88th Avenue Open Space Master Plan

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Submitted by:

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Introduction

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1.2 Project Background

The 88th Avenue Open Space area is an undeveloped open space that Adams County has been planning for recreational development for a number of years. The South Platte River Trail is the only development that has occurred to date, but future proposed improvement projects will restore and enhance surface water, wetlands, groundwater, and riparian and grassland habitat along the South Platte River in Adams County and the City of Thornton. Public accessibility of the restored natural resource areas will increase recreational opportunities, including wildlife viewing, and will enhance the public's understanding of the importance and value of wildlife and the need for restoration to compensate for natural resource uses for the Front Range communities.

The total open space land that encompasses the area is 246 acres. The open space is located along the west bank of the South Platte River, bounded by 88th Avenue, 96th Avenue, and Riverdale Road, and is approximately 2.0 miles west of the Rocky Mountain Arsenal (RMA). There are preserved lands to the north and south of the open space. To the north is West Sprat Platte Lake and to the south is the Gravel Ponds Fishing Lakes, both owned by the City of Thornton. The area makes a contiguous habitat and movement area for wildlife along the South Platte River. It is also a recognized key area for protection and preservation in both Adams County's South Platte River Heritage Corridor Plan and County Comprehensive Plan.

A majority of the open space area is a former gravel mining site used for gravel extraction and processing in the early 1990's by Aggregate Industries. Mining and reclamation was completed in the early 2000's, and the Colorado Division of Mining and Safety released the mine permits in January 2010, which allowed Adams County full management authority of the area. The former gravel mining process has left an eleven-acre lake, a five acre lake/wetland area, and other potential habitat areas. The two surface water ponds remaining from the former gravel mining are fed by groundwater. As former gravel mine pits, Colorado mining reclamation requirements are minimal in terms of creating ponds and wetlands that enhance and improve environmental values. Therefore, enhancing the habitat and biodiversity associated with these ponds is an excellent opportunity.

The 88th Avenue Open Space has many different habitat zones, each zone has been studied and recommended improvements have been proposed for this project that would restore this degraded ecosystem to a close approximation of its natural potential. The restoration project includes the implementation of short-grass habitat, riparian meadow, riparian woodlands, stands of plains cottonwood, lakes and wetlands, riverine wetlands, and submerged aquatic and emergent marsh. The project also includes noxious weed removal and native plant community re-vegetation.

The open space has great potential, especially the north and south ponds, and for this reason Adams County, in partnership with Urban Drainage and Flood Control District, has hired the consultant team to develop this master plan for habitat restoration, adding habitat viability with wetlands, and improvements to river bank and lake aquatic habitats. Another major scope of this project is recreation based improvements. They include: trailhead access, a parking lot, restrooms, picnic shelters, fishing access improvements, primitive trails, and education and interpretation.

1.3 Goals and Guiding Principles

The overall goals and guidelines of the 88th Avenue Open Space project range from providing recreational opportunities to improving and protecting wildlife habitat. Open spaces provide natural areas and trails of scenic and natural value close to where people live, work, attend school, and near community centers. The 88th Avenue Open Space is convenient for people to experience every day, providing a connection between the people and the land.

Project Objectives

Recreationally, the open space should provide a range of experiences, serving a variety of age groups, and user-types, year-round. In addition, the open space should provide quality trail experiences for pedestrian, equestrian, and bike route users, ensuring that the trail development is well balanced to serve all of these recreationists. These trails will connect to trail systems throughout the county and to adjacent counties and communities. Trail systems will be constructed to safely cross major vehicular roadways, and will be built to accommodate a wide variety of skill levels and interests.

The open space should protect and enhance important ecological and scenic resources, such as riparian areas, wetlands, floodplains, prairie grasslands, and unique land forms. It should also protect and enhance important and existing wildlife habitats and corridors, providing for species movement throughout the county. Adequate land should be provided around riparian habitats to ensure a sustainable species richness, and to prevent the diminution of critical wildlife habitat. Habitat linkages to regional open spaces, such as the Rocky Mountain Arsenal National Wildlife Refuge, Barr Lake State Park, and regional river corridors, should be created to ensure free movement for species of importance. Additionally, this open space is listed as one where enhancements for bird watching and wildlife viewing may be focused, supporting a variety of bird species, raptors, and other wildlife.

The open space should help improve water quality by protecting and enhancing wetland habitats and riparian zones, as well as by implementing stormwater management best practices, which will minimize runoff and improve infiltration. Floodplains will be enhanced with vegetation to reduce erosion and siltation, as well as to improve flood event conveyance, thereby potentially reducing flood hazards. Disturbed lands surrounding the river and drainage corridors will be restored with appropriate vegetation, improving the water quality, providing habitat, and improving aesthetics.

The open space will provide environmental education and interpretation to help residents, students, and open space users learn to appreciate the wealth of natural, cultural, and scenic resources of the surrounding area. Users will be educated on how to minimize environmental impacts, while still taking advantage of the full range of recreational opportunities, and the open space will support educational efforts that engage citizens in their role as stewards of our natural and cultural resources.

The open space will restore lands disturbed by gravel mining and extraction, focusing on lands in and around the river and drainage corridors, while supporting native habitats, wildlife, water storage, and recreation opportunities.

The open space will integrate the following uses and activities:

Heritage Corridor Preservation

- River Corridor "Gateway" Restoration
- Open Space
- Wetlands & Lakes
- Riparian Edge Restoration
- Prairie Restoration and Prairie Dog Habitat
- Wildlife Corridors
- Nesting Sites
- Interpretive Sites and Education
- Outdoor Class Room and Stewardship Projects
- Native Plant Restoration Site
- Wildlife Viewing and Bird-watching

Passive Recreation

- Hiking, Jogging, Walking Paths
- Bike Trail
- Fishing Access
- Informal Picnicking
- Horseback Riding
- Cross Country Skiing

88th Avenue Open Space Plan (2002)

The 2002 plan was consulted in reviewing previous planning efforts to determine goals and requirements for restoration of the open space. Many of the guiding principles and recommended improvements were reviewed and considered as a guide in developing improvements for the property (**Figure 1-1**). The Adams County 88th Avenue Open Space 2002 master plan goals and guiding principles included the following:

- Reclaim and enhance the riparian corridor character of the site per the vision of *the South Platte River Heritage Corridor Plan,* adding habitat viability with wetlands, diverse native vegetation, improved river and lake aquatic habitats, and natural contours.
- Promote opportunities for community access to the South Platte River Corridor for passive recreation, fishing, and observing nature.
- Avoid fragmenting and adequately buffer sensitive areas from recreational uses, roadways, utility crossings, and surrounding development; and minimize adverse visual, acoustical, water quality, and habitat impacts.
- Implement integrated pest management (*IPM*) to control invasive weeds, exotic plant species, and nuisance animal species.
- Provide educational and interpretive opportunities reflecting the history, culture, and ecology of the site, including its gravel mining history.
- Protect the functionality of the floodway, and the 100-year floodplain, with minimal use and visual impact of built structures.
- The site should not create nuisances, adversely impact or be adversely impacted by surrounding homes, places of business, roads, parks and other land uses.
- Improvement and management of the site should be affordable.
- Create a system of multiple-use trails serving recreation, transportation, floodplain/park management, and fish stocking.
- Site planning should address all of the seasons and allow for flexibility over the long term to optimize the multiple objectives of the plan.

Many of these objectives align with the intended uses and activities described in the project objectives section.

Funding Sources

Funding for construction has been committed by multiple grants and partners to successfully build on the vision identified by the guiding principles and goals, and as identified in the preliminary program descriptions (**Table 1-1**). Funding is specific in its allocation for various aspects of design and construction, and will need to be coordinated and tracked as designs progress into final design and construction (**Figure 1-2**). To date, funding allocations are based on the 2012 NRD grant application, and may vary based on the public input process and analysis of the project components (**Table 1-2**). Following is a list of funding partners, respective commitment amounts, and project elements specifically identified in each grant and funding source.

Adams County Open Space Sales Tax Grant

Adams County Open Space sales tax grant proceeds will provide funding for the following projects within the open space:

- Design and engineering (Please note that NRD funds may not be used for design and engineering).
- Recreation and public access improvements
- Relocation of the South Platte River Trail along the South Pond

Natural Resource Damages (NRD) Trustees/Foundation Fund
NRD aims to replace, restore, and enhance habitat for a wide variety of biological fauna including waterfowl, which suffered high mortality rates due to hazardous material releases in the vicinity. NRD funds may provide funding for the following projects within the open space:

- South Pond Improvements
- South Platte River Flood Control and Water Quality Improvements
- South Platte River Channel Improvements
- North Pond Improvements
- Riparian Forest and Upland Habitat Improvements

Fishing Is Fun (FIF)
The Fishing is Fun (FIF) program, administered by the Colorado Division of Parks and Wildlife, provides matching grants annually to local and county governments, park and recreation departments, water districts, angling organizations, and others, for projects to improve angling opportunities in Colorado. Within this open space, FIF will prioritize the following:

- Fishing Site Improvements
  - Develop public fishing access with a restored fishing lake
  - Trailhead access
  - Parking lot
  - Restroom
  - Picnic shelters
  - Fishing access improvements
  - Fishing piers
  - Primitive angler trails
  - Signage for education and interpretation
- South Lake Improvements
  - Improve fish habitat
- Habitat Development and Restoration

Figure 1-1: 88th Avenue Adams County Open Space Project

Table 1-1: 88th Avenue Adams County Open Space Project funding commitments

Funding Source	Commitment Amount	Encumbered to date	Work Elements specifically excluded
Adams County Open Space Sales Tax Grant	$700,000	$700,000	
Natural Resource Trustees/Foundation Fund - NRD	$1,750,000	$1,750,000	No design or passive recreation: trailhead access, parking lot, restrooms, picnic shelters, fishing access improvements, primitive trails and signage
CPW - Fishing is Fun	$80,000	$80,000	
Adams County Parks	$215,000	$215,000	
UDFCD	$555,000	$355,000	
Total	$3,300,000	$3,100,000	

Focus Areas

While not all areas will be initially constructed, site improvements in the 88th Avenue Open Space will include a parking lot, restrooms, picnic shelters, fishing access improvements, trails, and signage, and improvements will enhance the public's understanding of the importance and value of wildlife. Public accessibility of the restored natural resource areas will increase recreational opportunities, including wildlife viewing. Primary areas of initial improvements will include the following:

South Pond Improvements:

- Planned improvements will enhance habitat for fish and wildlife.
- Native wetland and riparian landscape restoration of all impacted areas will be completed.

Rerouting of the South Platte River Trail:

- Improvements will restore riparian habitat along the South Platte River.
- Movement of the South Platte River Trail to reduce impacts to wildlife will be evaluated.

South Platte River Flood Control and Water Quality Improvements:

- Creating a secondary channel will protect the South Pond from impacts during high flow events, and will create additional backwater that can help naturally filter water to improve quality.

South Platte River Channel Improvements:

- Riverbank restoration will include cottonwood and willow plantings to prevent future erosion and provide bird and other wildlife habitat.

North Pond Improvements:

- Wildlife habitat and bird habitat will be improved with native wetland and riparian vegetation.

Riparian Forest and Upland Habitat Improvements:

- Improvements will include removal of invasive plants.
- Upland and riparian areas will be planted with a variety of native trees and shrubs to increase wildlife benefits.
- Native dryland grass will be seeded in disturbed areas.

Surface Water and Shoreline Wetlands:

- Surface water and shoreline wetland habitat will be restored to benefit fish, wildlife, birds, and water quality.

Gravel Pit Restoration:

- Steep banks will be re-graded to have shallower slopes, which will enhance native vegetation at lake edges and benefit birds and other wildlife.

Biological Resources (benefits to all forms of wildlife):

- Riparian habitat restoration will benefit all forms of wildlife, including:
  - 7 species of amphibian,
  - 263 species of birds,
  - 59 species of mammals and
  - 20 species of reptiles.
  - Species of note found on the property include American White Pelican, Bald Eagle, Great Blue Heron, Ring-neck Pheasant, Mule Deer and White Tailed Deer.
  - Potential Species of Concern: Northern Leopard Frog, Burrowing Owl, Ferruginous Hawk, American Peregrine Falcon, Mountain Plover, Swift Fox, Black Tailed Prairie Dog, and Common Garter Snake.
- Short-grass Prairie habitat restoration will benefit birds and black tailed prairie dogs that are already present.
- A self-sustaining fishery will be created by developing a restored fishing lake and including developed public fishing access.

Table 1-2: 88th Avenue Adams County Open Space Project Budget funding allocations

		Funding Partners					
Figure 1-2	**Project Elements**	**Adams County Open Space Grant**	**Adams County Parks**	**Urban Drainage and Flood Control District (UDFCD)**	**FIF**	**NRD**	**Total**
Focus Areas	Design and Engineering services: construction documents	$150,000	$25,000	$75,000			$250,000
1	Recreation/Public Access Improvements: approx. 8500 feet of natural surface trails, ADA accessible 10' concrete trails: approx. 2000 feet, trailhead kiosk with park signage, Park Entrance Sign, asphalt parking lot with drainage and landscaping, rest-room enclosure, 3 picnic shelters with ADA picnic tables and grills, fishing access improvements: 2 fishing piers, boat ramp for stocking, interpretive signage, 8 benches, Fencing approx. 330 feet.	$250,000	$90,000	$80,000	$80,000		$500,000
2	South Pond Fishery and Shoreline Improvements: Earthwork and habitat creation		$100,000			$450,000	$550,000
3	South Platte River Flood Control and Water Quality Improvements: Side Channel Spillways for South Pond			$100,000		$380,000	$480,000
4	Re-routing and restoration of the South Platte River Trail	$200,000				$275,000	$475,000
5	South Platte River Channel Improvements			$100,000		$150,000	$250,000
6	North Pond Shoreline Improvements: Earthwork and Habitat Creation	$100,000				$295,000	$395,000
7	Riparian Forest & Upland Habitat Enhancement: Invasive removal and New Planting					$200,000	$200,000
	Total	$700,000	$215,000	$355,000	$80,000	$1,750,000	$3,100,000

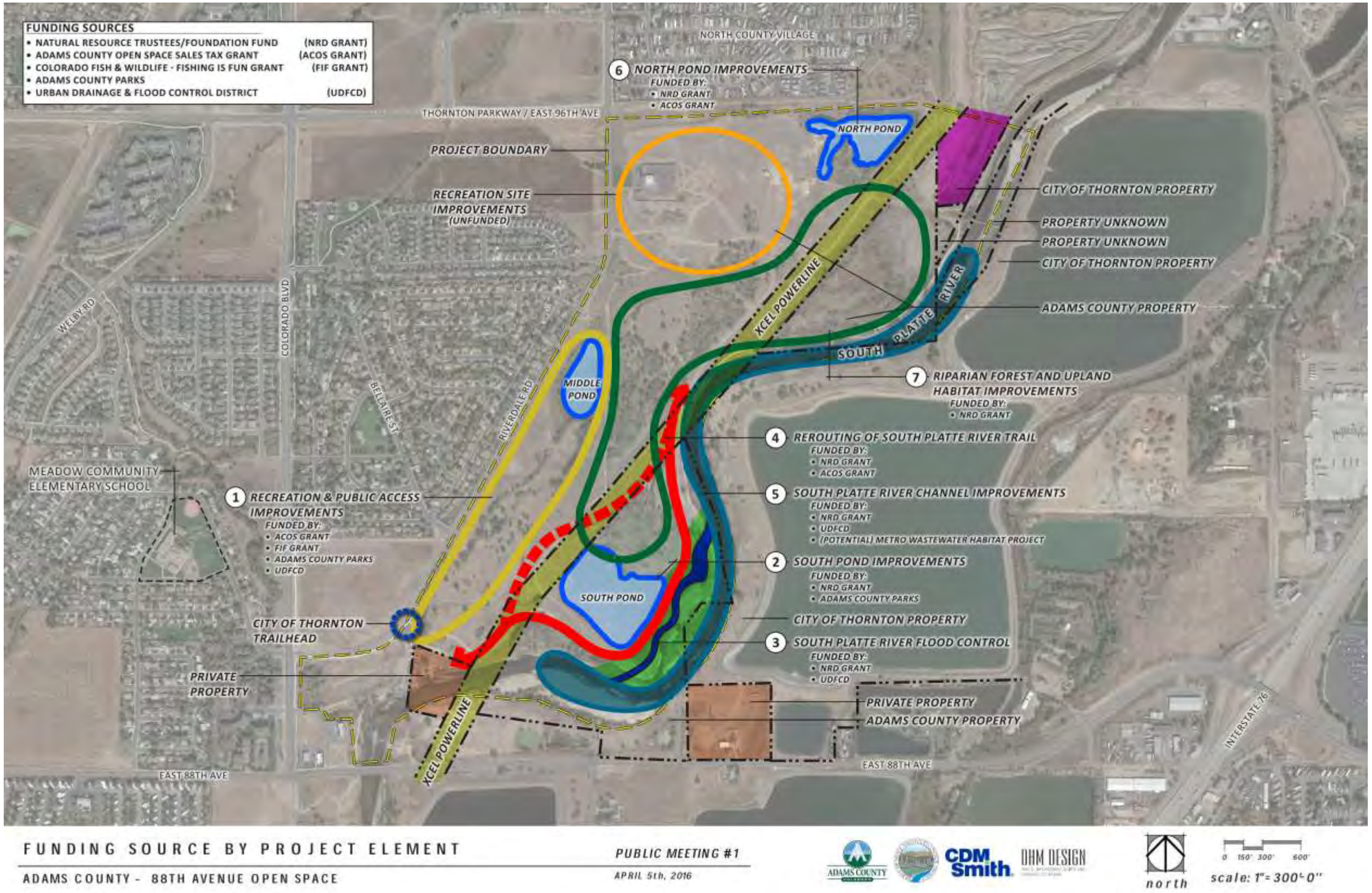


Figure 1-2: 88th Avenue Adams County Open Space Project funding sources by project element

Section 2

Initial Planning Process

2.1 Introduction

The initial planning process for the project included reviewing the guiding principles and goals developed in prior studies along with additional goals and objectives identified in the grants (see Section 1). The design team, led by CDM Smith and comprised of DHM Design, Corvus Environmental, The Restoration Group, and Hart Environmental, met with Adams County and UDFCD to clarify the work program, develop expectations and goals for the project. The major challenges and opportunities the project partners face were also discussed as preparation for public engagement and data collection.

The project proponents and design team performed site visits to collect and inventory relevant data. Additionally, the open space property was toured to determine any existing conditions and information to be included in site surveys. The site visits informed site opportunities and constraints which were considered in the development of the master plan program.

CDM Smith, as the prime consultant, managed the overall project, and led the civil and river engineering design. DHM Design led the landscape architecture design and public outreach. Corvus Environmental led the environmental restoration and permitting tasks. In addition, The Restoration Group and Hart Environmental provided technical oversight, including review of Master Plan concepts.

2.2 Data Collection and Site Investigations

The design team acquired and reviewed existing data for the project, including previous plans, reports, grant information, and topographic and utility information. In addition, the team performed a field survey of the project area. The field survey included topographic and planimetric survey in key project site areas as well as horizontal location of visible utilities. The survey also identified large trees (i.e., greater than 12 inches) and other ecological features. The team used contours from 2013 LiDAR data set for the master plan phase. Additional topographic surveying may be required in limited to areas to provide additional elevation data (e.g., south and north ponds).

For additional information on the data collected and site investigations, see the Data Summary Report in **Appendix A**.

2.3 Site Review and Site Inventory Analysis

The design team visited the site and performed field reconnaissance. The field reconnaissance inventoried existing amenities and features. The team also performed a preliminarily delineation of wetlands and other aquatic features in the study area. Dominant wetland, riparian and upland vegetation areas were mapped and characterized.

For additional information on the site inventory, see the Data Summary Report in **Appendix A**.

2.4 Program Analysis

Initial programming analysis was completed to review potential opportunities for open space restoration and development that aligned with project partners and funding requirements. These features were reviewed with the stakeholders and project team to determine feasibility and alignment with specific funding sources that have been identified for the project.

Water quality

Two options were considered to improve water quality. Both options implement stormwater management best practices, which will minimize runoff, encourage infiltration, and protect and enhance wetland habitats & riparian zones.

Option 1 looked at construction of 2 spillways to prevent the South Platte River from relocating through the South Pond in a major flood event. This would allow for overflows to move through the pond without causing erosion or embankment failure, slowing and temporarily storing floodwaters, and allowing impurities to settle out.

Option 2 looked at development of a secondary, or backwater, channel to accept overflows independent from the south pond. This would keep the south pond off-line from most flood events in the South Platte River and enhance water quality in the South Pond.

Streambank Stabilization

Areas prone to erosion will be stabilized by replacing steep banks with laid back slopes, repairing and armoring eroded banks, and creating a series of low terraces at the outside bends of the river's edge, thus improving the floodplain bench. Riverbank restoration will include vegetated riprap with 3:1 or shallower slopes, along with cottonwood and willow plantings.

A variety of tree and shrub species will be planted in the Open Space.

Habitat Enhancement

Existing and emergent vegetation will be improved and protected in upland, riparian, and wetland habitats within the site. Invasive plants, particularly tamarisk trees, will be removed, while a variety of tree and shrub species will be planted to increase wildlife benefits. These will include native dryland grasses, which will be planted in previously disturbed areas, and native tree species such as cottonwood and willow, which will further enhance the large amount of riparian forests on site.

Wetland Ecological Restoration

Wetland areas scarred from past gravel mining will be restored to increase the littoral zone, which consists of submerged, floating, and emergent plants, as well as moist soil. Restored wetlands will create habitat, and public access will be discouraged with thickets of prairie cordgrass, nuttall's sunflower, milkweed, aster, switchgrass, and sedges.

Low Water Use Native Landscapes

Much of the habitat area is dominated by non-native species, due to its historical land use of pasture and farmland. A restoration program will be developed to increase native short-grass prairie vegetation, as well as stands of plains cottonwood and other native plant communities.

Trails and Trailhead Access

Public access facilities will be developed to allow Adams County citizens to enjoy the South Platte River and natural habitat. These developments include trailhead parking, restrooms, shelters, and signage. Trailhead connections, and access for the adjacent neighborhoods across Riverdale Road, will be developed. Soft surface trails and trailheads utilizing natural materials will be developed to provide access throughout the site for non-motorized transportation, such as walking, biking, and horseback riding. Trail width will vary depending upon the function of the trail. An accessible concrete trail will also be developed that connects visitors from the trailhead to the south pond and the regional trail system.

Soft surface trails will be developed.

The river and ponds will be accessible.

River Access

River access points will provide accessible soft surface trails down to the river's edge where it is currently limited or inaccessible. These access points will provide significant interaction with the water and provide recreation access that is rare within this stretch of the South Platter River. The design would integrate the creation of wetland habitat, fishing access, group gatherings, and recreational access to the river.

Nature Based Play Opportunities

A natural outdoor play area will be developed, which will consist of elements that allow kids to stack, build, and create their own play environment using salvaged logs found along the South Platte River, branches, stumps, and other natural materials. These areas would consist of different zones that allow for gross motor skills building, balancing, climbing, team play, learning, discovery, and quiet areas to reflect, encouraging use of all five senses. All features will reflect the character of the natural environment, and be integrated into natural landforms that are either developed or existing on site.

Nature based play will provide fun and unique opportunities.

Bird Watching and Wildlife Viewing

Wildlife viewing opportunities will be enhanced through the creation and expansion of wildlife corridors and nesting sites. Creation of accessible overlooks and viewing blinds within wildlife habitat areas will allow users to watch, photograph, and learn about birds & local wildlife on site.

Outdoor Classroom

The outdoor classroom will be a place where the natural and built environments draw people into learning and exploration opportunities. It will be the framework for led excursions and have a central area for presentations. This classroom's furnishings will be made from natural materials.

Interpretive and Educational Areas

There will be opportunities throughout the site for education and interpretation that reflects the history, culture, and ecology of the open space, including its gravel mining history. This will include interpretive signage at points of interest that educate users on their role as stewards to the land, and the restoration efforts that have been put in place to protect the abundant wildlife habitat.

2.5 Ecological Considerations and Principles

The ecological restoration goals of the open space are to protect and enhance the native vegetative communities and habitat for wildlife in ways that are consistent with the recreation goals of the open space.

Upland Restoration

Restoring uplands on the open space is a priority, particularly in the south two-thirds of the open space where there is more plant community diversity, and where recreation activities will be focused. To accomplish grassland restoration, weed management needs to be implemented (described below), and prairie dogs must be removed from, and at least temporarily excluded from, the open space until native grasses are well established. Once a competitive stand of grass is established, any prairie dog recolonization should be limited to a small area or prevented, depending on the site management plans. Long term uncontrolled prairie dog occupation will likely lead to loss of restored grassland vegetation, and return of noxious weed infestations throughout the colony site. Prairie dog colonization in the north third of the open space may be more compatible with recreation development and use of the open space. It is recommended that if prairie dogs are to be allowed to colonize a portion of the site, that their populations be limited to a specific area. The site should be monitored annually for effects on restored areas and sustainability.

Riparian and Wetland Areas

Improving riparian vegetation is important for habitat values in the open space. Re-creation of the natural topographic features typical of the South Platte River corridor, such as broad lower and upper terraces and back water channels, will provide a generous setting to restore the diverse native vegetation characteristics of the South Platte River. Careful re-creation of the geomorphology typical of a more natural river corridor will assure the hydrologic connectivity required to develop functional, diverse, and self-sustaining native riparian vegetation, such as woodlands of plains cottonwoods and peach-leaved willows, as well as thickets of chokecherry, wild plum, red osier dogwood, golden currant, western snowberry, and sandbar willows. Properly located and planted, this riparian vegetation will provide important functions on the site, including erosion protection for the banks, nesting and foraging opportunities for wildlife, water quality improvement, and passive recreational improvements by creating a wilder, more beautiful and interesting setting for hiking and exploration. As more wildlife utilizes the restored woody vegetation, they will distribute the seeds of these shrub species up and down adjacent portions of the river corridor, expanding the benefits of the restored diversity present on this site.

Removing exotic woody species, including Russian olive, Siberian elm, crack willow, and tamarisk, should be a priority. This removal will improve the quality of the existing riparian woodlands on site, reduce potential for seed spread from the exotic trees, and assure better wildlife habitat. Protecting cottonwood trees from beaver activity is necessary, as it is likely that beaver will eventually move back into the area after their recent removal. New tree plantings should also be fenced, and older established trees painted with sand and latex paint mixtures to better ensure their survival. Recreation access to riparian and wetland areas should be via a limited number of well-designed trails. Trails adjacent to these areas should be planned and constructed to minimize impact on riparian habitat.

Weed Management

Noxious weed infestations on the open space have contributed to the loss of productivity and ecological functions of the area, adversely affecting native plants and wildlife. Integrated weed management, which employs mechanical, cultural, biological, and chemical control techniques, should be used. The most important part of any weed management program is prevention. Weed infestations should be monitored and vigorously addressed to prevent dispersal and the need for future control actions. Certified weed-free materials should be used in recreational developments and reclamation projects. Restoring and maintaining healthy plant communities, in particular grasslands, and reducing human impacts and use patterns can prevent weed establishment and spread.

Establishing favorable plant species is important for providing competition to weed species. Grass species are particularly important, as they are tolerant of selective weed management practices such as mowing and herbicide applications. Upland areas, which are currently dominated by cheatgrass, add little to the ecological value of the open space. Once preliminary weed management has weakened the weed communities, these areas will be suitable for large-scale seeding with native plants. Proper seed selection and implementation are critical to preventing the reintroduction of weeds. In some areas, nonnative perennial grass species, such as smooth brome, provide competition to noxious weeds. Transition to native species in areas of exotic grasses should be undertaken gradually to ensure success in one area at a time. Because these areas are generally stable, their transition is a lower priority.

Cottonwood stands are the most valuable communities on the open space. These areas are very important to the restoration of native plant communities and wildlife habitat. The mature trees in these areas should be protected during the implementation of any other management procedures. Understory seedlings and

saplings should be protected and encouraged. Controlling the weed populations that occur in the understory, and planting native shrubs and herbaceous plants, will enhance the ecological value of these woodlands.

2.6 Agency Coordination

Adams County and the design team has met with several agencies and grant providers to discuss concepts and confirm that the proposed improvements achieve the goals and requirements of grant, easement and permit requirements. Meetings to date are summarized below:

- Colorado Parks and Wildlife (CPW) on site meeting to discuss the Fishing-is-Fun grant requirements and CPW's vision of fishing access for the South Pond.
- Colorado Open Lands on site meeting to discuss allowable use of the conservation easement and proposed parking area improvements.
- City of Thornton concept review meeting including planning, parks, emergency response, and structural engineering staff to discuss the City's permit review process and requirements.
- Metro Wastewater has attended multiple project progress meetings. Metro Wastewater has a habitat restoration project that will dovetail with the secondary channel portion of 88th Avenue Open Space Improvements.

2.7 Master Plan Development

UDFCD and Adams County have decided to separate the project scope of work into multiple phases: 1) Master Planning Phase, 2) Design Phase, and 3) Construction Phase. The design team has prepared this Master Plan to describe the open space plan formulation and document stakeholders' desires for the open space. The team also prepared rendered plan alternatives that include different possible layouts of park features and activity areas. Graphics focus on key areas and open space features, such as the South Pond, secondary channel, trails, and recreation access. Concept graphics were prepared that included hand drawn illustrations, cross sections, and other detailed graphics to convey the intent of the design of the open space, and assisted in developing conceptual level costs. See Section 3 for further information on the master planning process.

Section 3

Master Planning Process

3.1 Initial Planning Studies

The design team's goal was to gain a deep understanding of the 88th Avenue Open Space existing conditions, opportunities & challenges, and an assessment of flood impacts based on conversations with the County and stakeholders, previous planning studies, assessments, and field observations. In this process, the planning team collected various data through land surveys, ecological and floodplain site assessments, and other means necessary and helpful to the planning process.

Previous Planning Efforts and Grant Requirements

Following is a list of previous planning studies that were reviewed, and a list of goals and guiding principles identified that were incorporated into the planning:

- Available Land Survey
- Adams County 2002 88th Avenue Open Space Master Plan
- NRD Grant Application
- FIF Grant Application
- Hart Feasibility Report
- Adams County Open Space Grant Application

Hydraulic Analysis

The South Platte River along the project reach is located in Adams County, which is part of the National Flood Insurance Program NFIP. The NFIP is administered by the Federal Emergency Management Agency (FEMA) and is within the regulatory (100-year) floodplain. The regulatory floodplain is developed through engineering analysis using hydraulic models to predict water surface elevations (WSELs) and delineate floodplain boundaries. The current regulatory floodplain has an effective date of March 5, 2007. While researching the effective regulatory model, CDM Smith discovered discrepancies between the model and what was reported in the FIS. CDM Smith contacted UDFCD about these discrepancies. UDFCD advised CDM Smith that the 2005 FHAD model is the official source for the South Platte River data in both the Adams County 2007 Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). The 2005 FHAD hydraulic model will be used in future analyses as part of the design progression.

3.2 Preparation of Draft Planning Documents

Inventory and Analysis of the Site

With a thorough understanding of the field conditions, based on site tours with the county and project partners and from available photography, initial inventory and analysis maps were created. These maps were based on the programming and guiding principles identified by the community, the county, and previous planning documents. Items of concern included habitat, hydraulics and hydrology, trail design, national ADA and AASHTO standards, and other items and critical issues identified during program development.

The planning team assisted with reviewing opportunities to minimize or avoid wetland and habitat impacts for all conceptual alternatives. After touring the site with the county and project partners, the planning team prepared a Preliminary Assessment, reviewing alternatives and offering solutions that aided in the enhancement of the property, based on project goals.

Site layout alternatives included options for trailhead parking, regional trail re-routing alignments, nature trails, habitat restoration and enhancements, recreation opportunities, flood control improvements, water quality improvements, and shoreline stabilization.

Conservation Values Assessment

A Conservation Easement exists on the 28-acre Reffel Property (Property), which is encompassed within the proposed 88th Avenue Open Space. The conservation easement describes the Property as possessing open space and passive recreation values (Conservation Values). As part of placing the Conservation Easement on the Property, Adams County prepared a baseline report that established the conditions of the Property's Conservation Values described for preservation and protection in the Conservation Easement. The baseline is established in order to assure that any future changes in the use of the Property, or amendments to the Conservation Easement, will be consistent with the terms of the easement.

The draft master plan includes a proposed new parking lot, a trail, and a nature play space on the Property. The recommended proposed parking lot would have access from, and be immediately adjacent to, Riverdale Road. The purpose of the parking lot would be to allow public access to proposed passive recreation improvements in the 88th Avenue Open Space, including a nature play space in the riparian forest on the Property. The trail would connect the parking lot to the remainder of the 88th Avenue Open Space, and to the nature play space. The nature play space would include landforms such as mounds and swales, and natural materials such as tree trunks and boulders, which encourage children to engage in unstructured play. The nature play space would also include picnic tables.

To aid Colorado Open Lands, the Grantee of the Conservation Easement, in determining if the proposed master plan improvements will be consistent with the preservation and protection of the Conservation Values of the Property and would not adversely affect the Property's Conservation Values, Adams County requested CORVUS Environmental Consulting LLC to prepare a Conservation Value Assessment.

CORVUS Environmental Consulting LLC found that the proposed master plan's effects on the Property's Conservation Values of open space and passive recreation values are as follows:

Open Space – The Conservation Easement states: "The Property contains open space values that can be viewed by the public from Riverdale Road. The Property also contains one pond and a wooded area. The Property will provide a buffer between neighborhood development and the future 88th Avenue Open Space County Park." The proposed parking lot, trail, and nature play space will have no effect on the open space values provided by the Property. The parcel and other parts of the 88th Avenue Open Space, including the pond and riparian forest, will continue to be visible from Riverdale Road. The parking lot will not be located in sensitive vegetation or wildlife habitat; rather, it will be located in an upland area described in the baseline report as "Tame Pasture/Disturbed Sites," dominated by non-native plant species. The proposed parking lot will be at least partially screened from Riverdale Road by grading and planted vegetation, minimizing its visual intrusion. The Property will also continue to provide a buffer between neighborhood development and the remainder of the 88th Avenue Open Space.

Passive Recreation – The Conservation Easement states: "The Property will contain a public trail that will connect to the South Platte River Trail system. Passive recreation such as hiking and picnicking will be available to the public." The proposed parking lot, trail, and nature play space will have a beneficial, rather than adverse effect, on the passive recreation values provided by the Property, and the trail and picnic tables are specifically included as supporting passive recreation. The parking lot is an integral part of providing access to the trail and nature play space and will enhance the availability of passive recreation to the public.

3.3 Stakeholder Input and Public Outreach

Public forums were held to present information and gather feedback from citizens at large. Initial meetings early in the process, and follow-up meetings during the conceptual alternative and final plan development process, were important. All public meetings were held at Margaret W. Carpenter Recreation Center. The planning team worked with project stakeholders, and had an extensive public outreach process to gather necessary information about the project that clearly communicated the visions and values that would be the guiding principles.

Building Awareness

Public outreach consisted of making project information widely accessible for citizens of Adams County. DHM advertised the project to the general public through mailed postcards, emails, and a project website.

Mailed flyers were distributed to members of the community, as well as being available at all public meetings. Project schedules and meetings were advertised throughout Adams County and through the Adams County email list.

Project Website

Adams County's website posted information about the project to engage the public, post the latest information & updates, and distribute a calendar of events pertaining to the project. The project website is hosted at http://co-adamscounty.civicplus.com/index.aspx?NID=1526. It created possibilities to receive input from the community beyond the public meetings, and allowed for a variety of discussions to take place in a secure and controlled environment.

Public Meetings

As part of the public outreach process the design team coordinated with county staff to develop the strategic approach and messaging for public meetings. The strategic planning included defining meeting objectives and desired outcomes, outreach and advertisement tactics, meeting dates, and the preferred location based on populations of concern. The design team managed the logistics of the event, including the agenda, informational handouts, fliers and notifications, room set up, sign-in table and attendance, meeting notes, and photo documentation.

The planning process conducted two (2) meetings to establish vision and guiding principles, review draft concepts, and finalize a planning process. The most important goal of these meetings was to ensure that everyone had an opportunity to speak, and that they knew we had heard what they said. The initial community meeting focused on the open space's specific goals and vision (**Figure 3-1**). In addition, this first meeting was devoted to soliciting ideas, input, and comments related to unmet and unidentified needs, current services and facilities, and desired opportunities.

The second community meeting was conducted during the draft planning process to review all goals, and incorporate and review all feedback and solutions to date. This second meeting was devoted to sharing with the entire community a look at the concept plan and alternatives, feedback to date, and collect any additional comments from the town and community.

After each public meeting, the planning team prepared meeting notes and feedback that summarized the progression of the project into a community feedback report. These reports were distributed to the county staff, project partners, and the general public for review and comment.

Incorporating Feedback

Throughout the planning process the design team worked closely with the public to solicit feedback at every step. Comment cards were provided that had opportunities for residents to fill out survey questionnaires, as well as to write general comments (**Figure 3-2, Figure 3-3**). All comments were reviewed thoroughly for feasibility and balanced against parks budgets, maintenance and operations considerations, safety, and other criteria identified by the town to create the best park experience, and were presented back to the public at public meetings (**Figure 3-4**). Planners and staff did their best to incorporate all comments into the planning process, but as with every process, compromise on some comments was needed. Results and decisions for developing the designs were reviewed and presented to the public for ultimate support of the final planning of all parks and recreation areas.

Meetings with county staff were held to review comments and feedback from the public, and to validate the design decisions moving forward into a preferred plan. This provided one last opportunity to discuss any gaps of information and ensure that the final products were in complete alignment with the goals and objectives identified with the county staff and community. This meeting served as a check and balance that the needs of the community were being met in the most cost effective and value added manner.

3.4 Conceptual Plan Development

Prioritization of features in restoration of the open space property happened early on in the planning process and focused on funding requirements and fall construction schedules. The County anticipates completing planning by mid-August 2016 to take advantage of final design in the late summer and fall, with the initial goal of starting construction during the winter of 2016 and into the spring, summer and fall of 2017. Schedules are continually changing due to funding requirements, prioritization, and commitments from other stakeholders and agencies.

Conceptual Plan Development incorporates all feedback gained through public meetings, meetings with the project partners and with County staff, stakeholders. Graphic presentations and renderings were developed that provide compelling and readable drawings clearly communicating the design intent and how all feedback has been incorporated. Our goal is to provide unique, creative and viable design solutions that reflect the preferences and values of the stakeholders and support the established vision developed in earlier tasks.

Plans were developed with alternates for different features within the open space that looked at different arrangements of features based on comments received early in the planning process and that align with the goals and guiding principles. Concept Drawings included specific park feature arrangements, parking options, trail alignments, identification of disturbances, impacts to existing vegetation, and other details for all projects that are necessary to understand the requirements for developing final designs.

A feasibility analysis, including impacts to property, wetlands and vegetation, costs, construction access, and other items was completed. Evaluations included review of possible construction costs (based on 2016 costs), a review of impacts to property and land disturbances, and evaluations and risk assessment for any environmental issues that would affect the implementation of the proposed plan.

The conceptual plan includes a review of phased recommendations of improvements based on funding and budgets. The planning team has prepared a detailed schedule of these recommendations, included in the subsequent cost estimating.

Site Layout Alternatives

Alternatives incorporated all comments and feedback to date that were collected through comment cards, public meetings, and the project website, and from all stakeholders including county staff. Often, the final preferred plan is a combination of design solutions identified in the draft plans.

Overall Project

The 88th Avenue Open Space project will restore wetlands, and riparian and grassland habitat; as well as enhance surface water and groundwater. Public access to the open space features is paramount to the success of the restoration project and is an important component in all grant requirements. Public access to the South Pond, Middle Pond, and proposed natural play area steered the concept designs. Focus areas include:

- Parking lot and trailhead
- Restroom facilities
- Secondary backwater channel
- Habitat and ecological restoration
- Natural play area and outdoor classroom
- Fishing access improvements
- Trails and signage
- Wildlife viewing
- Enhancement of the public's understanding of the importance and value of wildlife
- ADA accessibility of the restored natural resource areas

Backwater Channel and Re-Connection to the River

A backwater channel is a quiescent water area into which primary channel currents backflow. The channel will reconnect the main channel to the larger floodplain along the west bank and act as an overflow during large flow events. The channel will provide protective cover for aquatic and riparian habitat and sustain aquatic vegetation and riparian wildlife. The channel will be constructed off of the main channel within existing west bank and south pond, which will require regrading of the west bank.

CDM Smith developed an existing conditions 2-D hydraulic model using SRH-2D, hydraulic modeling software (U.S. Bureau of Reclamation). The terrain for the existing conditions model was developed by integrating bathymetric survey data collected by CDM Smith in July 2016 with LiDAR data recorded in October 2013. The purpose of the 2-D model was to analyze the proposed conditions of the backwater channel. The channel was evaluated at two flows: the low flow condition of 156 cfs and the bankfull flow of nearly 4,000 cfs.

The existing conditions model was then modified to represent the proposed channel conditions. The terrain was modified to represent the addition of the backwater channel and a downstream riffle. The channel was modeled to confirm that the mouth of the channel would have backwater in the low flow condition, and that during the bankfull flow condition there would be sufficient velocity in the secondary channel to move sediment. An iterative process was undertaken determine the elevation of the downstream riffle invert, and the elevation of the inlet to the channel. The riffle was set at an elevation to maintain the backwater condition at low flows. The elevation of the inlet was set at an elevation so that it was activated during the bankfull flows. Flow velocity at the bankfull flows through the secondary channel were targeted to be 4 fps so that sediment deposited in the channel would be transported out of the channel.

During low flows the riffle backed water up the secondary channel approximately 20 feet, and nearly filled the secondary channel during bankfull flow. The inlet of the secondary channel prevented water from entering the secondary channel at low flow and allowed water to activate the secondary channel during bankfull flow. Average flow depths and flow velocities were approximately 2 feet and 0.2 feet per second, respectively during the low flow and 5 feet and 4.0 feet per second, respectively during the bankfull flow.

South Pond

The majority of the work will take place at the South Pond (**Figure 3-5**). Creating a secondary channel in the river will protect the South Pond from impacts during high flow events, and will create a backwater area that can help naturally filter water to improve quality. In creating this channel, the slopes of the pond banks will be reduced to prevent erosion, which will allow vegetation to take root more easily. Increasing the vegetation will increase wildlife habitat, which will, in turn, increase fauna diversity. The increase in wildlife will create a great area for wildlife viewing, which is one of the driving goals of this project.

Part of the design concept is to provide areas to view wildlife, and in a larger sense, provide areas to enjoy the open space. Along the South Pond, the plan calls for an interpretive boardwalk, an overlook, several angler access points, and a fishing pier. Creating areas for fishing is part of the 'Fishing-Is-Fun' grant, which is a contributor to this project. The vision for the South Pond is to create a lush and diverse wildlife habitat that benefits not just the wildlife but those who wish to interact with it, as well (**Figure 3-6**).

Trailhead and Nature Based Play

Providing a new trailhead for the residents of Adams County, and visitors from surrounding areas, is an integral part of the open space design. There is currently a trailhead located on the southwest portion of the site. This trailhead is owned by the City of Thornton. The goal of the new trailhead is to provide a central point of improved access to all the recreational features in the open space. The trailhead will be located on the western side of the site, off Riverdale Road. It will consist of an entrance sign, a parking lot, a way-finding kiosk, a restroom, and a picnic shelter (**Figure 3-7**). The proposed trailhead will accommodate up to 40 parking spaces. Low impact development (LID) techniques are being reviewed for suitability within this project.

Located near to the trailhead will be the nature based play area (**Figure 3-8**). Nature based play is a type of play that uses natural material such as tree trunks, tree branches, boulders, and natural land forms. One benefit of this style of play is that it encourages children to pay attention to their surroundings, which has shown to help cognitive and gross motor skills. Nature based play, which strives to engage all five senses, provides a variety of opportunities for all children to connect with nature, and is a natural fit within the character of the open space property.

Ecological Restoration

The primary objective of ecological restoration within the open space is to restore and enhance native plant communities throughout the site. The highest priority is for county weed management staff to prepare a comprehensive Integrated Weed Management (IWM) plan for the open space. The IWM plan will include specified annual activities, such as mapping weed and invasive tree and shrub infestations, choosing control methods, and documenting the success for control methods. Having a plan will allow resource managers to prioritize control activities, document success, and track costs. Typically, the first several years of implementing an IWM plan require the most effort. It takes time to map, prioritize, and effectively control infestations. Once effective site-specific control methods are identified, activities become more routine.

Suggested priorities for the plan include:

- Identify and map small populations or individuals of noxious weeds and eliminate (high priority)
- Monitor post-construction revegetation of recreation and backwater channel improvements for noxious weeds and eliminate (high priority)
- Remove black-tailed prairie dogs, control noxious and invasive weeds in colony, and inter-seed with suitable native seed mix, mulch. Monitor and repeat as needed until sustainable stand of grass is established (high priority)
- Inter-seed weedy uplands with native grasses and forbs to increase diversity and ecological function (lower priority)

3.5 Parking Feasibility Analysis

Public access to the 88th Avenue Open Space is paramount to the success of the restoration project and is an important component in all grant requirements. Public access to the South Pond, Middle Pond, and proposed natural play area are the primary focal points of the recreation component of the project (**Figure 3-9**). A summary of project goals and guiding principles is provided below:

- Develop public access facilities to allow Adams County citizens to enjoy the South Platte River corridor and the natural habitat that will be restored.
- Improve public accessibility to the restored natural resource areas to increase recreational opportunities, including wildlife viewing.
- Provide public access to natural areas close to where people live, work, attend school, and near community centers so they are convenient for people to experience every day.
- Develop public access to strategically avoid important habitat areas and close areas of the park with signage and fencing.

In addition, planned improvements to site should be affordable and managed within current budgets for site improvements.

Description of Options

There are two trailhead options to accommodate increased visitor usage, access, and connectivity to the open space features. The design team presented the goals and guidelines listed above for the improvement project at two public meetings. Discussions at both public meetings included the review and location of the parking lot. Public meeting #1 (April 5, 2016) presented the general approach and need of a trailhead to align with the goals, as outlined by the county and grant requirements. Public meeting #2 (June 6, 2016) presented options for trailhead design and possible locations. Concept drawings were created and presented for the two options under consideration.

Trailhead Option 1 (**Figure 3-10**) is located on fairly flat terrain, at the approximate midpoint of the property along Riverdale Road. During the public meetings, a few citizens expressed concern regarding viewing the trailhead from their properties. The design team developed a concept to screen the residents' views using berms and landscaping as a buffer. The grade of the trailhead would also be located several feet below Riverdale Road, thereby increasing the screening from adjacent homes. The estimated conceptual construction cost for Trailhead Option 1 is approximately $180,000.

Trailhead Option 2 **(Figure 3-11**) is located on the southern portion of property, adjacent to the existing City of Thornton trailhead. Citizens concerned with the location of Trailhead Option 1 expressed a preference for Option 2, if existing condition constraints and the design goals of the project could still be met. The estimated conceptual construction cost for Trailhead Option 2 is approximately $260,000.

Comparison Summary

The benefits and limitations associated with each of the two options vary (**Table 3-1**).

Table 3-1: Comparison summary of Trailhead Option 1 and Trailhead Option 2

Option	Benefits	Limitations
Trailhead Option 1	▪ Close proximity to open space features ▪ Limited earthwork and associated costs ▪ Preserves vegetation and habitat ▪ Direct access to south pond and regional trail from Remington neighborhood ▪ Increased accessibility to open space features including Middle Pond, bird watching, nature based play, and north pond ▪ Provides overlook for natural play and picnic area safety and security	▪ Proximity to adjacent homes ▪ Viewshed impacts
Trailhead Option 2	▪ Opportunity to expand existing lot owned by City of Thornton ▪ Limited impact to viewshed of Remington neighborhood	▪ Larger land disturbance and site stability/development costs ▪ Conflicts with gas and water utilities ▪ Increased impacts to vegetation and sensitive habitat ▪ Limited public access to Middle Pond, north pond, bird habitat viewing areas, nature based play, and programmed areas of open space

Recommendations

The design team recommends that Trailhead Option 1 be pursued based on the following criteria: experience, balancing goals and guiding principles, ability to activate and engage open space features, physical constraints, managing access, and conceptual construction costs. This option best meets the goals and guiding principles of the project; and Trailhead Option 1 activates and engages all open space features, reduces site development constraints and existing infrastructure conflicts, improves security of new play areas, and limits impacts to sensitive vegetation areas. Furthermore, the anticipated construction costs in relation to available funding is approximately 30% less than the Trailhead Option 2, which reduces the strain on restricted funding.

3.6 Preliminary Estimate of Costs

Conceptual costs were developed for major improvements components. Estimated costs are presented in Opinion of Conceptual Costs (**Table 3-2**). Unit costs, markups, and fees were taken from a combination of UDFCD's cost database, recently bid projects, and previous phases of Metro Wastewater's habitat improvements projects. A 20% contingency was applied to the project.

Table 3-2 Conceptual Cost Summary

Item	Total
Construction Costs	
South Platte River Floodplain Connection and Water Quality Improvements	$ 1,166,900.00
South Platte River Channel Improvements	$ 450,000.00
Rerouting of South Platte River Trail	$ 224,400.00
South Pond Improvements: South Pond Fishery and Shoreline Improvements	$ 238,500.00
Recreation Site Improvements	$ 608,400.00
Riparian Forest and Upland Habitat Improvements	$ 182,500.00
Natural Outdoor Play	$ 300,000.00
Engineering Services (18%)	$ 570,700.00
Mobilization (5%)	$ 158,600.00
Demolition (5%)	$ 158,600.00
Administrative (Material Testing, Misc, 5.2%)	$ 164,900.00
Contingency (20%)	$ 844,800.00
Total	**$ 5,068,400.00**

The total cost of the proposed improvements exceeds the immediately available funding. Some improvements do not currently have grant funding, for example, the natural outdoor play. There is a potential for cost sharing between the project stakeholders and Metro Wastewater, for the backwater channel improvements portion of the proposed work. If an agreement is implemented, a larger proportion of the work could be completed during the initial phase of improvements. Recommended phasing of proposed improvements is discussed in Section 4.2.

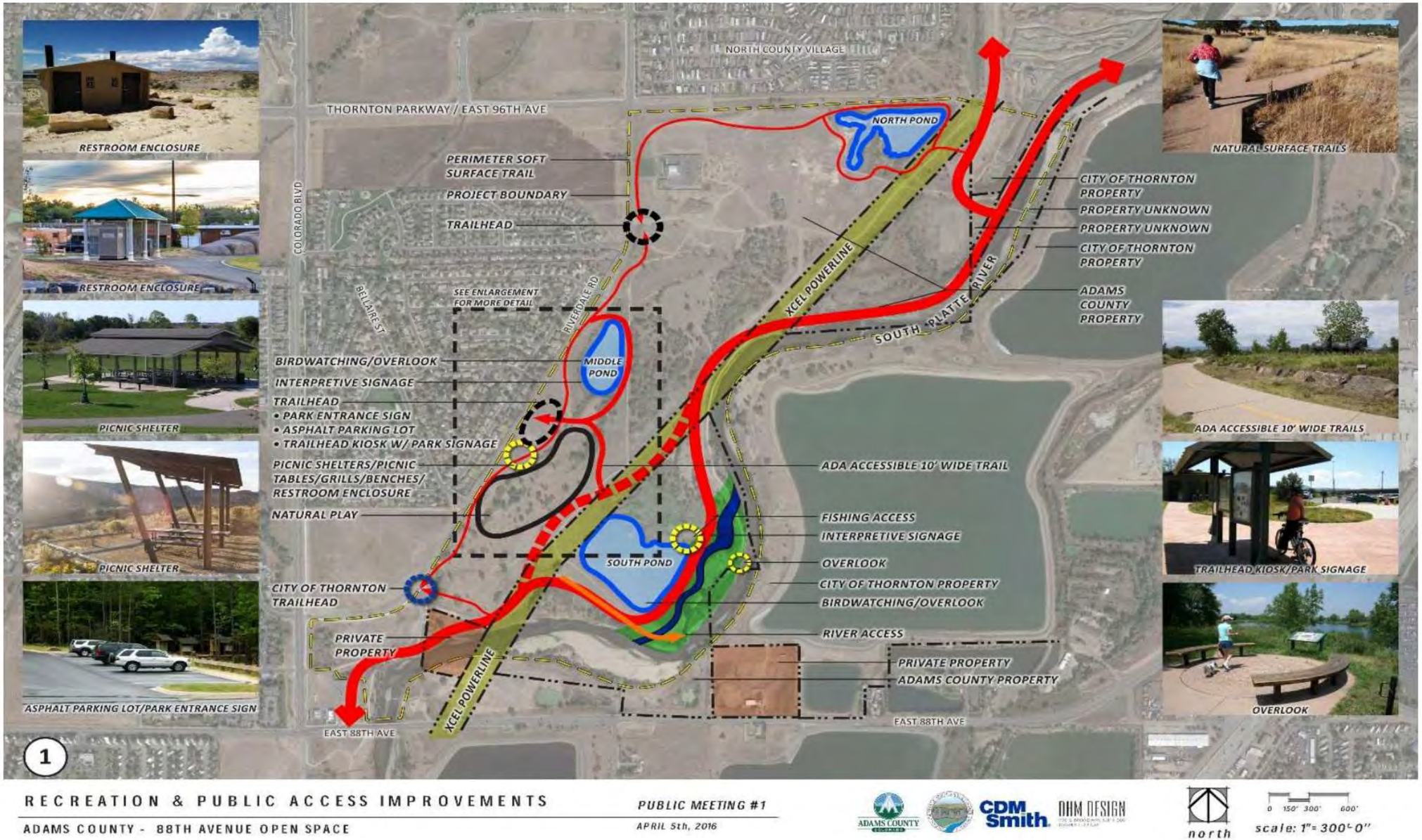


Figure 3-1: Recreation and Public Access Improvements – Page 1

Figure 3-1: Recreation and Public Access Improvements – Page 2

ADAMS COUNTY | 88TH AVENUE OPEN SPACE

Community Meeting #1 - Survey April 5, 2016

What would you use the open space for?

_____

_____

_____

_____

_____

_____

_____

Contact Information *(Optional)*

Name _____

Email _____

Address _____

Would you like to receive email updates regarding this project? Yes ☐ No ☐

CDM Smith DHM DESIGN

Figure 3-2: Community Meeting #1 Survey Card, Frontside, April 5, 2016

ADAMS COUNTY | 88TH AVENUE OPEN SPACE

Community Meeting #1 - Survey April 5, 2016

Questions:

How often do you use the Open Space?

- ☐ Daily
- ☐ Weekly
- ☐ Occasionally
- ☐ Never

How likely would you use the Open Space if recreation features you enjoy were implemented.

- ☐ Daily
- ☐ Weekly
- ☐ Occasionally
- ☐ Never

What type of natural/passive recreation features are most important to you?

- ☐ Trails (Informal, soft surface)
- ☐ Fishing
- ☐ Bird Watching
- ☐ Regional Trails
- ☐ Hiking Trails
- ☐ River/Pond Recreation Access
- ☐ Picnicking (BBQ Grills, Shelters)
- ☐ Natural Play

Based on the goals identified for the project what's most important to you? *(Rank 1 to 7 with 1 being most important)*

___ Habitat Restoration
___ Shoreline Stabilization
___ Recreation
___ North Pond Improvements
___ South Pond Improvements
___ Wetland Restoration
___ Flood Control and Water Quality Improvements

CDM Smith DHM DESIGN

Figure 3-3: Community Meeting #1 Survey Card, Backside, April 5 2016

#	How often do you use the Open Space?	Daily	Weekly	Occasionally	Never	How likely would you use the Open Space if recreation features you enjoy were implemented?	Daily	Weekly	Occasionally	Never	What type of natural/passive recreation features are most important to you?	Trails (informal, soft surfaces	Fishing	Bird Watching	Regional Trails	Hiking Trails	River/Pond Recreation Access	Picnicking (BBQ grills, shelters)	Natural Play	What type of natural/passive recreation features are most important to you?	Habitat Restoration	Shoreline Stabilization	Recreation	North Pond Improvements	South Pond Improvements	Wetland Restoration	Flood Control and Water Quality
1			1					1				1		1	1	1	1				3	2	5	7	6	4	1
2				1				1				1		1	1	1		1	1		1	4	5	6	7	2	3
3		1					1					1		1	1	1	1		1		x	x				x	x
4		1					1	1				1	1	1							x						x
5		1	1				1					1	1		1	1	1		1				x		x		
6		1					1					1				1							x				x
7																											
8				1					1					1	1	1	1				x			x		x	
9					1				1				1				1	1	1		1	1	1	1	1	1	5
10				1				1				1		1	1			1	1		1	5	7	6	4	3	2
11		1					1					1			1										x		
12		1					1					1				1					1	1	7	2	2	1	1
13			1					1						1		1			1		x		x				
14				1				1						1		1					x					x	x
15		1					1					1			1	1					x	x					
16		1					1					1			1	1					x	x					
17		1					1					1			1	1					x	x					
18		1					1					1			1	1					x	x					
	TOTAL (out of 18)	10	3	4	1	TOTAL (out of 18)	10	6	2	0	TOTAL	13	3	8	11	13	5	3	6								

Figure 3-4: Community meeting #1 survey card results, April 5, 2016

Figure 3-5: South Pond Improvements

Figure 3-6: South Pond improvements, Finished Perspective

Figure 3-7: Trailhead, Finished Perspective

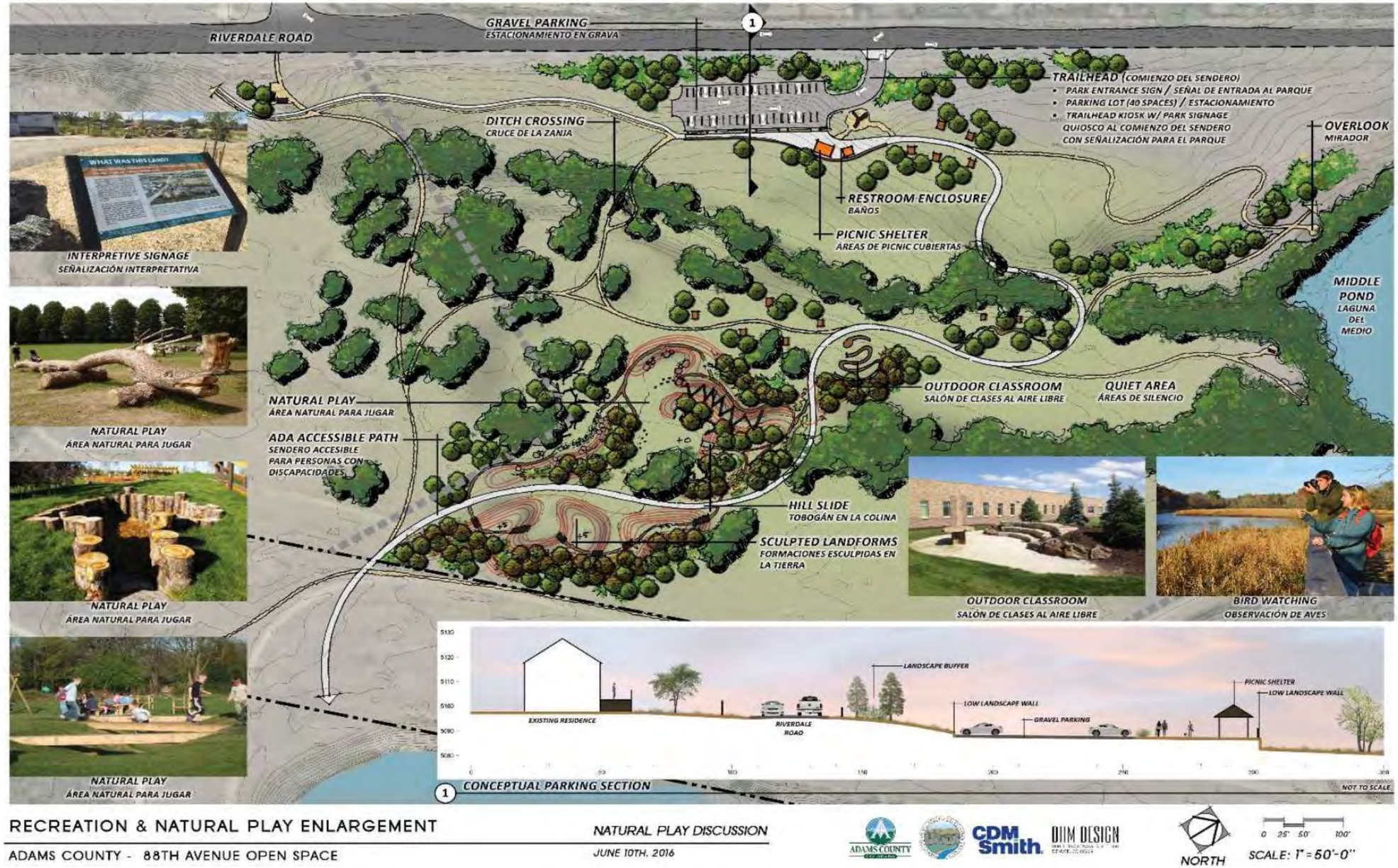


Figure 3-8: Recreation and Natural Play Improvements

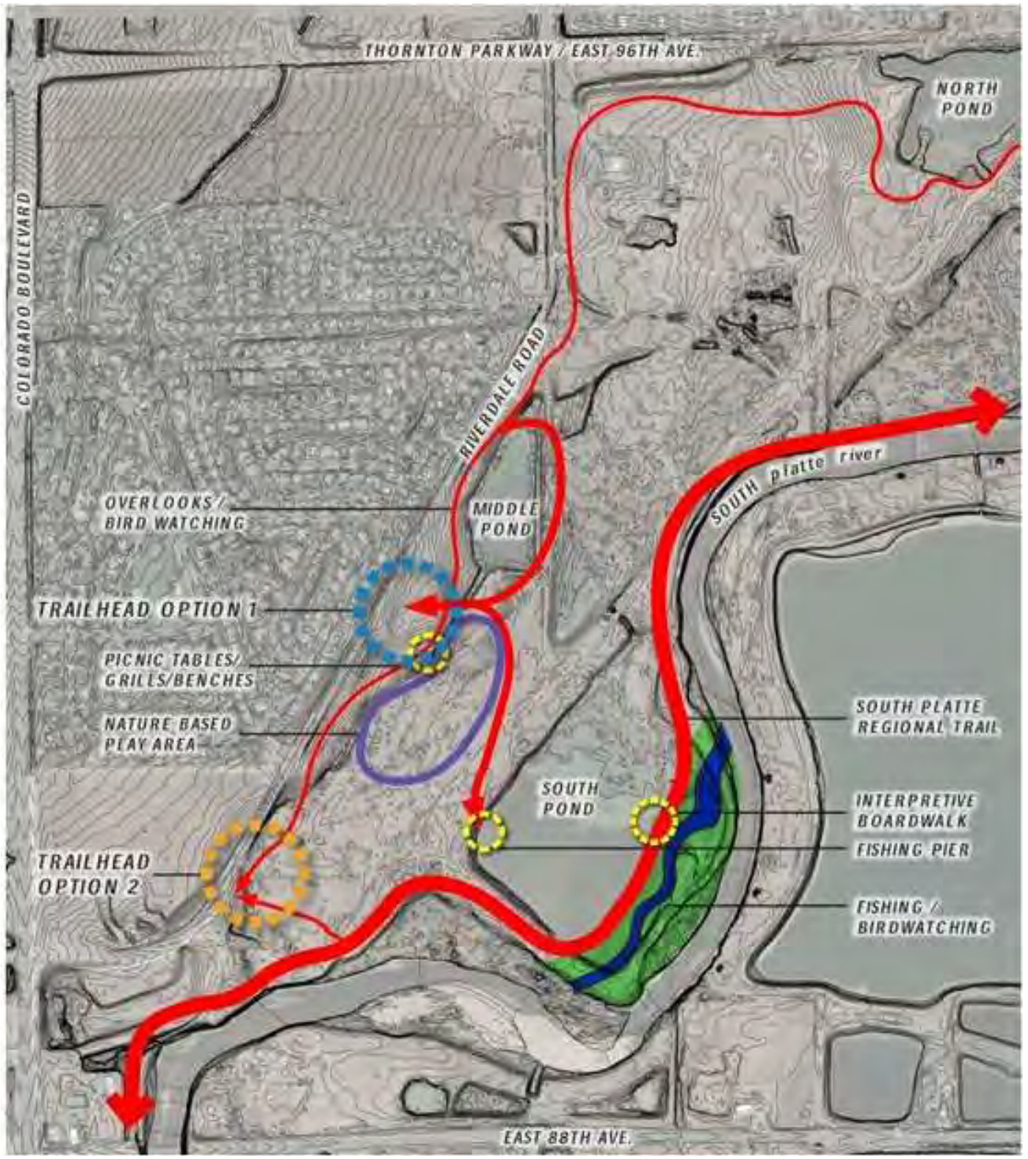


Figure 3-9: 88th Avenue Open Space Project Location, and Major Project Elements

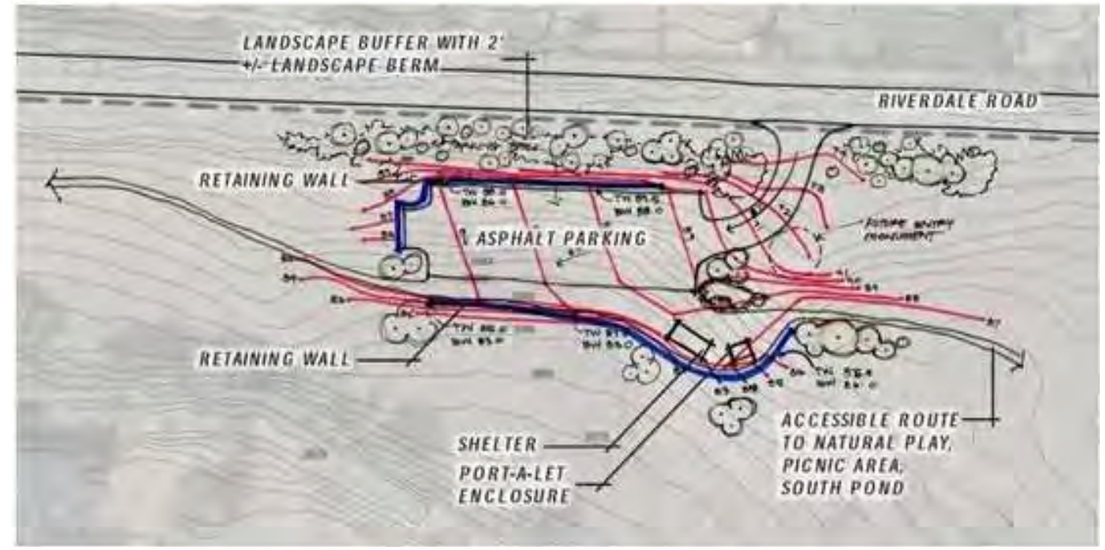


Figure 3-10: Trailhead Option 1

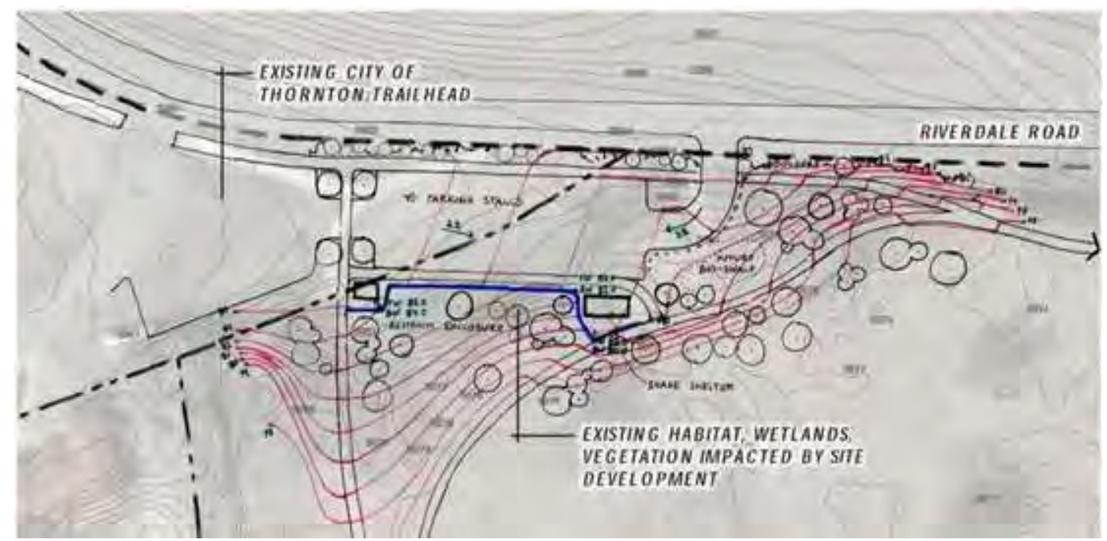


Figure 3-11: Trailhead Option 2

Section 4
Implementation Strategies

4.1 Funding

Funding sources were reviewed with the public to align interests and goals with available funding and funding requirements. Available funding, prioritization of projects, and funding requirements were factors that impact the ability to complete projects identified in the master plan. Following is a list of funding sources identified for Adams County 88th Avenue Open Space:

- Natural Resource Trustees/Foundation Fund – NRD
- CPW - Fishing is Fun
- Adams County Open Space Sales Tax Grant
- UDFCD
- Adams County Parks and Open Space

Additional funding sources are being reviewed by the County for possible Great Outdoors Colorado (GOCO) Local Park and Outdoor Recreation (LPOR) grants to fund currently unfunded, or partially funded, features, such as the nature based play area. Other grants and funding sources may need to be considered to fund other recreation and restoration features that are not identified within current funding sources but that are included in the overall master plan.

4.2 Phasing

Based on available funding, and priorities and requirements associated with funding and stakeholder contributions, the following phasing of improvements is recommended:

Phase 1:
South Platte River Floodplain Connection and Water Quality Improvements
South Platte River Channel Improvements
Rerouting of South Platte River Trail
South Pond Improvements: South Pond Fishery and Shoreline Improvements

Phase 2:
Recreation Site Improvements
Riparian Forest and Upland Habitat Improvements

Phase 3 (currently un-funded):
Natural Outdoor Play
North Pond Improvements

The phasing generally follows the focus areas described in Section 1. The design should include all three phases in case full funding is achieved. However, implementation of only the first two phases is feasible under current funding.

Design Phase

Concepts from the Master Plan will be used as the basis for the preliminary design. Preliminary design drawings will be developed as well as a refined cost estimate and preliminary design report. The report will outline design criteria, permitting requirements, and anticipated project specifications. Upon completion of preliminary design, a final design will be developed, including details of grading, access, vegetation and habitat restoration, and recreation components.

Construction Phase

The design team recommends that improvements within and adjacent to the river be constructed during winter. This would be the initial phase of construction, and recreation improvements could be constructed during spring and summer. Vegetation restoration work would be timed to be seasonally appropriate, and weed management is recommended to be a multi-season program.

4.3 Ecological Restoration

The following actions support implementation of the previously described goals and objectives for the 88th Avenue Open Space.

Vegetation Management

Objective 1: Control noxious weeds and invasive tree and shrub species on 88th Avenue Open Space.

- Develop and implement a phased IWM plan for 88th Avenue Open Space, with prioritized areas of control.
- Develop preconstruction, establishment, and long term weed control goals.
- Ensure the IWM plan complies with the State Weed Management Act, as well as with the county weed management objectives.
- Ensure chemical control is undertaken by state-licensed applicators, and is done in strict accordance to product labels.

Objective 2: Plan trails to minimize the risk of weed introduction and spread.

- Control weeds prior to constructing new trails in weed-infested areas.
- Avoid creating a trail corridor that travels from a weed-infested area into an area with little or no weed infestation.
- Keep trails out of depressions that are frequently muddy, and away from wetlands.

Objective 3: Include weed management best management practices during trail construction and maintenance.

- Use weed-free materials in trail construction and maintenance.
- Clean all equipment used in trail construction and maintenance before it is used on a new project.
- Minimize ground disturbance and soil compaction resulting from construction and maintenance activities by limiting trips by equipment across an area and turnaround sites for equipment.
- Reclaim disturbed areas as soon as possible to reduce the chance of weed infestation.

- Control noxious weeds in a mowed buffer along roads and trails to reduce spreading during mowing operations.

Objective 4: Implement noxious weed management with a regional perspective.

- Apply for a grant through the Colorado Noxious Weed Management Fund (if available) for control efforts on the open space.
- Explore additional funding options through the Colorado Division of Parks and Wildlife (CPW) and the Natural Resources Conservation Service for weed management.
- Explore cross boundary weed control cooperation with land managers of adjacent and nearby parcels of land.

Funding Opportunities

There are several dedicated funds that annually solicit funding proposals related to weed management and habitat restoration, including:

- Colorado Noxious Weed Management Fund
- Colorado Water Conservation Board Invasive Phreatophyte Control Program
- Colorado State Conservation Board
- Natural Resources Conservation Service Conservation Technical Assistance Program
- The National Fish and Wildlife Foundation Pulling Together Initiative
- Colorado Parks and Wildlife Habitat Partnership Program
- Colorado Parks and Wildlife Wetlands Project Funding

Grants from these funds could be used to implement Phase 3 noted above.

Wildlife Habitat Management

In addition to the benefits to wildlife from managing noxious weeds and restoring native communities, the following actions focus on protecting and enhancing wildlife habitat in and near riparian and wetland areas and the ponds:

- When well away from trails or other access points, and not a hazard to recreation users, leave standing dead (snags) and downed cottonwood trees.
- Protect cottonwood trees from beaver with fencing and sand paint.
- Identify how recreation use and maintenance could negatively affect wildlife habitat and avoid or mitigate these impacts when possible (e.g., time maintenance for non-nesting season).
- Identify management actions that can provide opportunities to support or improve wildlife habitat or the migration corridor, such as developing a native vegetation planting program in areas of the site that have adequate water.
- Develop annual volunteer shrub planting projects using local Conservation District Seedling Programs.
- Conduct annual prairie dog management to prevent conflicts with adjacent properties. Management will be carried out in accordance with applicable state and local regulations and guidelines.
- Locate trails at the edges of plant communities, where possible, to minimize habitat fragmentation.
- Provide reinforced, low gradient access to attractive locations along the river bank to reduce social trail development.
- Locate trail 30-50 feet away from the south edge of the lower pond, and 225-250 feet way from the south edge of the upper pond.
- Discourage access to the forested and wetland area north of the south pond to create a refuge for waterfowl and shorebirds on the north side of the pond.
- Implement a volunteer program to do quarterly trash pickup.

Appendix A

Data Summary Report

A.1 Natural Resources

Ecological Context

The 88th Ave. Open Space is located in the north Denver Metropolitan Area along the South Platte River Valley. It is in the Colorado Piedmont Section of the Great Plains Province of the Interior Plains, further subdivided into the Central High Plains, Southern Part Major Land Resource Area (MLRA) (USDA 2006). General descriptions of the MLRA are from the U.S. Department of Agriculture (USDA 2006).

Physiography

The MLRA is on an elevated, irregular plain formed of river-deposited sediments from the Rocky Mountains. The plain is dissected by streams and rivers and includes lava-capped plateaus and buttes. The South Platte River is the major drainage basin in the MLRA. Elevation ranges from 3,000 to 7,800 feet, gradually increasing from east to west. The elevation of the 88th Ave. Open Space is approximately 5,073 feet above mean sea level.

Climate

The average annual precipitation in MLRA is 12 to 18 inches, increasing from west to east. The amount of precipitation is highly variable from year to year. Rainfall occurs as frontal storms in spring and early summer and high-intensity, convective thunderstorms in late summer. The maximum precipitation occurs from the middle of spring through late autumn. Precipitation in winter occurs as snow. The average annual temperature is 45 to 55 degrees F. The freeze-free period averages 160 days and ranges from 135 to 190 days.

In the vicinity of the 88th Ave. Open Space, average annual precipitation is 14.03 inches and average annual temperature is 50.2 degrees F. May and June receive the highest average monthly precipitation, with 2.80 and 1.78, respectively (Western Regional Climate Center, Brighton Station).

Soils

Dominant soils in the MLRA are Mollisols, Alfisols, Aridisols, and Entisols. They are very shallow to very deep, generally well drained, and loamy or clayey. In the 88th Ave. Open Space, most of the soils have been significantly disturbed by gravel mining. The less disturbed areas in the west part of the open space that were not mined include terrace escarpments formed of sand and gravel, with clay loam soils on upper terraces. Sandy alluvial soils and sandy soils disturbed by mining are present in parts of the open space. These soils tend to have low percentages of organic material and to be excessively drained. Finally, three areas on the open space were used during gravel mining as settling ponds for fine materials washed from sand and gravel during processing. These areas have poorly developed, friable soils.

Implications for Natural Resource Management

Prior to agricultural use, gravel mining, and river channelization, the ecological context of the open space was dominated by frequent flooding across the broad South Platte River floodplain. The flooding supported riparian cottonwood forest galleries, moist meadows of taller grasses, and wetland complexes in the lower floodplain terraces and low-lands, with midgrass and shortgrass on the upper floodplain terraces and adjacent uplands. Although stable in natural conditions, the shortgrass uplands are fragile and easily disrupted by soil disturbing activities. Changes in flood dynamics and soil disturbance result in dry, somewhat nutrient-poor soils that are difficult to revegetate with native species and in which weedy and invasive species are well-established. For these reasons, restoring and enhancing native plant communities on the 88th Avenue Open Space will require detailed, site-specific planning; expert implementation; and committed long term monitoring and maintenance.

A.2 Existing Conditions

As previously described, disturbance associated with past agricultural use and gravel mining has changed the character of the soils and vegetation on the open space. While some native plant species are present, non-native invasive and noxious species are most prevalent. Wildlife has been less significantly affected, although human-tolerant species such as raccoon (*Procyon lotor*), coyote (*Canis latrans*), North American beaver (*Castor canadensis*), and black-tailed prairie dog (*Cynomys ludovicianus*) predominate. Bird species remain fairly diverse and include many water-associated species such as great blue heron (*Ardea Herodias*), Canada goose ((*Branta canadensis*), American white pelican (*Pelecanus erythrorhynchos*), mallard (*Anas platyrhynchos*), northern shoveler (*Anas clypeata*), and double crested cormorant (*Phalacrocorax auritus*). The following sections describe existing vegetation and wildlife.

Vegetation

Three upland, two riparian, and three wetland major communities are present in the 88th Ave. Open Space. The upland and riparian communities have high percentages of introduced and noxious species that reflect the disturbance in the 88th Ave. Open Space that was associated with gravel mining and utility installation and maintenance. In general, the riparian communities have an overstory of plains cottonwood trees and an understory composed of shrubs and grasses. Upland grasslands contain numerous areas dominated by cheatgrass and other noxious weeds. Wetlands are present along the South Platte River, around the ponds, and in a former settling pond.

Uplands

Vegetation in the majority (approximately 118 acres) of the 88th Avenue Open Space consists of introduced annual grasslands (**Photo 1**). This community is found in xeric site with dry sandy soils and mesic sites with loamy soils on the upper floodplain, including along the regional trail. In xeric areas, the community is dominated by cheatgrass (*Bromus tectorum*) with a few scattered native perennial grass species including western wheatgrass, sand dropseed (*Sporobolus airoides*), side-oats grama as well as a few native perennial forbs, namely (*Erigeron divergens*). Along pathways, where soils are more compacted, other introduced annual grasses may co-dominate with cheatgrass, including mouse barley (*Hordeum murinum*), intermediate wheatgrass (*Thinopyrum intermedium*) and jointed goatgrass (*Aegilops cylindrica*) or even native annuals including woolly plantain (*Plantago patagonica*) and sixweeks fescue (*Vulpia octoflora*).

In more mesic areas, the community is dominated by cheatgrass (*Bromus tectorum*) with a heavy presence of invasive and/or noxious weed species including whitetop (*Cardaria draba*), feral rye (*Secale cereale*),

horseweed (*Conyza canadensis*), common mullein (*Verbascum thapsus*), diffuse knapweed (*Acosta diffusa*), Canada thistle (*Cirsium arvense*), leafy spurge (*Euphorbia esula*), smooth brome (*Bromus inermis*), tall tumblemustard (*Sisymbrium altissimum*), small tumbleweed mustard (*Sisymbrium loeselii*), perennial pepperweed (*Lepidium latifolium*). Native and introduced cool season perennial grasses may also be interspersed with cheatgrass including western wheatgrass (*Pascopyrum smithii*), smooth brome, Russian wildrye (*Psathyrostachys juncea*) and crested wheatgrass (*Agropyrum cristatum*) - particularly in areas that have been previously seeded as part of the gravel mining reclamation activities.

Introduced perennial grasslands consisting of native and introduced cool season perennial grasses dominate sites where they are able to outcompete cheatgrass. This community is present in patches in dry uplands along the trail. The areas are dominated by a mosaic of western wheatgrass, smooth brome, Russian wildrye, timothy (*Phleum pratense*), orchardgrass (*Dactylis glomerata*), crested wheatgrass. Invasive and/or noxious weed species are less abundant than in the introduced annual grassland community.

Riparian Areas

Two non-wetland riparian communities are present on the open space.

Although not directly associated with the South Platte River, relatively pure stands of younger cottonwoods (*Populus deltoides*) dominate the overstory of this riparian community at the north end of the former settling pond just east of the detention pond (**Photo 2**). Coyote willow (*Salix exigua*) and peachleaf willow (*Salix amygdaloides*) are sparsely present in the shrub layer. The understory is heavily dominated by noxious weeds and other introduced species, including smooth brome, whitetop, cheatgrass, reed canarygrass, leafy spurge, Scotch thistle (*Onopordum acanthium*), Canada thistle (*Cirsium arvense*), quackgrass (*Elymus repens*) and poison hemlock (*Conium maculatum*).

The second non-wetland riparian community is mixed-riparian, which is generally located in areas that were not heavily disturbed by mining, including in the south part of the open space parallel to the abandoned irrigation ditch. The mixed riparian community has stands of mature cottonwoods mixed with Russian-olive (*Elaeagnus angustifolia*) and Siberian elm (*Ulmus pumila*) in the overstory. The shrub layer is composed mostly of peachleaf willow, crack willow (*Salix fragilis*) and coyote willow. The understory is heavily dominated by noxious weeds and introduced species including reed canary grass, poison hemlock, whitetop, leafy spurge, cheatgrass, and some areas of common reed (*Phragmites australis*). In some more intact areas, for example, near the trailhead, there are remnants of a woody understory including chokecherry (*Prunus virginiana*), green ash (*Fraxinus pennsylvanica*) and western snowberry (*Symphoricarpos occidentalis*).

Wetlands

Three types of wetland communities are present – herbaceous, shrub, and forested. Herbaceous and shrub wetlands are present as patches on the sandbar bench at the south end of the open space and as discontinuous fringe wetlands along the banks of the South Platte River through the open space. Herbaceous wetlands are also associated with the North, South, and Middle ponds. A forested wetland is present in the south end of the filled settling pond between the Middle Pond and the South Platte River.

Herbaceous wetlands include cattail (*Typha* spp.) dominated wetlands at the North Pond, reed canarygrass dominated wetlands along the South Platte River (**Photo 3**), and forb dominated wetlands north of the South Pond. Other species present in the herbaceous wetlands include common threesquare (*Schoenoplectus pungens*), annual rabbitsfoot grass (*Polypogon monspeliensis*), saltgrass (*Distichlis spicata*), sedges (*Carex* spp.), curly dock (*Rumex crispus*), water speedwell (*Veronica anagallis-aquatica*). Weedy species include Canada thistle, whitetop, and leafy spurge. Herbaceous wetlands have less than 30% cover of shrubs, which may include coyote willow, young Russian olives and young Tamarix (*Tamarix ramosissima*). Areas transitioning to upland near these sites may include patches of switchgrass (*Panicum virgatum*).

Shrub dominated wetlands occurr mostly on vegetated sandbars along the riparian areas (**Photo 4**). Vegetation is dominated by coyote willow (> 30%) and the occasional tamarix. Herbaceous understory species consist mostly of reed canary grass and noxious weeds and introduced species including poison hemlock, curly dock and whitetop.

Forested wetlands are relatively uniform stands of younger cottonwoods around the north end of the South Pond and at the south end of a filled settling pond. Conditions in these areas are wet enough to support a hydrophytic understory (or are seasonally ponded). Surfaces tend to be sparsely vegetated. In areas where ponding has recently receded, vegetation is dominated by dock species (*Rumex* spp.). In areas transitioning to upland, the vegetation in the understory tends to become weedier with species including cheatgrass, pennycress (*Thlaspi arvense*), smooth brome, horseweed and beggar's tick (*Bidens* sp.)

Noxious Weeds and Invasive Species

Disturbance associated with gravel mining and past bank stabilization has allowed numerous invasive and noxious species to become well-established in the 88th Ave. Open Space. Noxious weeds are invasive species that can significantly change vegetation composition and structure and, ultimately, ecosystem functions. Management of noxious weeds is required under the Colorado Noxious Weed Act (Colorado Revised Statute Title 35, Article 5.5). The Colorado Department of Agriculture (CDOA) is responsible for officially designating noxious weeds in Colorado. CDOA maintains a noxious weed list that designates and classifies noxious weeds into categories for immediate eradication, containment, and suppression:

- List A species are identified for eradication.
- List B species must be managed to stop their continued spread.
- List C species are species for which the state will provide support for the efforts of local governing bodies to manage their spread on public and private lands.

Adams County adheres to the state list and does not have supplemental species. No List A species were observed in the open space.

State B List noxious weeds present include:

- Diffuse knapweed (*Acosta diffusa*)
- Jointed goatgrass (*Aegilops cylindrica*)
- Hoary cress (*Cardaria draba*)
- Canada thistle (*Cirsium arvense*)
- Russian olive (*Elaeagnus angustifolia*)
- Leafy spurge (*Euphorbia esula*)
- Perennial pepperweed (*Lepidium latifolium*)
- Scotch thistle (*Onopordum acanthium*)
- Tamarix (T*amarix ramosissima*)

State C List noxious species include:

- Cheatgrass (*Bromus tectorum*)
- Poison hemlock (*Conium maculatum*)
- Quackgrass (*Elymus repens*)
- Common mullein (*Verbascum thapsus*)
- Common reed (*Phragmites australis*)

Wildlife

Pre-European settlement, shortgrass prairie dominated the open space and was likely used by grazers and browsers such as bison, elk, and deer during some parts of the year. As settlement and, more recently, urbanization occurred, wildlife habitat was reduced and many wildlife species were displaced.

Mammals

Mammal species now most likely found on 88th Avenue Open Space such as raccoon (*Procyon lotor*), coyote (*Canis latrans*), are well-adapted to human activities and human modified environments. A coyote den was observed during the site visits (**Figure 1**). North American beaver (*Castor canadensis*) have come and gone from the South Pond and a black-tailed prairie dog (*Cynomys ludovicianus*) colony is present in the south end of the open space. Small rodents likely to occur on the open space include deer mouse (*Peromyscus maniculatus*), prairie vole (*Microtus ochrogaster*), meadow vole (*Microtus pennsylvanicus*), house mouse (*Mus musculus*), and western harvest mouse (*Reithrodontomys megalotis*).

The black-tailed prairie dogs on the open space have a significant influence on plant and animal communities associated with them. Species such as black-footed ferret (Mustela nigripes), burrowing owl (*Athene cunicularia*), prairie rattlesnake (*Crotalus viridis*), and mountain plover (*Charadrius montanus*) are closely linked to prairie dog burrow systems for food and/or cover. Prairie dogs also provide a prey resource for numerous predators including coyote, fox, golden eagle, ferruginous hawk, and other raptors. Their repeated clipping of vegetation in and adjacent to their colonies has an adverse effect on revegetation efforts and so they must be removed and/or restricted from areas targeted for restoration or enhancement.

Migratory Birds and Raptors

Migratory birds, their eggs, and nests are protected under the Migratory Bird Treaty Act (MBTA). Most wild birds commonly found in the United States are protected by the MBTA, with exception of introduced species such as house sparrow, rock dove (or common pigeon), common starling (*Sturnus vulgaris*), and Eurasian collared dove (*Streptopelia decaocto*). Species that are not typically thought of as migratory and are present throughout the year, including great horned owl (*Bubo virginianus*), black-billed magpie (*Pica hudsonia*), and American crow (*Corvus brachyrhynchos*) are also protected by the MBTA. In addition to the birds themselves, all active nests are protected, including ground nests, cavity nests, and subterranean nests, used, for example, by western meadowlark, downy woodpecker, and burrowing owl, respectively.

Although no nests were observed during the site visits in, or in the vicinity of, the open space, abundant potential nest substrate such as trees, shrubs, and grasslands is present and nests are certain to be present. Additionally, black-tailed prairie dog burrows in the open space provide potential nest sites for western burrowing owl, although no owls were observed. Prairie dog management activities should be done during the non-nesting season (October – April) to minimize impacts on areas with potential owl activity. Colorado Division of Parks and Wildlife recommends no human encroachment or disturbance within 75 yards of burrowing owl nest sites from April 1 through July 31.

Bird species observed during fieldwork included western meadowlark (*Sturnella neglecta*), European starling (*Sturnus vulgaris*), redwing blackbird (*Agelaius phoeniceus*), American robin (*Turdus migratorius*), black-billed magpie (*Pica pica*), mourning dove (*Zenaida macroura*), great blue heron, double-crested cormorant, American white pelican, red-tailed hawk (*Buteo jamaicensis*), and American kestrel (*Falco sparverius*). The western meadowlark, American robin, redwing blackbird, mourning dove, and black-billed magpie may nest on the open space. The European starling is commonly associated with urban or suburban areas and likely nests in adjacent residential areas.

Existing Infrastructure

Existing utilities within the property include Xcel Energy overhead power, City of Thornton raw water transmission pipelines, and a petroleum pipeline owned by Magellan.

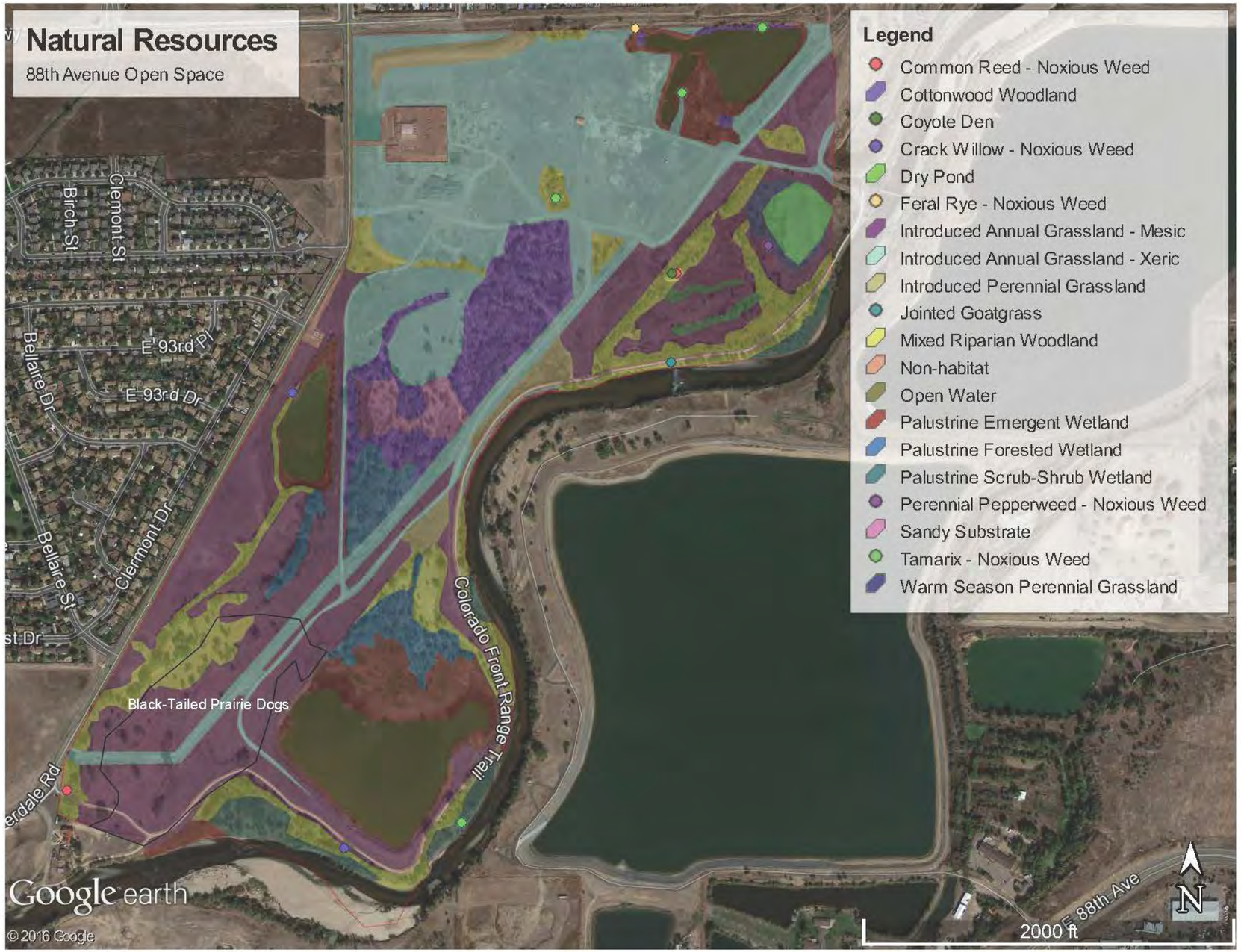
The Magellan pipeline runs east-west from Riverdale Road, within the berm on the south bank of the South Pond, and across the South Platte River. Magellan replaced a portion of the pipeline in May 2016. The new pipeline alignment is slightly north of the former horizontal alignment, and substantially deeper due to the method of construction and need to avoid disturbance of the river.

A.3 Field Investigations

In addition to site visits conducted to identify wildlife and vegetation currently on site, surface soil samples were collected at eight locations on the site. Preliminary nutrient and textural analyses were conducted. All the tested soils had an acceptable pH range falling between 7.0 and 8.3. Textures of the surface soils ranged from silt loam in the riparian understory and clay loam or loam in the un-mined upland grasslands to sandy loam for the soils sampled in areas on the mined portions of the site. None of the tested soils revealed high levels of salts, which could discourage germination. Organic matter and nitrogen levels were lower in the mined portions of the site and higher in the samples collected within the riparian edge along the better vegetated wooded river corridor. A sample location map is included **Attachment 1** to this appendix. Samples were collected at the following locations:

- Gallery cottonwood forest between South Pond and South Platte River
- River terrace on west bank below utility crossing riffle, east of South Pond
- Eastern peninsula into South Pond between regional trail and northeast side of south pond
- Wash fines deposit on northern edge of South Pond
- Southeast edge of wash fines deposit, northwest of intersection of the Xcel lines and regional trail
- Seeded grasslands on central wash fines area west of sampling area 5
- Seeded western wheatgrass area east of Riverdale and north of Middle Pond
- Shortgrass knoll east of Riverdale Rd. and south of Middle Pond

Planimetric survey data was also collected for the area focused around the South Pond and west bank of the river. An exhibit for the survey is included (**Figure 2**). Additionally, topographic data was collected for cross sections within the South Platte River, to aid in development of the existing conditions hydraulic model.


Natural Resources
88th Avenue Open Space
Legend
Common Reed - Noxious Weed
Cottonwood Woodland
Coyote Den
Crack Willow - Noxious Weed
Dry Pond
Feral Rye - Noxious Weed
Introduced Annual Grassland - Mesic
Introduced Annual Grassland - Xeric
Introduced Perennial Grassland
Jointed Goatgrass
Mixed Riparian Woodland
Non-habitat
Open Water
Palustrine Emergent Wetland
Palustrine Forested Wetland
Palustrine Scrub-Shrub Wetland
Perennial Pepperweed - Noxious Weed
Sandy Substrate
Tamarix - Noxious Weed
Warm Season Perennial Grassland
Birch St
Clemont St
E 93rd Pl
Bellaire Dr
E 93rd Dr
Clermont Dr
Bellaire St
Colorado Front Range Trail
Black-Tailed Prairie Dogs
E 88th Ave
2000 ft
N
Google earth
© 2016 Google

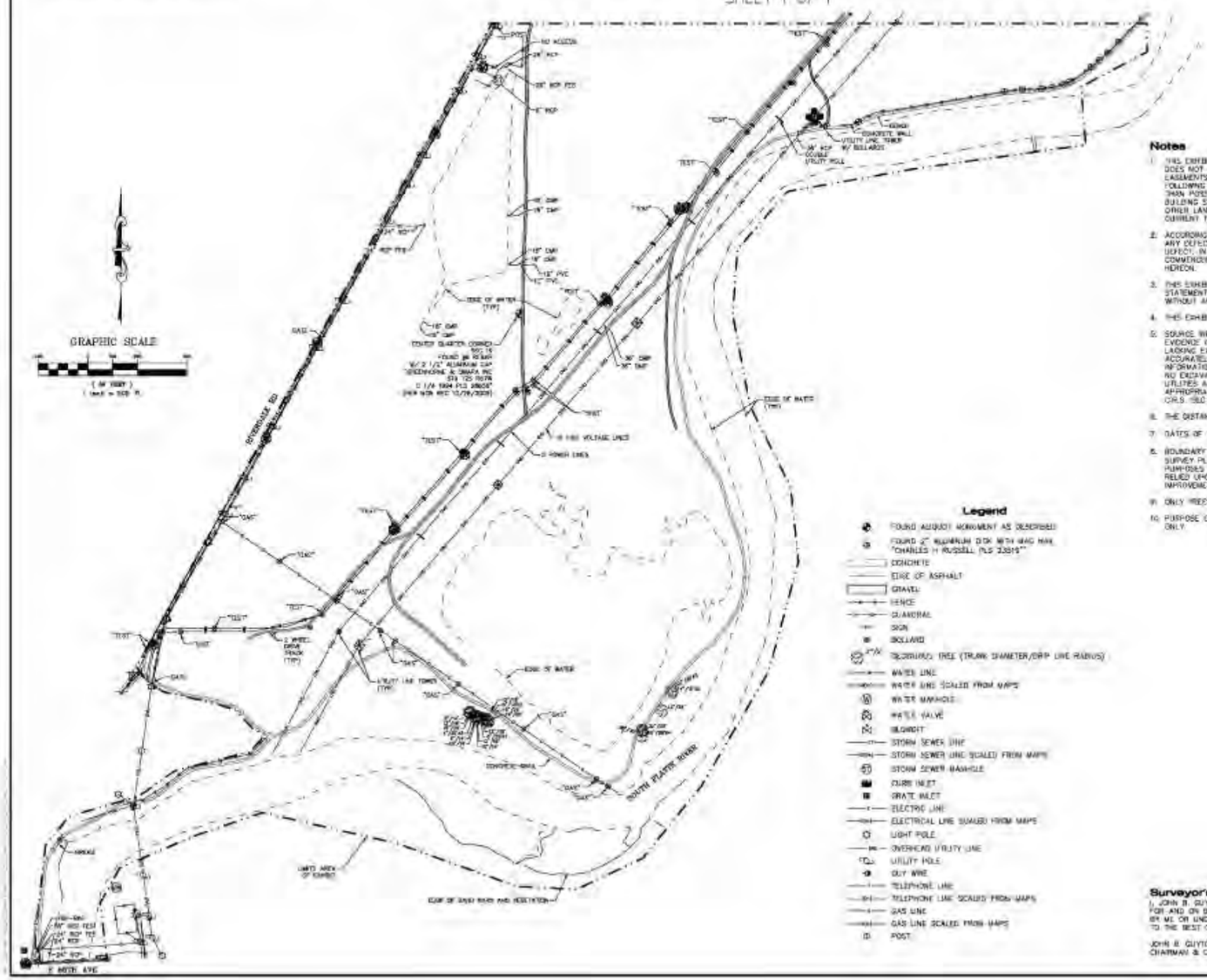
SITE EXHIBIT

LOCATED IN THE SOUTHWEST QUARTER OF SECTION 19, TOWNSHIP 2 SOUTH, RANGE 67 WEST OF THE 6TH P.M., COUNTY OF ADAMS, STATE OF COLORADO

SHEET 1 OF 1

Parcel Description
(PROVIDED BY CLIENT)

PORTIONS OF ADAMS COUNTY LAND BETWEEN THE SOUTH PLATTE RIVER AND RIVERDALE ROAD, NORTH OF E. 96TH AVE.



Legend

- FOUND AUGUST MONUMENT AS DESCRIBED
- FOUND 2" ALUMINUM DISK WITH MAG NAIL "CHARLES H RUSSELL PLS 33919"
- CONCRETE
- EDGE OF ASPHALT
- GRAVEL
- FENCE
- GUARDRAIL
- SIGN
- BOLLARD
- DECIDUOUS TREE (TRUNK DIAMETER/DRIP LINE RADIUS)
- WATER LINE
- WATER LINE SCALED FROM MAPS
- WATER MANHOLE
- WATER VALVE
- BLOWOFF
- STORM SEWER LINE
- STORM SEWER LINE SCALED FROM MAPS
- STORM SEWER MANHOLE
- CURB INLET
- GRATE INLET
- ELECTRIC LINE
- ELECTRICAL LINE SCALED FROM MAPS
- LIGHT POLE
- OVERHEAD UTILITY LINE
- UTILITY POLE
- GUY WIRE
- TELEPHONE LINE
- TELEPHONE LINE SCALED FROM MAPS
- GAS LINE
- GAS LINE SCALED FROM MAPS
- POST

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5. SOURCE INFORMATION FROM PLANS AND MARKINGS HAVE BEEN COMBINED WITH OBSERVED EVIDENCE OF UTILITIES TO DEVELOP A VIEW OF THESE UNDERGROUND UTILITIES. HOWEVER, LACKING EXCAVATION, THE EXACT LOCATION OF UNDERGROUND FEATURES CANNOT BE ACCURATELY, COMPLETELY AND RELIABLY DEPICTED. WHERE ADDITIONAL OR MORE DETAILED INFORMATION IS REQUIRED, THE CLIENT IS ADVISED THAT EXCAVATION MAY BE NECESSARY. NO EXCAVATIONS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES AND STRUCTURES. ALL UNDERGROUND UTILITIES MUST BE FIELD LOCATED BY THE APPROPRIATE AGENCY OR UTILITY COMPANY PRIOR TO ANY EXCAVATION, PURSUANT TO C.R.S. SEC. 9-1.5-103.
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7. DATES OF FIELDWORK: JUNE 16-17, 2016 (CREW CHIEF: T. FENTICK)
8. BOUNDARY DETERMINATION IS NOT A PART OF THIS EXHIBIT. THIS IS NOT A "LAND SURVEY PLAT" OR "IMPROVEMENT SURVEY PLAT" AND THIS EXHIBIT IS NOT INTENDED FOR PURPOSES OF TRANSFER OF TITLE OR SUBDIVISION OF LAND AND THAT IT IS NOT TO BE RELIED UPON FOR THE ESTABLISHMENT OF A FENCE, BUILDING OR OTHER FUTURE IMPROVEMENT LINES.
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10. PURPOSE OF THIS EXHIBIT IS TO SHOW PLANIMETRIC FEATURES FOR SITE EVALUATION ONLY.

Surveyor's Statement

I, JOHN B. GUYTON, A LAND SURVEYOR LICENSED IN THE STATE OF COLORADO, HEREBY STATE FOR AND ON BEHALF OF FLATIRONS, INC., TO CDM SMITH, THAT THIS SITE EXHIBIT WAS PREPARED BY ME OR UNDER MY RESPONSIBLE CHARGE; THAT SAID EXHIBIT SHOWN HEREON ARE ACCURATE TO THE BEST OF MY KNOWLEDGE, INFORMATION AND BELIEF.

JOHN B. GUYTON COLORADO P.L.S. #16406
CHAIRMAN & CEO, FLATIRONS, INC.

DATE	REVISION

SITE EXHIBIT
PREPARED FOR
CDM SMITH

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JOHN B. GUYTON
PLS 33919
STATE OF COLORADO
7/7/16
PROFESSIONAL LAND SURVEYOR

JOB NUMBER:	16-07,366
DATE:	07-07-2016
DRAWN BY:	T. COLVIN
CHECKED BY:	TDF/JJG/BW

SHEET 1 OF 1

Photo 1. Introduced annual grasslands with weedy species. Black-tailed prairie dogs are also in this area. View is to the northwest

Photo 2. Cottonwood woodland north of the south pond. View is to the northwest

Photo 3. Reed canarygrass-dominated herbaceous wetland along the South Platte River. View is to the northeast.

Photo 4. Shrubland wetland on a sandbar adjacent to the South Platte River. View is to the northwest.

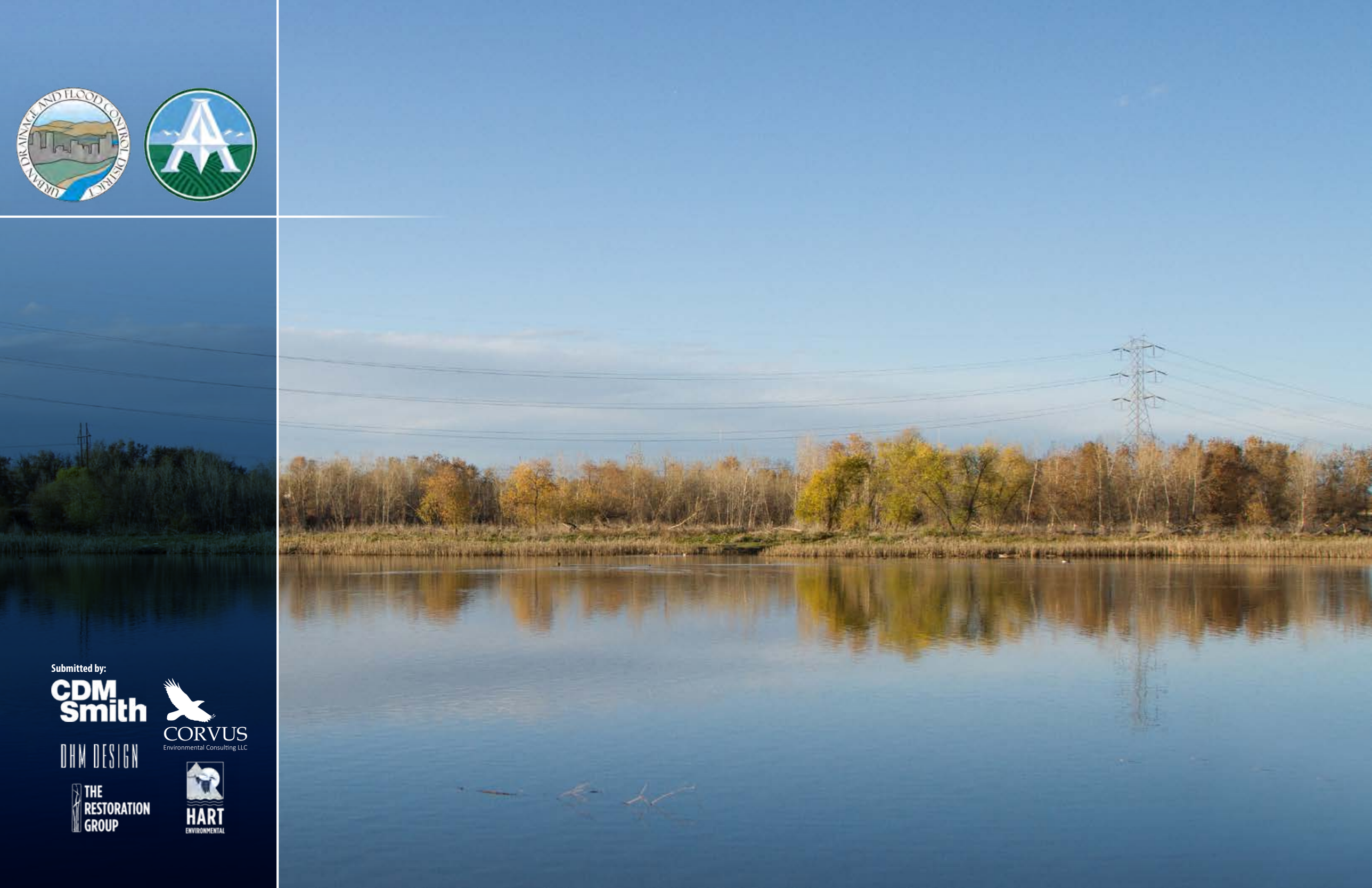
Soil Sample Locations

Appendix B

Opinion of Conceptual Costs

Opinion of Conceptual Costs

PHASE		TOTAL
Phase 1		
South Platte River Floodplain Connection and Water Quality Improvements		
Wetland/Riparian Ecological Restoration		$ 1,166,000.00
Erosion and Sediment Control		$ 900.00
South Platte River Channel Improvements		
Earthwork - South Pond Grading		$ 450,000.00
Rerouting of South Platte River Trail		
Concrete Trail (10' Wide)		$ 205,400.00
Crusher Fines Trail (4' Wide)		$ 19,000.00
South Pond Improvements: South Pond Fishery and Shoreline Improvements		
Gravel Ramp (CPW Access)		$ 2,100.00
Slabstone Boulder Wall		$ 36,400.00
Small Shade Shelter with Picnic Tables		$ 20,000.00
ADA Fishing Pier		$ 80,000.00
Interpretive Boardwalk		$ 100,000.00
	Subtotal	**$ 2,079,800.00**
Phase 2		
Recreation Site Improvements		
Site Amenities		$ 308,200.00
Trails		$ 63,000.00
Parking		$ 219,700.00
Restrooms		$ 17,500.00
Riparian Forest and Upland Habitat Improvements		
Seeding		$ 182,500.00
	Subtotal	**$ 790,900.00**
Phase 3		
Natural Outdoor Play		
Nature Based Play Area		$ 250,000.00
Outdoor Classroom		$ 50,000.00
	Subtotal	**$ 300,000.00**
	Subtotal	$ 3,170,700.00
Mobilization (5%)		$ 158,600.00
Demolition (5%)		$ 158,600.00
Engineering Services (18%)		$ 570,800.00
Administrative (Material Testing, Misc, 5.2%)		$ 164,900.00
Contingency (20%)		$ 844,800.00
	TOTAL	**$ 5,068,400.00**



Submitted by:

CDM Smith

CORVUS
Environmental Consulting LLC

DHM DESIGN

THE RESTORATION GROUP

HART
ENVIRONMENTAL