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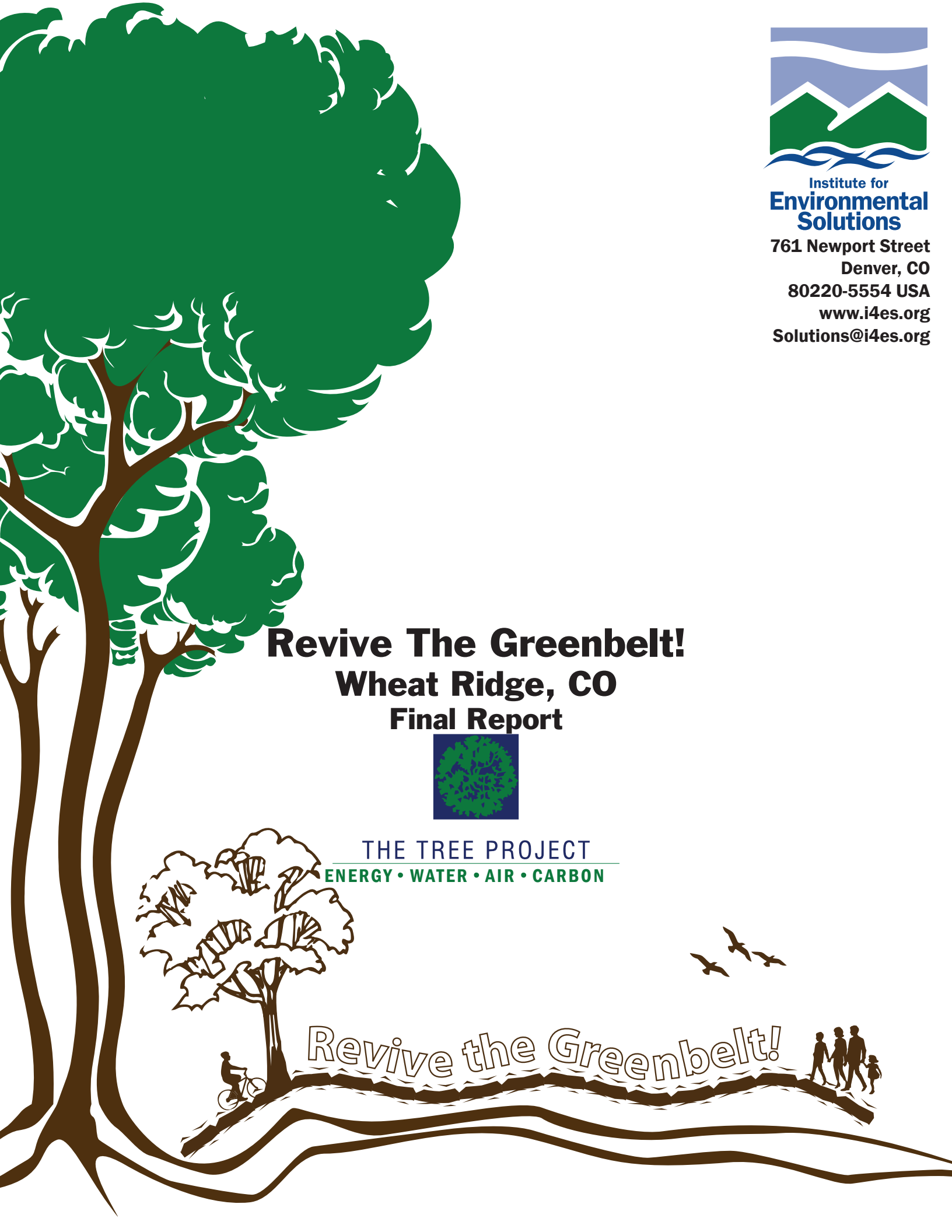
Revive The Greenbelt!
Wheat Ridge, CO
Final Report

THE TREE PROJECT
ENERGY • WATER • AIR • CARBON



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Revive the Greenbelt! Final Report

November 2013

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II. EXECUTIVE SUMMARY

This report describes the IES *Revive the Greenbelt!* project in the Greenbelt in Wheat Ridge, Colorado. The Institute for Environmental Solutions (IES) initiated this project as part of The Tree Project: Integrated Urban Environmental Improvement Through Tree Selection and Management.

The *Revive the Greenbelt!* Project conducted research in the Greenbelt in Wheat Ridge to develop a planting plan which capitalized on the unique opportunities and challenges presented by the project site. Historically, plantings in the area of the project site have experienced high mortality; *Revive the Greenbelt!* is an attempt to demonstrate a model to maximize survival of new plants.

IES used its expertise and guidelines from the Natural Resources Conservation Service (NRCS) to thoroughly analyze the site in developing a strategic landscape plan that addressed the opportunities and constraints occurring. On April 27, 2013, IES and its project partners held a community volunteer tree-planting event to implement the landscape plan, planting 200 trees and shrubs. With this Final Report, we hope the *Revive the Greenbelt!* Project will be a replicable model for implementing future projects.

Community volunteers help plants trees at the Revive the Greenbelt! project in the Wheat Ridge Greenbelt

IES is continuing to work in the Greenbelt with the *IES Wheat Ridge Tree Stewards Program*. The Tree Stewards are community volunteers trained and organized by IES to help maintain the trees and shrubs planted as a part of the *Revive the Greenbelt!* project.

This report documents the project's origins, planning, implementation, and outcomes. The following sections describe project goals and objectives, community stakeholder involvement, collaborative funding model, analysis, design and implementation, community volunteer tree planting event, project communication and public relations, the tree education program, a discussion of urban tree impacts on businesses and project evaluation.

IES welcomes comments and questions. Please contact Solutions@i4es.org.

III. TABLE OF CONTENTS

Revive the Greenbelt! Final Report

November 2013

I. AUTHORS AND ACKNOWLEDGEMENTS **1**

II. EXECUTIVE SUMMARY **3**

III. TABLE OF CONTENTS **4**

1. **INTRODUCTION AND OVERVIEW** **6**
   - THIS REPORT 6
   - INSTITUTE FOR ENVIRONMENTAL SOLUTIONS 6
   - THE IES TREE PROJECT 6

2. **IES WHEAT RIDGE REVIVE THE GREENBELT!** **7**
   - PROJECT GOAL 8
   - PROJECT OBJECTIVES 8

3. **PROJECT ORGANIZATION** **10**
   - COMMUNITY AND STAKEHOLDER INVOLVEMENT 10
   - COLLABORATIVE FUNDING MODEL 11
   - PROJECT TIMELINE 13

4. **COMMUNITY COLLABORATION** **13**
   - PUBLIC RELATIONS 13
   - MILE HIGH YOUTH CORPS 14
   - EAGLE SCOUT PARTICIPATION 15
   - WHEAT RIDGE HIGH SCHOOL SPECIAL EDUCATION CLASS 16
   - WATERING OPTIONS 16
   - WHEAT RIDGE HIGH SCHOOL NATIONAL HONOR SOCIETY 17
   - TREE STEWARDS 17

5. **PLANTING DESIGN** **18**
   - BACKGROUND 18
   - PLANTING DESIGN 25

6. **VOLUNTEER TREE PLANTING EVENT** **26**
   - VOLUNTEER RECRUITMENT 26
   - STAGING 27
   - PLANTING DAY 28
   - PLANTING DAY FEEDBACK 29
   - PLANTING DAY EDUCATIONAL CENTERS 29

7. **REVIEW THE GREENBELT PROJECT EVALUATION** **30**
PROJECT OUTCOMES 30
RECOMMENDATIONS FOR NEXT STEPS 31

APPENDICES

A – PROJECT ADVISORY COMMITTEE AGENDAS
B – EMAIL TO WHEAT RIDGE BUSINESSES
C – PROJECT FACT SHEET
D – PROJECT TIMELINE
E – BUSINESS ASSOCIATION PRESENTATION OUTLINE
F – PROJECT PRESS AND MEDIA COVERAGE
G – MILE HIGH YOUTH CORPS SPONSOR AGREEMENT
H – AGENDA FOR TREE STEWARDS TRAINING WORKSHOP
I – TREE STEWARDS TRACKING FORM EXAMPLE
J – LANDSCAPE PLAN
K – VOLUNTEER RECRUITMENT FLIER/POSTER
L – PLANTING DAY AGENDA
M - CERTIFICATE OF APPRECIATION
N – HOW TO PLANT A TREE POSTER
O – PLANTING DAY COLORING ACTIVITY
P – PROJECT THANK YOU LETTERS
Q – TREE STEWARDS MANUAL AND TREE AND SHRUB SPECIES LIST
R – RIPARIAN CONDITIONS ASSESSMENT

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1. INTRODUCTION AND OVERVIEW

THIS REPORT: IES Wheat Ridge *Revive the Greenbelt!* Final Report

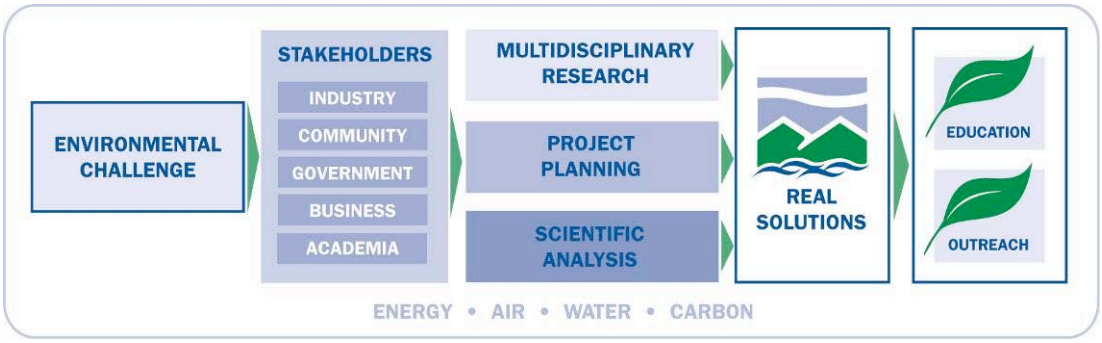
This report describes the 2012-2013 IES *Revive the Greenbelt!* project in Wheat Ridge, Colorado. The Institute for Environmental Solutions (IES) initiated this project as part of The Tree Project: Integrated Urban Environmental Improvement Through Tree Selection and Management.

This *Revive the Greenbelt!* Final Report documents the project's origins, planning, implementation and outcomes. This report, along with the attached appendices, provides a replicable model for strategic community tree planting and education for use by other communities.

INSTITUTE FOR ENVIRONMENTAL SOLUTIONS

The Institute for Environmental Solutions (IES) is a Denver-based nonprofit organization that engages stakeholders to deliver technically sound solutions to complex environmental and human health problems – without unwanted side effects.

The IES approach to environmental improvement is objective, practical, and cost-effective. IES confronts multi-faceted environmental issues such as community health, climate change, ozone air pollution, and contaminants in waterways from pharmaceuticals, personal care, and cleaning products that others believe are too complicated or difficult to address. By maintaining a commitment to science and collaborating with people of different backgrounds, perspectives, and interests, IES provides lasting solutions for Colorado's most pressing environmental problems. Through groundbreaking projects, IES provides Colorado communities with opportunities to make measurable improvements to the environment.



The IES approach to solving environmental challenges

THE IES TREE PROJECT

The Tree Project, one of IES's major on-going programs, is dedicated to improving the environment of Colorado's urban areas through proper tree selection and management. The Tree Project helps communities, businesses, and individuals to cost-effectively achieve multiple environmental improvement objectives. The Tree Project targets environmental improvement in

air and water quality, carbon sequestration and energy conservation, and stormwater management. These outcomes lead to better environmental health and invigorated local economies.

IES is concerned about rapidly growing Colorado Front Range communities, the complex environmental concerns facing them, and the need for an interdisciplinary, scientifically sound approach to meeting these environmental challenges. Environmental quality in Front Range communities is increasingly challenged by the stress of population growth, resource consumption, habitat loss, and pollution. The Front Range needs solutions with broad benefits and minimal negative side effects. Implementing strategic tree selection, planting, and maintenance programs is one potential solution. Through the Tree Project, IES has researched and developed ways to optimize the benefits associated with urban tree planting and is one of Colorado's leading resources for strategic environmental tree planting.

Trees – properly selected, planted, and maintained – can reduce energy and water consumption, improve air quality, mitigate the effects of climate change, and provide many other environmental and human health benefits. Planting trees and other vegetation is frequently suggested to achieve multiple benefits; however, a multidisciplinary scientific analysis is needed to evaluate the actual improvements and long-term costs of such measures. It is especially important to Colorado's prairie ecosystem – where native trees are historically limited in their diversity and density – to know which planting practices are effective and sustainable.

THE TREE PROJECT

ENERGY • WATER • AIR

The Tree Project helps communities, businesses and individuals achieve multiple environmental improvement goals by using trees.

The mission of the Tree Project is to improve environmental quality of Colorado cities using tree science. Through strategic tree selection and maintenance, we improve community health and local economies. The Tree Project assesses planting practices and vegetation benefits under various scenarios to establish optimal urban tree selection, planting, and maintenance guidelines for practical and cost-effective environmental, social, and economic improvement.

2. IES WHEAT RIDGE REVIVE THE GREENBELT!

The IES Wheat Ridge *Revive the Greenbelt!* Project was an urban forestry project designed to use sound scientific research to understand the opportunities and constraints in the Wheat Ridge Greenbelt, and to develop and test strategies to improve the Greenbelt and improve tree survival. Historically, the Greenbelt has experienced very high tree mortality. Over 75% of newly planted trees in the Greenbelt have died in their first year. This project sought to discover why tree mortality in the Greenbelt was so high. Once the reasons for mortality were discovered, IES and

our project partners designed and implemented a plan which will serve as a replicable model for all communities to improve tree survival.

Volunteers ensure this Narrow-leaf Cottonwood is properly planted, mulched and watered at the Revive the Greenbelt! Planting Day in the Wheat Ridge Greenbelt.

IES implemented this project through collaboration with the City of Wheat Ridge, Colorado State Forest Service, Urban Waters Partnership, Xcel Energy, Denver Urban Drainage and Flood Control District, local businesses, and community organizations. IES used its scientific expertise, the expertise of our project partners, and NRCS inventory methods to develop a landscape plan which seeks to maximize both the environmental benefit to the area and the survivability of all plants in the area while using species native to the area.

PROJECT GOAL

The goal of the *Revive the Greenbelt!* Project was to restore and revitalize the Clear Creek waterway located south of Prospect Park in Wheat Ridge, through strategic tree selection, siting, planting, and maintenance.

This project and goal were chosen because of high tree mortality in the Greenbelt near Prospect Park, the importance of Clear Creek, the importance of the Wheat Ridge Greenbelt as an critical environmental and recreational area, and a devastating 2009 hail storm which damaged a high number of trees in the area.

PROJECT OBJECTIVES

The project objectives were:

1. Collaborate with Wheat Ridge Parks and Recreation Department and the Mile High Youth Corps (MHYC) to remove invasive Russian Olives from the planting site.

The first objective was critical as there are a number of invasive species in Greenbelt, most notably the Russian Olive. It was important to remove invasive species from the area to help ensure that the native species being planted as a part of the *Revive the Greenbelt!* project had the best chance of survival by not having to compete with the invasive species.

2. Strategically plant trees to replace canopy gaps created by the removal of invasive species and the 2009 hailstorm. The strategic tree-planting plan was to be designed to optimize air and water quality, enhance stormwater management, and protect the native habitat of the Ute Ladies'-Tresses Orchid species.

This objective established the focus of the planting plan. IES wanted to focus on restoring canopy cover to the Greenbelt while ensuring that the plants were planted to optimize all environmental benefits.

3. Ensure environmental health benefits and survival of the trees by identifying strategies that will improve long-term health of urban tree canopy and develop a comprehensive three-year maintenance plan. IES was to recruit community volunteers and host a workshop to train volunteer tree stewards on proper tree care and maintenance practices.

The third objective was very important to the success of the project. Maintenance planning is just as important to a planting plan and its success as planting the trees which is why IES chose to pursue this objective.

4. Plan and host a volunteer tree-planting event in spring 2013 to provide educational opportunities for community stakeholders and organizations. Collaborate with partners to recruit volunteers and host a "How to Plant a Tree" training session before the planting event.

5. Increase awareness of the benefits of strategic urban forestry by educating the local community through informative signs posted near the tree planting site and distributing and displaying educational materials focusing on the many ecosystem services provided by trees.

Objectives four and five highlight IES's commitment to educating the community and involving people in urban forestry. IES's approach to volunteer engagement emphasizes technical training, clear communication, supportive organizational structures, and a rewarding experience. IES built on its extensive experience working with volunteer groups to successfully execute multi-objective tree planting programs.

6. Evaluate the project and produce a final report that documents the project's origins, planning, implementation, and outcomes. The report is designed to serve as a replicable model so that this project can be easily reproduced in other communities.

The final objective is something that IES seeks to provide with all projects. The *Revive the Greenbelt!* project was a successful and replicable project. IES is committed to sharing knowledge among people that want that knowledge to ensure that more projects are attempted.

Clear Creek as it passes by the Revive the Greenbelt! planting location.

3. PROJECT ORGANIZATION

COMMUNITY AND STAKEHOLDER INVOLVEMENT

IES established a Project Advisory Committee and recruited stakeholders to participate in project planning and implementation. To establish the committee, IES does a comprehensive analysis to determine who should be invited to participate. We ask our existing sponsors and committee members to recommend individuals, community members and groups, companies and other organizations that might have a stake in the implementation of the project. Based on these recommendations and our own analysis, we actively recruit committee members to represent the broadest possible range of stakeholders. The committee provided the opportunity for interested stakeholders to collaborate and voice their ideas, interests, and concerns throughout the planning process. The purpose of the committee was to provide technical advice and guidance for project analysis, design, implementation, and evaluation. The committee was comprised of industry professionals and community stakeholders who represented local government, businesses, and community organizations. By including representatives from different stakeholder groups, IES ensured that all viewpoints were understood and taken into consideration when planning the project.

The members of the PAC were instrumental in helping with the planning and implementation of the project. They included IES project staff members and:
Devon Buckels, *Urban Water Partnership Coordinator, Colorado State Forest Service*
Preston Gibson, *Area Manager, Community and Local Government Affairs, Xcel Energy*
Bryan Kohlenberg, *Senior Project Engineer, Denver Urban Drainage and Flood Control District*
Lloyd Levy, *Citizen, City of Wheat Ridge*

Kevin Lyles, *Landscape Architect, Confluent Design*
Nathan Mosley, *Management Analyst, City of Wheat Ridge*
Betty Jo Page, *Sierra Club Rocky Mountain Chapter, Wheat Ridge Active Adult Center*
Margaret Paget, *Forestry and Open Space Supervisor, City of Wheat Ridge*
Keith Wood, Community Forestry Program Manager, *Colorado State Forest Service*

The diversity of expertise and interests on the PAC helped the project by ensuring that IES took into consideration varied viewpoints. Having an organized Project Advisory Committee with regular meetings kept the planning process on track and ensured that program objectives were met. IES set the meeting schedule after conferring with the members of the PAC during the first meeting. IES scheduled the meetings six weeks apart. IES decided that six weeks was respectful of the PAC members' time while not being too long in between meetings to cause PAC members to disengage from the project.

Clear communication within the committee was integral to the success of the project's comprehensive planting plan, volunteer program, planting day event, economic analysis, and evaluation. Two weeks before every meeting, IES sent out a 'Save the Date' reminder to the PAC members regarding the next scheduled meeting. PAC members were asked to RSVP. Four days before the meeting, IES sent the meeting agenda to the PAC members to inform them of the topics to be discussed during the meeting. Project Advisory Committee meeting agendas are in Appendix A.

COLLABORATIVE FUNDING MODEL

A combination of in-kind contributions, cash, and material donations funded the *Revive the Greenbelt!* Project. The Urban Waters Federal Partnership administered by the Colorado State Forest Service provided initial project funding. The Urban Waters grant was matched by a grant from Xcel Energy. Denver Urban Drainage and Flood Control District contributed contract services to the project including willow staking at the project site and pre-digging the holes for plant material on planting day.

IES staff members, graduate interns, and Institute Associates contributed hundreds of hours to project planning, implementation, research, evaluation, public relations, project promotion, business outreach, volunteer recruitment and labor assistance leading up to and on planting day.

The City of Wheat Ridge contributed a significant amount of staff time to project planning, public relations, project promotion and labor assistance leading up to and on planting day. The City of Wheat Ridge hired MHYC to remove invasive species including Russian Olive from the project area in October 2012. Wheat Ridge also provided mulch, soil amendments, shovels, picks and beaver cages on planting day.

IES encouraged Wheat Ridge businesses to take part in a collaborative funding model based on the shared values of a thriving Greenbelt. IES compiled a list of all businesses in Wheat Ridge using business data from the library. IES attempted to find contact information for these businesses through Internet search. Businesses which did not have easily accessible contact information were removed from the list. Once the initial list of businesses was constructed, IES

ranked businesses in tiers of anticipated interest in the project. The tier system was developed to prioritize IES outreach efforts to use our limited human resources efficiently.

The City of Wheat Ridge city logo

Tier 1 businesses were the highest priority; tier 2 medium; tier 3 low. Businesses were considered tier 1 if a PAC member recommended the business owner as someone who was involved in the community or if the business website suggested that it was civic-minded and located close to the project site. The majority of businesses were placed in tier 2 if they were located within 5 miles of the project site. Few businesses were placed in tier 3. If IES was able to find their contact information but their website made no mention of the business owner being civic-minded and the business location was more than 5 miles from the project site they were placed into tier 3.

IES sent emails to all Tier 1 businesses in January 2013. Two days after the email a follow-up phone call was made to attempt to set up an in-person meeting. Tier 2 businesses were emailed in February 2013 and again in March 2013. Tier 3 businesses were emailed in March 2013. See Appendix B for the content of the emails.

Included with the emails was the Project Information Packet which described the project to interested businesses, citizens and stakeholders which described the importance of the Wheat Ridge Greenbelt and encouraged them to get involved with the project. The packet included a letter of support for the project from Wheat Ridge Mayor, Jerry DiTullio, and suggested donations to help the project. A copy of the information packet is in Appendix C.

IES efforts were successful in recruiting the Applewood Business Association, MyPIE, Einstein Bros. Bagels, Starbucks, Larkin Floor and the Modern Woodmen of America to contribute to the project.

Sponsors were acknowledged on project t-shirts distributed to volunteers on planting day, posters displayed at the planting event at the registration tables and near the food and beverages. Sponsors were acknowledged in the IES quarterly e-newsletter, the Wheat Ridge *Connections* newsletter, local newspapers, press releases, media advisories and social media.

With a few notable exceptions, community outreach for funding was largely unsuccessful. Businesses in Wheat Ridge were mostly unresponsive despite repeated attempts at contact. IES was constrained by limited human resources available to make personal visits to important businesses in Wheat Ridge. Organizations seeking to replicate the *Revive the Greenbelt!* project should not count on funding from local businesses unless they have existing personal contacts

and resources to make a significant investment in personal contact with these businesses.

PROJECT TIMELINE

The *Revive the Greenbelt* Project Timeline (Appendix D) presents each component of the project from July 2012 to July 2013. The *Revive the Greenbelt!* Project Timeline was based on past, successful projects administered by IES. The project had six major segments:

- Project organization and scheduling
- Planting organization and implementation
- Maintenance planning
- Community tree planting event organization
- Educational program
- PR / communications
- Project documentation

The initial timeline was useful throughout the project. When planning a project of this size it is important to be realistic with the time and resources available for each task. The timeline in Appendix D was tailored specifically for IES. Other organizations will find the list of tasks useful. However, the timeline may need to be adjusted on an organization-by-organization basis.

4. COMMUNITY COLLABORATION

PUBLIC RELATIONS

The goal of conducting public relations for the project was to introduce the project to Wheat Ridge citizens and businesses, educate the community about the benefits of urban forestry, and recruit volunteers. IES and the City of Wheat Ridge promoted the project and planting day event in several ways.

Project updates were broadcast through local news sources, print newsletters, email and website updates, and social media sites. IES issued project updates to all IES stakeholders, friends, and followers via Facebook and the quarterly e-newsletter.

The City of Wheat Ridge published a story about *Revive the Greenbelt!* on the front page of its *Connections* newsletter. The *Connections* newsletter is a city publication delivered quarterly to every address in Wheat Ridge. The *Revive the Greenbelt!* Project was the front-page story for Issue 45, Winter/Spring 2013. Local newspapers, the *Neighborhood Gazette, Denver Post YourHub,* and the *Wheat Ridge Transcript* also published stories about the event and highlighted the importance of the project. Copies of these articles are in Appendix F.

IES reached out to local businesses through email and telephone. IES Project Manager, Michael Haney, presented the project to the Applewood Business Association meeting in February 2014 to highlight the importance of the project and to ask for donations and support. The presentation was successful in persuading some businesses to help sponsor the project. The Applewood Business association matched donations that were made after the presentation. Appendix E is a

copy of the outline used for the presentation.

A videographer was hired by the City of Wheat Ridge to record event activities and interview participants about the planting event and future impacts of the project. The final product was a video about the *Revive the Greenbelt!* Project. The video was featured daily on the local Wheat Ridge television station in its *Top of the Hour* program. The video highlighted the many environmental, social, and economic benefits of this tree planting. It included interviews with the Wheat Ridge Mayor Jerry DiTullio, Wheat Ridge Forestry and Open Space Supervisor Margaret Paget, Wheat Ridge Parks and Recreation Director Joyce Manwaring, Principal Landscape Designer Confluent Design Kevin Lyles, Wheat Ridge Citizen Lloyd Levy, Xcel Energy manager Preston Gibson, IES Graduate Intern Trevor Hammrich, IES Executive Director Carol Lyons, and IES Project Manager Michael Haney.

The video can be found on Youtube at: http://www.youtube.com/watch?v=fgYBBs6wWw0. The video was produced for the Wheat Ridge Public Broadcast Channel (Channel 8) and was shown in the *Top of the Hour* programming. The *Top of the Hour* program is a 30-minute magazine-style show produced to educate citizens about important issues in the City of Wheat Ridge.

IES distributed project t-shirts with a project image on the front and sponsor logos on the back to all participants. The t-shirts served to thank participants for supporting the project and acknowledge sponsors and partner organizations. Sponsors were acknowledged on printed posters displayed at the volunteer registration and food tables.

MILE HIGH YOUTH CORPS

The City of Wheat Ridge contracted with MHYC to remove noxious tree species and reduce fuel load in the project site area in October 2012. Working with MHYC was one of the objectives of our project. It was important for the project that invasive species were removed to ensure that they would not compete with the new plants that we put in the area. The species removed were Russian olive, Buckthorn and Siberian elm.

All trees were cut and herbicide was immediately applied to the remaining stumps. Trees that were removed were chipped and the chips were spread at the site. The City of Wheat Ridge provided supervisory staff for the 12 MHYC workers for four days; the MHYC worked for 8 hours each day to accomplish its goals: remove Russian Olive trees from the project site, reduce fuel load, and remove dead trees in the Greenbelt. All of the goals were met or exceeded for the project. A copy of the Wheat Ridge-MHYC Sponsor Agreement is attached in Appendix G.

MHYC crew removing invasive species from the Wheat Ridge Greenbelt.

EAGLE SCOUT PARTICIPATION

Boy Scouts installing water totes in the Greenbelt near the Revive the Greenbelt! planting site. These water totes are used by the Tree Stewards to provide water for the newly planted plant material.

While conducting community outreach, Project Manager Michael Haney met the leader of a local Boy Scout troop. The Boy Scout troop leader was very interested in the project and asked if he could introduce the project to his scouts. One of the scouts contacted IES about finding a task suitable for him to earn his Eagle Rank.

The IES maintenance plan called for 275-gallon water totes to be accessible to the community in the Greenbelt to allow volunteers to water the newly planted trees. For the water to be accessible, the totes needed to be elevated on bases. One of the Boy Scouts proposed the project of designing, manufacturing and installing bases for the Tree Stewards water totes to his troop for his Eagle Scout project and his proposal was approved. Collaboration with the prospective Eagle Scout proceeded very smoothly. IES paid for the materials, assisted in the development of the plan, and reviewed the work.

WHEAT RIDGE HIGH SCHOOL CAREER EXPLORATION CLASS

Nathan Mosley, Wheat Ridge Management Analyst, proposed to IES involvement of the Wheat Ridge High School Career Exploration class. The Career Exploration class is special education students taught by Wheat Ridge Mayor, Jerry DiTullio. IES and Nathan developed a field trip to the planting site on the day before the official planting day as a service learning opportunity for the class.

The class was assigned a variety of tasks to prepare the site for the volunteer the planting day. The class distributed of soil amendments and mulch throughout the planting site, planted some trees and shrubs, and cut all of the protective wire mesh used to protect the trees from beavers and other grazing animals.

Before the students started on the tasks for the day, IES and employees of the City of Wheat Ridge spoke with the students about their professions. An integral part of the class experience was to expose the students to different careers to show them opportunities available. Nathan Mosley discussed his career in the Administrative Services department as a management analyst. Margaret Paget talked about her career as Forestry and Open Space Supervisor. Carol Lyons discussed her position as Executive Director of IES. Michael Haney talked about his position as a Project Manager for IES.

The work with the Career Explorations Class was very useful for the project. The assistance with staging the supplies while engaging the students in environmental education was rewarding and supported with the project goals. IES reinforced to the students the importance of the Greenbelt and the *Revive the Greenbelt!* project.

WATERING OPTIONS

IES explored a variety of options for watering the plants. Through our research of the site it was determined that lack of access to water was the primary reason for the low survival rate of newly planted trees in the Greenbelt. The three options that were pursued were: fully automatic, semi-automatic and manual watering.

The fully automatic option was to use water from the Prospect Park's irrigation system. The fully automatic system included a timer to automatically turn on drip lines running to the plants. The semi-automatic option was similar to the automatic system with drip lines run to all the plants. However, the system would be turned on and off manually. The final option was manual watering, the option chosen. IES decided against the automatic and semi-automatic systems due to the cost and the fact that these systems would have little applicability to other projects in the Greenbelt. This project was unique in that it was close to Prospect Park and we had the possibility of using water from the Prospect Park irrigation system. Most areas along the Greenbelt do not have this luxury.

Integral to the success of the *Revive the Greenbelt!* Project was the task of finding water for the manual watering option to maintain the newly planted trees and shrubs in the Greenbelt. Clear Creek runs through the Greenbelt. Most of the water in Clear Creek in the Greenbelt is owned by Molson Coors. This presented the challenge of obtaining permission from Molson Coors to draw water from Clear Creek. The creek represented the most appropriate source from which to

obtain water from because of its direct adjacency to the new plantings.

Through a connection on the PAC, IES was able to make contact with Molson Coors and ask permission to withdraw water from Clear Creek. After providing Molson Coors with a detailed plan with calculations about how much water was to be withdrawn, and much back and forth IES was given permission to take water from Clear Creek. As a part of the agreement, IES provides Molson Coors with monthly updates on the amount of water withdrawn. Molson Coors then replenishes the amount taken for downstream users.

NATIONAL HONOR SOCIETY

IES contacted Wheat Ridge High School's guidance counselor about engaging students in the project. The *Revive the Greenbelt!* project provided an excellent opportunity for students to engage with their community and help the Greenbelt. The school counselor recommended that IES contact the National Honor Society (NHS) group at the school. NHS is a nationwide organization that encourages students to participate in community activities and demonstrate leadership. IES introduced the project to the NHS students and encouraged them to contact IES if they were interested in participating. Five students from the Wheat Ridge High School NHS group volunteered for the planting day event.

The NHS students were among the most engaged volunteers on planting day. Before the event started, they approached the IES Project Manager, Michael Haney, and asked for additional responsibilities and ways they could help with the event. During the event, they helped hand out supplies and guided other volunteers around the planting site. At the end of the event, all five students stayed to help IES and Wheat Ridge staff members clean up the area. IES recommends that organizations seeking to replicate a project similar to *Revive the Greenbelt!* contact the local NHS chapter early in the volunteer recruitment process as working with them was helpful and rewarding.

IES WHEAT RIDGE TREE STEWARDS

A top priority objective of this project was to ensure environmental health benefits and survival of the trees by identifying strategies that will improve long-term health of urban tree canopy and developing a comprehensive three-year maintenance plan. IES committed to recruit community volunteers and host a workshop to train volunteer tree stewards on proper tree care and maintenance practices.

Tree mortality is a major challenge in the Greenbelt. The City of Wheat Ridge does not have adequate resources (personnel and equipment) to maintain trees and shrubs in the Greenbelt. To maintain newly planted plants, IES created the *Tree Stewards* program.

Tree Stewards are community volunteers tasked with maintaining the newly planted trees and shrubs in the Greenbelt. Using water donated by Molson Coors from Clear Creek and pumped by Wheat Ridge employees into water totes installed by an Eagle Scout, the Tree Stewards have led the IES maintainance program to care for the newly planted trees and shrubs.

Tree Stewards were predominantly recruited from the volunteers for planting day. IES recruited using posters in the Greenbelt and Recreation center and word of mouth from project volunteers. During registration on planting day the Tree Stewards program was described to all volunteers. Volunteers were asked if they would be interested in the program. IES followed up with those that were interested.

Volunteer Tree Stewards attend a training workshop in the Greenbelt!

IES conducted two training workshops on Saturday, June 1 and Wednesday, June 5, 2013. Total attendance was 18 people. The workshops were designed to take one hour. Appendix H shows an outline for the workshop. The key topics for the workshop were to introduce the Tree Stewards to the common problems that the new trees and shrubs in the Greenbelt might face and to explain what was required of the volunteers to help the plants survive. Tree Stewards were shown how to look for signs of distress, reapply mulch, weed around the plants, and apply water. IES created the Tree Stewards Manual (Appendix Q) to help the Tree Stewards understand their responsibilities. The manual detailed best maintenance practices, included pictures and descriptions of the plant species, and included contact information for IES and the City of Wheat Ridge.

Tree Stewards were introduced to the online tracking form (Appendix I) to maintain a record of the watering and other maintenance and to report concerns about the plants. The tracking form is an online spreadsheet to which all Stewards have access. On the day of the workshop and in every email sent to the Stewards, IES emphasized the importance of proper information tracking. By using this form, IES has been able to, with minimal effort, maintain knowledge of how the new plants are faring in the Greenbelt.

Thus far, the Tree Stewards have been successful. The new plants are thriving in the Greenbelt. This is due, in large part, to the efforts of the Tree Stewards and their dedication and hard work.

5. PLANTING DESIGN

BACKGROUND

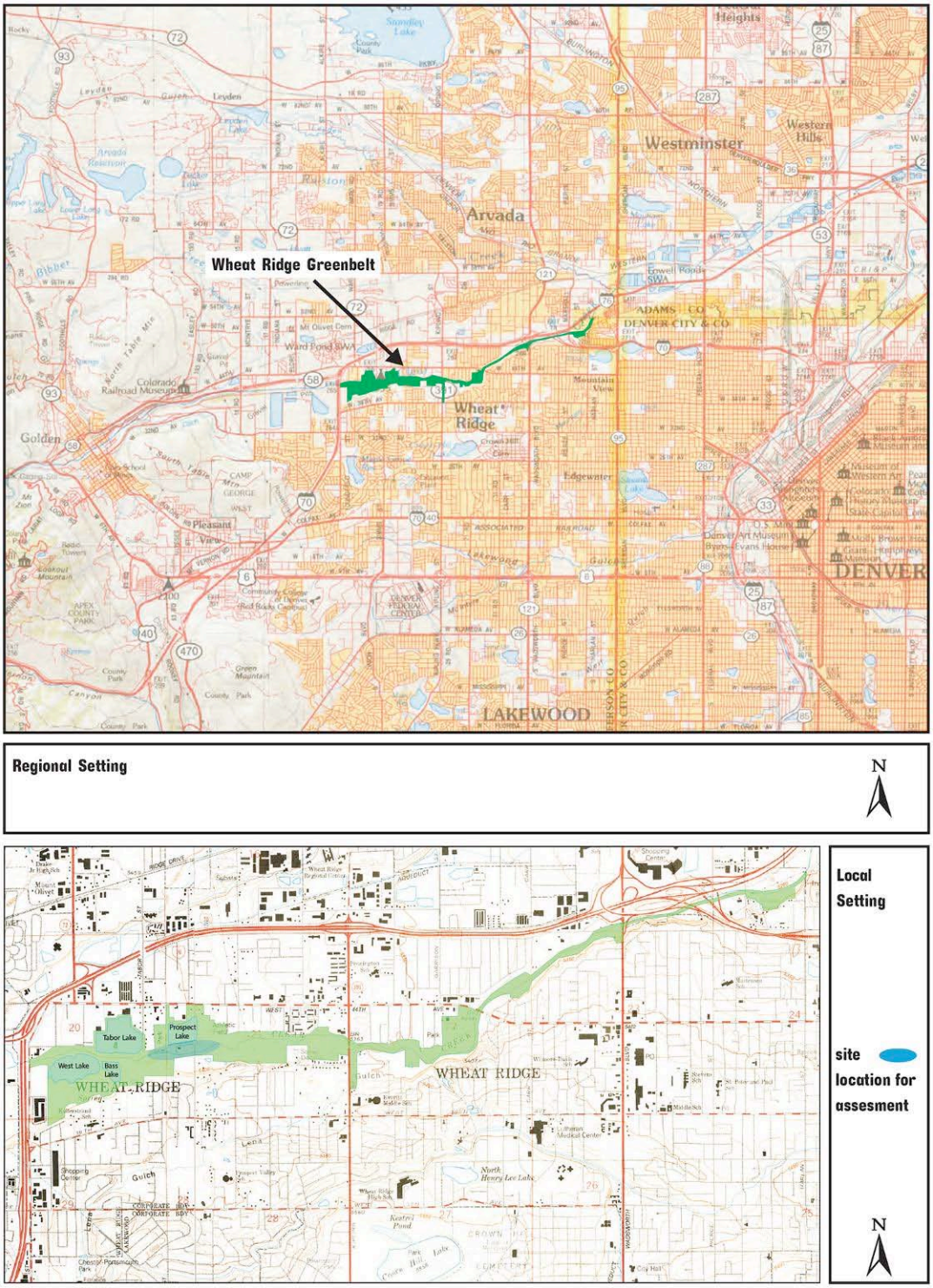
IES proposed the project site, located in the heart ofWheat Ridge, along the north and south banks of Clear Creek, a major tributary to the South Platte River. The project site was in the Wheat Ridge Greenbelt Conservation Area (WRGCA), south of Prospect Park between Tabor Street to the west and Pierson Street to the east. From Kipling Street and 44th Avenue, Prospect Park is eight blocks west. The project site can be accessed by the public from the Prospect Park

parking area south of Prospect Lake and northwest of Prospect Bridge, which crosses Clear Creek and connects to the Clear Creek trail system in the WRGCA. It is a popular recreation area for community members. It is connected to baseball fields, a picnic pavilion, and a playground. This site was chosen for the project for several reasons:

- The Greenbelt is surrounded by residential development and suffers from edge effects.
- Historic grazing, haying, and gravel mining has resulted in considerable disturbance and alteration of the natural flora and topography of the floodplain and creek.
- Artificial lakes from gravel quarrying dominate the western portion of the floodplain. The creek has been significantly incised and now is largely isolated from its floodplain.
- Amendments to the creek banks in many areas, such as the area south of Prospect Lake, have further served to alter the natural hydrology of the creek system.
- The proposed site was severely impacted by a hailstorm in 2009, resulting in significant canopy loss.

Figure 1 shows the location of the project site in relation to the Denver-metro area.

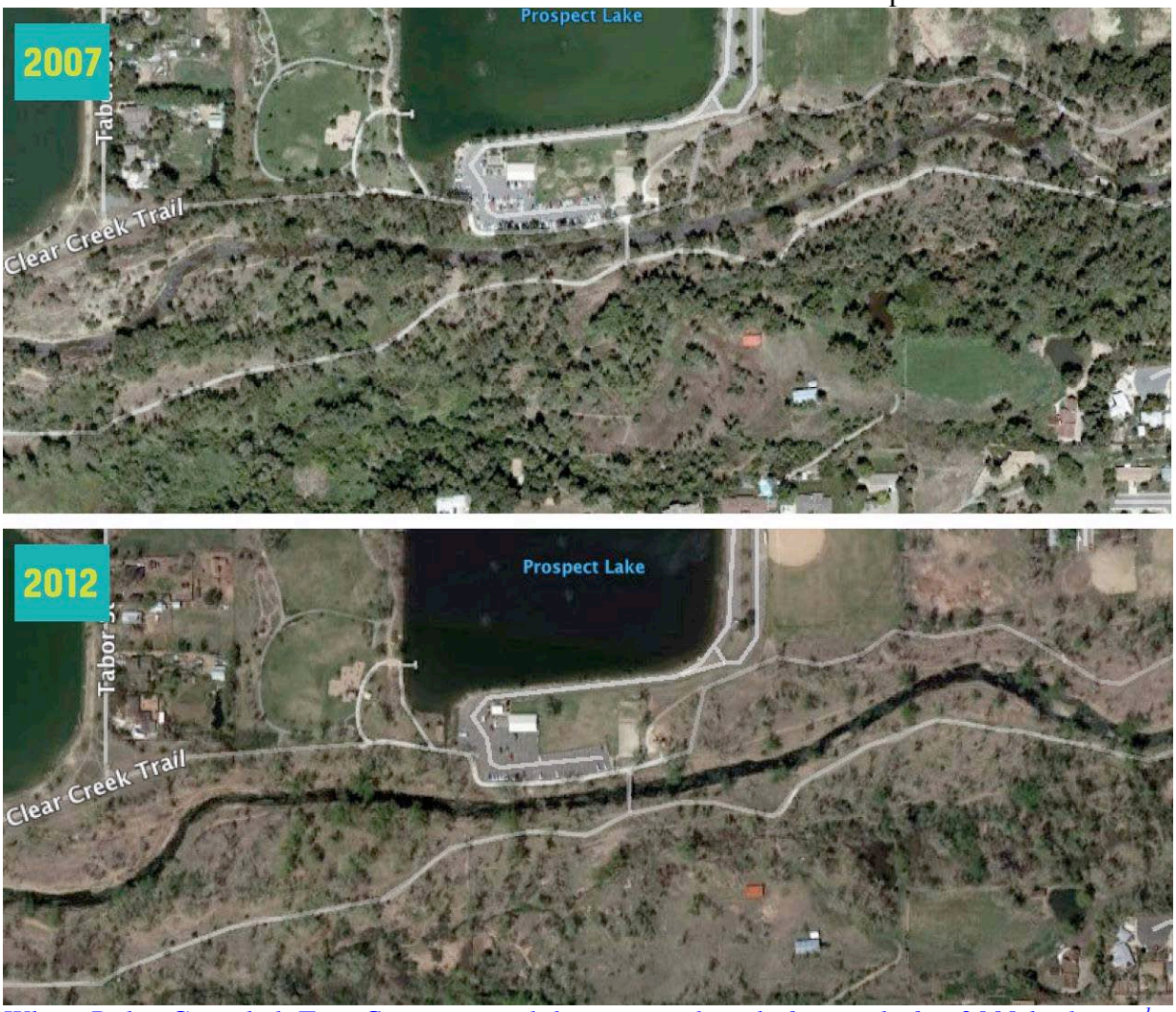
Site analysis and assessment of the current conditions was necessary for determining factors that influence an overall design approach. Without a thorough understanding of the existing riparian system's opportunities and constraints, the proposed design may fall short in its restorative intent. IES approached the Wheat Ridge Greenbelt with the objective of improving hydrologic and ecological processes in a locally degraded reach within the greater South Platte watershed system. Design implementation replaces lost, damaged, or compromised elements of the natural system.



Site Context maps at regional and local scales

The Wheat Ridge Greenbelt has seen limited success in previous efforts to establish new trees in the WRCGA due to the disconnect between the stream and its historical floodplain. A lack of maintenance support staff for new plants has also been a challenge for Wheat Ridge. The combination of these factors has caused high mortality rates among newly planted trees in the Greenbelt.

The Greenbelt area was extensively damaged by a large hailstorm in 2009. The epicenter destroyed a swath of existing vegetative cover exposing the stream and its banks in the project site to erosion and ecological imbalance. Figure 2 shows tree canopy cover in 2007 before the storm, and tree canopy cover after the storm in 2012. Older growth trees, with extensive root systems, were the most affected by the storm microburst that left wide gaps in the canopy cover along the riparian corridor. This exposure, along with the urban pressure on the system, led the stream to become severely incised and further exacerbate bank erosion. Urbanization often leads to flash flows into the stream channels. The faster and higher flows in storm events along with devastated vegetation, whose root mass would normally hold the banks together, is ultimately the basis of the detrimental stream incisement and abandonment of the floodplain.



Wheat Ridge Greenbelt Tree Canopy aerial damage analysis before and after 2009 hailstorm[1]

IES conducted research to assess the riparian condition. Two external documents produced for

[1] Google Maps. (2013). [Prospect Park, Wheat Ridge, Colorado] Retrieved from https://maps.google.com/maps?q=prospect+park+wheat+ridge&ie=UTF-8&ei=db08UvDsMuuqyQHpnoD4BA&ved=0CAoQ_AUoAg

state and local constituents and one IES document informed design decisions for the site:

- Colorado Natural Heritage Program's (CNHP) Biological Inventory of the site identifies several key factors affecting the whole site.[2]
- City of Wheat Ridge's Open Space Management Plan (OSMP) identifies the Greenbelt as the jewel in the community and proposes management plans to improve its value for wildlife, social and economic importance.[3]
- IES's 2012 Riparian Conditions Assessment (RCA) following NRCS guidelines to provide more recent data at a more micro-area scale (Appendix R).

The CNHP, in the Department of Fish, Wildlife and Conservation Biology, a sponsored program of the Warner College of Natural Resources at Colorado State University, delineated the Prospect Park section of the Wheat Ridge Greenbelt as a Conservation Area based on its biological inventory. CNHP's biological survey focused on capturing the ecological processes that are necessary to support the continued existence of a particular element occurrence that is of natural heritage significance. It identified that the Prospect Park Conservation Area (PPCA) supports the globally rare Ute ladies'-tresses orchid (*Spiranthes diluvialis*) and contains the only known occurrence worldwide of a newly discovered species of earthstar (genus *Mycenastrum*), a type of fungus. There are occurrences of two significant woodland communities:

- Plains Cottonwood / Western Snowberry Riparian Woodland community is ranked as "globally/state imperiled" (G2G3S2)
- Plains Cottonwood/Chokecherry Riparian Woodland community is ranked as "globally/state critically imperiled" (G1QS1Q).

The CNHP report indicates these are both worthy of restoration efforts. In addition to these important species within the communities, it identifies that the area is in high need of management action to maintain the existing plant and plant communities in the PPCA. The CNHP recommends the encouragement and proliferation of native plants and animals, and the development of an ecosystem with more natural ecological attributes.

The Wheat Ridge OSMP shares the overall goals of the CNHP report for its vegetation in passive recreation areas. The Wheat Ridge OSMP requires the Greenbelt to maintain, improve and encourage the composition, structure, and distribution of vegetation types that naturally occur in the area. Specific efforts from Wheat Ridge have been to remove non-native and invasive species to provide benefits to bird, mammal, and rare plant habitat. Russian Olive (*Elaeagnus angustifolia*), targeted for removal, has been the dominant forest tree in many areas and is the single greatest barrier to establishing a native forest canopy. Other species targeted for eradication are common teasel (*Dipsacus fullonum*), cutleaf teasel (*D. laciniatus*), leafy spurge (*Euphorbia esula*), and yellow toadflax (*Linaria vulgaris*). The areas with a significant proportion of non-native species have been gradually treated over several years to allow native

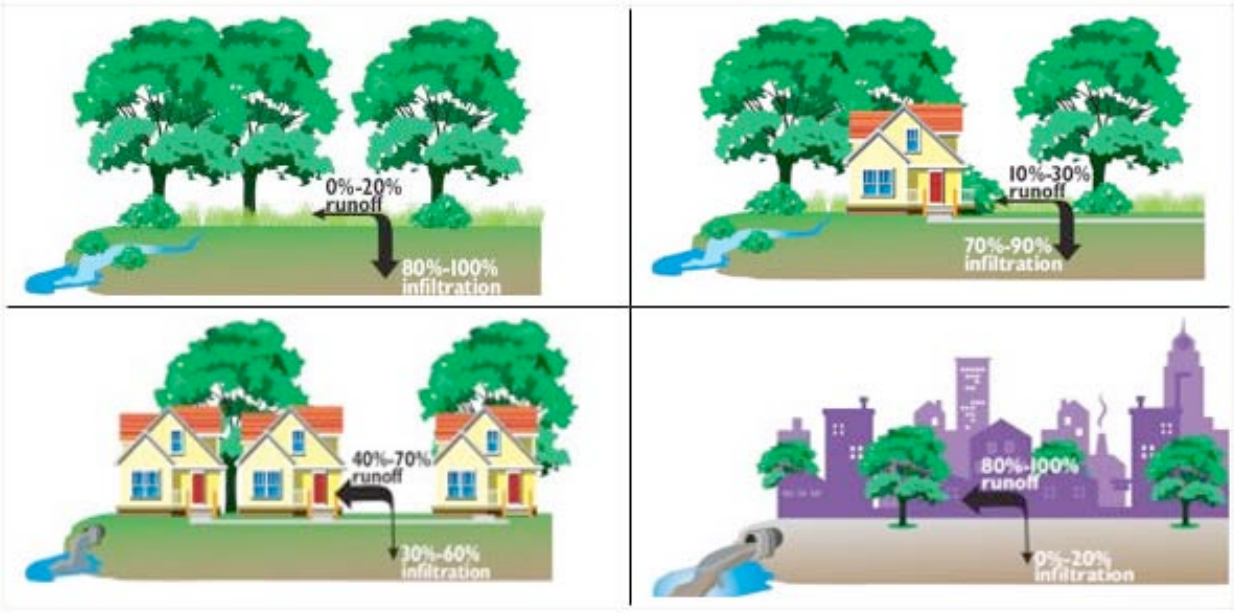
[2] Anderson, David G. and Joe Stevens. Colorado Natural Heritage Program. "Wheat Ridge Open Space Biological Inventory". 2000

[3] City of Wheat Ridge Parks Department and ERO Resources Corporation. City of Wheat Ridge Open Space Management Plan. 2002

species to assert dominance after the removal of the non-natives. Natural regeneration of this area can benefit from and be dependent on the effects of inundation and scouring of the floodplain in the distribution of seeds. Therefore, periodic flooding of the floodplains or manual disturbance and planting can help to ensure regeneration and persistence throughout the Greenbelt over time. A stronger connection between Clear Creek and the larger floodplain is described in the OSMP as desirable and recommended.

IES performed a riparian conditions assessment (RCA) using NRCS guidelines that identified and confirmed the specific deficiencies throughout this section of the Greenbelt in fall 2012. It gave IES a more exacting look into the specific morphologies happening across the project area with guidance from the broader background of the previous two studies. In doing so, IES noted several factors affecting the riparian corridor's health.

Both sides of Clear Creek exhibit much lateral side cutting and incisement disconnecting the floodplain from the creek's water access table. The heavily entrenched stream channel loses the ability to dissipate energy in times of increased flow across the floodplain. With the amount of urbanization surrounding the creek, much heavier loading to the stream system occurs in times of rain events. Directly connected surface runoff through roads and storm drains is the main cause of increased peak flow magnitude in a shorter time-period. This in turn decreases base flows throughout the summer from a lack of infiltration and loading to the surrounding soils. The reduced amount of infiltration to the system through imperviousness from roads, storm drains and parking lots takes away from the needed groundwater storage and may eventually reduce the creek from a perennial stream channel to intermittent flows. Diversion of water into irrigation canals upstream from the project site also has an effect to the overall water base flows.



Difference in stormwater runoff between developed and undeveloped sites.[4]

[4] Henry County Georgia Stormwater Management Department. (2009). [Storm water run off image]. Retrieved from

The creek and its banks exhibit very little vegetation that would help to reduce stream energy and/or capture sediment. Because of this, obvious evidence of incipient, well-defined erosion and head cuts were identified as being readily present. Figure 3 shows the difference in stream flow rate of a pre-development site versus a post-development site. Both sides of the creek banks and benches are lacking in mid-age trees (5-20 years of age). Shrubs and grasses are predominantly exhibited along with saplings from suckering root masses paired with the older growth (20+ years) trees. Age variability is severely lacking and could be described as predominately single generation.

As the banks have become increasingly steeper, they have become very unstable, creating stream bank sloughing. Sedimentation has occurred due to the erosive force of the stream channel at the toe of the slope. Channel widening is now occurring due to the collapse of undercut banks. The meadow aquifers located at greater distances laterally from the creek and beyond the project site, boundaries may begin to drain as the water table lowers further, resulting in a conversion of vegetation from wet-meadow species to more drought tolerant or upland species.

Based on the RCA, IES decided to focus restoration efforts east of the bridge that divided the assessment area, east and west. The site to the west of the bridge is severely separated from the floodplain with banks of 10 feet high or more. The lack of access to the water table for newly planted trees without major stream bank modification would cause planting efforts in the area to fail. Heavier earthwork and stream realignment upstream of the selected project focus area would create a much stronger connection between the creek and its historical flood plain. This would in turn help the ecology of the area through its historically natural cycles of flooding and deposition.

Many riparian plant species depend on these areas of inundation and new sediment deposition for germination and the establishment of seedlings. Without this natural cycle, the amount of water available to the riparian vegetation is heavily reduced in the floodplain, which alters the types of vegetation that can persist in these conditions. A lack of flooding decreases the amount of habitat heterogeneity in riparian ecosystems as wetland depressions, benches and shelves in the floodplain no longer fill and hold water. Because habitat heterogeneity is correlated with species diversity, the overall species biodiversity is in decline throughout the riparian ecosystem.[5]

Channel incision, leading to a reduced overbank infiltration into the riparian zone, also results in less filtering of upland-derived nitrates and other pollutants. A stream system typically adjusts to maintain a steady state, or dynamic equilibrium between the driving mechanisms of flow and sediment transport and the resisting forces of bed and bank stability and resistance to flow. However, there are times when the environmental change is great enough that the stream system adjusts and/or reaches a new steady state that is considered an irreversible degradation of geomorphic, hydraulic, or ecological processes of the stream system, in which case restoration

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http://www.co.henry.ga.us/stormwater/WhyStormwaterMatters.shtml

[5] Franklin, S.B.; et al. (2009), "Complex effects of channelization and levee construction on western Tennessee floodplain forest function", *Wetlands* **29** (2): 451–464

may be appropriate.[6] Examples of possible restoration measures include raising the elevation of the channel by gully fill, check dams, beaver reintroduction, or complete bank or valley re-grading.

The UDFCD rock drop structure.

Because of an Urban Drainage and Flood Control District (UDFCD) creek restoration project the previous year, the Greenbelt area east of the bridge just south of Prospect Park is being reconnected to its less abandoned floodplain. UDFCD regraded portions of the creek system and installed a drop structure at the downstream portion of the IES project area. The UDFCD area of focus provided the greatest opportunity to see the elements of flooding and deposition occur. The water has slowed in the area and the water surface elevation has risen, thus laterally inundating lower sloped bank grades, providing better access to newly planted trees and shrubs root systems.

PLANTING DESIGN

IES collaborated with Landscape Architect Kevin Lyles of Confluent Design in the research and preparation of a strategic planting plan. A copy of the planting plan is in Appendix J. The design plan focused on using strategic tree selection and placement along the Greenbelt's riparian banks to help stabilize failing structure, provide greater survival rates, and mitigate declining ecosystems in the area.

Tree species were strategically selected and planted to optimize environmental benefits and to minimize potential negative impacts. Selections of plants all native to the local Greenbelt's ecosystem were used to bring a more naturalized, functional ecological state to the Greenbelt. These include adding to the significant and imperiled Plains Cottonwood/Western Snowberry and Plains Cottonwood/Chokecherry riparian woodland communities occurring throughout the area.

The planting sites themselves were developed through a combination of tree canopy analysis with the use of aerial imagery and on the ground observation. Topographic maps, GIS, GPS and CAD software helped to visually identify potential planting sites. There are several topographic features, such as benches, shelves and depressions, existing on the site that have greater potential for holding water and providing moisture to plants that were used in the final plan. Wind direction and sun exposure were also considerations in placement of the plantings.

[6] Soar, P.J., and C.R. Thorne. September 2001. Channel restoration design for meandering rivers. U.S. Army Corps of Engineers. Report ERDC/CHL.

6. VOLUNTEER TREE PLANTING EVENT

VOLUNTEER RECRUITMENT

IES used several different methods to recruit volunteers for planting day. The City of Wheat Ridge printed and hung large signs advertising the project. These signs included the date and time of the planting day event. Interested volunteers were asked to contact IES to register. These signs were displayed at the Recreation Center in Wheat Ridge and at informational kiosks in the city's parks and open spaces.

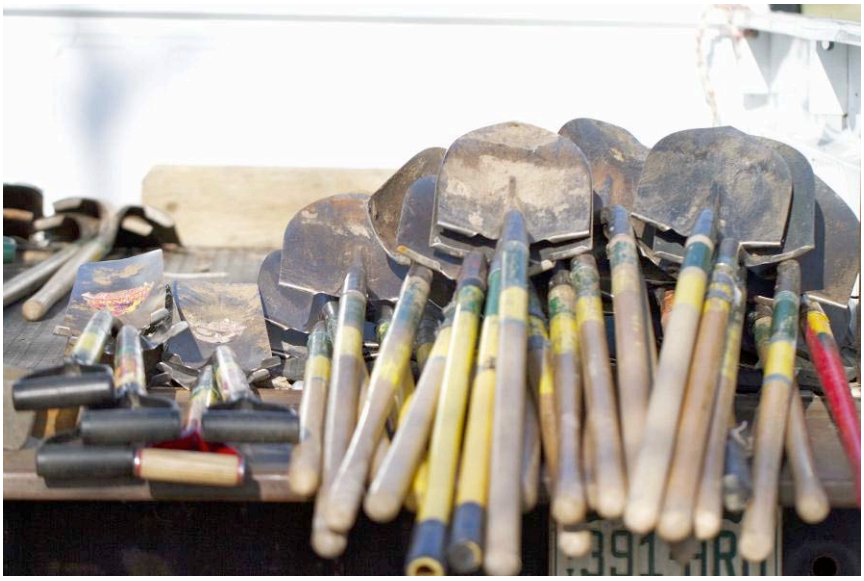
Volunteers planting trees and shrubs on the Revive the Greenbelt! planting day.

Volunteers were asked to register for the event. Individuals started registering as early as February for planting day. As planting day approached, registrations increased dramatically. The largest increase in registrations occurred immediately after the *Connections* newsletter was delivered to all addresses in Wheat Ridge, three weeks before the planting day.

IES set the goal of 80 volunteers. This goal was met with 81 people registered before the event. On planting day, twenty-one people who were not registered participated in the planting day activities. Twenty people that were registered did not show up to the event.

Recruitment efforts made a month or more before the event were largely unsuccessful. For future projects, IES recommends that recruitment should not be implemented more than one month before the project date. Before implementation an intensive plan should be created to ensure recruitment efforts are successful. Appendix K has copies of the recruitment posters and fliers used to recruit volunteers for the planting day event.

STAGING



Mile High Youth Corps and the City of Wheat Ridge was able to provide all necessary equipment for volunteers on planting day.

Leading up to the April 27 planting day, IES worked with the Wheat Ridge Parks and Recreation Department and Landscape Architect Kevin Lyles to coordinate equipment and human resource logistics and material staging. IES worked to get the plants delivered three days before the planting and had the plants dropped off at Wheat Ridge's adjacent storage facility. The plants were inspected for proper species and quality, and placed on trailers for easy delivery to the site. Four 275-gallon water totes were delivered two days before planting day to provide accessible water for the new plants.

Kevin Lyles, Margaret Paget (Wheat Ridge Forestry and Open Space Supervisor) and Trevor Hammrich (IES Research and Design Associate) field marked the planting sites for individual species locations with landscaping flags and stakes. Arrowhead Landscaping dug the planting holes under contract to UDFCD in coordination with IES the week before planting day. On planting day, Wheat Ridge supplied and had onsite extra topsoil, mulch and beaver cages, and placed them near the planting sites. The City supplied buckets for hauling water and provided enough shovels for the day. The plants were placed at the marked sites by the Wheat Ridge staff the morning before the event. The Wheat Ridge High School Career Exploration class spread soil amendments and mulch, and cut protective cages the day before planting day.

PLANTING DAY

When the volunteers arrived at the tree-planting event, they signed in at the registration table. Volunteers received a nametag and project t-shirt, and were informed of the day's schedule. One of the most important aspects of working with stakeholder volunteers is to show appreciation for their efforts. IES designed and produced commemorative t-shirts for volunteers to wear during the planting day and take home. The t-shirts connected volunteers to the event and created a sense of camaraderie among participants. Volunteers were provided with breakfast and lunch. A schedule for the day is in Appendix L.

There were 81 volunteers on planting day, along with 15 IES and Wheat Ridge staff members. IES started the event day with the opening ceremony. To start the event the Director of Parks and

Recreation, Joyce Manwaring, thanked all the volunteers for coming to the event and also thanked IES for planning and implementing the project in collaboration with the city. IES Executive Director, Carol Lyons, spoke about IES and the work that IES does. Carol introduced Preston Gibson of Xcel Energy and Devon Buckels of the Urban Waters Partnership. Carol recognized contributions from key members of the PAC and the City of Wheat Ridge. A copy of the Certificate of Appreciation given to these volunteers is in Appendix M. Devon Buckels spoke about the importance of the Greenbelt and Clear Creek. Devon emphasized the importance of the *Revive the Greenbelt!* Project for the South Platte River system. The ceremony provided context for the volunteers to let them know about how important their work would be to preserve and protect the Greenbelt. Preston Gibson from Xcel Energy also spoke Xcel Energy's role in assisting the project both financially and with a number of volunteers and in-kind services. Preston also thanked the volunteers for coming to the event.

The volunteers were divided into groups of 20 people to train them on proper tree and shrub planting techniques. An IES or Wheat Ridge professional with extensive knowledge of proper planting techniques led each team. The training discussed and demonstrated how to properly prepare the root ball, place and plant the root ball at the proper depth, backfill, mulch and protect with beaver cage. A handout that was made to assist in the instruction of tree planting is in Appendix N.

For trees, volunteers were instructed to plant the root collar even with the adjacent grade in a hole three times the width of the root ball. The hole was then to be backfilled with a mixture of the excavated soil and a supplied topsoil mix. Volunteers were instructed to provide a six-inch high ring of soil around the trees approximately 12-18 inches from the trunk to create a watering basin. Four inches of mulch was added in the watering basin six inches from trunk base. A beaver protection cage was placed around the tree and buried below grade to prevent beavers from lifting the protection.

Volunteers planting trees and shrubs on the Revive the Greenbelt! planting day.

Volunteers were instructed to place the shrubs in a hole two times the pot's diameter with the top of root ball two inches below grade. A four-inch high soil ring was to be placed around the shrub at the diameter of the hole. Four inches deep of mulch was to be placed within the soil ring while keeping it two inches away from the shrubs trunk to prevent the buildup of moisture and the

formation of disease. No beaver protection was deemed necessary for the shrubs. Volunteers were supervised continuously throughout the morning to ensure that proper planting techniques were being followed.

PLANTING DAY EDUCATIONAL CENTERS

IES, the City of Wheat Ridge Parks and Recreation Department, and the City of Wheat Ridge Stormwater Management Department set up educational booths on the Revive the Greenbelt planting day. The booths educated the volunteers about the trees and shrubs they were planting and the importance of the Greenbelt to the local community and natural environment.

IES, the Wheat Ridge Parks and Recreation Department, and Wheat Ridge Stormwater Department set up educational centers on planting day. Volunteers were encouraged to visit these booths during registration. The purpose of the booths was to provide the opportunity for the volunteers to increase their knowledge of the Greenbelt, storm water, and IES.

The IES education center had a variety of handouts including: How to Plant a Tree (Appendix N), a coloring activity for children (Appendix O), IES Annual Reports, stickers and information about IES. The Wheat Ridge Parks and Recreation department displayed pictures, leaves and branches of native trees and shrubs in Colorado including most of the species that the volunteers planted on planting day. The storm water educational center, set up by Bill LaRow, Wheat Ridge Stormwater Coordinator, included information about the importance of the Greenbelt in managing stormwater and highlighted other efforts by the City to improve stormwater management.

PLANTING DAY FEEDBACK

IES and our project partners received anecdotal feedback from volunteers that was overwhelmingly positive about the planting day event. Volunteers commented on how much they enjoyed the event and how smoothly the day proceeded. Volunteers commented on how nice it was to have the holes for the trees dug and the plants placed next to the holes and ready to be planted.

Wheat Ridge Mayor Jerry DiTullio and Director of Parks and Recreation Joyce Manwaring sent thank you letters to IES (Appendix P). The letters expressed their gratitude with how well the

planting day event was organized and implemented. The letters stated that they would be interested in continuing to work with IES.

7. REVIVE THE GREENBELT! PROJECT EVALUATION

PROJECT OUTCOMES

The *Revive the Greenbelt!* Project was hugely successful. IES was able to meet the goals and all of the objectives set at the beginning of the project. The first objective was to collaborate with Wheat Ridge Parks and Recreation Department and MHYC to remove invasive Russian Olives from the planting site. The City of Wheat Ridge hired and supervised MHYC. The efforts of the MHYC team to remove noxious and invasive species were successful.

The second objective was to strategically plant trees to replace canopy gaps created by the removal of invasive species and the devastating hailstorm of 2009 while optimizing air and water quality, enhancing stormwater management, and protecting the native habitat of the Ute Ladies'-Tresses Orchid species. The IES planting plan, described above, was designed to optimize the environmental and ecological benefits to the Greenbelt. The planting site was centered where the largest loss of canopy cover was experienced from the 2009 hailstorm.

Clear Creek is heavily incised in some areas of the Greenbelt.

The third objective was to identify strategies that will improve long-term health of urban tree canopy and develop a comprehensive three-year maintenance plan. IES was to recruit community volunteers and host a workshop to train volunteer tree stewards on proper tree care and maintenance practices. The three-year maintenance plan was distilled into the Tree Stewards training manual (Appendix Q) and will guide the Tree Stewards toward the shared goal of ensuring the survival of the new plants. As discussed above the Tree Stewards training was successful and, to date, the Tree Stewards are doing an excellent job taking care of the plants.

The fourth objective was to plan and host a volunteer tree-planting event in spring 2013 that would provide educational opportunities for community stakeholders and organizations. IES was to collaborate with partners to recruit volunteers and host a "How to Plant a Tree" training session before the event. On planting day, three educational booths gave volunteers the opportunity to learn about the Greenbelt and the plant species native to the area. During the introduction to the event Urban Waters coordinator Devon Buckels, spoke about the Greenbelt and its importance to the South Platte River and the surrounding communities. As discussed above, all volunteers were trained on how to properly plant the trees and shrubs and were closely

supervised during the day.

The fifth objective was to increase awareness of the benefits of strategic urban forestry by educating the local community through informative signs posted near the tree planting site and distributing and displaying educational materials focusing on the many ecosystem services provided by trees. IES prepared and displayed educational posters in the Greenbelt and other parks in Wheat Ridge leading up to planting day (Appendix F). IES made sure that all of the articles printed about the *Revive the Greenbelt!* Project discussed the many environmental and social benefits of the Greenbelt and the new plants.

The final objective was to evaluate the project and produce a final report to document the project's origins, planning, implementation, and outcomes. The report was to be designed to serve as a replicable model so that this project can be easily reproduced in other communities. The final objective is to be met by this report and appendices.

RECOMMENDATIONS FOR NEXT STEPS

The *Revive the Greenbelt!* Project is an important step in helping communities around the Clear Creek Greenbelt understand the unique challenges in the area. The IES RCA illustrated the important point that trees and shrubs cannot, on their own, solve the problems facing the Greenbelt. Clear Creek, in some areas of the Greenbelt, is so heavily incised that trees planted on the stream banks would have no hope of reaching the water table.

There are many approaches to remedy the problem of water access for plants. IES chose to implement a community-based volunteer program to hand water the trees. More research needs to be conducted in the Wheat Ridge Greenbelt to find other possible planting sites where community-based volunteers might be appropriate to restore these other areas.

IES believes that engaging the community of Wheat Ridge to help restore the Greenbelt is an important and worthwhile endeavor. The Tree Stewards IES has recruited have been devoted and enthusiastic. The Tree Stewards require little training and oversight and they are able to provide very valuable services.

IES and the City of Wheat Ridge will continue to work with the Tree Stewards and improve the program. Communication among Tree Stewards, IES, and the City of Wheat Ridge can be improved. Creating a more responsive feedback mechanism or procedure will improve the Tree Stewards program. It is important to demonstrate to the Tree Stewards that their observations are being heard and action is being taken.

One unforeseen issue came up after planting day. Native chokecherries were specified in the planting plan and ordered. However, it was discovered that the stock delivered and planted was a different species. Most of the plants delivered came in at a period of dormancy and had no leaves to be identified by. It is much more difficult to identify shrubs by their buds so the error went unnoticed. Once the plants started leafing out it became apparent what had happened. Chokeberries (*Rhus aromatica*) had been delivered mistakenly in the place of the native Western Chokecherries (*Prunus virginiana melanocarpa*). The supplier, once notified of the disparity,

reshipped the appropriate plant stock and Wheat Ridge staff swapped the mis-identified plants for the correct native species.

Several areas within the Greenbelt are currently unsuitable for planting the typical riparian species found throughout the Greenbelt without significant intervention. The typical native species would have (and have had) a hard time establishing themselves as the ecosystem dynamics historically have changed since initial community establishment. The present riparian ecosystem, functioning in its current state, is damaged and may continue to see more deterioration before it gets better.

Some areas of the Greenbelt have both a heavily incised stream and active lateral cutting (bank erosion.)

The planting design for the project, as of July 1, 2013, is working well. Through the extensive research, RCA and inventories IES and partners developed an informed and appropriate plan for this specific site. IES toured the site with Assistant Colorado State Forester, Keith Wood, two months after planting day. Mr. Wood remarked at how well the plants have been responding to their new settings in the Greenbelt. The plants appeared to be establishing well as evidenced in the new growth on the plants. A strong collaboration among IES, Wheat Ridge, Kevin Lyles and the Project Advisory Committee led to a well-organized and successful project. Margaret Paget's Wheat Ridge staff was resourceful and responsive throughout the project. Wheat Ridge staff members helped with a lot of the finer details involved with and leading up to planting day. It was inspiring to see such widespread community support and involvement on planting day. Getting the help and support of the daily users to the Greenbelt shows how wonderful, cherished and important the area is.