended comments are against developing a parking lot.
    - These 39 open ended comments represent 9% of the total number of survey respondents.
- 152 residents (34% of the total survey respondents) said that they desire potential trailhead parking as an amenity, with many indicating that they think this would best be placed on the Wottge property (Question 6).

- Other comments concerning parking received:
    - Concerns about traffic congestion along Sheridan,
    - Vehicular and pedestrian safety concerns with creating a parking lot,
    - Desire to retain as much open space for recreation and wildlife as possible,
    - Natural surface parking lot preferred over hard surface parking lot,
    - Comments from pop-up events: safety concerns about creating a "hang-out" destination in a parking lot.
    - Comments from pop-up events: Safety at street crossings.
- There were many comments that referenced utilizing surrounding parking lots.

Incorporation into Initial Plans: Due to the initial feedback received against having a parking lot and the concern that that would increase traffic congestion, no parking lots were proposed on the alternative plans. Traffic assessments have been conducted due to this feedback and it has been determined that the traffic volume does not meet engineering warrants that would call for a new stoplight at this time. On-going traffic assessments and pedestrian assessment will continue to be conducted. Given that 152 residents (34% of survey respondents) were in favor of a parking lot, all plans included the potential to place a parking lot on the Wottge Property at a future time if it is deemed necessary. Other comments received concerning parking included the desire for the lot to be comprised of a natural, soft-surface material and for the size of the lot to be minimized, which will both be considerations if the parking lot is deemed necessary in the future. Signage will be placed near surrounding parking lots that direct them to the properties, allowing surrounding existing parking lots to be utilized for property access.

Summary of Feedback Received from the Second Survey:

The second survey for the Markel and Wottge properties was presented along with the initial alternative designs at an Open House held on February 16, 2023 at Aspen Creek Elementary School. These design alternatives all incorporated feedback from the initial survey and outreach conducted. The second survey presented two alternatives for each property (four total designs), with various elements of the amenities that residents indicated that they desired on the initial survey proposed on both properties. Residents were then asked if they support or do not support the proposed elements of each design. Over 80 Broomfield residents attended the Open House and took the survey at that time. The second survey was also made available www.broomfieldvoice.com/markelwottgeplan from February 16 (beginning at the Open House) until March 5, 2023. It received 159 responses, though not all responses were complete.

Summary of Feedback received from Wottge Alternative Designs:
The Loop trail (Design #1) was strongly favored by the survey respondents. Nearly all elements across both designs were supported, including a Gateway feature (boulders, potential art feature, signage), the installation of Picnic/Shade/Nature Education Pavilions, the use of Low-water use pollinator plantings for habitat enhancement, the installation of Benches, the installation of Interpretive Signs for nature, history and agricultural information. Residents were also asked if they supported a plan to review the on-site parking if and when that is necessary in the future through a separate public engagement process, of which the majority of respondents were not in favor.

Summary of Feedback received from Markel Alternative Designs:
The Loop trail (Design #4) was strongly favored by the survey respondents. All proposed elements across both designs were supported, including the installation of a Gateway feature (boulders and signage, Low-water use pollinator plantings for habitat enhancement, Wildlife Viewing/Education/Fishing deck at pond, the installation of Interpretive signs for nature, history and agricultural information, and a Pedestrian crossing with flashers across Aspen Street. The pedestrian crossing question, while residents were in favor of, did receive the least amount of unanimity, with residents stating concerns about pedestrian and traffic safety in the open comments section.

<u>Incorporation into Draft Final Plans:</u> The Loop trails (#1 for Wottge and #4 for Markel) were selected as the overall trail layout for the properties. All proposed elements, including the gateway features, pollinator plantings, benches, interpretive signage, and a potential deck at the Markel pond are incorporated into Draft final plans. The specific location of each element has been adjusted in the final plans with consideration to the comments received from neighboring property owners through meetings between the property owners and project staff, as requested by the property owners, listed on page 28 above of the Markel and Wottge Plan Report.

Summary of Feedback Received and changes incorporated from Phase 4:

The Open House, Second Survey responses, and other comments received during Phase 3 were analyzed and incorporated into the draft final designs. The Results from the Phase 3 second public survey and Open House, and proposed changes to the Final Designs, were presented at the June 22, 2023 Open Space and Trails Citizen Advisory Committee. Presentation slides from the meeting were made available to the public on the Broomfield Voice website.

Additional citizen feedback from the OSTAC meeting included:

- Ensure safe access to the Open Spaces
- Maintaining mountain views
- Creating connections to existing trails and underpasses is important
- Address safety improvements to the Sheridan Blvd underpass

A second public Pop-Up Event on July 29, 2023, held at Country Estates Park and Broadlands West Park from 9:30 a.m. - 11:30 a.m., presented the DRAFT final plans to the public for review and feedback.

Feedback received at the Pop-Up Event:

- Overall, attendees liked the presented Plans
- Attendees felt like the process has been very transparent and feel they have been able to voice their comments and be heard by project staff
- Attendees appreciated that their suggestions were taken into consideration and added to the Plans

Summary of Requested Changes to Plans from July 29, 2023 Pop-Up:

- Markel Open Space:
    - Speed flashers with happy-sad face proposed by proposed new pedestrian crossing on Aspen Street
    - Desire for additional wayfinding from Markel to Wottge properties; Preference from neighbors to direct circulation along Aspen Street and not through the neighborhoods
    - Pond enhancements (algae reduction, trash pick up, etc.)
    - Comments on the Broomfield Voice project page requested removal of the eastern shade pavilion

- Wottge Open Space:
    - At the point where the crusher fines trail aligns with the 10-foot concrete trail, make the crusher fines trail 5 feet wide.
    - Move the North South Trail along Sheridan Blvd. further east to maintain about a 200-foot buffer from Sheridan's asphalt.
    - Push the trail that runs east west with the picnic pavilion farther to the north parallel to the most southern trees on the L-Shaped Wottge property.

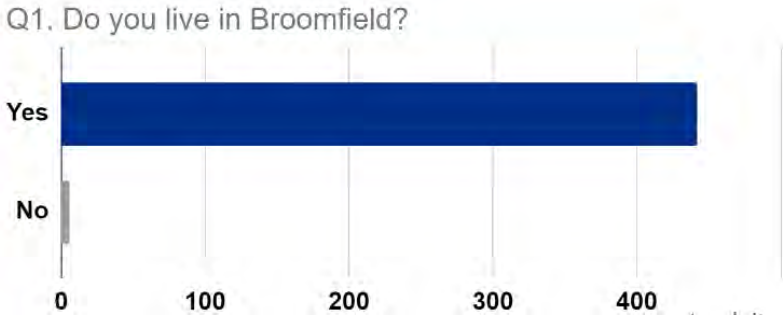
- Pull the 10-foot wide trail that connects from the .85 mile trail to Dillon Road to the west.
- Add a bench along the trail by the trees at the northeast corner of the site.
- Trail in southwest corner of Plan is to be marked "Future Potential Trail connection if demand warrants and/or a social trail develops".

Incorporation into Final Open Space Plans:

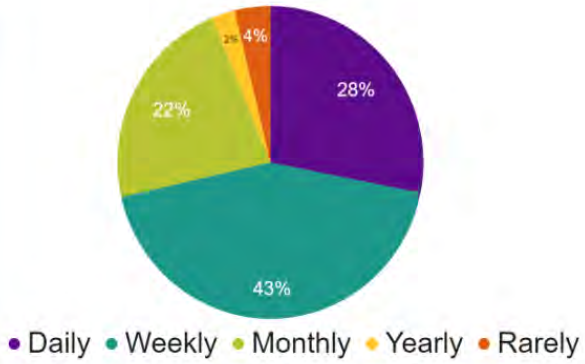
All of the requested changes to the plans from the second Pop-Up event and OSTAC Meeting were incorporated into the Final Open Space Plans for each property.

Public Process Planning Report - Appendix I: Initial Survey Data Charts

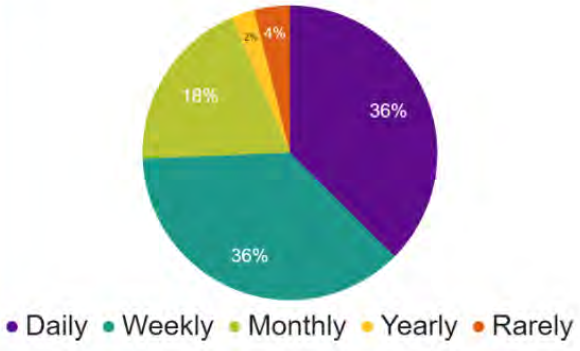
Q1. Do you live in Broomfield?	
Yes	442
No	6



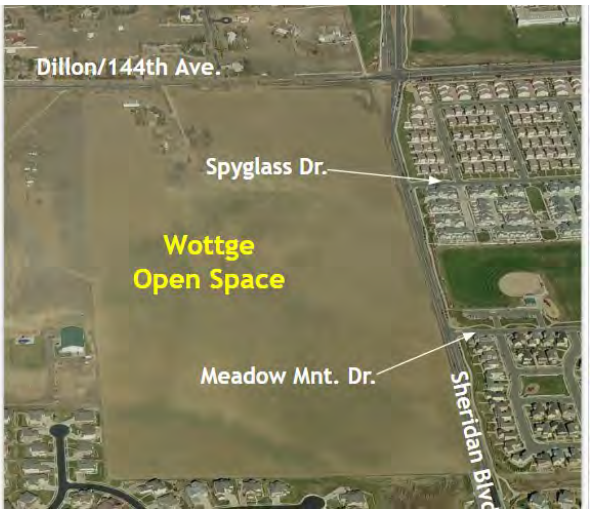
Q2. How often do you visit Broomfield Open Spaces?		% of survey respondents
Daily	124	28%
Weekly	194	43%
Monthly	100	22%
Yearly	11	2%
Rarely	17	4%



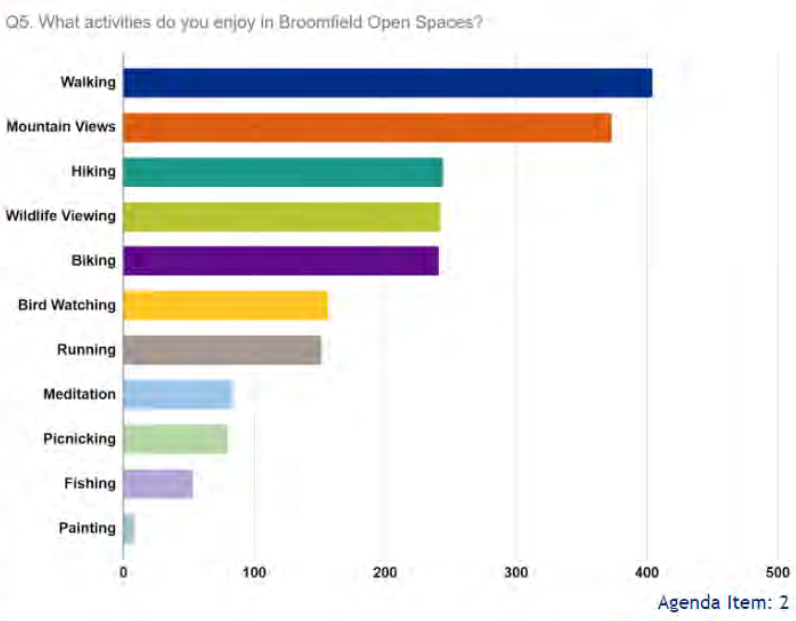
Q3. How often do you use Broomfield Trails?		% of survey respondents
Daily	162	36%
Weekly	160	36%
Monthly	83	18%
Yearly	11	2%
Rarely	17	4%



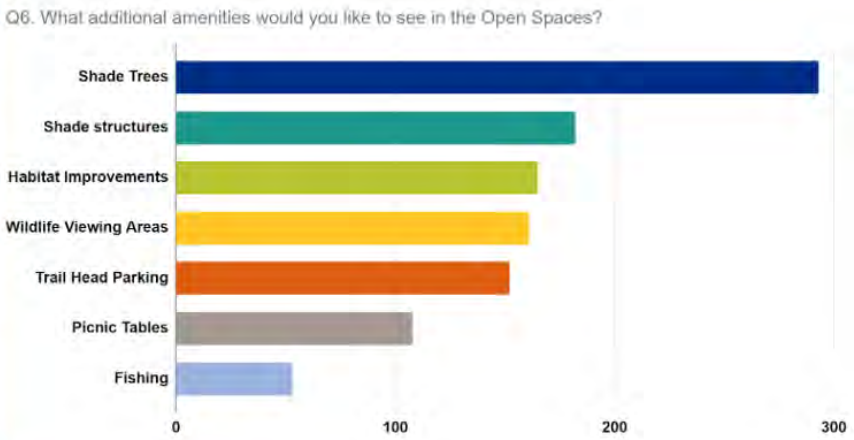
Q4. A trailhead is planned at Sheridan Blvd. near Spyglass Drive. The trailhead will provide parking for Open Space users. Do you have any concerns with this location?		% of survey respondents
Yes	83	18%
No	301	67%
Additional Feedback	50	11%



Q5. What activities do you enjoy in Broomfield Open Spaces?		% of survey respondents
Walking	404	90%
Mountain Views	373	83%
Hiking	244	54%
Wildlife Viewing	242	54%
Biking	241	54%
Bird Watching	156	35%
Running	151	34%
Meditation	83	18%
Picnicking	80	18%
Fishing	53	12%
Painting	8	2%



Q6. What additional amenities would you like to see in the Open Spaces?		% of survey respondents
Shade Trees	293	65%
Shade structures	182	40%
Habitat Improvements	165	37%
Wildlife Viewing Areas	161	36%
Trailhead Parking	152	34%
Picnic Tables	108	24%
Fishing	53	12%



Q7. Information from Open Comments			
172 respondents left open comments in the survey. These comments were placed into the following categories (note that longer comments sometimes mentioned multiple categories).			
Category	Total	% of total respondents	% of those that left comments
Art	1	0%	1%
Benches	2	0%	1%
Bike park	1	0%	1%
Natural surface parking lot	1	0%	1%
Disc golf	1	0%	1%
Dog park	1	0%	1%
Wildlife Habitat	14	3%	8%
Increase access	7	2%	4%
Natural*	127	28%	74%
No parking / Trailhead**	39	9%	23%
Pond	4	1%	2%
Restrooms	2	0%	1%
Safety***	3	1%	2%
Singletrack	1	0%	1%
Traffic congestion	7	2%	4%
Add Trails	10	2%	6%
Wildfire Mitigation	2	0%	1%
Total	223		

Question: Are there things about Markel and/or Wottge Open Spaces that you would not want to be changed?

* Natural included comments that mentioned at least one of the following: 1) maintain mountain views, 2) do not develop 3) do not add structures 4) and maintain as open space

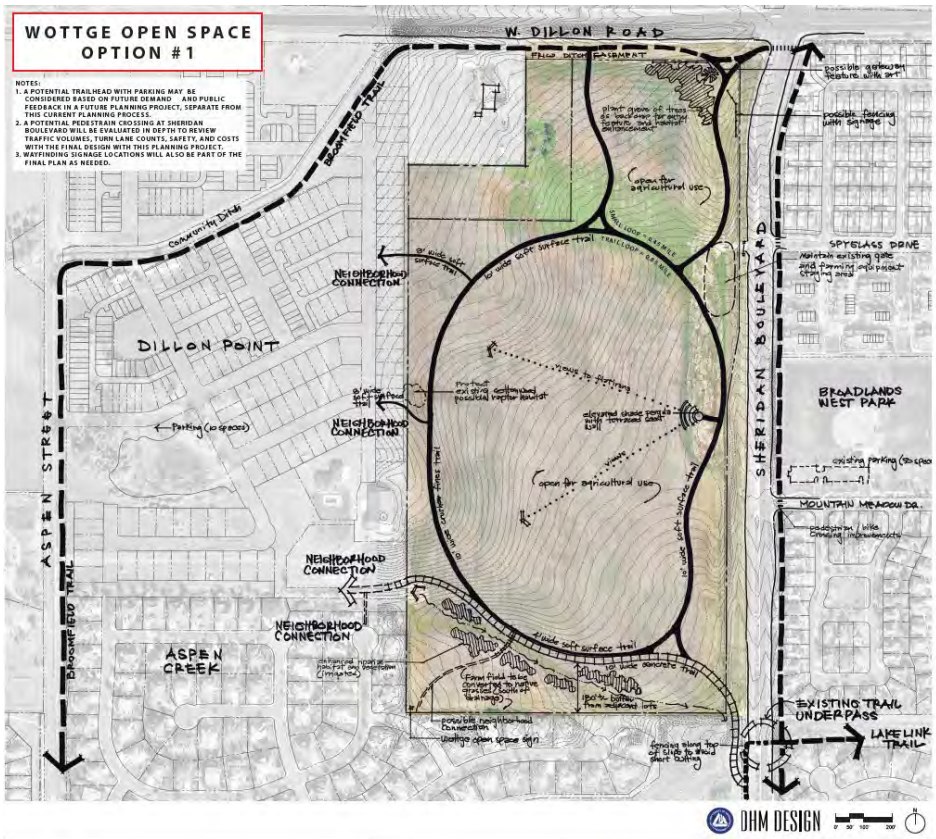
** No parking / trailhead comments were those that specifically stated that they do not want a parking lot and/or trailhead. Please also see "Natural" which specifies a desire for no development generally

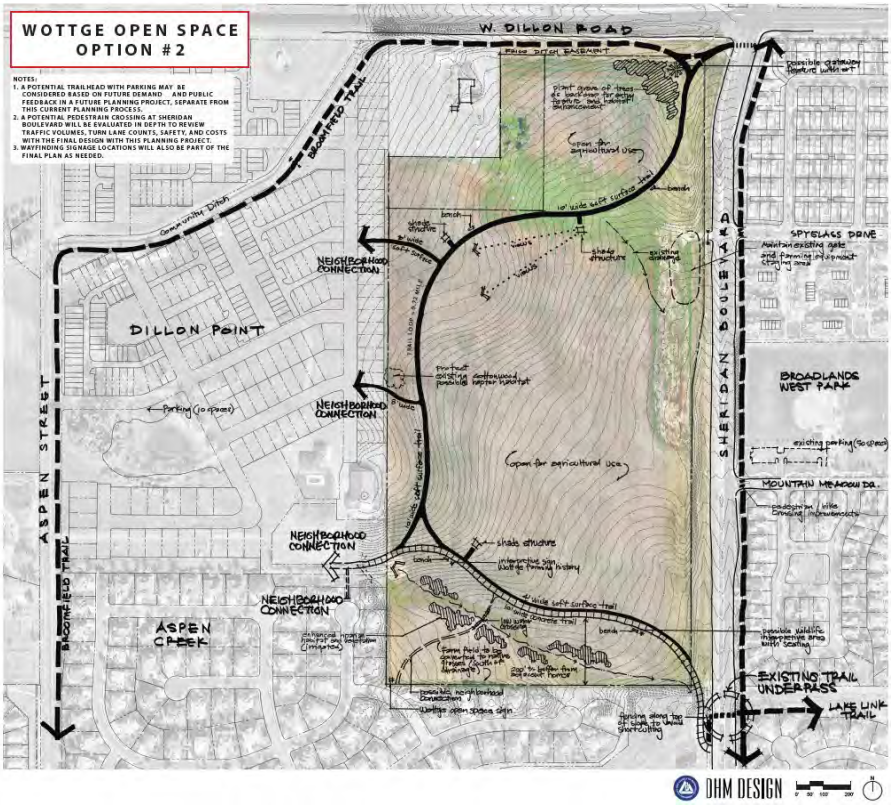
*** Safety included concerns about increasing public access, homelessness, and the desire to not have the trails run adjacent to homes

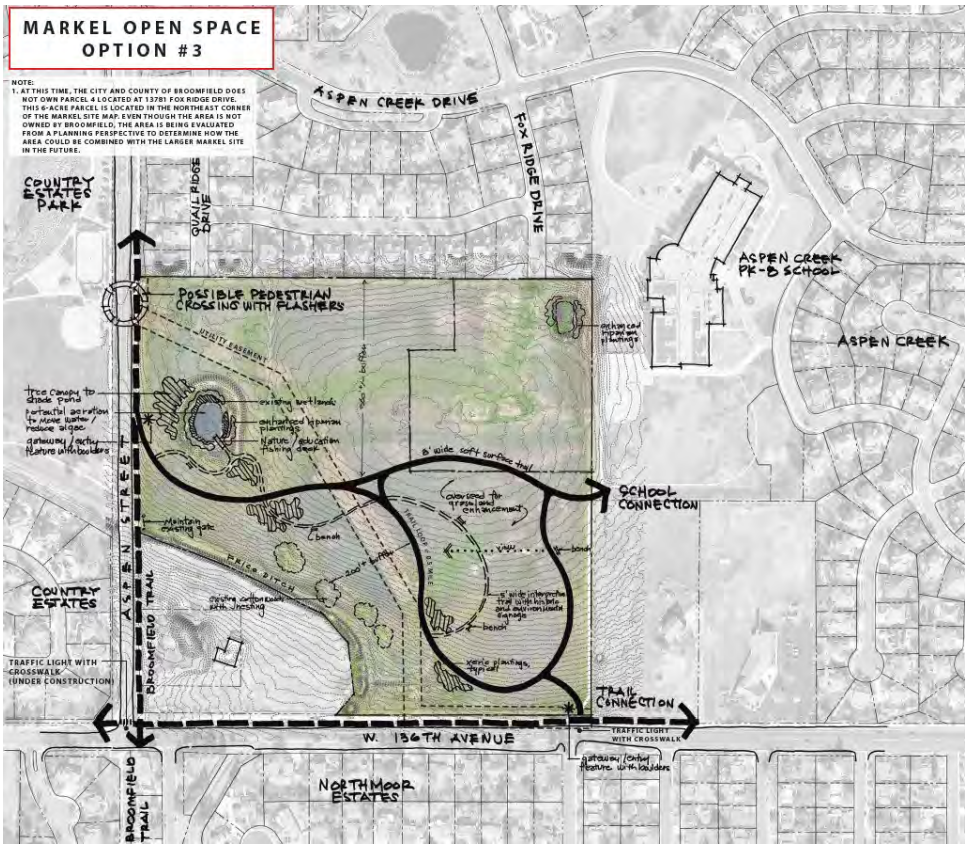
Age

Public Process Planning Report - Appendix II: Alternative Plans

Presented at the Feb 16, 2023 Open House






MARKEL OPEN SPACE
OPTION #3
NOTE:
1. AT THIS TIME, THE CITY AND COUNTY OF BROOMFIELD DOES NOT OWN PARCEL 4 LOCATED AT 13781 FOX RIDGE DRIVE. THIS 6-ACRE PARCEL IS LOCATED IN THE NORTHEAST CORNER OF THE MARKEL SITE MAP. EVEN THOUGH THE AREA IS NOT OWNED BY BROOMFIELD, THE AREA IS BEING EVALUATED FROM A PLANNING PERSPECTIVE TO DETERMINE HOW THE AREA COULD BE COMBINED WITH THE LARGER MARKEL SITE IN THE FUTURE.
ASPEN CREEK DRIVE
FOX RIDGE DRIVE
QUAIL RIDGE DRIVE
COUNTRY ESTATES PARK
POSSIBLE PEDESTRIAN CROSSING WITH FLASHERS
ASPEN CREEK PK-8 SCHOOL
ASPEN CREEK
SCHOOL CONNECTION
TRAIL CONNECTION
ASPEN STREET
BROOMFIELD TRAIL
COUNTRY ESTATES
TRAFFIC LIGHT WITH CROSSWALK (UNDER CONSTRUCTION)
W. 136TH AVENUE
NORTHMOOR ESTATES


MARKEL OPEN SPACE
OPTION #4
NOTE:
1. AT THIS TIME, THE CITY AND COUNTY OF BROOMFIELD DOES NOT OWN PARCEL 4 LOCATED AT 13781 FOX RIDGE DRIVE. THIS 6-ACRE PARCEL IS LOCATED IN THE NORTHEAST CORNER OF THE MARKEL SITE MAP. EVEN THOUGH THE AREA IS NOT OWNED BY BROOMFIELD, THE AREA IS BEING EVALUATED FROM A PLANNING PERSPECTIVE TO DETERMINE HOW THE AREA COULD BE COMBINED WITH THE LARGER MARKEL SITE IN THE FUTURE.
ASPEN CREEK DRIVE
FOX RIDGE DRIVE
QUAIL RIDGE DRIVE
COUNTRY ESTATES PARK
NEIGHBORHOOD CONNECTION
NEIGHBORHOOD CONNECTION
POSSIBLE PEDESTRIAN CROSSING W/FLASHERS
ASPEN CREEK PK-8 SCHOOL
ASPEN CREEK
SCHOOL CONNECTION
ASPEN STREET
BROOMFIELD TRAIL
COUNTRY ESTATES
TRAFFIC LIGHT WITH CROSSWALK (UNDER CONSTRUCTION)
W. 136TH AVENUE
EXISTING TRAFFIC SIGNAL
NORTHMOOR ESTATES
DHM DESIGN

Public Process Planning Report - Appendix III: Second Survey

Survey open from Feb 15 – Mar 5, 2023

WOTTGE

1

2

1. What design do you most support? (select one)
   - ❑ Design 1 ❑ Design 2
2. What elements do you <u>support</u> in the design that you selected?
   - ❑ Overall trail layout
   - ❑ Gateway feature (boulders, potential art feature, signage)
   - ❑ Picnic/Shade/Nature Education Pavilions
   - ❑ Low-water use pollinator plantings for habitat enhancement
   - ❑ Benches
   - ❑ Interpretive Signs for nature, history and agricultural information
   - ❑ Plan to review the on-site parking if and when that is necessary in the future through a separate public engagement process
3. What elements do you <u>NOT support</u> about the design that you selected?
   - ❑ Overall trail layout
   - ❑ Gateway feature (boulders, potential art feature, signage)
   - ❑ Picnic/Shade/Nature Education Pavilions
   - ❑ Low-water use pollinator plantings for habitat enhancement
   - ❑ Benches
   - ❑ Interpretive Signs for nature, history and agricultural information
   - ❑ Plan to review the on-site parking if and when that is necessary in the future through a separate public engagement process
4. Do you have any additional comments?
   - ❑ No
   - ❑ Yes: _____

MARKEL

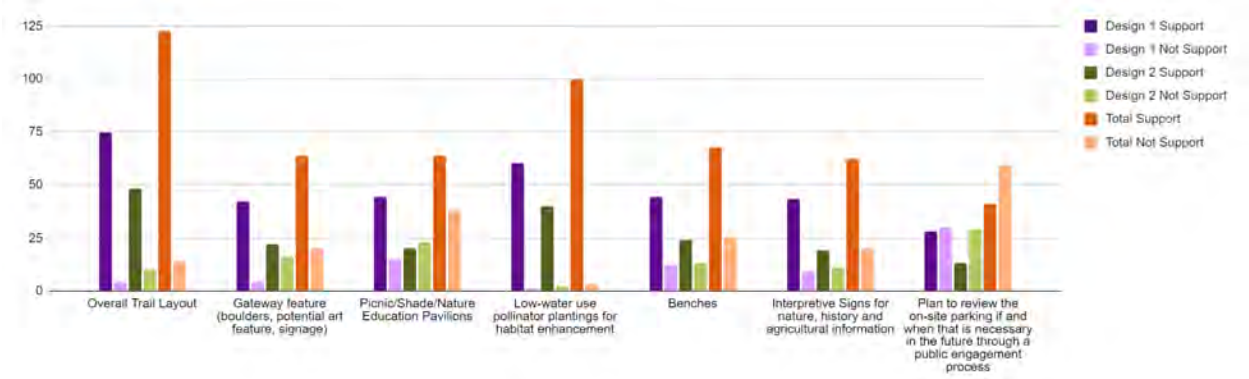
3

4

5. What design do you most support? (select one)
   - ❑ Design 3 ❑ Design 4
6. What elements do you <u>support</u> in the design that you selected?
   - ❑ Overall trail layout
   - ❑ Gateway feature (boulders and signage)
   - ❑ Low-water use pollinator plantings for habitat enhancement
   - ❑ Wildlife Viewing/Education/Fishing deck at pond
   - ❑ Benches
   - ❑ Interpretive signs for nature, history and agricultural information
   - ❑ Pedestrian crossing with flashers across Aspen Street
7. What elements do you <u>NOT support</u> about the design that you selected?
   - ❑ Overall trail layout
   - ❑ Gateway feature (boulders and signage)
   - ❑ Low-water use pollinator plantings for habitat enhancement
   - ❑ Wildlife Viewing/Education/Fishing deck at pond
   - ❑ Benches
   - ❑ Interpretive signs for nature, history and agricultural information
   - ❑ Pedestrian crossing with flashers across Aspen St
8. Do you have any additional comments?
   - ❑ No
   - ❑ Yes: _____

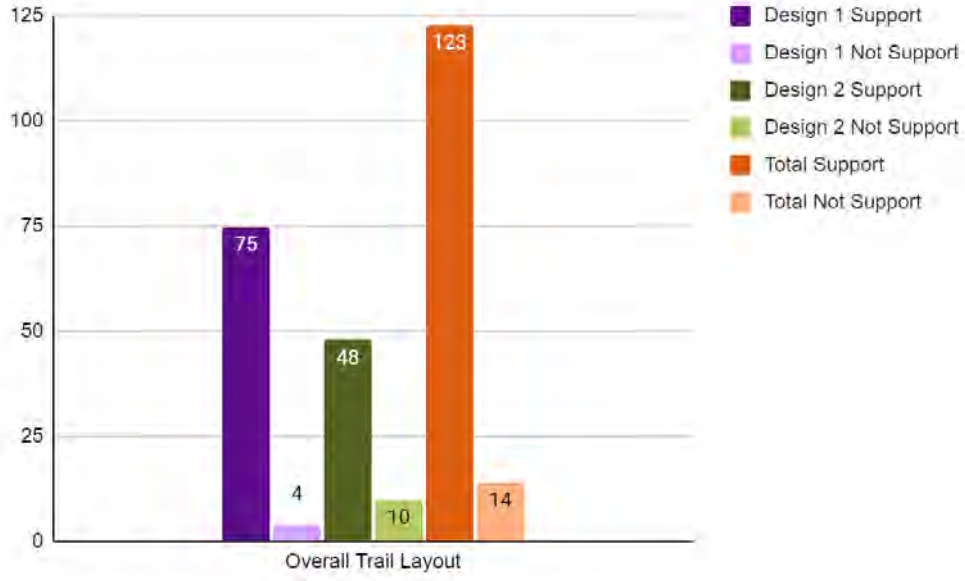
Public Process Planning Report –
Appendix IV: Second Survey Data Charts
Presented at the June 22, 2023 Open Space and Trails Citizen Advisory Committee Meeting

Full Results: Wottge Property, Second Survey

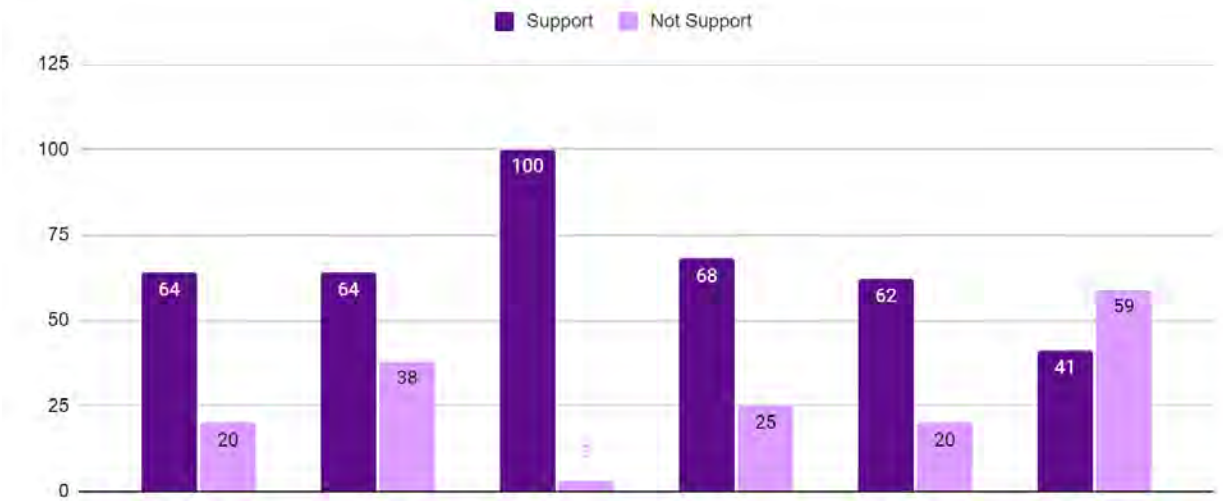


Loop trail (#1) is favored; All proposed elements were strongly favored (except for parking review)

Survey Question 1: Wottge, Overall Trail Layout: Design 1 (Loop Trail) is favored.

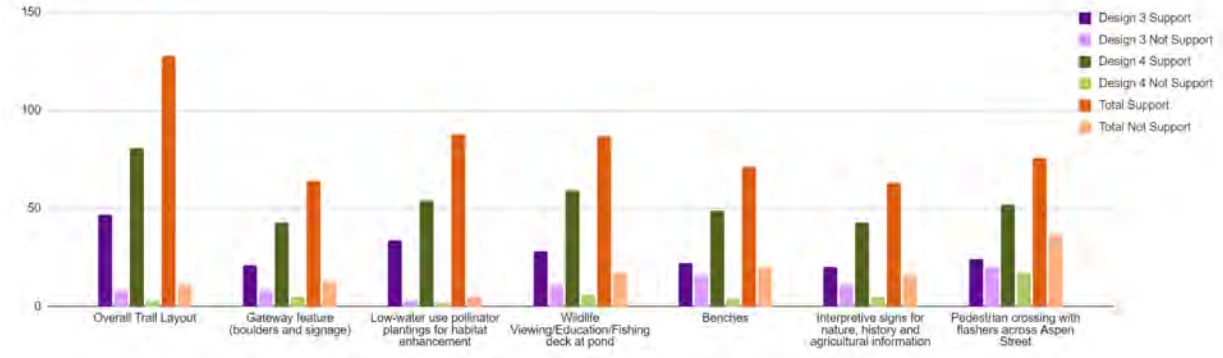


Total responses to second survey, Wottge Property, Elements



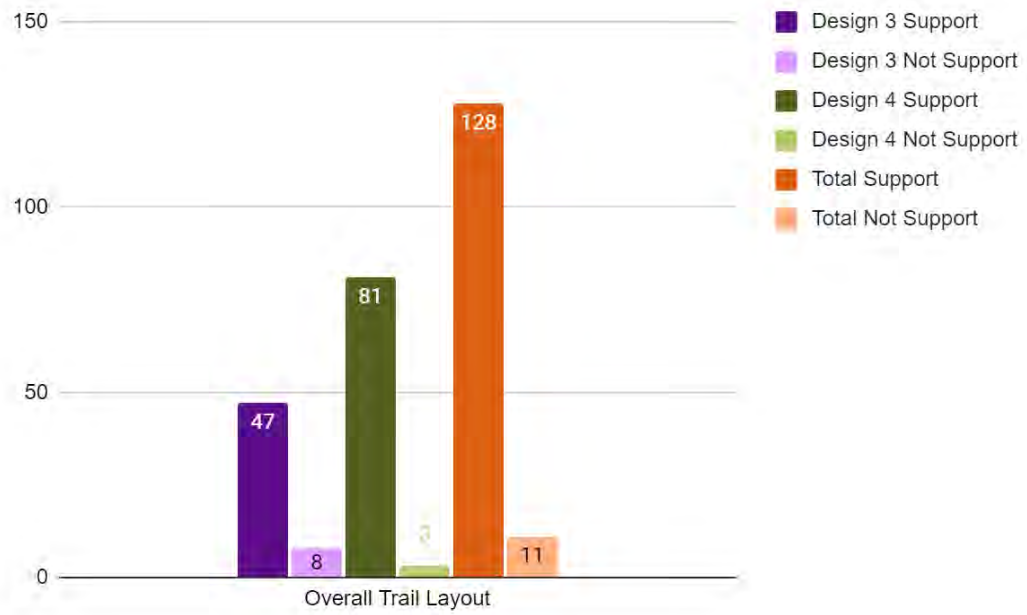
All proposed elements are strongly favored, except for a plan to review parking in the future.

Full Results: Markel Property, Second Survey

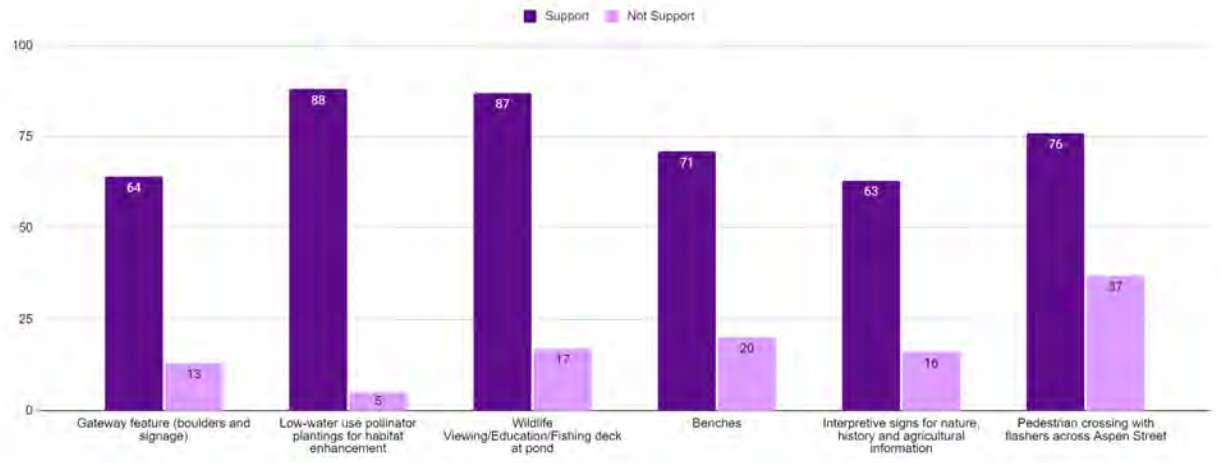


Loop trail (#4) is favored; All proposed elements were strongly favored.

Survey Question 1: Markel, Overall Trail Layout: Design 4 (Loop Trail) is favored.



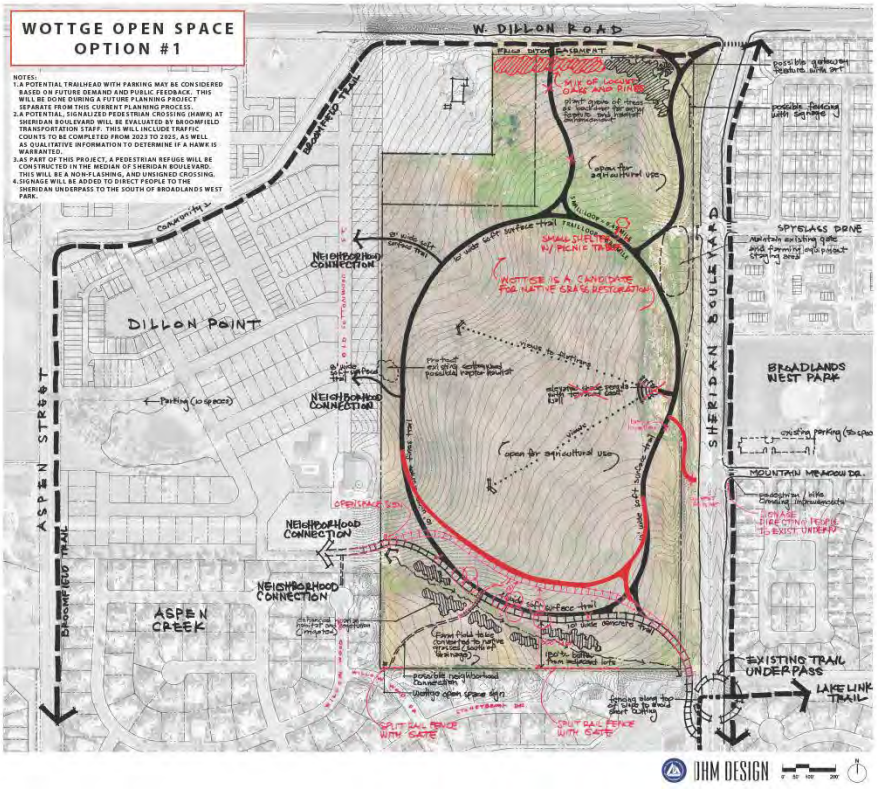
Total responses to second survey, Markel Property, Elements

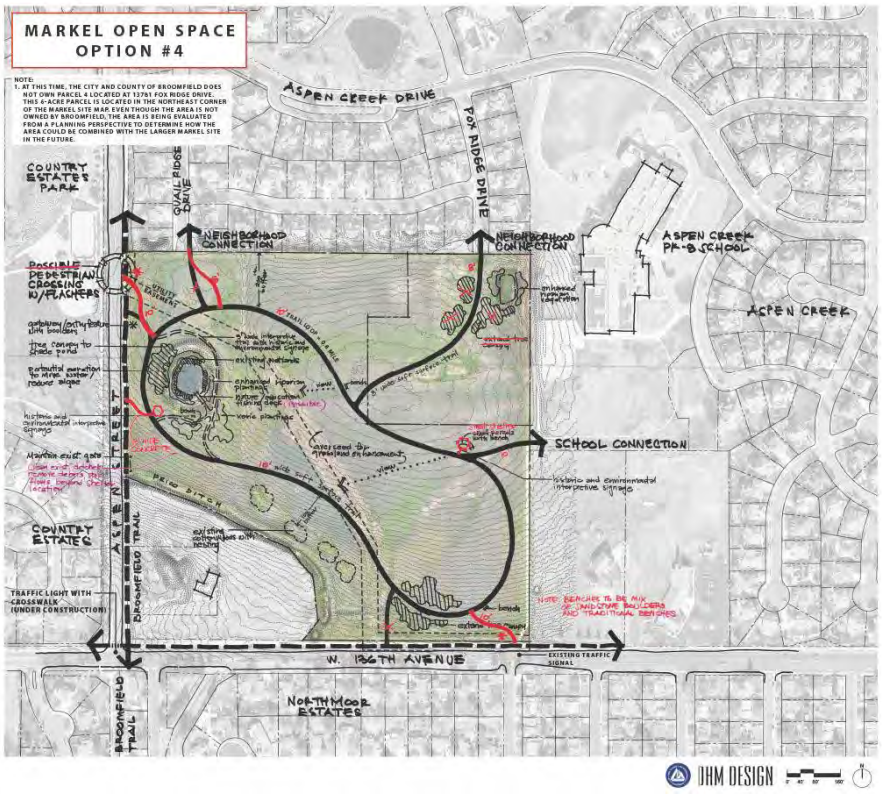


All proposed elements are strongly favored, with some mixed open comments on the Pedestrian crossing at Aspen St. concerning traffic and pedestrian safety.

Public Process Planning Report - Appendix V: Proposed Changes to Draft Final Plans

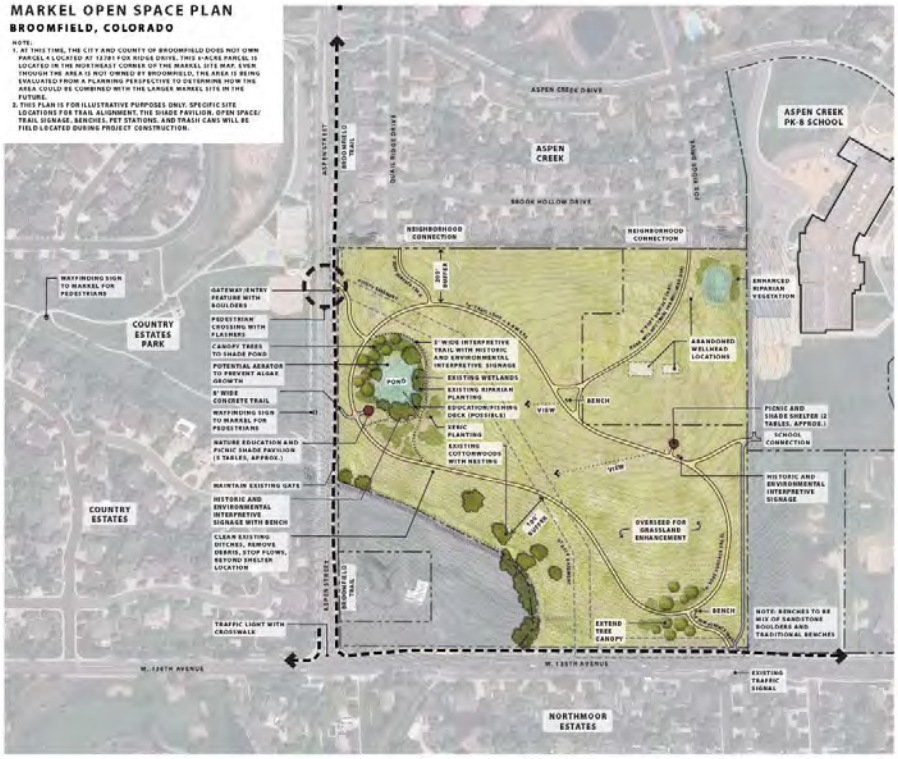
Presented at the Open Space and Trails Committee Meeting on Jun 22, 2023

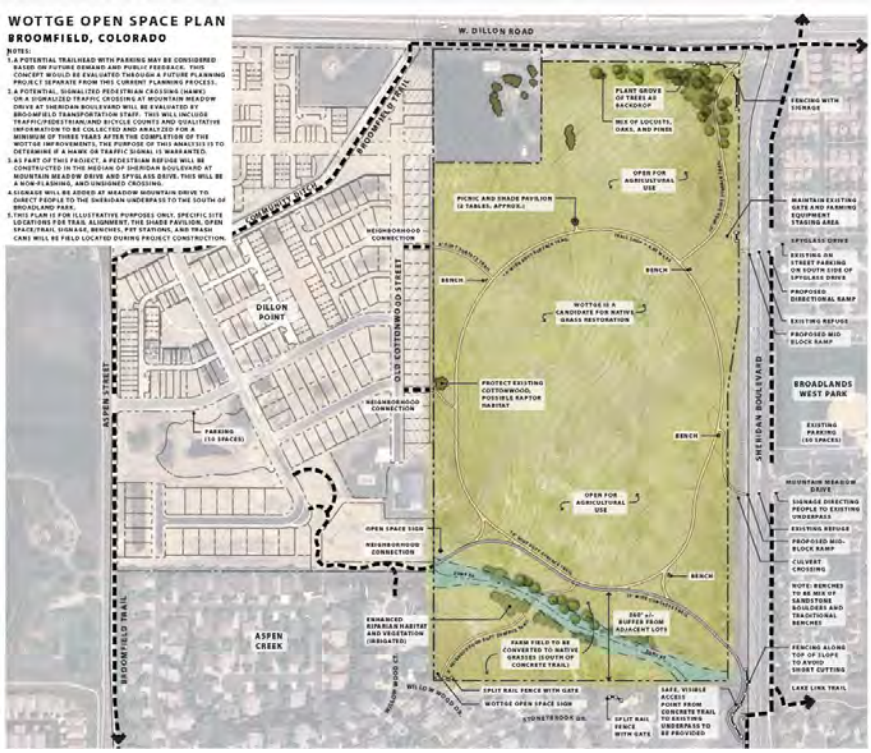




Public Process Planning Report - Appendix VI: Draft Final Plans

Presented at the July 29, 2023 Informational Booths





Public Process Planning Report - Appendix VII: Final Plans

Presented at the Sept 28, 2023 Open Space and Trails Citizen Advisory Committee Meeting

APPENDIX 2 - NATURAL RESOURCES ASSESSMENT REPORT

Markel & Wottge Open Space Properties

Natural Resources Assessment Report

City and County of Broomfield

August 2023

Prepared For:
The City and County of Broomfield

Prepared By:
DHM DESIGN

Table of Contents

TABLES

MAPS

FIGURES

APPENDICES

LIST OF ACRONYMS

AOI	Area of Interest
BCI	Bat Conservation International
BCR	Bird Conservancy of the Rockies
CNHP	Colorado Natural Heritage Program
CPW	Colorado Parks and Wildlife
FQA	Floristic Quality Assessment
FQI	Floristic Quality Index
IPAC	Information for Planning and Consultation
MLRA	Major Land Resource Area
MU	Map Units
NAIP	National Agriculture Imagery Program
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
SAM	Species Activity Mapper
T&E	Threatened and Endangered Species
USFWS	U.S. Fish and Wildlife Service
USNVC	U.S. National Vegetation Classification

1 Introduction

The purpose of this document is to present a comprehensive analysis of the existing ecological communities and their current condition within the Markel Open Space (south parcel) and the Wottge Open Space (north parcel) and surrounding areas to assist in the creation of the Properties' Open Space Plan. DHM Design Ecological Services staff have completed a site analysis to evaluate existing ecological conditions, opportunities, and constraints as they relate to current and future management of the natural resources of the property. The information included in this report is intended to guide decisions for restoration and passive recreational use on the property. The City and County of Broomfield envisions an open space design that harmonizes the relationship between passive recreation and ecological function. This ecological evaluation takes into consideration this overarching goal and describes the natural resources that are present on the properties including vegetation communities, aquatic resources, and wildlife habitat.

2 Methods

2.1 Desktop Analysis

To initiate the analysis, DHM Design Ecological Services staff completed a comprehensive desktop review to assess and evaluate existing data for the property. The desktop review includes all data and information provided to date by the City and County of Broomfield. In addition, DHM conducted a further-refined review of available resource data for the property to best support the Open Space Plan vision. This analysis provides the most available resource data to date, including but not limited to:

- U.S. National Vegetation Classification (USNVC) Standard, Version 2 (2008)
- Colorado Parks and Wildlife Species Activity Mapper (SAM) (2022)
- Colorado Natural Heritage Program (CNHP) CODEX Tool (2022)
- Natural Resources Conservation Service (NRCS) Geospatial Data Gateway (2020)
- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPAC)
- National Wetlands Inventory (NWI) Wetland Mapper (USFWS) 2020
- National Hydrography Dataset (NHD) Data 2020
- NRCS Web Soils Mapper (2020)
- Google Earth Imagery
- NRCS National Agriculture Imagery Program (NAIP) aerial photographs

2.2 Field Survey

DHM Design Ecological Services staff completed detailed pedestrian surveys of the two open spaces on August 31st, September 2nd, and September 26th, 2022. DHM surveyed both properties to assess and map existing ecological conditions and evaluate opportunities and constraints for future management of the property. GPS data were collected in ArcGIS Collector on a handheld mobile device connected to an external GNSS receiver. The average accuracy for spatial data collection was 2-8 inches.

2.3 Data Processing and Mapping

GIS data were processed in ArcPro version 2.4.0. Mapping digitization for property features was completed at a 1:500 scale using high resolution aerial imagery available through ESRI databases, Google Earth and NAIP.

3 Existing Conditions

3.1 Location

The Project Area is located in the City and County of Broomfield (*Map 1 – Project Location*). There are multiple access locations for the project. The South Parcel (Markel Open Space) can be accessed along Aspen Street, 136th Avenue, or, Fox Ridge Drive and the North Parcel (Wottge Open Space) can be accessed at the end of Stony Brook Drive, Sheridan Boulevard, Dillon Point (once completed) or off Dillon Road. The legal description for the open space properties is included below:

County, State: Broomfield County, Colorado

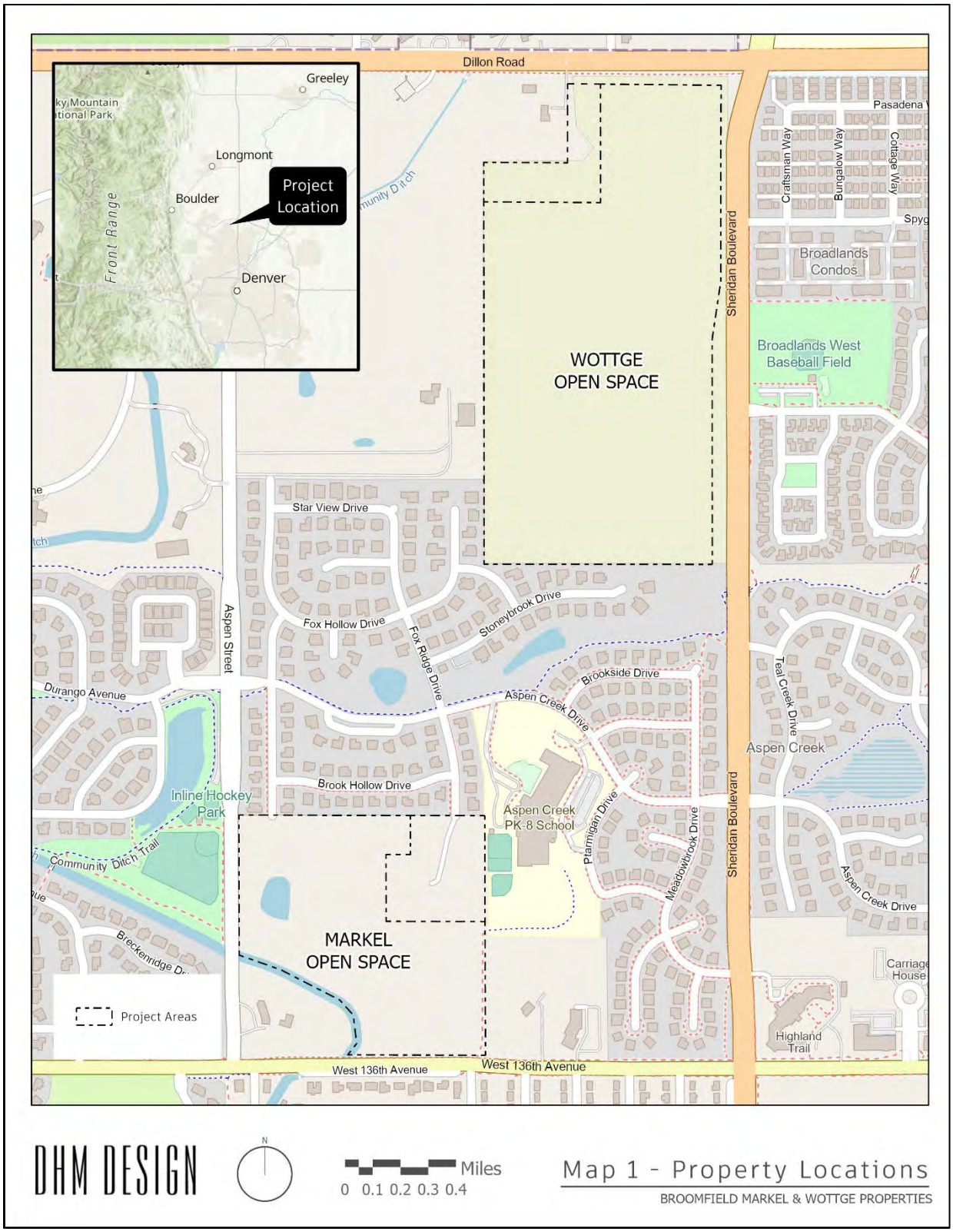
Legal Description: Section 24; Township 1S; Range 69W

U.S. Geological Survey (USGS) 7.5 Minute Quadrangle: Broomfield County, CO

Location	Parcel Number	Latitude/Longitude
Markel Open Space (south parcel)	157524440002	39.944868°N, 105.061283°W
Wottge Open Space (north parcel)	157524139001	39.954872°N, -105.055444°W

This Project was divided into two planning parcels: the Markel Open Space and the Wottge Open Space. These parcels share the same general geomorphological characteristics, ecological conditions, and land ownership types. The north parcel is named the Wottge Open Space for Bernhard "Ben" Wottge who purchased this land in 1955. It is bordered by Dillon Road and the Community Ditch that is piped to the north, Sheridan Boulevard to the east, and private residential land to the south and west. Seeps from Nissen Reservoir Number 2 to the northwest drain into the southeast portion of the parcel. The south parcel is named the Markel Open Space after Jean and Bill Markel who purchased the property in 1968. It is bordered by private residential property to the north, Boulder Valley School District property to the east, 136th Avenue to the south, and Aspen Street to the west. Community Ditch Runs along the southwest boundary of the parcel. All results presented here are organized according to these two parcels.

Map 1 - Property Locations.



3.2 Landform, Elevation and Size

The overall Project Area, containing the two parcels, is approximately 98 acres in size and is situated at approximately 5,300-5,400 feet in elevation. Markel Open Space slopes gently from the southwest to the northeast (*Figure 1*). This analysis also includes Lot 1, Blk 1, Markel Filing No. 1 that is to be transferred into City and County of Broomfield ownership. Lot 1 is 6 acres. In total, the Markel Open Space is anticipated to be approximately 30 acres after the transfer is completed. The Wottge Open Space covers approximately 70 acres and slopes gently from west to east, with very little elevation change (*Figure 2)*.

Figure 1 – Overview photo of Markel Open Space, facing south, from the drone survey for the site.

Figure 2 – Overview photo of Wottge Open Space, facing south, from the drone survey for the site.

3.3 Soils

A total of five mapped NRCS soil map units (MU) are located within two parcels and are shown on *Map 2 – Soils Data* and listed below in *Table 1*. The soil types on both parcels are classified as predominantly Nunn clay loam (95% of site area). This soil is formed on terraces, is well-drained, and has a runoff class of medium. The depth to water table for Nuun clay loam is typically 80 inches. This soil is non-saline to very slightly saline, with a high available water supply. It is recommended that soil analysis is completed prior to restoration efforts to fully understand the composition and state of the soils in the area.

Table 1 – NRCS-Mapped Soil Units within Broomfield Trails and Open Space Project Area.

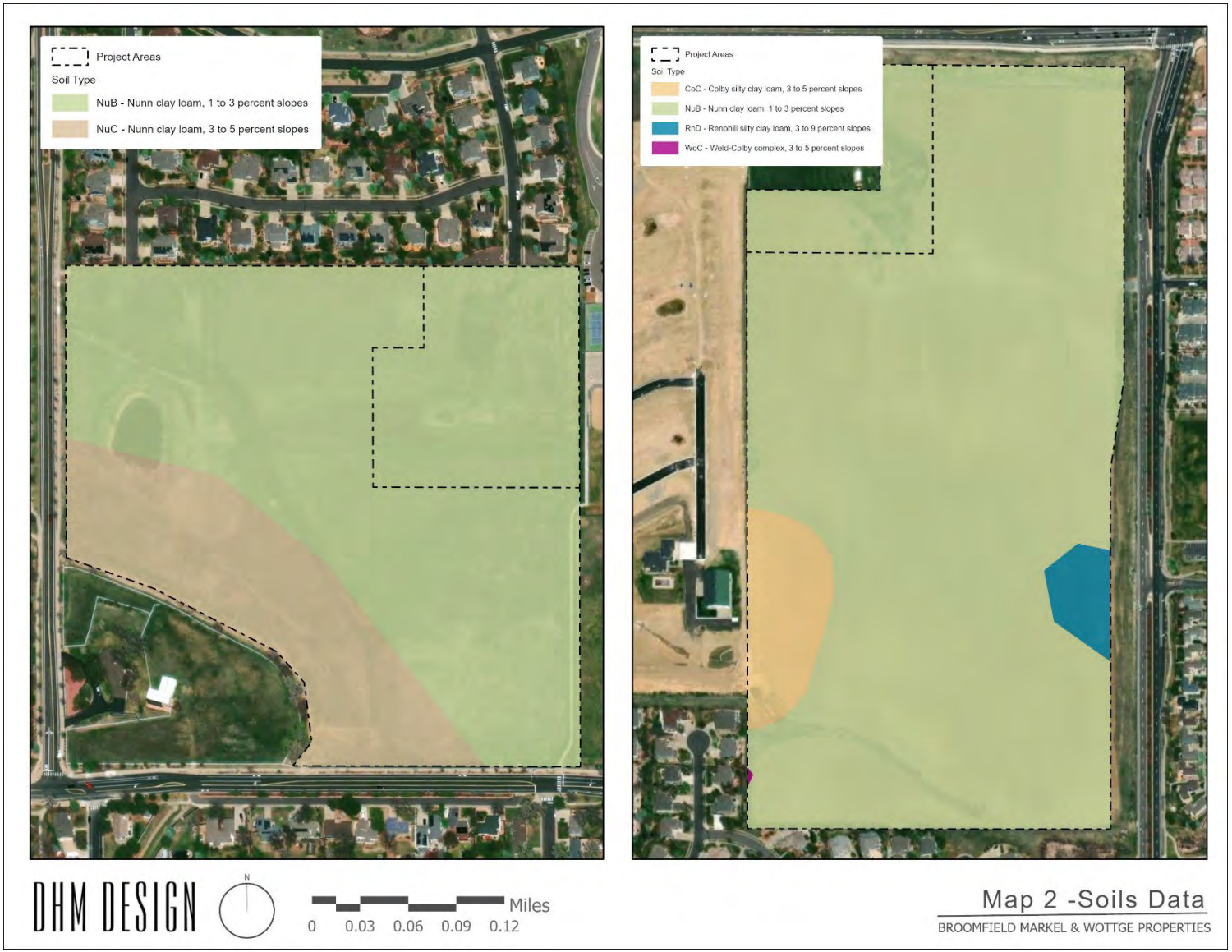
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CoC	Colby silty clay loam, 3 to 5 percent slopes	3.7	4.2%
NuB	Nunn clay loam, 1 to 3 percent slopes	74.7	85.6%
NuC	Nunn clay loam, 3 to 5 percent slopes	7.5	8.6%
RnD	Renohill silty clay loam, 3 to 9 percent slopes	1.4	1.6%
WoC	Weld-Colby complex, 3 to 5 percent slopes	0.0	0.0%
	Totals for Area of Interest	87.3	100.0%

3.4 Hydrology

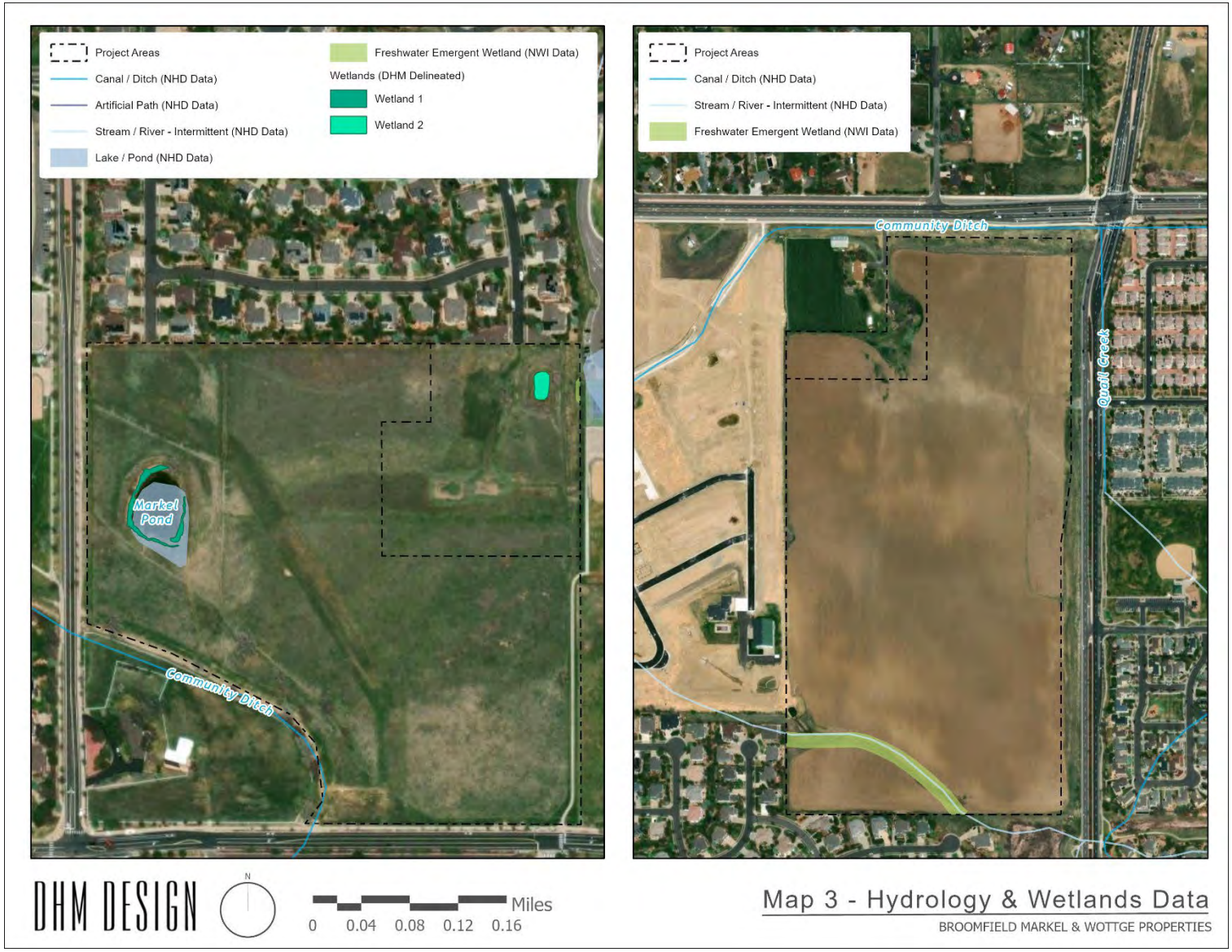
The man-made Markel Pond is the primary hydrological feature within the Project Area and is located on the Markel Open Space. This section of Community Ditch is located within the Middle Big Dry Creek Catchment of the Big Dry Creek-South Platte River Watershed. Community Ditch travels north approximately 15 miles and ends in a housing subdivision located north of Erie and just west of Interstate 25. Community Ditch also flows along the northern boundary of the Wottge Open Space, but no signs of a drainage were seen on the northern portion of the parcel, as the drainage travels in an underground culvert through this area. The Markel Pond is fed by an unnamed irrigation lateral that connects the Community Ditch to the pond from the south side of the pond. The City and County of Broomfield indicated the pond is filled typically twice annually by releasing waters from Community Ditch.

An unnamed drainage on the Wottge Open Space flows from the adjacent Dillon Point project to the west through the southeast part of the parcel. The water source of the drainage is likely precipitation captured in a small pond on the neighboring property, called Nissen Reservoir #2 in the NHD data, which is then conveyed onto the Wottge Open Space. This drainage flows west to east and merges with Quail Creek to the east of Sheridan Boulevard. Quail Creek then flows north and merges with Community Ditch at the intersection of Sheridan Boulevard and 144th Avenue. *Map 3 – Hydrology and Wetlands* provides the NHD for the vicinity of the Project Area, including features that travel through the properties.

Map 2 - Soils Data.



Map 3 - Hydrology and Wetlands Data.



3.5 Ecological Setting

The Markel and Wottge Open Spaces are located in the Central High Plains, Southern Part (67B) Major Land Resource Area (MLRA) and are situated in the Colorado Plains approximately ten miles from the base of the foothills of the Colorado Front Range of the Southern Rocky Mountains. The location of the properties is in the rain shadow of the Rocky Mountains and is considered to be in a cold semi-arid climatic zone. The ecology and vegetation of the central high plains is characterized by rolling plains and river valleys. The major river in this area is the South Platte which flows from the Rocky Mountains into Nebraska and Kansas. The region is affected by periods of severe drought, with non-drought years' average annual precipitation ranging between 14 and 17 inches per year. Precipitation primarily occurs during the growing season, often through rapid-onset thunderstorms. Mean annual air temperature is between 48 and 52 degrees Fahrenheit. Though much of the region's land is used for rangeland and cropland, the immediate area around these parcels in Broomfield are nearly primarily commercial or residential developed spaces.

The current ecological condition of these parcels is a result of past disturbances. Land use has heavily impacted the Project Area. Soil disturbances associated with canal development, the building of the Markel Pond, tillage for crops and pasture have affected the natural flow of the waterways and the composition of vegetation in the area. Wottge Open Space is still used for agricultural purposes and winter wheat (*Triticum aestivum*) crop is produced on the site. Markel Open Space is periodically grazed by horses.

3.6 Vegetation

3.6.1 Vegetative Communities

The land encompassing the Project Area is largely associated with upper great plains community types with transitional riparian community types along the canal, the seeps, and the pond. These two categories are primarily distinguishable by land form and positioning in relation to these waterways. Additionally, the development of the City and County of Broomfield and historic land use have altered the vegetation and associated communities from their native, natural state throughout the project area, resulting in large areas of disturbed and developed vegetation types.

To better define the site ecology and guide restoration and management needs for the property, the site has been delineated into a set of niche ecological communities based upon defining vegetative characteristics. GPS points were taken in the field to document dominant plant species of different areas, and then were digitized in ArcPro based on vegetative signatures seen on drone aerial imagery collected by DHM Design and Broomfield's "2020 NEARMAP 3" imagery. A total of four vegetative communities have been identified within the Project Area based on the identification of dominant species. Communities were attempted to reference the United States National Vegetation Classification (NVC, 2020), however, not all matched a standardized community due to their composition. These communities are listed below in *Table 2* and shown on *Map 4 – Vegetative Communities.*

Map 4 - Vegetation Communities Data.

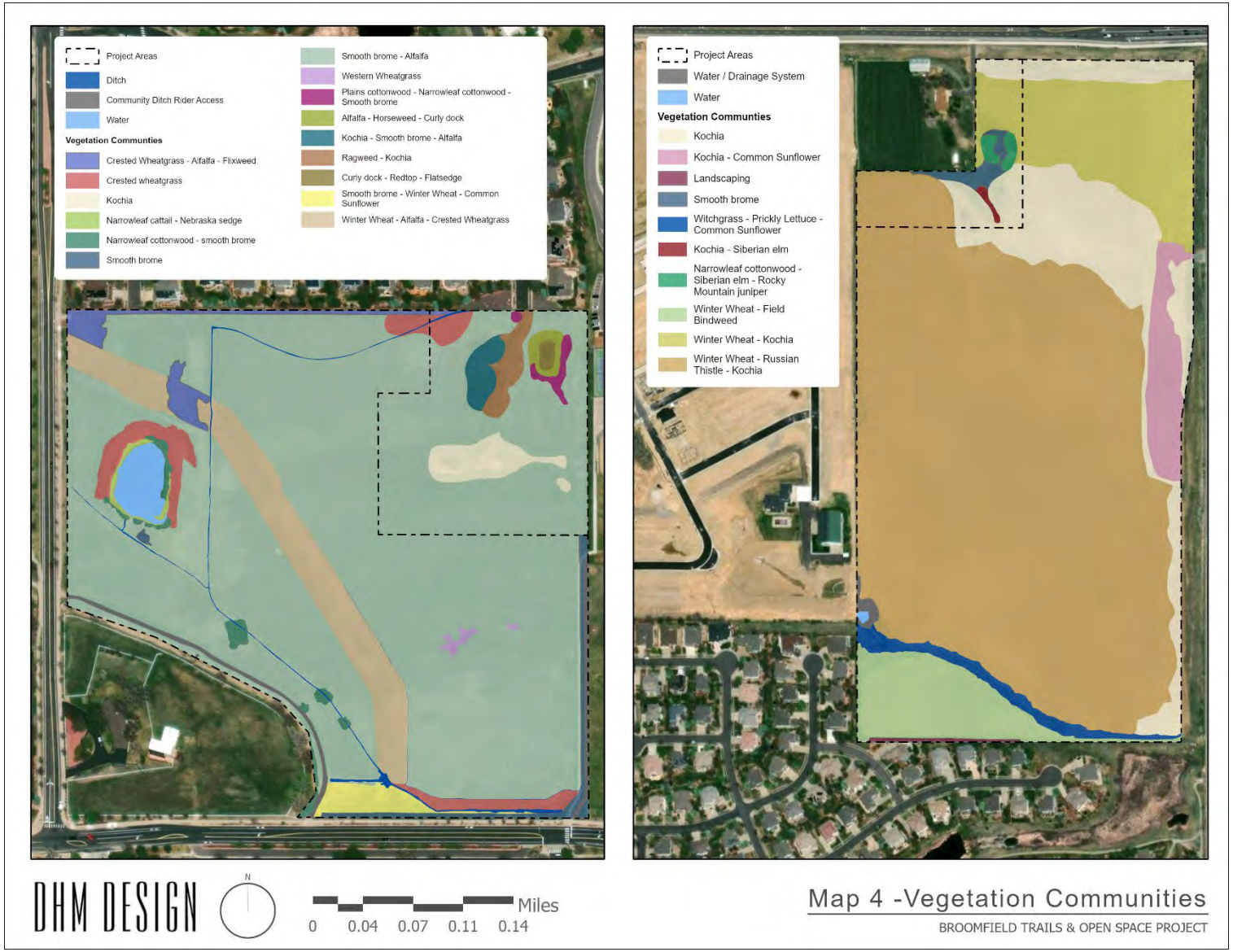


Table 2 – Vegetation Community Types and Areas Found on the Markel and Wottge Open Spaces.

Property	Vegetation Type	Detailed Types	Acreages	Percent of AOI*
Markel	Forested Riparian	Narrowleaf or plains cottonwood dominant communities	0.40	1.3%
	Emergent Wetland Marsh	Cattail and sedge communities	0.16	0.5%
	Intermountain Shrubland and Grassland	Crested wheatgrass and smooth brome – dominant communities	26.5	82.8%
	Agricultural Areas / Disturbed Areas	Winter wheat, alfalfa, kochia, and other weedy species	3.71	11.6%
Wottge	Forested Riparian	Narrowleaf cottonwood or Siberian elm-dominant areas	0.26	0.4%
	Intermountain Shrubland and Grassland	Smooth brome – dominant communities	0.43	0.6%
	Agricultural Areas / Disturbed Areas	Winter wheat, kochia, Russian thistle – dominant areas	69.2	98.9%

**Percentages do not equal 100% due to the presence of developed areas, which are not included in the natural vegetation communities totals.*

Vegetative Communities

- Forested Riparian
- Emergent Wetland Marsh
- Intermountain Shrubland and Grassland
- Agricultural Areas / Disturbed Areas

3.6.1.1 Forested Riparian

This vegetative community is primarily found around the east side of Markel Pond and scattered along the man-made ditch that feeds the pond in the Markel Open Space. It is also found on the Wottge Open Space in the northwest corner of the Property. A lone, large cottonwood tree is also present on the west side of the Wottge Open Space. This community is distinguishable by the dominance of plains cottonwoods (*Populus deltoides*) surrounded by shortgrass prairie vegetation. This particular community on the east side of the Markel pond is dominated by plains cottonwoods in the canopy and smooth brome (*Bromus inermis*) in the understory, with some scattered false indigo bush (*Amorpha fruticosa*) along the water's edge. Additionally, green ash (*Fraxinus pennsylvanica*), showy milkweed (*Asclepius speciosa*), curly dock (*Rumex crispus*), prickly lettuce (*Lactuca serriola*), and field bindweed (*Convolvulus arvensis*) were found in the riparian zones.

Cottonwood riparian forests are usually found in alluvial soils in a variety of landscapes, usually adjacent to a water source. Typical riparian forests dominated by cottonwood species occupy larger floodplain shelves reliant upon periodic flooding. Flooding is imperative to the natural ecological succession of cottonwood

stands, allowing for establishment of new growth in areas of scouring and deposition with adequate hydrology. Conditionally, this community occupies narrow stretches of the riparian corridor east of the pond and appears to be trending towards middle stages of succession, with a low to moderate diversity of vertical and age class among the cottonwoods. In areas where understory vegetation is present, it is dominated by a monoculture of smooth brome herbaceous vegetation. Functionally, these communities provide shade to the pond and ditches, keeping the water cooler than if it were inundated with sunlight.

Figure 3 - Forested riparian area with cottonwood trees, smooth brome understory, and some scattered false indigo bush located on Markel Open Space, surrounding the Markel Pond.

3.6.1.2 Agricultural Areas / Disturbed Areas

A number of agricultural/disturbed areas exist within the Project Area that do not fit any standardized vegetative community classification. These areas are dominated by species planted by humans in the past. In this case these species were planted for agricultural or ornamental purposes when the properties were under private land ownership. The agricultural/disturbed areas within the Project Area can be divided into three groups based on their dominant species and locations.

On the Wottge Open Space parcel, winter wheat co-dominates with Russian thistle (*Sasola tragus*) in the southern half of the property and kochia (*Kochia scoparia*) in the northern half. The kochia plants in some areas had grown up to five feet tall and were extremely dense. An area with mostly kochia and common sunflower (*Helianthus annuus*) is also present on the east side of the Wottge Open Space, near the main entrance gate/parking area. The Wottge Open Space is planted with winter wheat currently, and this species continues to thrive in many areas in the parcel.

On the Markel Open Space there is a narrow strip of planted vegetation traveling from the northwest to the south-central portion of the property. Winter wheat dominates these areas in the location where Xcel placed an underground gas line in 2020 but species such as field bindweed, prickly lettuce, alfalfa (*Medicago sativa*), and kochia are present in high densities. These disturbed and modified communities do not match any standard USNVC community.

Figure 4 - View of the area with winter wheat growth from the Xcel gas line installation on the Markel Open Space (left) and an area dominated by kochia and common sunflower (right) on the Wottge Open Space.

3.6.1.3 Intermountain Shrubland and Grassland

The intermountain ruderal shrublands and grasslands are the dominant vegetative community found within the Project Area, and are indicative of the land disturbances associated with human land uses. The majority of the fields within the Project Area are co-dominated by smooth brome and crested wheatgrass (*Acropyron cristatum*), with alfalfa, prickly lettuce, western wheatgrass (*Pascopyrum smithii*), and field bindweed found scattered throughout. Besides western wheatgrass, none of these plants are native to Colorado, and all of them are considered invasive.

Figure 4 - A smooth brome grassland containing low diversity located on the Markel Open Space.

3.6.1.4 Emergent Wetland Marsh

An emergent marsh is a shallow-water wetland existing along the shores of lakes and streams, characterized by robust emergent herbs and grass-like plants such as cattail or bulrush. Marshes form in landscape depressions created by landscape processes or by human activity, or as fringes around lakes and ponds. Emergent wetland marsh is present on the Markel Open Space surrounding two depressional pond areas. The emergent wetland marsh surrounding Markel Pond appears to have been created by the fluctuating water levels of Markel Pond and an unnamed pond/depression in the northeast area of the Markel Property, is likely fed by precipitation events and water accumulating in the depression. No emergent wetland marsh was identified on the Wottge Open Space. Marshes normally contain standing water in spring and early summer and are frequently or continually inundated with water. Typically,

marshes have mineral soils, but can also accumulate minimal organic matter in the uppermost soil horizon. The emergent wetland marshes on the Markel Property are co-dominated by narrowleaf cattail (*Typha angustifolia*) and Nebraska sedge (*Carex nebrascensis*) with scattered false indigo bush, showy milkweed, western goldenrod (*Euthamia occidentalis*), and curly dock.

Figure 5 - Emergent wetland marsh containing narrowleaf cattail and Nebraska sedge on the perimeter of the pond on the Markel Open Space.

3.6.2 Floristic Quality Assessment (FQA)

3.6.2.1 Description

Floristic Quality Assessment (FQA) is a vegetation-based assessment tool that assesses an area's ecological integrity based on its vegetative species composition. The method for FQA is built on plant species conservatism, which refers to a species' tolerance level to disturbance. This assessment method uses "Coefficients of Conservativism" (C-values) which are assigned to all species in a region or state. These coefficients range from 0 to 10 and represent an estimated likelihood that a plant will occur in a landscape relatively unaltered from pre-European settlement conditions. High C-values are assigned to species that are obligate to high-quality natural areas and cannot tolerate habitat degradation, while low C-values are assigned to species with wide tolerance to human disturbance. C-values of 0 are reserved for non-native species (CNHP 2020).

Table 3 - Interpretation of Conservatism Coefficients (C-Value).

C-Values	Interpretation
0	Non-native species. Very prevalent in new ground or non-natural areas.
1-3	Commonly found in non-natural areas.
4-6	Equally found in natural and non-natural areas.
7-9	Obligate to natural areas but can sustain some habitat degradation.
10	Obligate to high-quality natural areas (relatively unaltered from pre-European settlement).

Source: (CNHP 2020)

The percentage of conservative plants within a community offers a powerful assessment of a site's ecological integrity that moves beyond simple measures of species richness and abundance. Several indices can be calculated from a site species list and associated C-values and inform management practices (CNHP 2020). The most common indices include:

- **Total Mean C:** Mean coefficient of conservatism value of all species present.
- **Native Mean C:** Mean coefficient of conservatism value of native species present. If total and native mean C differ significantly, vegetation in the site contains numerous non-native species.
- **Floristic Quality Index (FQI):** Incorporates species richness and indicates overall vegetative quality of the site. Generally, 1–19 is low quality, 20–35 is high quality, and above 35 is exceptional.

3.6.2.2 Floristic Quality Assessment of the Property

The C-Values of each species found during vegetation surveys can be found in Natural Resources Report **Appendix A**, and provide information on each species likelihood to occur prior to European settlement of the area. The species list in the Appendix will not only provide the City and County of Broomfield with an understanding of what species are native and non-native, but also, which species were most likely to naturally occur in the area. This information was included to assist in identifying plant species to promote or include in future restoration efforts on the sites. Refer to **Sections 4.4.2 and 4.4.5** for a list of potential species to use on the site. The basic indices that were calculated for the total project area (Markel and Wottge Open Spaces) are located in *Table 4*. Other conservation-based metrics for species richness and duration are found in *Table 5.*

Table 4 - Basic Conservatism Indices.

Index	Value
Mean C	1.653
Native Mean C (Mean C_{Nat})	3.375
FQI	0.236
Native FQI (FQI_{Nat})	0.689
Adjusted FQI	23.620
% C value 0	52.2%
% C value 1-3	23.9%
% C value 4-6	21.7%
% C value 7-10	2.2%
Native Tree Mean C	4.5
Native Shrub Mean C	6
Native Herbaceous Mean C	2.7

Table 5 - Species Richness and Duration Metrics.

Metric	Value
Total Species	48
Native Species	24 (50%)
Non-Native Species	24 (50%)
Native Annual	11 (45.8%)
Native Perennial	13 (54.2%)
Native Biennial	0 (0.0%)

3.7 Wetlands

One wetland type consisting of approximately 0.16 acres was identified and delineated during the field assessment for the Wottge and Markel Open Spaces. The wetland type observed was the seasonally flooded palustrine persistent emergent wetlands, located around the Markel Open Space Pond and in the depression in the northeast corner of the Markel Property. No wetlands were delineated on the Wottge Open Space.

The location and extent of the wetlands can be viewed on *Map 3 – Hydrology and Wetlands* provides the NWI data for the vicinity of the project areas, and the DHM-mapped wetland located on the site.

Many of the features in the NWI dataset were not present at the time of the field site visit, including a large wetland historically mapped on the Markel Open Space. This data is historical information that is no longer relevant, and therefore was not included in maps. A drainage running through the south side of the Wottge Open Space was found to be present but was not considered to be a wetland due to a lack of hydric soils. Additionally, the area identified as a historically inundated swale in the northern half of Wottge Open Space, did not contain any hydrophytic vegetation and was therefore not classified as a wetland. However, these two areas are candidates for wetland creation and are discussed more in Section 4.4.2 and can be viewed on *Map 6*.

3.7.1 Palustrine Emergent Wetlands

The palustrine emergent wetlands are located around the Markel Open Space Pond and in the depression in the northeast corner of the Markel Property. The extents of the wetlands around the Markel Open Space Pond are limited by where the hydrology of the pond permits the establishment of emergent wetland vegetation. The extent is strongly reliant on the hydrology of the pond and therefore the extent of wetlands inward towards the middle of the pond may vary seasonally. During the site visit, completely inundated vegetation was seen in the pond and was not included in the wetland delineation. If exposed, these areas would be considered a wetland and should not be disturbed. The wetlands around the pond were dominated by narrowleaf cattail, forming dense monocultures in the wetland buffers along the banks of the pond. In other areas, higher quality wetland benches are found, consisting primarily of hydrophytic graminoids, including Nebraska sedge, Baltic rush (*Juncus arcticus*), showy milkweed, western goldenrod, and scattered false indigo bush. Plants within the wetland on the northeast parcel of the Markel Property include curly dock (*Rumex crispus*), redtop (*Agrostis gigantea*), and flatsedge (*Cyperus odoratus*) (CPW 2022a, 2022b, 2022c).

Figure 6 – Overview photo of the Markel Pond, facing south, located on the Markel Property.

3.8 Wildlife

The riparian, wetland, and grassland systems found on the properties support a diversity of wildlife. In addition to onsite observations, the Colorado Parks and Wildlife (CPW) SAM and the USFWS IPaC was used to determine potential species that could inhabit the Project Area. Wildlife species associated with CPW's SAM data were reviewed and the list of species that could occur were refined and included in *Table 4* below. In addition to the species listed in *Table 4*, the project parcels provide habitat to a number of other species, including: coyote (*Canis latrans*), red fox (*Vulpes vulpes*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), cottontail rabbit, squirrels, mice, voles, and shrews. A coyote was seen on the Markel Open Space on September 26, 2022 and on the Wottge Open Space during the drone survey in early September.

Table 6 - Colorado Parks and Wildlife Species Activity Map Species with Potential to Occur.

Common Name	Scientific Name	Range
Birds		
American bittern	*Botaurus lentiginosus*	Breeding range
Canada geese	*Branta canadensis*	Foraging area Winter range
Grasshopper sparrow	*Ammodramus savannarum*	Breeding range
Northern harrier	*Circus cyaneus*	Breeding range
Swainson's hawk	*Buteo swainsoni*	Breeding range
Mammals		
Black-tailed prairie dog	*Cynomys ludovicianus*	Overall range
Big brown bat	*Eptesicus fuscus*	Overall range
Hoary bat	*Lasiurus cinereus*	Overall range
Little brown myotis	*Myotis lucifigus*	Overall range
Mule deer	*Odocoileus hemionus*	Overall range
Olive-backed pocket mouse	*Perognathus fasciatus*	Overall range
Red bat	*Lasiurus borealis*	Overall range
Western small-footed myotis	*Myotis ciliolabrum*	Overall range
White-tailed deer	*Odocoileus virginianus*	Overall range
Reptiles		
Bullsnake	*Pituophis catenifer sayi*	Overall range
Common gartersnake	*Thamnophis sirtalis*	Overall range
Hernandez's short-horned lizard	*Phrynosoma hernandesi*	Overall range
Lined snake	*Tropidoclonion lineatum*	Overall range
Northern watersnake	*Nerodia sipedon*	Overall range
Plains gartersnake	*Thamnophis radix*	Overall range
Plains hog-nosed snake	*Heterodon nasicus*	Overall range
Snapping turtle	*Chelydra serpentina*	Overall range
Terrestrial gartersnake	*Thamnophis elegans*	Overall range

3.8.1 Threatened and Endangered Species

USFWS IPaC data was accessed to determine what potential Threatened and Endangered Species (T&E) species and habitat could exist on the property. ***Table 5*** includes a list of five T&E species resulting from running the tool. In review of preferred habitat for the species, only one species, monarch butterfly (*Danaus plexippus*), is likely to occur on the site. The larval host plant for the species, showy milkweed, was located

on both the Markel and Wottge Open Spaces. Impacts to habitat for this species should be considered if modifications to the host plant will occur. However, habitat improvements planned for the site may enhance habitat for this species. The monarch is a candidate species and not yet listed or proposed for listing. Consultation with USFWS under Section 7 of the Endangered Species Act is not required for candidate species. It is encouraged, however, to take advantage of any opportunity to conserve the species.

Habitat is available on both sites for whooping crane (*Grus americana*), but it is unlikely the species would occur due to it being uncommon for the area. Whooping crane is a very uncommon species in the state but often uses agricultural fields for foraging, such as those found on the site. Four species, Preble's meadow jumping mouse (*Zapus hudsonius preblei*), western prairie fringed orchid (*Platanthera praeclara*), greenback cutthroat trout (*Oncorhyncus clarkia stomias*), and Ute Ladies'-tresses orchid (*Spiranthes diluvialis*), are unlikely to occur at the site and no habitat is currently present for them. The site is highly disturbed with non-native plant species, land management such as grazing and mowing practices, and does not have perennial water sources, which many of the species depend upon. Restoration and enhancement of the project site may increase the likelihood of the presence of some species, but the current conditions do not support their presence. The properties are both located within the Block Clearance Zone for Preble's meadow jumping mouse, indicating that there is sufficient information that the species is absent from large acreages within the zone.

Table 7 – USFWS Threatened and Endangered Species List.

Scientific Name	Common Name	USFWS Status	Habitat Description	Habitat Present?
Danaus plexippus	Monarch butterfly	Candidate	During the breeding season, the species lays eggs on their obligate milkweed host plant (primarily Asclepias spp.). Showy milkweed was located on the site.	Habitat present on both properties
Grus americana	Whooping crane	Endangered	Breeds, migrates, winters, and forages in a variety of wetland and other habitats, including coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields.	Habitat present on both properties
Oncorhyncus clarkia stomias	Greenback cutthroat trout	Threatened	Inhabits cold water streams and cold-water lakes with adequate stream spawning habitat present during spring.	No habitat present
Platanthera praeclara	Western prairie fringed orchid	Threatened	North American tall grass prairie on unplowed, calcareous prairies and sedge meadows.	No habitat present
Spiranthes diluvialis	Ute Ladies'-tresses orchid	Threatened	Known primarily from moist meadows associated with perennial stream terraces, floodplains, and oxbows at elevations between 4,300-6,850 feet.	No habitat present
*Zapus hudsonius preblei**	Preble's meadow	Threatened	Well-developed riparian habitat with adjacent, relatively undisturbed grassland communities, and a nearby	No habitat present

Table 7 – USFWS Threatened and Endangered Species List.

Scientific Name	Common Name	USFWS Status	Habitat Description	Habitat Present?
	jumping mouse		water source. Well-developed riparian habitat includes a dense combination of grasses, forbs and shrubs; a taller shrub and tree canopy may be present.	

- Excluded pallid sturgeon and piping plover as the project does not include water-related activities and/or use in the N. Platte, S. Platte, and Laramie River Basins which may affect listed species in Nebraska.
- Excluded gray wolf as the project does not include predator management programs.
**Species was not listed on USFWS IPAC, but CPW SAM overall range overlapped with the project site.*
As a result of this review, the species identified as unlikely to occur will require no further study.

3.8.2 Migratory Birds

The two parcels provide important foraging, breeding, and nesting habitat for migratory birds. A total of eleven species were documented during surveys conducted, most of which are likely year-round residents. Many of the migratory species may have started migrations at the time of surveys, so species diversity and abundance are expected to be much higher than what was documented.

The cottonwood riparian habitats provide a variety of nesting substrates including shrubby understory and cottonwood and green ash trees. Abundant insects and seeds are present for birds. A high density of resources supports a larger number of individuals in a smaller space, which is typically true for riparian woodlands in Colorado. Many species may not nest or breed in riparian areas but still use them for foraging grounds or cover during inclement weather. Species seen using the riparian woodlands on the properties include mourning dove (*Zenaida macroura*), American kestrel (*Falco sparverius*), northern flicker (*Colaptes auratus*), and hairy woodpecker (*Picoides villosus*).

The open grasslands present on the site are important for bird species, as native prairies are the most altered ecosystems in North America and are disappearing along the Front Range due to development and agriculture (Kingery 2007; BCR 2016). As a result, grassland bird species have experienced the steepest population declines of any guild from habitat being reduced and converted (BCR 2016, Rosenberg et al. 2019). Many of the grasslands in the parcels were historically grazed which introduced non-native graminoid and forb species. Native grasslands provide better habitat for at-risk grassland bird species by providing heterogeneous vegetation structure that hosts a diversity of arthropods and seeds for their diet. Presence of non-native plant species can displace native vegetation and subsequently decrease habitat quality for grassland birds (BCR 2016). Species documented in grassland areas of the properties included barn swallow (*Hirundo rustica*), Say's phoebe (*Sayornis saya*), western kingbird (*Tyrannus verticalis*), and Swainson's hawk (*Buteo swainsoni*).

During the three site visits conducted for the project, several raptors were seen perched within the parcels or soaring overhead, likely foraging in the open grasslands. A pair of Swainson's hawks were seen circling the Wottge Open Space and acting territorial towards a juvenile red-tailed hawk that was perched on the property. American kestrels were seen or heard on both properties. All three species require open habitat for foraging with large trees for nests. Red-tailed hawks and Swainson's hawks build stick nests located in trees or other structures and American kestrels' nest in cavities of trees.

A raptor stick nest was located on the Markel Open Space along Community Ditch on the south side of the property. This nest was confirmed to be occupied by a pair of great horned owls during the summer months by the City and County of Broomfield in 2022 (*Figure 7*). A Raptor Management Plan is expected to be completed in 2023 for the City and County of Broomfield Properties and should be considered when managing the Markel and Wottge Open Spaces when it is complete. Maintenance of trees on the property is essential for these keystone species' survival and successful nesting in the vicinity of the project. Enhancement of the grasslands on the site will likely attract more prey and foraging opportunities for raptors in the area.

Figure 7 – Great horned owl on the nest located in the Markel Open Space near the Community Ditch.

Source: City and County of Broomfield

3.8.3 Bats

Nine species of bats in Colorado use forests and woodlands for foraging and roosting, including the western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), little brown bat (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and silver-haired bat (*Lasionycteris noctivagans*) (Navo et al. 2018). Of the species listed above, those that could occur at the Wottge and Markel Open Spaces based on the habitat available and species overall mapped ranges include big brown bat, hoary bat, little brown myotis, red bat, and western small-footed myotis.

Bats may use tree crevices or cavities, exfoliating bark, or foliage of live trees for roosting activities. Hoary bats and silver-haired bats may roost on tree trunks or among live tree leaves. Generally, larger trees are selected for roosting more often due to their large surface area and ability to persist for longer, which makes them usable for several years. Snags and trees may be used by up to hundreds of bats at one time for roosting. Bats may use the same tree to roost for an entire season and even come back to the same trees year after year. They may also change roost locations daily or every few days depending on the environment. Riparian areas and open surface water are also important foraging areas where insect densities are often higher and insect communities are different than surrounding uplands (Navo et al. 2018).

Habitat for bat species is present throughout much of the Markel Open Space. The open grasslands and the pond area provide insect foraging grounds during dusk and the cottonwood and green ash trees provide

potential roosting locations for bats. Foraging habitat is available on the Wottge Open Space but without a water source or trees, bats are unlikely to roost on the property.

3.9 Noxious Vegetation

A total of six species classified as noxious weeds in Colorado were observed within the project properties (*Table 8*). Additionally, many non-native weedy species have been observed on site, including: kochia (*Kochia scoparia*), curly dock (*Rumex crispus*), barnyard grass (*Echinochloa crus-galli*), smooth brome (*Bromus inermis*), crested wheatgrass (*Agropyron cristatum*), white goosefoot (*Chenopodium album*), flixweed (*Descurainia sophia*), alfalfa (*Medicago sativa*), prostrate knotweed (*Polygonum aviculare*), Russian thistle (*Salsola tragus*), and winter wheat. These species are known to be aggressive and are considered to be an ecological threat. Detailed mapping was not completed as part of the project scope, but a species list was created. The City and County of Broomfield noxious weed management plan should be referred to for more information and weed treatment options.

Table 8 - Noxious Vegetation Species Observed Within Project Area.

Scientific Name	Common Name	State List Status	Life Cycle
Carduus nutans	Musk thistle	B	Biennial
Cichorium intybus	Chicory	C	Perennial
Cirsium arvense	Canada thistle	B	Perennial
Convolvulus arvensis	Field bindweed	C	Perennial
Elaeagnus angustifolia	Russian olive	B	Perennial
Sonchus arvensis	Perennial sowthistle	C	Perennial

The suppression and eradication of noxious vegetation within the Project Area will be essential throughout the Planning process and restoration activities, providing both aesthetic and ecological benefits. Once the plan has been completed, it is suggested that the Noxious Weed Management Plan already created by the City and County of Broomfield continue to be followed to control weeds on the sites. In general, management efforts for existing noxious vegetation should be implemented based upon prevalence throughout the site and the target plants life cycle (annual, biennial, perennial and woody perennial species). The species that will be the most inhibiting to restoration activities and therefore should be priority for management include; Canada thistle, field bindweed, smooth brome, and crested wheatgrass. The management of other species is also important, and should not be neglected at the expense of treating the more prevalent species. It is important to treat species before they become more wide spread, and the management of these species will be easier if managed despite the size or extent of infestation. Persistent efforts, with timely treatments throughout the growing season – ideally spring, summer, and fall – should be utilized for the property.

3.9.1 Biennial Species

Only one biennial forb species, musk thistle, was found on site. These species reproduce solely by seed and are considered to be aggressive due to their high seed production rates. The key to control for these species is to suppress seed production and to eliminate the seed bank. Targeting first year plant growth in the early rosette stage, and second year plant growth as it starts to bolt in the late spring/early summer with repeated applications of herbicide or mechanical control are strategies to manage these species. Specifically, management efforts for these species will utilize a hybrid option of mechanical and chemical

treatments, targeting spring and fall rosettes with chemical spot spray treatments and mechanical removal of plants.

3.9.2 Perennial Species

The perennial, state listed noxious vegetation species found on site consist of chicory, Canada thistle, Russian olive, perennial sowthistle, and field bindweed. In general, these species are deep-rooted perennial forbs that tend to form large colonies connected by a common root system. These root systems are often extensive, reaching depths of up to 20 feet and spreading up to 15 feet laterally. They have the ability to reproduce by rhizomes and via seed, therefore it is essential to both suppress seed production and systematically kill the below ground root systems. Using a combination of chemical, mechanical and cultural treatments, the key to control of these species is to continually stress the plants to diminish their energy reserves and deplete their rhizomatous root systems beneath the ground.

4 Opportunities and Constraints

Opportunities for habitat restoration, wildlife habitat enhancement features, and wildlife conservation measures are present on both the Markel and Wottge Open Spaces. Although located in a suburban environment, the two Open Spaces provide essential habitat for wildlife present in the area and could be improved and protected for plants and wildlife native to the Front Range of Colorado. The following sections provide information about different approaches to conservation at the site and Property-specific actions that may be implemented.

4.1 Habitat Restoration

Developing an Open Space Plan for the City and County of Broomfield Wottge and Markel Properties offers numerous opportunities for restoration of the land to more natural conditions. Constraints within the Project Area include the desire to not obstruct mountain views on the property, non-native species presence, and adjacent development and land use. However, the development of adjacent properties also creates an opportunity to preserve and restore the two properties to a natural space retreat for nearby residents. The restoration recommendations provided in this report are high-level recommendations that provide a holistic approach to improving ecological conditions within the two properties.

Based upon current site conditions, areas have been identified for restoration utilizing the following types of interventions:

1. Creation – Identifying and re-establishing areas that are heavily degraded but have the opportunity to become a native feature, due to location and surrounding vegetation resulting in the creation of a new instream habitat feature, wetland, riparian or upland area depending on site conditions.
2. Enhancement – The restoration of partially functioning uplands, wetlands and riparian areas. This can include noxious weed elimination, planting, seeding, and other restoration techniques as well as the utilization of wetland benching to improve hydrological connectivity to existing wetlands.
3. Preservation – The protection of intact and functioning upland, wetland or riparian areas through ecologic and landscape planning. Installation of habitat enhancing elements as recommended.

It is recommended that restoration activities are focused on short, medium, and long-range planning activities and that established restoration goals are identified to provide a base for monitoring success. Through restoration, the goal is to improve portions of the properties' ecological setting prior to anthropogenic influences. Site-specific measures for habitat restoration, enhancement and preservation are provided in Sections 4.4.1 and 4.4.2.

4.2 Wildlife Habitat Enhancements

In addition to creating, enhancing, or restoring natural vegetation on the two parcels of land, wildlife habitat enhancement features can be added to the landscape to encourage use of the land by native species. Potential locations for grassland/pollinator enhancement, bluebird nest boxes, and bat houses are discussed for each Property in Sections 4.4.1 and 4.4.2. Details about how to implement the various enhancements at both sites are provided below.

4.2.1 Bat Houses

Installing bat houses would provide additional locations for bats to roost during inactive hours. Prefabricated bat houses are available for purchase and many bat house plans are available online if Broomfield has materials and staff to build them. Some considerations for distributing bat houses on the property include (BCI 2022, Colorado Trails with Wildlife in Mind Task Force 2021):

- Mount bat houses on poles rather than trees is the best option, since there are no buildings or structures to use as a mount.
- Position bat house near a water source in a location that receives at least six hours of sun exposure. *Map 5* displays an area within 100 feet of the pond where a bat house could be located.
- Bat houses should be 10-20 feet off the ground, with 10-14 feet of clear space above vegetation below the house, and 20-30 feet from the nearest trees.
- Bats are more likely to use roosts if three or more roosts exist. Multiple bat houses can be mounted back-to-back on poles.
- Paint the bat house according to the average high temperatures for the area in July based on the ranges below. Broomfield's average July temperature for 2022 was 86 degrees Fahrenheit:
    - 85 or less: Black
    - 85-95: Dark or medium colors like brown, gray, and green
    - 95-100: Medium/light colors
    - 100 and higher: Light colors or white

More information about bat house construction can be found on Bat Conservation's website.

4.2.2 Bluebird Boxes

Western and mountain bluebirds are two native grassland species that are likely present at the sites and nesting substrates may be provided to assist in increasing their populations in the local area. Populations of these two species have declined and are projected to decrease in the future due to climate change reducing available range in the future.

These two species seek tree cavities or woodpecker holes for nesting sites, but natural cavities are difficult to locate and competition for these limited sites is high (Audubon 2019). Installation of man-made nest boxes in suitable habitat areas is an option to help increase biodiversity and wildlife use of the properties.

It is possible the two species would nest at the site without the boxes, but adding them increases the probability of nesting occurring and also could increase the number of nesting pairs on the sites. Other species, such as swallows (native), starlings (non-native), or house sparrows (non-native), may also use the boxes, as they are already present in the suburban location of the properties.

Prefabricated boxes are available online for purchase or plans are available online with construction directions. It is recommended that boxes be installed (Audubon 2019):

- In pairs approximately 15-20 feet apart from one another and approximately 300 ft or more from the next pairing of boxes. Bluebirds defend large feeding territories around their nests and they do not want to nest near other bluebirds. However, other species such as chickadees and swallows may also compete for nest sites and will nest near bluebirds. Pairing boxes gives birds the opportunity to nest near a species that is not a competitor rather than compete over limited boxes spread out over a larger area.
- Mount boxes onto half-inch conduit/rebar pole located in a good habitat area, such as open grassland areas of the properties.

Figure 8 - A mountain bluebird entering a nest box with young.

Sources: Cornell Lab of Ornithology and Audubon

- Mount boxes six to eight feet off the ground to protect them from potential predators in the area.

4.2.3 Pollinator Habitat

The sites contain ample opportunity to enhance and create pollinator habitat for native insects. Some opportunities and recommendations include (Mader et al. 2011):

- Seed/plant native grass and forb species within grassland areas of the open space. Native vegetation is much more likely to attract bees, butterflies, and moths than non-native vegetation. Native grasses and sedges supply nesting sites for some bee species and overwintering sites for other insects. Forbs provide nectar sources, egg-laying sites, and cover for a variety of pollinator species.

- Avoid mowing and applying herbicides to created pollinator habitat to reduce the likelihood of direct mortality of pollinators. It is understood that mowing in some portions of the two properties is required for wildfire prevention and weed management, and this should continue. However, pollinator habitat should not be restored in these areas.

- Plant and protect existing plants of native showy milkweed to attract the sensitive monarch butterfly and other native pollinators.

- Create nesting sites for ground- and tunnel-nesting bee species with:

- Ground-nesting bees: maximize areas of undisturbed, untilled ground including patchy areas of bare soil with few bunch grasses.
- Tunnel-nesting bees: distribute mason bee blocks, consisting of a wood block drilled with a series of dead-end holes in a protected location with light shade and direct morning sun, east-facing.

4.3 Wildlife & Habitat Conservation Measures

In addition to habitat restoration and the addition of habitat features to the landscape, other conservation measures can be considered when planning trails within an open space property. Although the ecological condition of the properties is relatively low due to historic grazing and the presence of non-native plant species, the properties provide important open space in an otherwise largely developed area of the Front Range of Colorado. Maintenance of these areas for natural resources should not be overlooked in the planning process. The lands provide intact open space in a fragmented and human-influenced landscape. Protecting sensitive communities, maintaining large, undivided tracts of land, and protecting sensitive wildlife resources when discovered should be considered. Details about conservation measures relevant to each Open Space are provided in Sections 4.4.1 and 4.4.2.

4.4 Property-Specific Actions

4.4.1 Markel Open Space

A combination of habitat restoration / enhancement, wildlife habitat enhancement features, and habitat conservation measures can be implemented on the Markel Open Space. *Table 9* below summarizes the types of actions that may be taken and the sections where information is located for the measures.

Table 9 – Property-Specific Actions for the Markel Open Space.

Property	Opportunity	Details	Section Reference
Markel	Habitat Restoration or Enhancement	Restore wetlands and riparian areas surrounding Markel Pond.	Section 4.4.4.1
		Restore or enhance grasslands	Section 4.4.4.2
	Wildlife Habitat Enhancement Features	Bat Houses	Section 4.2.1
		Bluebird Boxes	Section 4.2.2
		Pollinator Habitat Enhancement	Section 4.2.3
	Wildlife and Habitat Conservation Measures	Various measures related to fencing, signage, etc.	Section 4.4.1.3

4.4.2 Habitat Restoration or Enhancement

4.4.2.1 Markel Open Space Pond and Wetlands

The emergent wetland on the northeast portion of the Markel Property is located at the base of an artificial depression. Plants within this wetland include curly dock (*Rumex crispus*), redtop (*Agrostis gigantea*), and flatsedge (*Cyperus odoratus*). The riparian woodlands surrounding the wetland contain small-diameter plains and narrowleaf cottonwood trees and smooth brome understory. The Markel Open Space Pond

located on the Markel Open Space contains regular inundation from flows directed from Community Ditch to an unnamed ditch on the property that enters the pond from the south side. It is understood the pond is filled twice annually, subject to water right appropriation, and that depths are not known. As a result of the regular inundation, emergent wetland and cottonwood riparian communities are present on the perimeter of the pond. The emergent wetlands present within the water and on the slopes of the pond contain species such as narrowleaf cattail, Nebraska sedge, Baltic rush, and false indigo bush. The riparian woodlands contain large-diameter plains cottonwood trees, green ash trees, and smooth brome understory.

Noxious weed coverage was low in the both areas due to existing habitat management efforts, with the exception of some Canada thistle populations and the presence of non-native species such as smooth brome and narrowleaf cattail. The riparian habitat present in both riparian zones provides important cover, shelter, and forage for wildlife species and typically is an ecologically diverse vegetative community. However, the site currently contains low ecological diversity and could be enhanced to improve vegetative community conditions and wildlife habitat. Typically, wetland and riparian areas in the Front Range of Colorado would have a higher diversity of understory graminoids, forbs, and woody shrubs than the site currently contains.

Additionally, the pond is an attraction for people wanting to fish. Trash, fishing line, and tackle were found around the pond and social trails are found throughout the wetland area. The current conditions on the site present opportunities for intervention and enhancement of wetland and riparian health around the pond through managing these activities.

Figure 9 - View of the pond on the Markel Open Space facing north with sedge and cattail emergent wetlands in the forefront and cottonwood riparian woodlands in the background.

Recommendations include:

- Short-term Goals:
    - *Treat noxious weed populations surrounding the pond* in accordance with the property noxious weed management plan. Creating an Open Space Plan for the open space and potentially creating new trails in the vicinity of the pond will increase the visitation to the area, and could more readily spread noxious vegetation populations. Addressing the issue prior to increased visitation will reduce the possibility of noxious weed spread.
    - *Protect the existing wetland and riparian zone* from human encroachment by locating trail construction away from sensitive areas to the extent possible.
    - *Make a designated trail* and discourage social trail creation through signage. Use of the pond for fishing and other recreational activities will be included as part of the Open Space Plan. Creating a designated trail with signage will encourage visitors to use the trail instead of creating numerous social trails in sensitive wetland and riparian vegetation.
- Long-term Goals:
    - *Enhance wetland and riparian areas by increasing vegetative diversity* through the creation of site-specific seed mixes and planting lists, focusing on native species adapted to the area. Increase herbaceous cover diversity by adding more sedge, rush, and forb species. Plant additional riparian trees and shrubs to increase woody species age class diversity at the site. Several cottonwoods were dying and adding new trees to the site will help to maintain or increase cover in the future.
    - *Promote native species present at the site* that are naturally-occurring in the area. Review the species list in the Appendix to identify native species with high FIA C-Values. Examples include golden currant (*Ribes aureum*), false indigo bush (*Amorpha fruticosa*), white snowberry (*Symphoricarpos albus*), western goldenrod, Nebraska sedge, and narrowleaf cottonwood. FIA C-Values are explained in Section 3.6.2 on pages 13-14 and the site species lists with C-Values are provided in Appendix A, pages 39-43.

4.4.2.2 Markel Open Space Grasslands

The condition and composition of the grasslands located on the Markel Open Space provide evidence of past disturbance, including grazing and utility installation. In the past, the site was grazed by horses. The majority of the property is composed of non-native grazing plant species, such as smooth brome, crested wheatgrass, and alfalfa. Prickly lettuce, flixweed, and field bindweed are three other non-native species that are widely and densely distributed on the property. An obvious linear strip of disturbed and seeded vegetation occurs from the northwest corner to the central part of the southern boundary and contains winter wheat, prickly lettuce, alfalfa, and field bindweed as well. Some native forbs were identified on the property, such as curly cup gumweed (*Grindelia squarrosa*), showy milkweed, and white heath aster (*Symphyotrichum ericoides*), but diversity was overall limited.

Prior to disturbance, the site was likely short- or mid-grass prairie which is characteristic of the drought-prone eastern plains of Colorado. A variety of graminoid species would dominate with intermixed forb species. Shrubs species may be present, but in a scattered or very low density. The site currently does not resemble the typical vegetative cover for this area and presents an opportunity for enhancement of the current vegetation.

The current disturbed condition and presence of noxious vegetation throughout the site has significantly suppressed the native vegetation. In order to revert the vegetative structure to its natural state, active removal and suppression of the noxious and non-native vegetation is needed as well as actively seeding and introducing native vegetation to the site through strategic planting and seeding efforts. Seeding will be the primary objective for revegetation efforts, but for key plant species that do not reproduce well from seed, transplanting of seedlings may be necessary.

Figure 10 – Disturbed grassland on the Markel Open Space with potential to benefit from restoration and enhancement efforts.

Additionally, restoring sites that contain deep-rooting pasture grasses, such as smooth brome and crested wheatgrass is a difficult, time-consuming and costly task. However, depending on the level of effort and funding available, the City and County of Broomfield may be able to implement small restoration activities, such as introducing more forb diversity on the site, in order to improve the overall conditions while still allowing recreational and agricultural practices to continue. Recommendations include:

- Short-term Goals:
    - *Plant native shrubs and forbs that can compete with existing vegetation.* It is advised that the need for drip irrigation may be necessary in some locations and this need will be balanced with water conservation and weed management strategies.
    - *Treat noxious weeds that are listed by the state of Colorado* in accordance with the noxious weed management plan. This has been ongoing and there is an existing Weed Management Plan for Markel Open Space.
- Long-term Goals:
    - *Enhance and restore native prairie communities by increasing vegetative diversity* through development of a site-specific seed list based upon reference documents for species found within the short grass prairie. Use a diversity of graminoid and herbaceous forb species, selecting plants for their establishment, habitat and pollinator attributes. The short grass prairie ecosystem should support a rich and vibrant pollinator habitat – selecting species for the pollinator roles will help achieve this. Identify any desirable shrub or forb species that do not establish well from seed and assess whether transplanting of seedlings will be achievable.

- *Promote native species present at the site that* are naturally-occurring in the area. Review the species list in the Appendix to identify native species with high FIA C-Values. Examples include prickly poppy (*Argemone* sp.), white heath aster, and western wheatgrass. FIA C-Values are explained in Section 3.6.2 on pages 13-14 and the site species lists with C-Values are provided in Appendix A, pages 39-43.
- *Create Interpretive Signage* about the role of short-grass prairie ecosystems in Colorado's Front Range and their importance to pollinators and other wildlife species native to the area.

4.4.3 Wildlife & Habitat Conservation Measures

4.4.3.1 Markel Open Space Wildlife & Habitat Conservation Measures

The following conservation measures are specifically related to resources found on the Markel Open Space:

- To reduce human-coyote interactions, add Broomfield's standard coyote signage at trailheads to inform trail users of the leash requirements for dogs throughout Broomfield. A coyote was documented on the Markel Open Space during the site visit. It is recognized that coyotes pass through all areas of Broomfield.
- Consider implementing nest protections, such as seasonal trail closures, after consulting the City and County of Broomfield's Raptor Management Plan. A nest has historically been occupied by a great-horned owl near Community Ditch at the location noted on *Map 5 - Markel Open Space Conservation and Restoration Opportunities.*
- Remove unnecessary fencing within the parcel that poses a threat to wildlife, such as abandoned grazing fences. When new fencing is necessary, use the CPW's Fencing with Wildlife in Mind specifications or the Broomfield open space split rail fence (Hanopy 2009). Fencing on the Markel Open Space was noted during surveys and interior fencing is not needed for the new uses of the Open Space.
- Limit disturbance within wetlands and riparian zones from human encroachment by locating trail construction away from these sensitive areas on the Markel Open Space to the extent possible. Currently, two wetlands exist on the Open Space.
- To the extent possible, preserve the intactness of the land and minimize habitat fragmentation by maintaining large blocks of undisturbed core habitat throughout the properties and consolidate trails into a smaller area.
- Maintain large cottonwood trees and any tree snags on the open space property for raptors and bats.

Map 5 - Markel Open Space Conservation and Restoration Opportunities.

4.4.4 Wottge Open Space

A combination of vegetation restoration/enhancement, wildlife habitat enhancement features, and habitat conservation measures can be implemented on the Wottge Open Space. *Table 10* below summarizes the types of actions that may be taken and the sections where information is located for the measures.

Table 10 – Property-Specific Actions for the Wottge Open Space.

Property	Opportunity	Details	Section Reference
Wottge	Habitat Enhancement	Restore wet drainage on the south side of Property and the north side.	Section 4.4.2.1
		Restore or enhance grasslands	Section 4.4.2.2
	Wildlife Habitat Enhancement Features	Bluebird Boxes	Section 4.2.2
		Pollinator Habitat Enhancement	Section 4.2.3
	Wildlife and Habitat Conservation Measures	Various measures related to fencing, signage, etc.	Section 4.4.2.3

4.4.5 Habitat Restoration or Enhancement

4.4.5.1 Wottge Open Space Habitat Creation

The Wottge Open Space contains a wet drainage that runs from the southwest corner to the southeast corner and is fed by precipitation accumulating in a pond on an adjacent property to the west, Dillon Pointe. Historically, this adjacent property was a private farm with permeable land surrounding the pond and a drainage directing water onto the Wottge Open Space. Water flow from the adjacent property onto the Wottge Open Space was likely intermittent following springtime or big storm events. Additionally, the Wottge Open Space naturally slopes towards the southeast. In 2021, the adjacent property was sold and began conversion to a housing subdivision. A culvert directing collected water on the property drains directly onto the Wottge Open Space in the same location as the previous flows from the site to the west (*Figure 11*). During the field investigation conducted for this report, the culvert outlet area was inundated with several inches of water and the drainage on the Wottge Open Space was saturated within approximately the first 200-300 feet, traveling east from the outlet (*Figure 11*).

Figure 11 – A drainage culvert from the new housing subdivision located to the west of the Wottge Open Space that drains onto the property, creating wet conditions that could be used to create a new wetland feature on the property.

Wetland features were evaluated in this area and hydrology and some hydric plants were present, but hydric soils were not detected at the site. This area is not currently classified as a wetland, as hydric soils have not developed due to the area not being saturated for long periods of the year. The presence of the sloped topology and water source from the nearby housing subdivision presents an opportunity to create a natural wetland feature on the site that supports wildlife and plant diversity. Currently, the drainage contains primarily non-native plant species that thrive in wet conditions, such as Canada thistle, curly dock, perennial sowthistle, and prickly lettuce. The drainage location and extent of the potential wetland creation area can be viewed on *Map 6 - Wottge Open Space Conservation and Restoration Opportunities.*

Figure 12 – View of drainage on south side of Wottge Open Space.

- Short-term Goals:
  - *Treat noxious weed populations* in accordance with the property noxious weed management plan.
- Long-term Goals:
  - *Create diverse wetland vegetative communities by increasing species diversity* through the creation of site-specific seed mixes and planting lists, focusing on native species adapted to the area. Increase herbaceous cover diversity by adding more sedges, rush, and forb species. Plant riparian trees and shrubs, such as cottonwoods and willows, to introduce woody species to the site that provide vegetative strata diversity near the drainage corridor on the south end of the site. Currently, no trees or shrubs exist in this area.

4.4.5.2 Wottge Open Space Grasslands

The condition and composition of the grasslands located on the Wottge Open Space provide evidence of past disturbance, including agricultural land practices. The site currently is planted with winter wheat, and portions of the site will continue to be used for agricultural purposes in the future. The majority of the property is composed of non-native plant species, such as winter wheat, kochia, and Russian thistle. Diversity on the site was overall very limited given the site is currently in agricultural use.

Figure 13 – Aerial view of the Wottge Open Space grassland enhancement / restoration area located in the southwest corner of the parcel.

Similar to the Markel Open Space, the site was likely short- or mid-grass prairie in the past, which is characteristic of the drought-prone eastern plains of Colorado. A variety of graminoid species would dominate with intermixed forb species. Shrubs species may be present, but in a scattered or very low density. The site currently does not resemble the typical vegetative cover for this area and presents an opportunity for enhancement of the current vegetation.

It is recommended that shortgrass prairie ecosystems be restored through active measures in areas that will not continue to be used for agriculture. Based on conversations with the City and County of Broomfield, the current restoration efforts would be limited to the southwest corner of the parcel (*Map 6*, *Figure 13*). The current condition and presence of noxious vegetation throughout the site has significantly suppressed the native vegetation. To revert the vegetative structure to its natural state, active removal and suppression of the noxious, agricultural, and non-native vegetation is needed as well as actively seeding and introducing

native vegetation to the site through strategic planting and seeding efforts. Seeding will be the primary objective for revegetation efforts, but for key plant species that do not reproduce well from seed, transplanting of seedlings may be necessary. In the future, the site is planned to potentially be converted from agricultural use to more of a native grassland as budget and maintenance capability allows.

Varied degrees of restoration could be implemented as part of this process, as it is understood that continued farming will occur on the area north of the drainage in the immediate future, which will likely require the presence of winter wheat. However, the identified area is isolated from the rest of the agricultural areas by the wet drainage present along the north side of the restoration area. This may allow for a full restoration of the small tract of land. Depending on the level of effort and funding available, the City and County of Broomfield can implement small restoration activities, such as introducing more forb diversity on the site, in order to improve the overall conditions while still allowing trail use and agricultural practices to continue. Recommendations include:

- Short-term Goals:
    - *Plant native shrubs and forbs that can compete with existing vegetation.* It is advised this could be done without irrigation where feasible but irrigation may be necessary in some locations. Water conservation and weed management will be balanced with irrigation needs for survivability of the plantings.

    - *Treat noxious weeds that are listed by the state of Colorado* in accordance with the noxious weed management plan. This has been ongoing and there is an existing Weed Management Plan for Wottge Open Space.
- Long-term Goals:
    - *Enhance and restore native prairie communities by increasing vegetative diversity* through development of a site-specific seed list based upon reference documents for species found within the short grass prairie. Use a diversity of graminoid and herbaceous forb species, selecting plants for their establishment, habitat and pollinator attributes. The short grass prairie ecosystem should support a rich and vibrant pollinator habitat – selecting species for the pollinator roles will help achieve this. Identify any desirable shrub or forb species that do not establish well from seed and assess whether transplanting of seedlings will be achievable.

    - *Promote native species existing at the site that* are naturally-occurring in the area. Review the species list in the Appendix to identify native species with high FIA C-Values. Examples include prickly poppy (*Argemone* sp.), white heath aster, and western wheatgrass. FIA C-Values are explained in Section 3.6.2 on pages 13-14 and the site species lists with C-Values are provided in Appendix A, pages 39-43.

    - *Create Interpretive Signage* about the role of short-grass prairie ecosystems in Colorado's Front Range and their importance to pollinators and other wildlife species native to the area.

- *Plan for maintenance and management of the site* to ensure that conditions remain favorable for the establishment and continuing vigor of native plant communities. It may be helpful to have an irrigation system in place following revegetation activities to provide water as needed to establish and support continued plant growth.

Map 6 - Wottge Open Space Conservation and Restoration Opportunities.

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Natural Resources Report Appendix A – Species Documented

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Amaranthaceae: Goosefoot Family									
Amaranthus retroflexus	Redfoot amaranth			X	Non-native		0	forb	annual
Chenopodium album	White goosefoot		X	X	Non-native		0	forb	annual
Kochia scoparia	Kochia		X	X	Non-native		0	forb	annual
Salsola tragus	Russian thistle			X	Non-native		0	forb	annual
***Apocynaceae*: Dogbane Family**									
Asclepias speciosa	Showy milkweed		X		**Native**		3	forb	perennial
Asteraceae: Aster Family									
Ambrosia artemisiifolia	Annual ragweed			X	**Native**		1	forb	annual
Carduus nutans	Musk thistle		X	X	Non-native	List B Noxious Weed	0	forb	biennial
Cichorium intybus	Chicory			X	Non-native	List C Noxious Weed	0	forb	biennial
Cirsium arvense	Canada thistle		X	X	Non-native	List B Noxious Weed	0	forb	perennial
Dyssodia papposa	Fetid marigold		X		**Native**		2	forb	annual
Erigeron canadensis	Horseweed		X	X	**Native**		1	forb	annual
Euthamia occidentalis	Western goldenrod		X		**Native**		4	forb	perennial
Grindelia squarrosa	Curly cup gumweed		X		**Native**		3	forb	annual

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Helianthus annuus	Common sunflower		X	X	**Native**		1	forb	annual
Helianthus petiolaris	Prairie sunflower			X	**Native**		2	forb	annual
Lactuca serriola	Prickly lettuce		X	X	Non-native		0	forb	annual
Sonchus arvensis	Perennial sowthistle			X	Non-native	List C Noxious Weed	0	forb	perennial
Symphyotrichum ericoides	White heath aster		X		**Native**		4	forb	perennial
***Brassicaceae*: Mustard Family**									
Descurainia sophia	Flixweed		X	X	Non-native		0	forb	annual
Caprifoliaceae: Honeysuckle Family									
Symphoricarpos albus	White snowberry		X	X	**Native**		6	shrub	perennial
***Convolvulaceae*: Morning Glory Family**									
Convolvulus arvensis	Field bindweed		X	X	Non-native	List C Noxious Weed	0	vine	perennial
***Cupressaceae*: Cypress Family**									
Juniperus scopulorum	Rocky Mountain juniper			X	**Native**		5	shrub	perennial
***Cyperaceae*: Sedge Family**									
Carex nebrascensis	Nebraska sedge		X		**Native**		5	sedge	perennial
Cyperus odoratus	Flatsedge		X		**Native**		2	sedge	annual
***Elaeagnaceae*: Oleaster Family**									

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Elaeagnus angustifolia	Russian olive		X		Non-native	List B Noxious Weed	0	shrub	perennial
***Fabaceae*: Pea Family**									
Amorpha fruticosa	False indigo bush		X		**Native**		7	shrub	perennial
Medicago sativa	Alfalfa		X	X	Non-native		0	forb	annual
***Grossulariaceae*: Gooseberry Family**									
Ribes aureum	Golden currant		X		**Native**		6	shrub	perennial
***Juncaceae*: Rush Family**									
Juncus arcticus	Baltic rush		X		**Native**		4	rush	perennial
***Oleaceae*: Olive Family**									
Fraxinus pennsylvanica	Green ash		X		Non-native		0	tree	perennial
***Papaveraceae*: Poppy Family**									
Argemone sp.	Prickly poppy	A. hispida and A. polyanthemos both occur in this region.		X	**Native**		4	forb	perennial
***Plantaginaceae*: Plaintain Family**									
Plantago major	Common plantain		X		Non-native		0	forb	perennial
***Poaceae*: Grass Family**									
Agropyron cristatum	Crested wheatgrass		X	X	Non-native		0	grass	perennial
Agrostis gigantea	Redtop		X	X	Non-native		0	grass	perennial
Bromus inermis	Smooth brome		X	X	Non-native		0	grass	perennial

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Echinochloa crus-galli	Barnyard grass		X	X	Non-native		0	grass	annual
Panicum capillare	Witchgrass		X	X	**Native**		1	grass	annual
Pascopyrum smithii	Western wheatgrass		X	X	**Native**		5	grass	perennial
Triticum aestivum	Winter wheat		X	X	Non-native		0	grass	annual
***Polygonaceae*: Buckwheat Family**									
Persicaria lapathifolia	Pale smartweed			X	**Native**		2	forb	annual
Polygonum aviculare	Prostrate knotweed		X	X	Non-native		0	forb	annual
Rumex crispus	Curly dock		X	X	Non-native		0	forb	perennial
***Portulacaceae*: Purslane Family**									
Portulaca oleracea	Common purslane			X	Non-native		0	forb	annual
***Salicaceae*: Willow Family**									
Populus angustifolia	Narrowleaf Cottonwood		X		**Native**		5	tree	perennial
Populus deltoides	Plains cottonwood		X	X	**Native**		4	tree	perennial
***Solanaceae*: Nightshade Family**									
Solanum rostratum	Buffalo bur			X	**Native**		2	forb	annual
Typhaceae: Cattail Family									
Typha angustifolia	Narrowleaf cattail		X		Cryptogenic		1	forb	perennial
***Ulmaceae*: Elm Family**									
Ulmus pumila	Siberian elm			X	Non-native	State Watch List	0	tree	perennial

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Verbenaceae: Vervain Family									
Verbena bracteata	Bigbract verbena			X	Native		2	forb	annual

Documented Wildlife Species		
BIRDS		
Scientific Name	Common Name	Comment
Buteo jamaicensis	Red-tailed hawk	Pair observed on Markel Open Space 8/31/22, Juvenile seen on Wottge Open Space 9/2/2022
Buteo swainsoni	Swainson's hawk	Pair observed on Wottge Open Space 9/2/22
Colaptes auratus	Northern flicker	
Corvus brachyrhynchos	American crow	
Cyanocitta cristata	Blue jay	
Falco sparverius	American kestrel	Observed on Markel Open Space 8/31/22, heard on Wottge 9/2/22
Haemorhous mexicanus	House finch	
Hirundo rustica	Barn swallow	
Pica hudsonia	Black-billed magpie	
Picoides villosus	Hairy woodpecker	
Pooecetes gramineus	Vesper sparrow	
Quiscalus quiscula	Common grackle	
Sayornis saya	Say's phoebe	
Spinus psaltria	Lesser goldfinch	
Spinus tristis	American goldfinch	
Tyrannus verticalis	Western kingbird	
Zenaida macroura	Mourning dove	
MAMMALS		
Scientific Name	Common Name	Comment
Canis latrans	Coyote	Seen on Markel Open Space 9/26/2022

APPENDIX 3 - WETLAND DELINEATION REPORT

Markel & Wottge Open Space Properties

Wetland Delineation Report

City and County of Broomfield

August 2023

Prepared For:
The City and County of Broomfield

Prepared By:
DHM DESIGN

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LIST OF ACRONYMS

AOI	Area of Interest
CNHP	Colorado Natural Heritage Program
FAC	Facultative. Equally likely to occur in wetlands and nonwetlands
FACU	Facultative Upland. Usually occur in non-wetlands but occasionally found in wetlands.
FACW	Facultative Wetland. Usually occur in wetlands but occasionally found in non-wetlands.
GNSS	Global Navigation Satellite System
HUC	Hydrologic Unit Code
MU	Map Units
NAIP	National Agriculture Imagery Program
NHD	National Hydrography Dataset
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	Obligate. Occur almost always under natural conditions in wetlands.
PEM1C	Palustrine Emergent Persistent Wetland
PRBKrx	Palustrine Rock Bottom Artificially Flooded Artificial Substrate Excavated
PUBFx	Palustrine Unconsolidated Bottom Semipermanently Flooded Excavated Wetland
R4SBC	Riverine Intermittent Streambed Seasonally Flooded Wetland
USACE	U.S. Army Corps of Engineers
USNVC	U.S. National Vegetation Classification

Executive Summary

DHM Design Corporation (DHM), under contract to the City and County of Broomfield, conducted an aquatic resource delineation (delineation) August 31st, September 2nd, September 26th, and November 11th, 2022. The purpose of the delineation is to identify wetland resources within the established Project Areas located within the Markel and Wottge Open Spaces. Wetland boundaries and characteristics were assessed to help evaluate the project's potential impacts on wetlands and to determine appropriate compensation for unavoidable wetland impacts as required by the U.S. Army Corps of Engineers (USACE). This wetland delineation was conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains* (Version 2.0) (USACE 2010).

One wetland type consisting of approximately 0.16 acres was identified and delineated during the field assessment for the Wottge and Markel Open Spaces. The wetland type observed was the seasonally flooded palustrine persistent emergent wetlands, located around the Markel Open Space Pond and in a depression near the plugged and abandoned well site in the northeast corner of the Markel Property. Other potential aquatic resources on the Properties include the Markel Pond, a shallow constructed detention pond on Wottge Open Space, and a ditch on the Markel Open Space.

1 Introduction

1.1 Survey Area Description

The survey area included the entirety of probable wetland habitat within the Markel Open Space (south parcel) and the Wottge Open Space (north parcel) as outlined in National Wetlands Inventory (NWI) and National Hydrography Dataset (NHD) GIS data.

1.2 Objective

This report presents the results of a delineation of aquatic resources found inside the Markel Open Space and Wottge Open Space. This report facilitates efforts to:

1. Avoid or minimize impacts to aquatic resources
2. Document aquatic resource boundaries for review by regulatory authorities
3. Provide background information

The aquatic resources delineated and described in this report may be subject to regulation by the USACE under Section 404 of the Federal Clean Water Act. Delineation results are subject to change pending USACE review and determination.

1.3 Location & Directions to Survey Areas

The Project Area is located within the City and County of Broomfield (*Map 1 – Project Location*). There are multiple access locations for the project. The South Parcel (Markel Open Space) can be accessed along Aspen Street, 136th Avenue and Foxridge Drive. The North Parcel (Wottge Open Space) can be accessed at the end of Stony Brook Drive, Dillon Road, or Sheridan Boulevard. The legal description for the open space properties is included below:

Location	Parcel Number
Markel Open Space (south parcel)	157524440002
Wottge Open Space (north parcel)	157524139001

Location	Latitude/Longitude
Markel Open Space (south parcel)	39.944868°N, 105.061283°W
Wottge Open Space (north parcel)	39.954872°N, -105.055444°W

County, State: Broomfield County, Colorado

Legal Description: Section 24; Township 1S; Range 69W

U.S. Geological Survey (USGS) 7.5 Minute Quadrangle: Broomfield County, CO

This Project was divided into two planning parcels. These parcels share the same general geomorphological characteristics, ecological conditions, and land ownership types. The north parcel is named the Wottge Open Space for Bernhard “Ben” Wottge who purchased this land in 1955. It is bordered by West Dillon Road and the Community Ditch waterway to the north, Sheridan Boulevard to the east, and private residential land to the south and west. Seeps from Nissen Reservoir Number 2 in the Dillon Point project to the northwest drain into the southeast portion of the parcel.

The south parcel is named the Markel Open Space after Jean and Bill Markel who purchased the property in 1968. It is bordered by private residential property to the north, school district property to the east, 136th Avenue to the south, and Aspen Street to the east. The Community Ditch Runs along the southwest boundary of the parcel. All results presented here are organized according to these two parcels.

All results presented here are organized according to these two parcels.

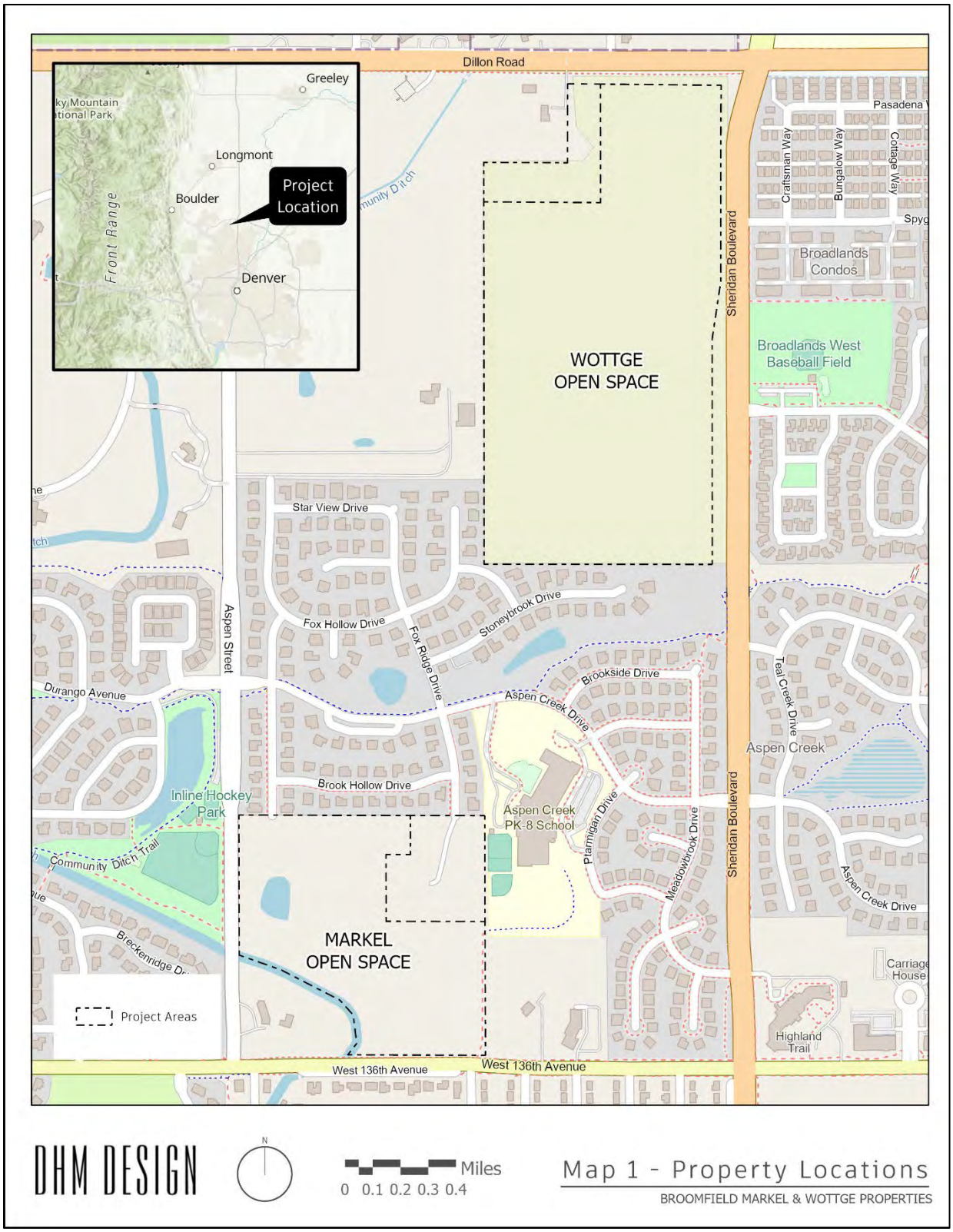
2 Methods

2.1 Data Review

To initiate the delineation, DHM Design Ecological Services staff completed a comprehensive desktop analysis to assess and evaluate existing data for the property. This analysis provides the most available resource data to date, including but not limited to:

- U.S. National Vegetation Classification (USNVC) Standard, Version 2 (2008)
- Colorado Natural Heritage Program (CNHP) CODEX Tool (2022)
- Natural Resources Conservation Service (NRCS) Geospatial Data Gateway (2020)
- NWI Wetland Mapper (USFWS) 2020
- NHD Data 2020
- NRCS Web Soils Mapper (2020)
- Google Earth Imagery
- NRCS National Agriculture Imagery Program (NAIP) aerial photographs

Map 1 - Property Locations.



2.2 Field Survey

2.2.1 Survey Dates

The delineation was conducted for both properties on August 31st, September 2nd, September 26th, and November 11th 2022 by Melissa Belmar and Caroline Hildebrand of DHM Design Ecological Services.

2.2.2 Wetland Delineation

Wetlands were delineated based upon vegetation, soils, and hydrology using the approach outlined in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains.* Data was collected at paired sample points to determine wetland boundaries. Data sheets were completed for representative sample points, although additional sampling was conducted as needed to refine the delineator's understanding of the wetland boundaries. A determination of hydric soils was made based upon guidance provided in *Field Indicators of Hydric Soils in the United States, Guide for Identifying and Delineating Hydric Soils* (NRCS 2017a). A Munsell soil color chart was used to determine soil color. Large rock and compacted rock/sand layers were sometimes encountered below the ground surface, which restricted the depth of soil pits. Vegetation cover (absolute canopy cover) by species was estimated in representative plots around each sample point. After evaluating the vegetation, soils, and hydrology, the boundaries of the wetlands were extrapolated by following contours, wetland vegetation boundaries, and/or clear hydrologic boundaries.

Wetland determination data forms were completed at 11 sample points. Additional soil pits were dug as needed to assist in the determination of wetland boundaries and not recorded. DHM-mapped wetland boundaries and sample site (SS) locations using handheld iPads connected to an external Global Navigation Satellite System (GNSS) Arrow 100 receiver. Submeter accuracy was achieved and, in most instances, accuracy ranged from 6.5 inches to 1.5 feet. The GIS data was incorporated onto aerial photography at a scale of 1-inch equals 200 feet. Photos of representative wetlands are included in Appendix B.

3 Existing Conditions

3.1 Geographic Setting

The Project is located in the City of Broomfield in Broomfield County (*Map 1 – Project Location*). The overall Project Area is approximately 98 acres in size and is situated at approximately 5,300-5,400 feet in elevation. The Markel Open Space totals approximately 30 acres in size and slopes gently from the southwest to the northeast. The Wottge Open Space covers approximately 70 acres and slopes gently from west to east, with very little elevation change.

3.2 Hydrology

Community Ditch and the man-made pond are the primary hydrological features in the project vicinity. Community Ditch is located outside of the project boundary and Markel Pond is located on the west side of the Markel Open Space. There is also a small pond located at the northeast corner of the Markel Open Space. This section of Community Ditch is located within the Hydrologic Unit Code (HUC) 12 Middle Big Dry Creek Catchment (10190030407) of the HUC 10 Big Dry Creek-South Platte River Watershed

(10109000304). *Map 2 – Hydrology and Wetlands* provides the NHD for the vicinity of the project areas, including features that travel through the properties.

Community Ditch borders the southwest side of the Markel Open Space, but is located outside of the property boundary. Community Ditch also flows just outside of the northern boundary of the Wottge Open Space, through an underground culvert. Community Ditch travels north approximately 15 miles and ends in a housing subdivision located north of Erie and just west of Interstate 25. Little Dry Creek is a tributary to Community Ditch and begins near the Weld and Broomfield County border. Little Dry Creek eventually connects to the South Platte River. Due to its location outside of the property's boundary, it was not further evaluated for the project.

3.3 Soils

A total of five mapped NRCS soil map units (MU) are located within two parcels and are shown in *Map 3 – Soils Data* and are listed below in *Table 1*. The soil types on both parcels are classified as predominantly Nunn clay loam (95% of site area). This soil is formed on terraces, is well-drained, and has a runoff class of medium. The depth to water table for Nuun clay loam is typically 80 inches. This soil is non-saline to very slightly saline, with a high available water supply. It is recommended that soil analysis be completed prior to restoration efforts to fully understand the composition and state of the soils in the area.

Table 1 – NRCS-Mapped Soil Units within Broomfield Trails and Open Space Project Area.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CoC	Colby silty clay loam, 3 to 5 percent slopes	3.7	4.2%
NuB	Nunn clay loam, 1 to 3 percent slopes	74.7	85.6%
NuC	Nunn clay loam, 3 to 5 percent slopes	7.5	8.6%
RnD	Renohill silty clay loam, 3 to 9 percent slopes	1.4	1.6%
WoC	Weld-Colby complex, 3 to 5 percent slopes	0.0	0.0%
	Totals for Area of Interest	87.3	100.0%

3.4 Plant Communities

The land encompassing the Project Area is largely associated with upper great plains community types with transitional riparian community types along the agricultural ditches and the pond. These two categories are primarily distinguishable by land form and positioning in relation to these waterways. More information about the plant communities at the site can be found in the site's Natural Resources Assessment Report.

Map 2 - Hydrology and Wetlands Data.

Map 3 - Soils Data.

4 Results

Delineated aquatic resources on the Properties include approximately 3,442 feet of an unnamed irrigation lateral that drains into Markel Pond (0.45 acres) on the Markel Open Space. An excavated detention pond totaling 0.04 acres is located on the Wottge Open Space on the western boundary between the Wottge Open Space and a newly developed subdivision. See *Map 4* and *Table 2* for the location and details regarding the open water resources identified on both properties.

Vegetated wetlands include 0.16 acres of palustrine emergent wetlands present around Markel Pond and surrounding a depressional area that is a plugged and abandoned well site, also located on the Markel Property. See *Map 4* and *Table 2* for the location and details regarding the wetland resources identified on Markel Open Space. The Wottge Property did not contain any wetland features, but did contain a wet drainage that was not identified as a wetland due to a lack of hydric soil indicators and a historic wetland swale that lacked hydrophytic vegetation and also would not be classified as a wetland.

Table 2 – Aquatic Resources Present Within the Project Area.

Aquatic Resources	Cowardin Type*	Latitude	Longitude	Length (lf.)	Area (ac)
Wetlands					
Wetland 1 (Markel Open Space)	PEM1C - Palustrine Emergent Persistent	39.946	-105.0617	-	0.1
Wetland 2 (Markel Open Space)	PEM1C - Palustrine Emergent Persistent	39.947	-105.0579	-	0.06
			Total	0	0.16
Open Water					
Markel Pond	PUBFx - Palustrine Unconsolidated Bottom Semipermanently Flooded Excavated	39.946	-105.062	-	0.46
Markel Ditch	R4SBC - Riverine Intermittent Streambed Seasonally Flooded	39.943	-105.059	3,442	0.15
Wottge Pond	PRBKrx - Palustrine Rock Bottom Artificially Flooded Artificial Substrate Excavated	39.952	-105.0575	-	0.04
			Total	3,442	0.65

**Refers to the Cowardin classification of wetlands names and codes used by the U.S. Fish and Wildlife Service for the National Wetlands Inventory. In this system, wetlands are classified by landscape position, vegetation cover and hydrologic regime. The Cowardin system includes five major wetland types: marine, estuarine, lacustrine, palustrine and riverine.*

4.1 Riverine

4.1.1 Markel Open Space Agricultural Ditches

Several agricultural ditches are present on the Markel Open Space (*Map 4 – Delineated Aquatic Resources Map*). The main ditch, located on the south-central portion of the open space, travels east and connects to a ditch along 136th Avenue, and also travels northwest, and drains into the Markel Pond. The ditch that travels northwest comes to a "Y" intersection where the western offshoot drains to the pond and the northern offshoot was completely dry and vegetated during the site visit. The northern offshoot is not

considered in the total length and area of aquatic resources for this project, as it did not contain water and was densely vegetated during the site visit, indicating it had not been used for water conveyance recently.

Assessment of Potential Jurisdictional Status

The drainage ditches on the Markel Open Space are connected to Community Ditch, which travels north approximately 15 miles and ends in a housing subdivision located north of Erie and just west of Interstate 25. Little Dry Creek is a tributary to Community Ditch and begins near the Weld and Broomfield County border. Little Dry Creek eventually connects to the South Platte River. The USACE is likely to consider Community Ditch jurisdictional, however, it is uncertain if the agricultural ditches on the property would be considered jurisdictional. If impacts to the agricultural ditches are expected, it is recommended USACE be contacted to determine jurisdictional status.

4.2 Lacustrine

4.2.1 Markel Pond

The Markel Pond is a small, man-made pond totaling about 0.45 acres. It is fed by an unnamed ditch that connects the Community Ditch to the pond from the south side of the pond. The City and County of Broomfield indicated the pond is filled approximately twice annually by releasing waters from the Community Ditch. The average annual depth of the pond is uncertain. Aquatic vegetation and fish species were noted in the pond during the site visit in September.

4.2.2 Wottge Detention Pond

The detention pond located on the Wottge Open Space totals approximately 0.04 acres. The pond was excavated to store water runoff from the adjacent property that contains a new housing development. No wetland vegetation was noted and the feature is contained by cement berms and rocky substrates (*Appendix B - Photos 23 & 24*).

4.3 Wetlands

One wetland type consisting of approximately 0.16 acres was identified and delineated during the field assessment for the Wottge and Markel Open Spaces. The wetland type observed was the seasonally flooded palustrine persistent emergent wetlands, located around the Markel Open Space Pond and in a depression in the northeast corner of the Markel Property. The location and extent of the wetland can be viewed on *Map 4 - Delineated Aquatic Resources Map*. Additionally, *Map – 2 Hydrology and Wetlands Data Map* contains USFWS-mapped NWI data. Many of the features in the NWI dataset were not present at the time of the field site visit, including a large wetland historically mapped on the Markel Open Space. The drainage running through the south side of the Wottge Open Space was found to be present but was not considered to be a wetland due to a lack of hydric soils. Several other features were investigated and also deemed to not be wetlands.

4.3.1 Markel Open Space

Palustrine Emergent Wetlands

The 0.1 acres of palustrine emergent wetlands comprise the dominant wetland features in the survey area and are located around the Markel Open Space Pond (Wetland 1) and in the depression near the plugged and abandoned well site in the northeast corner of the Markel Property (Wetland 2). A total of six sample points (SP 1, 2, 3, 9, 11, 12) were taken in the areas to evaluate and confirm the absence or presence of a wetland See *Map 4 - Delineated Aquatic Resources Map* and *Appendix B - Photo Documentation (Photos 1 – 3)* for wetland location and representative photos. The extents of Wetland 1 around the Markel Open Space Pond are limited by where the hydrology of the pond permits the establishment of emergent wetland vegetation. As such, the extent of wetlands inward toward the center of Markel Pond may fluctuate seasonally. During the site visit, completely inundated vegetation was seen in the pond and was not included in the wetland delineation. If exposed, these areas would be considered a wetland and should not be disturbed (*Appendix B - Photo Documentation [Photo 5]*). Wetland 2 is comprised of 0.06 acres of palustrine emergent wetlands located in a man-made depression near a plugged and abandoned well site in the landscape in the northeast corner of the Markel Open Space property and apparently experiences fluctuations in water inundation. Inundation of Wetland 2 was observed during the first site visit in late August, but during delineations in November the wetland was completely dry.

Wetland 1 was dominated by narrowleaf cattail (*Typha angustifolia*) (OBL), forming dense monocultures in the wetland buffers along the banks of the pond. In other areas, higher quality wetland benches are found, consisting primarily of hydrophytic graminoids, including Nebraska sedge (*Carex nebrascensis*) (OBL), Baltic rush (*Juncus arcticus*) (FACW), showy milkweed (FAC), western goldenrod (*Euthamia occidentalis*) (OBL), and scattered false indigo bush (*Amorpha fructicosa*) (FACW). Plants within Wetland 2 on the northeast parcel of the Markel Property include curly dock (*Rumex crispus*) (FAC), redtop (*Agrostis gigantea*) (FACW), and flatsedge (*Cyperus odoratus*) (FACW).

4.4 Other Areas

Other areas with signs of hydrology were identified but ultimately were not considered wetlands due to not meeting all three wetland criteria.

4.4.1 Wottge Open Space Wet Drainage

The Wottge Open Space contains a wet drainage that runs from the southwest corner to the southeast corner and is fed by precipitation accumulating in a man-made retention pond on an adjacent property to the west, called Nissen Reservoir #2 in the NHD data. Historically, this property was a private farm with permeable land surrounding the pond and a drainage directing water onto the Wottge Open Space. This drainage flows west to east and merges with Equity Ditch to the east of Sheridan Boulevard. Equity Ditch then flows north and merges with Community Ditch at the intersection of Sheridan Boulevard and 144th Avenue.

Water flow from the adjacent property onto the Wottge Open Space was likely intermittent following springtime or big storm events. Additionally, the Wottge Open Space naturally slopes towards the southeast, and irrigation activities on the property likely contributed to water traveling in a similar path off the property. In 2021, the adjacent property was sold and began conversion to a housing subdivision with impervious surfaces. A culvert directing collected water on the property drains directly on to the Wottge

Open Space (*Appendix B - Photo Documentation [Photos 23 – 24]*). Currently, the culvert outlet area is inundated with several inches of water and the drainage on the Wottge Open Space is saturated within approximately the first 200-300 feet, traveling east.

A total of four sample points (SP 4, 5, 6, 9) were taken in the drainage area to evaluate and confirm the absence or presence of a wetland (*Map 4- Delineated Aquatic Resources Map* and *Appendix B - Photo Documentation [Photos 17 - 22]*). Wetland features were evaluated in this area and hydrology and some hydric plants were present, but hydric soils were not detected at the site. It was determined to not be a wetland, as hydric soils have not developed due to the area not being saturated for long periods of the year. Currently, the drainage contains primarily non-native plant species that thrive in wet conditions, such as Canada thistle (*Cirsium arvense*) (FACU), perennial sowthistle (*Sonchus arvensis*) (FAC), field bindweed (*Convolvulus arvensis*)(NI), chicory (*Cichorium intybus*) (FACU), curly dock (FAC), and prickly lettuce (*Lactuca serriola*) (FAC). Other species present included curlytop knotweed (*Persicaria lapathifolia*) (OBL), witchgrass (*Panicum capillare*) (FAC), cereal rye (*Secale cereale*) (NI), and common sunflower (*Helianthus annuus*) (FACU).

4.4.2 Other

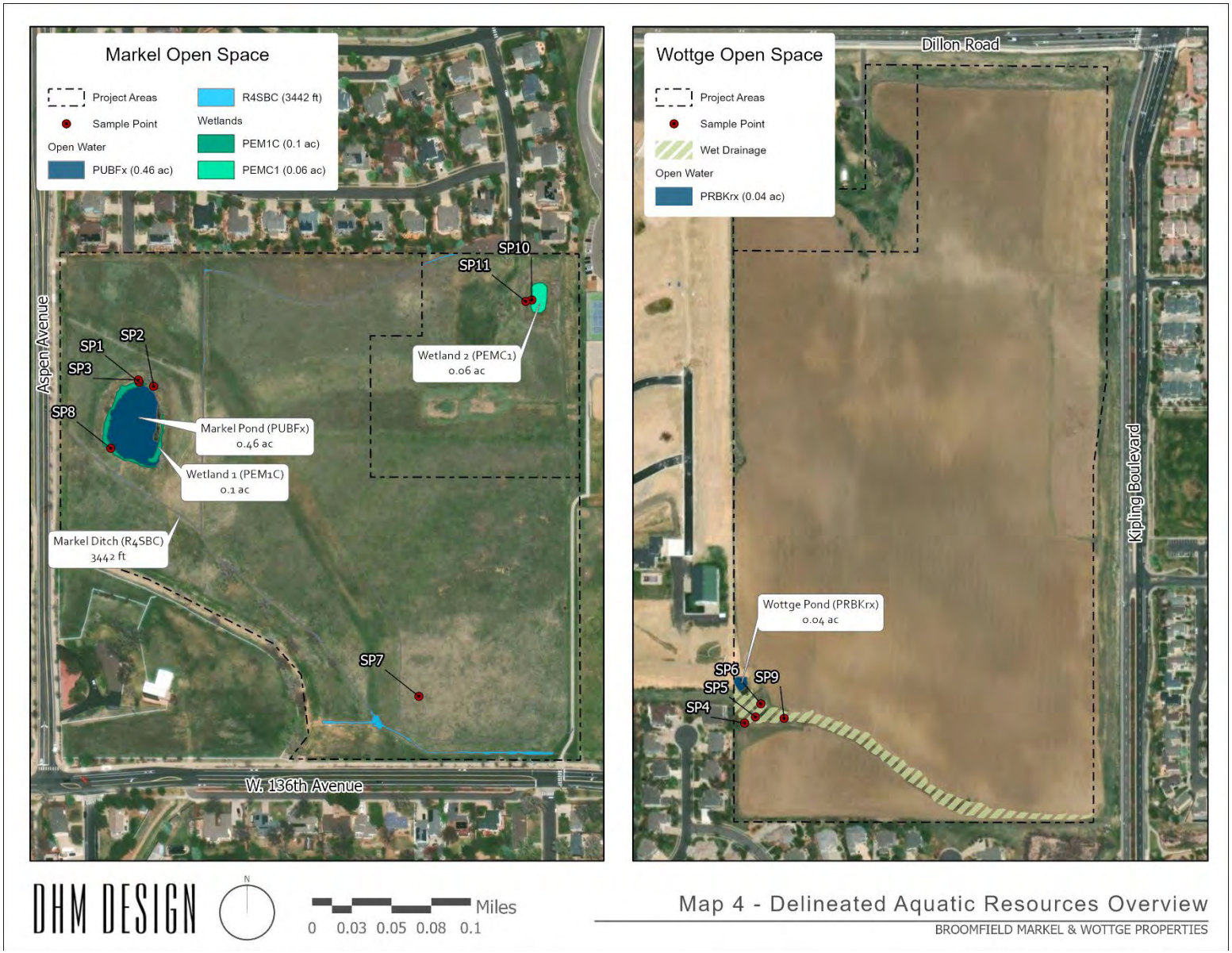
Several drainage ditches were located on the Markel Open Space, along the southern border and traveling through the central part of the property to the south side of the Markel Pond and also connecting to Community Ditch on the southwest side of the Markel Open Space. Some wetland vegetation, including Nebraska sedge, was seen at the bottom of one ditch (*Map 4 - Delineated Aquatic Resources Map* and *Appendix B - Photo Documentation [Photo 13]).* However, due to the location being at the bottom of a ditch, it was not further evaluated. No other ditches appeared to have wetland vegetation present.

A small patch of Nebraska sedge was found in the southeast corner of the Markel Open Space and a sample point (SP7) confirmed the area did not qualify as a wetland. Wetland soils and hydrology were not documented at this location (*Map 4 - Delineated Aquatic Resources Map* and *Appendix B - Photo Documentation [Photo 15]).*

Wetlands appeared to be present along the deeply sloped sides of the Community Ditch, located just outside of the Markel Open Space Property boundary. These areas were not delineated as they were identified as outside of the project boundaries by the City and County of Broomfield.

Additional areas evaluated on the Wottge Open Space included a depression along Sheridan Blvd (*Appendix B - Photo Documentation [Photo 27])*. Field investigation found the area was primarily composed of upland grass, kochia (*Kochia scoparia*) (FACU), field bindweed, and Russian thistle (*Salsola tragus*) (FACU). Another area investigated was the northern boundary, where Community Ditch is mapped in the NHD data to travel through. Field investigation found this area to be composed of upland grasses and Kochia, with no signs of water or inundation (*Appendix B - Photo Documentation [Photo 28]).* Lastly, an area more centrally located in the Wottge Open Space was reviewed due to it appearing wet on aerial imagery. Once reviewed in the field, it was obvious that the area was upland as it contained primarily cereal rye and kochia (*Appendix B - Photo Documentation [Photo 29])*. No sample points were taken here, as it was obvious that it would not be identified as a wetland due to its lack of hydrophytic vegetation.

Map 4 – Delineated Aquatic Resources Overview.



5 Conclusions

An aquatic resource delineation was conducted in August and September, 2022 to identify wetland and water resources within the established Project Areas located within the Markel and Wottge Open Spaces. Wetland boundaries and characteristics were assessed to help evaluate the project's potential impacts on wetlands and to determine appropriate compensation for impacts. Surveys determined one wetland type consisting of approximately 0.16 acres to be present on Markel Open Space and no wetlands to be present on Wottge Open Space. The wetland type observed was the seasonally flooded palustrine persistent emergent wetlands, located around the Markel Open Space Pond and in a depression in the northeast corner of the Markel Property. Other potential aquatic resources on the Properties include the Markel Pond itself, a shallow constructed detention pond on Wottge Open Space, and a ditch on the Markel Open Space. Several other areas with signs of hydrology were identified, but ultimately the features were not considered wetlands due to not meeting all three wetland criteria.

Current plans for both properties do not include any impacts to identified wetland or water resources on the sites, and therefore no further action is needed. However, a fishing and educational deck will potentially be built over a small portion of a wetland on the Markel Property surrounding the Markel Pond. If this portion of the plan is pursued, further consultation with the USACE may be required depending on the anticipated impacts. If any other plan changes occur and impacts are expected to wetland or water resources, further consultation with the USACE will be required.

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Wetland Delineation Report Appendix A – Documented Species

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Amaranthaceae: Goosefoot Family									
Amaranthus retroflexus	Redfoot amaranth			X	Non-native		0	forb	annual
Chenopodium album	White goosefoot		X	X	Non-native		0	forb	annual
Kochia scoparia	Kochia		X	X	Non-native		0	forb	annual
Salsola tragus	Russian thistle			X	Non-native		0	forb	annual
***Apocynaceae*: Dogbane Family**									
Asclepias speciosa	Showy milkweed		X		**Native**		3	forb	perennial
Asteraceae: Aster Family									
Ambrosia artemisiifolia	Annual ragweed			X	**Native**		1	forb	annual
Carduus nutans	Musk thistle		X	X	Non-native	List B Noxious Weed	0	forb	biennial
Cichorium intybus	Chicory			X	Non-native	List C Noxious Weed	0	forb	biennial
Cirsium arvense	Canada thistle		X	X	Non-native	List B Noxious Weed	0	forb	perennial
Dyssodia papposa	Fetid marigold		X		**Native**		2	forb	annual
Erigeron canadensis	Horseweed		X	X	**Native**		1	forb	annual
Euthamia occidentalis	Western goldenrod		X		**Native**		4	forb	perennial
Grindelia squarrosa	Curly cup gumweed		X		**Native**		3	forb	annual

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Helianthus annuus	Common sunflower		X	X	**Native**		1	forb	annual
Helianthus petiolaris	Prairie sunflower			X	**Native**		2	forb	annual
Lactuca serriola	Prickly lettuce		X	X	Non-native		0	forb	annual
Sonchus arvensis	Perennial sowthistle			X	Non-native	List C Noxious Weed	0	forb	perennial
Symphyotrichum ericoides	White heath aster		X		**Native**		4	forb	perennial
***Brassicaceae*: Mustard Family**									
Descurainia sophia	Flixweed		X	X	Non-native		0	forb	annual
Caprifoliaceae: Honeysuckle Family									
Symphoricarpos albus	White snowberry		X	X	**Native**		6	shrub	perennial
***Convolvulaceae*: Morning Glory Family**									
Convolvulus arvensis	Field bindweed		X	X	Non-native	List C Noxious Weed	0	vine	perennial
***Cupressaceae*: Cypress Family**									
Juniperus scopulorum	Rocky Mountain juniper			X	**Native**		5	shrub	perennial
***Cyperaceae*: Sedge Family**									
Carex nebrascensis	Nebraska sedge		X		**Native**		5	sedge	perennial
Cyperus odoratus	Flatsedge		X		**Native**		2	sedge	annual
***Elaeagnaceae*: Oleaster Family**									

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Elaeagnus angustifolia	Russian olive		X		Non-native	List B Noxious Weed	0	shrub	perennial
***Fabaceae*: Pea Family**									
Amorpha fruticosa	False indigo bush		X		**Native**		7	shrub	perennial
Medicago sativa	Alfalfa		X	X	Non-native		0	forb	annual
***Grossulariaceae*: Gooseberry Family**									
Ribes aureum	Golden currant		X		**Native**		6	shrub	perennial
***Juncaceae*: Rush Family**									
Juncus arcticus	Baltic rush		X		**Native**		4	rush	perennial
***Oleaceae*: Olive Family**									
Fraxinus pennsylvanica	Green ash		X		Non-native		0	tree	perennial
***Papaveraceae*: Poppy Family**									
Argemone sp.	Prickly poppy	A. hispida and A. polyanthemos both occur in this region.		X	**Native**		4	forb	perennial
***Plantaginaceae*: Plaintain Family**									
Plantago major	Common plantain		X		Non-native		0	forb	perennial
***Poaceae*: Grass Family**									
Agropyron cristatum	Crested wheatgrass		X	X	Non-native		0	grass	perennial
Agrostis gigantea	Redtop		X	X	Non-native		0	grass	perennial
Bromus inermis	Smooth brome		X	X	Non-native		0	grass	perennial

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Echinochloa crus-galli	Barnyard grass		X	X	Non-native		0	grass	annual
Panicum capillare	Witchgrass		X	X	**Native**		1	grass	annual
Pascopyrum smithii	Western wheatgrass		X	X	**Native**		5	grass	perennial
Triticum aestivum	Winter wheat		X	X	Non-native		0	grass	annual
***Polygonaceae*: Buckwheat Family**									
Persicaria lapathifolia	Pale smartweed			X	**Native**		2	forb	annual
Polygonum aviculare	Prostrate knotweed		X	X	Non-native		0	forb	annual
Rumex crispus	Curly dock		X	X	Non-native		0	forb	perennial
***Portulacaceae*: Purslane Family**									
Portulaca oleracea	Common purslane			X	Non-native		0	forb	annual
***Salicaceae*: Willow Family**									
Populus angustifolia	Narrowleaf Cottonwood		X		**Native**		5	tree	perennial
Populus deltoides	Plains cottonwood		X	X	**Native**		4	tree	perennial
***Solanaceae*: Nightshade Family**									
Solanum rostratum	Buffalo bur			X	**Native**		2	forb	annual
Typhaceae: Cattail Family									
Typha angustifolia	Narrowleaf cattail		X		Cryptogenic		1	forb	perennial
***Ulmaceae*: Elm Family**									
Ulmus pumila	Siberian elm			X	Non-native	State Watch List	0	tree	perennial

Documented Plant Species									
Scientific Name	Common Name	Comment	Observed at Markel	Observed at Wottge	Native/ Non-native	Listing	C-Value	**Physiognomy**	Duration
Verbenaceae: Vervain Family									
Verbena bracteata	Bigbract verbena			X	Native		2	forb	annual

Wetland Delineation Report Appendix B – Photographic Documentation

Photo 1: Overview of SP1, located within Wetland 1 on the periphery of the Markel Pond in Markel Open Space. Presence of Nebraska sedge and other hydrophytic vegetation can be seen. View looking down and south.

Photo 2: Overview of Wetland 1 and the Markel Pond in the Markel Open Space. View looking South.

Photo 3: Overview of Wetland 1 boundary from SP3 on Markel Open Space. Pink flags indicate Wetland 1 boundary between wetland and upland areas.

Photo 4: Overview of cottonwood riparian area surrounding the Markel Pond on the Markel Open Space. View from SP2 facing southwest that was not located in a wetland.

Photo 5: Submerged vegetation located within Markel Pond on Markel Open Space. Area would likely be considered a wetland when water levels are lower at different times of year.

Photo 6: Overview of SP8 located within Wetland 1 surrounding the Markel Pond on Markel Open Space. Sample point was located where green flag can be seen. Photo facing down and west.

Photo 7: Overview of Wetland 1 surrounding Markel Pond on Markel Open Space. Photo facing northeast.

Photo 8: Overview of Wetland 2 on Markel Open Space. Photo facing northeast.

Photo 9: View of upland vegetation surrounding Wetland 2 on Markel Open Space. Photo facing northeast.

Photo 10: View of upland vegetation surrounding Wetland 2 on Markel Open Space. Photo facing southeast

Photo 11: View wetland sample point in Wetland 2 on Markel Open Space. Photo facing northeast.

Photo 12: Soil horizons in SP10 in Wetland 2 on Markel Open Space. Photo facing down and east.

Photo 13: Soil horizons in SP11 in Wetland 2 on Markel Open Space. Photo facing down and east.

Photo 14: Overview of some wetland vegetation located within an unnamed irrigation lateral on Markel Open Space. Due to location within a ditch, a sampling point was not evaluated here.

Photo 15: Overview of SP7 that was not located within a wetland on Markel Open Space. Nebraska sedge was a dominant plant species, but the site was lacking hydrology and hydric soils. View looking south.

Photo 16: Overview of SP4 that was not located within a wetland on Wottge Open Space. Wetland hydrology, soils, and vegetation were not present. View looking south.

Photo 17: Overview of SP5 that was not located within a wetland on Wottge Open Space. Wetland hydrology and vegetation were present, but hydric soils were not identified. View looking east.

Photo 18: Overview of SP5 vegetation composition on Wottge Open Space. View looking east.

Photo 19: Overview of SP6 that was not located within a wetland on Wottge Open Space. Wetland hydrology and vegetation were present, but hydric soils were not identified. View looking north.

Photo 20: Overview of SP6 vegetation composition on Wottge Open Space. View looking north.

Photo 21: Overview of SP9 that was not located within a wetland on Wottge Open Space. Wetland hydrology and vegetation were present, but hydric soils were not identified. View looking west.

Photo 22: Overview of SP9 vegetation composition on Wottge Open Space. View looking west.

Photo 23: Overview of drainage on Wottge Open Space draining from west to east from Dillon Point. View looking south.

Photo 24: Overview of culvert outlet on Wottge Open Space draining from west to east from Dillon Point. View looking northwest.

Photo 25: Overview of wet drainage on Wottge Open Space that was not determined to be a wetland due to a lack of hydric soils. View looking northwest.

Photo 26: Overview of wet drainage on Wottge Open Space that was not determined to be a wetland due to a lack of hydric soils. Photo located on the southern boundary, looking east.

Photo 27: Overview of a depression (swale) along Sheridan Blvd. on the eastern boundary of Wottge Open Space. View looking north.

Photo 28: Overview of area to the north of Wottge Open Space, where National Hydrography Dataset (NHD) data maps Community Ditch, looking west. No signs of waters or wetlands were found in the area.

Photo 29: Overview of an area on Wottge Open Space that appeared on aerial imagery to potentially be a wetland. Some soil cracks were noted but no hydrophytic vegetation was seen. View looking north.

Wetland Delineation Report Appendix C – Data Sheets

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-08-31

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP1

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 30

Subregion (LRR): G 67B Lat: 39.94598 Long: -105.0615 Datum: NAD 83

Soil Map Unit Name: NuB - Nunn clay loam, 1 to 3 percent slopes NWI classification: PEMC1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Point is located on the hillslope of a small pond with an emergent wetland fringe.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1. Amorpha fruticosa	10	✔	FACW
2.			
3.			
4.			FAC
5.			
	10% = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Carex nebrascensis	40	✔	OBL
2. Bromus inermis	20	✔	UPL
3. Agropyron cristatum	10		
4. Typha angustifolia	10		OBL
5. Asclepias speciosa	2		FAC
6. Helianthus annuus	2		FACU
7.			
8.			
9.			
10.			
	84% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum 15.0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	10	x 2 =	20
FAC species	2	x 3 =	6
FACU species	2	x 4 =	8
UPL species	20	x 5 =	100
Column Totals:	84 (A)		184 (B)

Prevalence Index = B/A = 2.19

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

✔ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:

SOIL

Sampling Point: SP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/1	100					Silty Clay Loam	
3 - 7	2.5Y 5/1	90	7.5YR 5/6	10	C	PL	Silty Clay Loam	
7 - 15	10YR 5/1	20	10YR 6/6	80	C	PL / M	Clay Loam	
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✔ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ✔ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✔ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✔ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✔ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ✔ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✔ No ___ Depth (inches): 3

Water Table Present? Yes ✔ No ___ Depth (inches): 7

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 3

Wetland Hydrology Present? **Yes** ✔ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-08-31

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP2

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 30

Subregion (LRR): G 67B Lat: 39.94595 Long: -105.0614 Datum: NAD 83

Soil Map Unit Name: NuB - Nunn clay loam, 1 to 3 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

Point located in riparian area outside of the Markel Pond.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1. Populus deltoides	70	✔	FAC
2.			
3.			
4.			
	70%	= Total Cover	
Sapling/Shrub Stratum (Plot size: 10 ft r)			
1.			
2.			
3.			
4.			
5.			
		= Total Cover	
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	80	✔	UPL
2. Convolvulus arvensis	5		
3. Lactuca serriola	2		FAC
4. Rumex crispus	1		FAC
5.			
6.			
7.			
8.			
9.			
10.			
	88%	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
		= Total Cover	

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	73	x 3 =	219
FACU species	0	x 4 =	0
UPL species	80	x 5 =	400
Column Totals:	153 (A)		619 (B)

Prevalence Index = B/A = 4.05

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	7.5YR 4/1	90	7.5YR 6/6	10	C			
4 - 10	10YR 6/2	70	10YR 4/6	30	C	PL / M	Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✔ Depth (inches): _____

Water Table Present? Yes _____ No ✔ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✔ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-08-31

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP3

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 30

Subregion (LRR): G 67B Lat: 39.946 Long: -105.0615 Datum: NAD 83

Soil Map Unit Name: NuB - Nunn clay loam, 1 to 3 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✔ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✔

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✔	**Is the Sampled Area within a Wetland?** Yes ____ No ✔
Hydric Soil Present?	Yes ____	No ✔	
Wetland Hydrology Present?	Yes ____	No ✔	

Remarks:

Point located in upland area outside of the Markel Pond.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Agropyrum cristatum	20	✔	
2. Bromus inermis	15	✔	UPL
3. Convolvulus arvensis	10	✔	
4. Chenopodium album	2		FACU
5. Medicago sativa	2		UPL
6.			
7.			
8.			
9.			
10.			
	49% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 50.0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	2	x 4 =	8
UPL species	17	x 5 =	85
Column Totals:	19 (A)		93 (B)

Prevalence Index = B/A = 4.89

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✔

Remarks:

SOIL

Sampling Point: SP3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 15	7.5YR 5/3	100					Clay Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✔ Depth (inches): _____

Water Table Present? Yes _____ No ✔ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✔ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-08-31

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP4

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): 1

Subregion (LRR): G 67B Lat: 39.95136 Long: -105.0575 Datum: NAD 83

Soil Map Unit Name: CoC - Colby silty clay loam, 3 to 5 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✔ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✔

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No ✔	**Is the Sampled Area within a Wetland?** Yes ____ No ✔
Hydric Soil Present?	Yes ____	No ✔	
Wetland Hydrology Present?	Yes ____	No ✔	

Remarks:

Point located outside of wet drainage located on Wottge Open Space, within field of cereal rye.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 10 ft r)			
1. Secale cereale	50	✔	
2. Cirsium arvense	10		FACU
3. Ambrosia artemisiifolia	5		FACU
4. Convolvulus arvensis	5		
5. Helianthus annuus	5		FACU
6. Verbena bracteata	2		FACU
7. Cichorium intybus	1		FACU
8.			
9.			
10.			
	78% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 0 (A)

Total Number of Dominant Species Across All Strata: 0 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: NaN (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	23	x 4 =	92
UPL species	0	x 5 =	0
Column Totals:	23 (A)		92 (B)

Prevalence Index = B/A = 4.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ____ No ✔

Remarks:

SOIL

Sampling Point: SP4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 16	7.5YR 5/2	100					Clay Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✔ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✔ Depth (inches): _____

Water Table Present? Yes _____ No ✔ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✔ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-08-31

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP5

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): 1

Subregion (LRR): G 67B Lat: 39.95142 Long: -105.0574 Datum: NAD 83

Soil Map Unit Name: CoC - Colby silty clay loam, 3 to 5 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✔ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✔

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✔
Hydric Soil Present?	Yes ____	No ✔	
Wetland Hydrology Present?	Yes ✔	No ____	

Remarks:

Point located within wet drainage on the Wottge Open Space. Run off from adjacent housing development conveying water onto the site. Area is saturated with 1" of water at the point location. However, hydric soils were not documented at the site, indicating the runoff and standing water has not been present long enough to develop hydric soil conditions.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft r)			
1.			
2.			
3.			
4.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		
Herb Stratum (Plot size: 10 ft r)			
1. Panicum capillare	25	✔	FAC
2. Convolvulus arvensis	15	✔	
3. Persicaria lapathifolia	15	✔	OBL
4. Secale cereale	15	✔	
5. Ambrosia artemisiifolia	10		FACU
6. Helianthus annuus	10		FACU
7. Lactuca serriola	7		FAC
8. Sonchus arvensis	7		FAC
9. Cichorium intybus	2		FACU
10. Rumex crispus	1		FAC
	107% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	15	x 1 =	15
FACW species	0	x 2 =	0
FAC species	40	x 3 =	120
FACU species	22	x 4 =	88
UPL species	0	x 5 =	0
Column Totals:	77 (A)		223 (B)

Prevalence Index = B/A = 2.90

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No ____

Remarks:

SOIL

Sampling Point: SP5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 17	7.5YR 5/3	100					Clay	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): 17

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✔ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✔ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✔ No ___ Depth (inches): 1

Water Table Present? Yes ✔ No ___ Depth (inches): 8

Saturation Present? (includes capillary fringe) Yes ✔ No ___ Depth (inches): 0

Wetland Hydrology Present? Yes ✔ No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Drainage from nearby housing development and reservoir lead to this area. Obvious inundation for part of the year, but none seen during site visit. Soil cracks seen in vicinity of point.

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-09-02

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP6

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): _____

Subregion (LRR): G 67B Lat: 39.95153 Long: -105.0573 Datum: NAD 83

Soil Map Unit Name: CoC - Colby silty clay loam, 3 to 5 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✔ (If no, explain in Remarks.)

Are Vegetation ✔, Soil _____, or Hydrology ✔ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Point located within wet drainage on the Wottge Open Space, closer to culvert and source of water. Run off from adjacent housing development conveying water onto the site. Area is saturated with 2" of water at the point location. However, hydric soils were not documented at the site, indicating the runoff and standing water has not been present long enough to develop hydric soil conditions.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft r)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 10 ft r)			
1. Secale cereale	70	✔	
2. Panicum capillare	20	✔	FAC
3. Cirsium arvense	2		FACU
4. Polygonum aviculare	2		FACU
5. Portulaca oleracea	2		FAC
6. Rumex crispus	1		FAC
7.			
8.			
9.			
10.			
	97% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	23	x 3 =	69
FACU species	4	x 4 =	16
UPL species	0	x 5 =	0
Column Totals:	27 (A)		85 (B)

Prevalence Index = B/A = 3.15

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0 - 20	10YR 5/4	100					Silty Clay Loam	No redox noted in soil or along living roots.
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✔ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✔ No ____ Depth (inches): .5

Water Table Present? Yes ✔ No ____ Depth (inches): 6

Saturation Present? (includes capillary fringe) Yes ✔ No ____ Depth (inches): 1

Wetland Hydrology Present? **Yes** ✔ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-09-02

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP7

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): _____

Subregion (LRR): _____ Lat: 39.94384 Long: -105.0591 Datum: WGS 84

Soil Map Unit Name: NuC - Nunn clay loam, 3 to 5 percent slopes NWI classification: _____

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✔ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes _____ No ✔

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

Point located within small patch of Nebraska sedge located on the Markel Open Space.

VEGETATION – Use scientific names of plants.

	Absolute % Cover	Dominant Species?	Indicator Status
Tree Stratum (Plot size: 30 ft r)			
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Bromus inermis	50	✔	UPL
2. Carex nebrascensis	50	✔	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	0	x 2 =	0
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	50	x 5 =	250
Column Totals:	100 (A)		300 (B)

Prevalence Index = B/A = 3.00

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 5/3	100						
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✔ Depth (inches): _____

Water Table Present? Yes _____ No ✔ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✔ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-09-26

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: Sp8

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): Concave Slope (%): 10

Subregion (LRR): G 67B Lat: 39.94553 Long: -105.0618 Datum: NAD 83

Soil Map Unit Name: NuC - Nunn clay loam, 3 to 5 percent slopes NWI classification: PEMC1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ✔ No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

Point located within wetland fringe surrounding Markel Pond. Point was taken to check status of soils in vegetation community with Nebraska sedge and false indigo bush.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 5 ft r)			
1. Amorpha fruticosa	80	✔	FACW
2.			
3.			
4.			
5.			
	80% = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Carex nebrascensis	40	✔	OBL
2. Bromus inermis	30	✔	UPL
3. Cirsium arvense	5		FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	75% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 66.7 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	40	x 1 =	40
FACW species	80	x 2 =	160
FAC species	0	x 3 =	0
FACU species	5	x 4 =	20
UPL species	30	x 5 =	150
Column Totals:	155 (A)		370 (B)

Prevalence Index = B/A = 2.39

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

✔ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:

SOIL

Sampling Point: Sp8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/1	100					Clay Loam	
4 - 14	10YR 4/2	95	10YR 4/6	5	C	PL	Clay Loam	
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ✔ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ✔ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes ✔ **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ✔ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ✔ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ✔ Saturation Visible on Aerial Imagery (C9)
- ✔ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ___ No ✔ Depth (inches): _____

Water Table Present? Yes ✔ No ___ Depth (inches): 12

Saturation Present? (includes capillary fringe) Yes ___ No ✔ Depth (inches): _____

Wetland Hydrology Present? Yes ✔ **No** ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-09-26

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: Sp9

Investigator(s): Melissa Belmar and Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): Flat Local relief (concave, convex, none): None Slope (%): 1

Subregion (LRR): G 67B Lat: 39.9514 Long: -105.057 Datum: NAD 83

Soil Map Unit Name: NuB - Nunn clay loam, 1 to 3 percent slopes NWI classification:

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ____ No ✔ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ____ No ✔

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No ____	**Is the Sampled Area within a Wetland?** Yes ____ No ✔
Hydric Soil Present?	Yes ____	No ✔	
Wetland Hydrology Present?	Yes ✔	No ____	

Remarks:

Point located within wet drainage located on Wottge open space. Point taken to confirm the absence of wetlands further from the water source.

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	____ = Total Cover		
Herb Stratum (Plot size: 10 ft r)			
1. Panicum capillare	50	✔	FAC
2. Sonchus arvensis	30	✔	FAC
3. Lactuca serriola	15		FAC
4. Persicaria lapathifolia	7		OBL
5. Helianthus annuus	5		FACU
6. Rumex crispus	5		FAC
7.			
8.			
9.			
10.			
	112% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	____ = Total Cover		

% Bare Ground in Herb Stratum ____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	7	x 1 =	7
FACW species	0	x 2 =	0
FAC species	100	x 3 =	300
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	112 (A)		327 (B)

Prevalence Index = B/A = 2.92

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No ____

Remarks:

SOIL

Sampling Point: Sp9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 15	10YR 4/3	100					Clay Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✔ Surface Water (A1)
- ✔ High Water Table (A2)
- ✔ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✔ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ✔ No ____ Depth (inches): .5

Water Table Present? Yes ✔ No ____ Depth (inches): 4

Saturation Present? (includes capillary fringe) Yes ✔ No ____ Depth (inches): 0

Wetland Hydrology Present? **Yes** ✔ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-11-09

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP10

Investigator(s): Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): _____ Slope (%): 1

Subregion (LRR): G 67B Lat: 39.9465219 Long: -105.0580663 Datum: WGS 84

Soil Map Unit Name: NuB - Nunn clay loam, 1 to 3 percent slopes NWI classification: PUBFx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✔ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✔	No _____	**Is the Sampled Area within a Wetland?** Yes ✔ No _____
Hydric Soil Present?	Yes ✔	No _____	
Wetland Hydrology Present?	Yes ✔	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Rumex crispus	45	✔	FAC
2. Apium sp.	40	✔	FACW
3. Agrostis gigantea	15		FACW
4. Cyperus odoratus	15		FACW
5. Plantago major	10		FAC
6.			
7.			
8.			
9.			
10.			
	125% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	70	x 2 =	140
FAC species	55	x 3 =	165
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	125 (A)		305 (B)

Prevalence Index = B/A = 2.44

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

✔ 2 - Dominance Test is >50%

✔ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ✔ No _____

Remarks:

SOIL

Sampling Point: SP10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	2.5Y 4/1	95	7.5YR 6/6	5	C	M	Clay Loam	
4 - 11	2.5Y 5/3	30	10YR 6/8	50	RM	M	Clay Loam	
11 - 14	5Y 5/3	60	2.5Y 7/1	40	D	M	Clay	2 shades lighter than 2.5 y 7/1
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ✔ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ✔ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ✔ **No** _____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ✔ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ✔ Inundation Vis ble on Aerial Imagery (B7)
- ✔ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ✔ Surface Soil Cracks (B6)
- ✔ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ✔ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes _____ No ✔ Depth (inches): _____

Water Table Present? Yes _____ No ✔ Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No ✔ Depth (inches): _____

Wetland Hydrology Present? **Yes** ✔ **No** _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: Broomfield - Markel and Wottge Properties City/County: Broomfield Sampling Date: 2022-11-09

Applicant/Owner: City of Broomfield State: Colorado Sampling Point: SP11

Investigator(s): Caroline Hildebrand Section, Township, Range: S24 T1S R69W

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Convex Slope (%): 7

Subregion (LRR): G 67B Lat: 39.9465136 Long: -105.0581316 Datum: WGS 84

Soil Map Unit Name: NuB - Nunn clay loam, 1 to 3 percent slopes NWI classification: PUBFx

Are climatic / hydrologic conditions on the site typical for this time of year? Yes _____ No ✔ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✔ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No ✔	**Is the Sampled Area within a Wetland?** Yes _____ No ✔
Hydric Soil Present?	Yes _____	No ✔	
Wetland Hydrology Present?	Yes _____	No ✔	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30 ft r)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	_____ = Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft r)			
1.			
2.			
3.			
4.			
5.			
	_____ = Total Cover		
Herb Stratum (Plot size: 5 ft r)			
1. Medicago sativa	50	✔	UPL
2. Rumex crispus	40	✔	FAC
3. Erigeron canadensis	25		FACU
4. bromus tectorum	25		UPL
5. Epilobium sp.	5		
6. Lactuca serriola	5		FAC
7.			
8.			
9.			
10.			
	150% = Total Cover		
Woody Vine Stratum (Plot size: 30 ft r)			
1.			
2.			
	_____ = Total Cover		

% Bare Ground in Herb Stratum _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC−): 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	45	x 3 =	135
FACU species	25	x 4 =	100
UPL species	75	x 5 =	375
Column Totals:	145 (A)		610 (B)

Prevalence Index = B/A = 4.21

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes _____ No ✔

Remarks:

SOIL

Sampling Point: SP11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 5/4						Loam	
-								
-								
-								
-								
-								
-								
-								

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR F**)
- ___ 1 cm Muck (A9) (**LRR F, G, H**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) (**LRR G, H**)
- ___ 5 cm Mucky Peat or Peat (S3) (**LRR F**)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High Plains Depressions (F16) (**MLRA 72 & 73 of LRR H**)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR I, J**)
- ___ Coast Prairie Redox (A16) (**LRR F, G, H**)
- ___ Dark Surface (S7) (**LRR G**)
- ___ High Plains Depressions (F16) (**LRR H outside of MLRA 72 & 73**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: dense roots and compacted soils

Depth (inches): 4

Hydric Soil Present? Yes ____ No ✔

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Vis ble on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where not tilled**)
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) (**where tilled**)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) (**LRR F**)

Field Observations:

Surface Water Present? Yes ____ No ✔ Depth (inches): ____

Water Table Present? Yes ____ No ✔ Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No ✔ Depth (inches): ____

Wetland Hydrology Present? Yes ____ No ✔

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX 4 - COLORADO CULTURAL RESOURCE SURVEY

Colorado Historical Society - Office of Archaeology and Historic Preservation
COLORADO CULTURAL RESOURCE SURVEY
OAHP 1420
Revised 9/98

LIMITED-RESULTS CULTURAL RESOURCE SURVEY FORM

(Page 1 of 7)

This form (#1420) is for small scale limited results projects - block surveys less than 160 acres with linear surveys under four miles. Additionally, there should be no sites and a maximum of four Isolated Finds. This form must be typed.

I. IDENTIFICATION

1. Report Title (include County): A Class III Cultural Resources Inventory of the Markel and Wottge Open Space Parcels for the City of Broomfield, Broomfield County, Colorado.
2. Date of Field Work: June 26, 2023
3. Form completed by: Jenean Roberts Date: June 29, 2023
4. Survey Organization/Agency: Metcalf Archaeological Consultants, Inc.
   Principal Investigator: Kim Kintz
   Principal Investigator's Signature: 
   Other Crew: Rebekah Shields
   Address: 17301 West Colfax Avenue, Suite 305, Golden, CO 80401
5. Lead Agency / Land Owner: City of Broomfield
   Contact: Ed Thompson
   Address: One DesCombes Drive, Broomfield, CO 80020
6. Client: City of Broomfield
7. Permit Type and Number: State of CO Archaeological Permit #82438 (expires 02/29/24).
8. Report / Contract Number: Metcalf Project No. 2023.CO.055
9. Comments:

II. DESCRIPTION OF UNDERTAKING / PROJECT

10. Type of Undertaking: The cultural resources study, in addition to other environmental and planning reviews, is being completed at the request of the City of Broomfield as part of *due diligence* prior to development and access of the parcels as public open space. No federal or state nexus is involved. Paved multi-use paths, benches, interpretive signage, and other elements for public use will be developed on these parcels.
11. Size of Undertaking (acres): 97 Size of Project (if different):
12. Nature of the Anticipated Disturbance: Construction of multi-use pathways and other recreational elements, with associated work areas for equipment and materials.
13. Comments:

III. PROJECT LOCATION

14. Description: The Wottge parcel of the project area is located at the southwest corner of the intersection of West Dillon Road and Sheridan Blvd. The Markel parcel is located at the northeast corner of the intersection of 136th Ave. and Aspen Street. Both parcels are within the City of Broomfield city limits.

15. Legal Location: Quad. Map: Lafayette, CO Date(s): 1965 (PR 1994)

Principal Meridian: 6th X NM __ Ute __

NOTE: Only generalized subdivision ("quarter quarters") within each section is needed

Township: 1S Range: 69W Sec.: 24 E ½

If section(s) is irregular, explain alignment method: N/A

16. Total number of acres surveyed: 97

17. Comments:

IV. ENVIRONMENT

18. General Topographic Setting: This project area is located on a gentle east-trending slope of the upper terrace of Rock Creek to the west.

Current Land Use: Limited agriculture.

19. Flora: Vegetation in the Wottge block consisted of Russian thistle (tumbleweed), morning glory vines (bind weed), and Summer Cypress. Sporadic patches of winter wheat were also present. Vegetation in the Markel block consisted of grasses, occasional Scottish thistle patches, few prickly pear cactus, winter wheat, and a few other forbs.

20. Soils/Geology: According to the USDA Soil Survey (2023), both parcels are comprised of soils that are predominantly Nunn clay loam, with 1 to 3 percent slopes on a terraced landform. Surface observations noted a medium brown clay loam with infrequent subrounded to subangular pebbles and cobbles.

21. Ground Visibility: Ground visibility was generally poor on both parcels at less than 5% and often at 0%. Dense vegetation obscured much of the ground surface, with small, intermittent areas of higher visibility.

22. Comments: The entirety of the project area has been disturbed to varying degrees, mostly by past crop cultivation efforts.

V. LITERATURE REVIEW

23. Location of File Search: Compass database & GIS data request from the Office of Archaeology and Historic Preservation (OAHP) Date: 07/05/2023

24. Previous Survey Activity –

In the project area: The OAHP files indicate that no previous surveys have been performed within the project area.

In the general region: Within one mile of the project parcel, 18 previous surveys have been performed. These were largely done for parcel annexations, road developments, trails, wells, and a pipeline.

25. Known Cultural Resources –
In the project area: None.
In the general region (summarize): There is one previously recorded segment of the Community Ditch that borders the edges and outside of both project parcels (5BF.67.16). It is listed as officially not eligible for inclusion on the NRHP. Within one mile of the project area, 30 cultural resources have been recorded. The vast majority of them are historic in age. These include water control features, railroads, rural living structures, a bridge, a church, and a convenience store. The prehistoric resources are a few isolated finds and open lithic scatters.
26. Expected Results: Due to the lack of development in these parcels, the limited potential for historic structures (based on historic map review), and the disturbed nature of the ground surface (due to past farming activities), the likelihood of discovering cultural materials is relatively low.

VI. STATEMENT OF OBJECTIVES

27. The project objective was to conduct a thorough archaeological pedestrian survey of the open space parcels as due diligence for the City of Broomfield, where the expected work is proposed. Any non-structural cultural resources were to be recorded and assessed for NRHP eligibility recommendations, with further recommendations made if warranted.

VII. FIELD METHODS

28. Definitions: Site: A site is the locus of previous (50-year age minimum) human activity at which the preponderance of evidence suggests repeated and patterned use over time, or multiple classes of activities.

IF: An isolated find refers to one or more culturally modified and transportable objects representing a single activity and not found in the context of a site as defined above.

29. Describe Survey Method: Standard 20 meter transects were walked across both survey blocks by staff archaeologists J. Roberts and R. Shields. Within the northern 1/3 of the Wottge block, the Summer Cypress became extremely dense and tall. Formal transects were walked around the edges of this area, which coincided with the proposed placements of the walking trails. No formal survey was performed within the heavy, dense vegetated areas.

VIII. RESULTS

30. List IFs if applicable. Indicate IF locations on the map completed for Part III.

No cultural resources were observed within the project area. Within the Wottge parcel, a segment of the Community Ditch (5BF.67.16) is mapped along the northern boundary. The ditch is now piped and buried along that stretch, with no visible remnant of the original ditch. In the Markel parcel, the same segment bounds the southwestern

curve of the project area boundary. The ditch is still an open ditch. It was not recorded as it is outside of the project area.

31. Using your professional knowledge of the region, why are there none or very limited cultural remains in the project area? Is there subsurface potential? It is not surprising No cultural resources were observed in this project due to past and recent agricultural use of the field, and a lack of construction or occupation within the area as based on historic map research. Subsurface potential for intact buried cultural deposits is very low.

Reference Cited:

Natural Resources Conservation Service (NRCS)
2023 Web Soil Survey. Accessed on July 24, 2023 at https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

Project Area Photos

Overview of Wottge parcel from the southwest corner, facing northeast.
(Roll 23-406; Image 1)

Overview of Wottge parcel from the northeast corner, facing southwest.
(Roll 23-406; Image 2)

Project Area Photos

Overview of Markel parcel from the northeast corner, facing southwest.
(Roll 23-406; Image 3)

Overview of Markel parcel from the southeast corner, facing north-northwest.
(Roll 23-406; Image 4)

Project Location Map

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