IES Greenbelt Restoration and Environmental Education Network (GREEN)

Final Report
September 2016

Institute for Environmental Solutions

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THE TREE PROJECT
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2. Executive Summary

This report documents the 2015-2016 *IES Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network* Project. The program took place in the Wheat Ridge Greenbelt and at Kullerstrand Elementary School in Wheat Ridge, Colorado. The Institute for Environmental Solutions (IES) and the City of Wheat Ridge Parks and Recreation Department (WRPRD) developed the program to continue a four-year partnership that emphasizes sound ecological improvements to the Greenbelt utilizing community planting programs. The project was initiated by a request from the Kullerstrand school psychologist for a tree program for Kullerstrand's emotionally disabled students.

This report describes the project's origins, planning, implementation, and outcomes. The report and the attached appendices document the project's organizations, goals, objectives, and the stakeholders and contributions. The project's replicable design is described in detail so it can be used as a model for future community planting programs.

IES and the City of Wheat Ridge have been partners since 2012. The dedication and participation by the WRPRD through Margaret Paget, Forestry and Open Space Supervisor, have been vital for successful planting projects. The partnership has now produced three projects: *Revive the Greenbelt* (2012-2013), *Preserve the Greenbelt Elementary Education Program* (2013-2014), and *Growing the Greenbelt Education and Ecological Health Program*. These projects focused on improving the Greenbelt's ecological balance by increasing canopy and biological diversity, and slowing storm water runoff and erosion.

The *Greenbelt Restoration and Environmental Education Network* Project was developed to give students with special needs the opportunity to have hands-on science lessons and the community of Wheat Ridge the knowledge and tools to improve the Wheat Ridge Greenbelt. Students participated in two hands-on classroom workshops and a planting day, while community volunteers aided students in planting and caring for trees. The planting program was planned by IES and the City of Wheat Ridge with the help of UCD Master of Urban and Regional Planning student Andrew Rasmussen. The planting day resulted in 90 trees, shrubs, and grasses being planted along the new trail section of the Greenbelt just north of 41st Avenue and Kipling Street. Survival rates for the site are currently above 95%.

IES will continue to care for the new plants to maximize survival rates through the *IES Tree Stewards Program* and the new *IES Tree Ambassador Program*. These programs give community members and Wheat Ridge summer camp students the training and tools needed to care for the new GREEN planting site. These stewards have been trained and organized by IES to help ensure that health of newest planting site in the Greenbelt.

IES encourages comments and questions. Please contact IES at solutions@i4es.org or visit our website at www.i4es.org.

3. Introduction and Overview

This Report: *The IES Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network*

This report describes the 2015-2016 *IES Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network* (GREEN) Project. The Institute for Environmental Solutions (IES) created this program as part of the Tree Project.

This final report documents the program's development, planning, implementation, outcomes, and suggestions for future projects. The report and appendices provide the complete details about the elementary education program, the GREEN trail planting event, and tree stewardship. The program was designed to provide seriously emotionally disabled (SED) students at Kullerstrand Elementary School in Wheat Ridge the opportunity to receive hands-on science lessons and improve their local environment. Students learned about Colorado's ecology, the importance of ecological balance for ecosystem health, and how to properly plant and care for trees. The project and this report will provide a model for future environmental education programs and volunteer planting events in the Colorado Front Range.

The Institute for Environmental Solutions

The Institute for Environmental Solutions delivers scientific solutions to improve our health and environment. IES's vision is to create efficient ways of dealing with complex environmental problems. IES strives to prevent waste and unwanted side effects, provides opportunities to optimize environmental improvements and reduces energy consumption and greenhouse gas emissions through a unique technical, multi-disciplinary approach. By engaging a broad spectrum of participants in examining these problems on a project basis, IES develops sound, cost-effective solutions.

Institute for Environmental Solutions

The IES Tree Project

The IES Tree Project is one of IES's main on-going programs, and is dedicated to improving the environment of Colorado's urban areas through strategic tree selection and management. Through collaborative, multi-disciplinary partnerships and programs, we restore natural systems and urban green infrastructure, educate children and adults to become environmental stewards, rehabilitate, improve, and maintain critical urban natural resources, and improve community health and economy.

The mission of the Tree Project is to improve Colorado cities using tree science. Through collaborative, multi-disciplinary partnerships and programs, we:

- Restore natural systems and urban green infrastructure.
- Educate children and adults to become environmental stewards.
- Engage community members to rehabilitate, improve and maintain critical urban natural resources.
- Improve the environment, community health and economy.

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The IES Tree Project has completed six planting programs along Colorado's Front Range. The first, IES's *Trees for Healthy Kids and Community Project*, took place in Golden during the fall of 2010 and spring of 2011. The project resulted in 40 trees being planted at Mitchell Elementary School to help reduce air pollution and noise from the adjacent highway, control storm water, and mitigate strong wind on the school property.

In 2011-2012, IES partnered with the City and County of Broomfield on the *Trees for a Healthy Community and Economy Project*. IES and community partners planted trees in the newly developed downtown Broomfield. IES developed a strategic landscape plan with economic and environmental improvement targets that will contribute to commercial growth, strengthen the community, and create a healthier environment.

IES volunteers plant trees during *Revive the Greenbelt*, April 2013

IES has worked in the Wheat Ridge Greenbelt since 2012 and completed three projects prior to GREEN. In 2012-2013, IES *Revive the Greenbelt!* Program was the beginning of a partnership between IES and WRPRD. During the program, over 200 community volunteers planted more than 200 native trees, shrubs, and grasses, and removed invasive species to help repair and improve the Greenbelt's riparian ecosystem. The spring of 2016 marked the end of the three-year maintenance program for *Revive the Greenbelt!* and IES measured survival rates for the trees planted in 2013 at more than 50%.

The 2013-2014 *Preserve the Greenbelt Elementary Education Program* was IES's first partnership with Kullerstrand Elementary. The project included classroom workshops and planting days for 4th grade students at Kullerstrand and 3rd graders at Mountain Phoenix Community School. More than 120 students planted over 200 native trees and shrubs, and removed invasive species. *Preserve the Greenbelt* was awarded the Colorado Alliance for Environmental Education 2014 Environmental Educational Award for Excellence. IES estimates for survival rates at these sites are over 85%.

The 2014-2015 *Growing the Greenbelt Education and Environmental Health Project* combined classroom workshops and tree planting for high school students in the Career Exploration class at Wheat Ridge High School and a planting day for community volunteers. High school students participated in two hands-on workshops to introduce them to careers in science and how to plant and care for trees. Students planted 15 native cottonwood trees at the *Growing the Greenbelt* planting site and helped prepare the site for the volunteer planting day. The volunteer planting day included over more than 30 community volunteers. Girl and Boy Scouts, IES Tree Stewards, and Wheat Ridge community members planted more than 140 native trees, shrubs, and grasses. A year after the planting, the survival rate is more than 85%. WRPRD employees support all Greenbelt planting projects.

Kullerstrand students at *Preserve the Greenbelt* planting day, April 2014

IES also planned and implemented an environmental improvement project in Sheridan, Colorado in the fall of 2015. The *IES Sheridan Quincy Tree Project* brought leadership opportunities and science education to students at Fort Logan Northgate 3-8 School. The project also saw the planting of 60 native trees on school property just north of the Sheridan Quincy Trail. This project was continued in 2016 with the *IES Sheridan Quincy Trail Project*, where students planted shrubs, grasses, and wildflowers along the trail section to help reduce erosion and manage storm water runoff, as well as make the trail a more inviting space for the Sheridan community.

These programs are the base for the *IES Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network Project*. The project is focuses on five critical factors that IES has discovered for successful community planting programs.

- Collaboration with the full range of interested stakeholders
- Careful planning of the education and planting program

- Careful selection of the planting sites and plant species to optimize survival
- Good instruction and proper planting with well-organized volunteer participation
- Appropriate maintenance planning and implementation.

In spring 2015, IES was contacted by Jane Reuteler, Kullerstrand Elementary School Psychologist. Ms. Reuteler asked if IES could organize a tree program for Kullerstrand's TRAILS students. TRAILS, or Teaching Responsibility and Independence with Learning

Volunteers at *Growing the Greenbelt* planting day, April 2015

Supports, is a specialized program that supports students with behavioral, emotional, social, and learning disabilities that have struggled in traditional special education settings. Students in TRAILS are instructed in designated seriously emotionally disabled (SED) classrooms because of their emotional disabilities and social behavior. GREEN was specially designed for these students to receive science education and the opportunity to build social skills.

IES contacted Wheat Ridge Forestry and Open Space Supervisor Margaret Paget to continue our partnership in restoring the Greenbelt. Both parties agreed to an ecological improvement project that included hands-on science lessons for Kullerstrand students. The project's planting site was chosen by Margaret Paget, who suggested that GREEN could start to restore a new trail section in the Greenbelt where many trees were taken out during construction. With support from teachers and staff members at Kullerstrand, IES was excited to meet the challenge of creating a tree program for special education students.

4. IES Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network (GREEN)

IES planned and implemented the *Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network* (GREEN) Project starting in the fall 2015. The project included two in-class workshops and an educational planting day for Kullerstrand Elementary School TRAILS students in spring 2016. A new tree stewardship program for Wheat Ridge Sun Camp participants was established in June 2016. GREEN was an initiative to improve the health of the Greenbelt while engaging Wheat Ridge students and community members in environmental stewardship and science education. Kullerstrand TRAILS students completed two workshops that introduced them to concepts of ecological balance, Colorado's ecology, and how to plant and care for trees. The students participated in a planting event, where students, adult chaperones, IES team members and Tree Stewards, community volunteers, and WRPRD staff members planted 90 native trees, shrubs, and grasses along a new trail segment in the Wheat Ridge Greenbelt north of 41st Avenue and west of Kipling Street. Summer campers from the Wheat Ridge Sun Camp participated in the first *IES Tree Ambassador Program* where they learned to care for trees and watered the newly planted GREEN site twice a week during the first summer after the trees, shrubs, grasses, and flowers were planted.

Project goals

The project goals for the GREEN Project were:

- Implement a pilot program for at-risk, underprivileged seriously emotionally disabled (SED) elementary students to restore and care for the Wheat Ridge Greenbelt through hands-on science education.
- Provide the opportunity for SED students to learn about Colorado's ecology and put green initiatives into practice while developing important socialization skills.
- Continue to build the collaboration among IES, Kullerstrand Elementary, the City of Wheat Ridge, and the community.
- Advance existing initiatives to restore the Greenbelt.
- Develop the plan for a multi-year program where SED students continue to engage in stewardship and planting experiences throughout their years in the TRAILS program.

Kullerstrand paraprofessional and student at planting day, April 2016

Project objectives

The GREEN Project objectives were:

1. All TRAILS students from Kullerstrand Elementary will learn concepts of ecology, tree science, and stewardship in two classroom workshops and one planting day.
2. Educators at Kullerstrand will learn a replicable education and planting program to teach at-risk SED students about local ecology and stewardship.
3. Local Tree Stewards will learn about tree care through stewardship training and a planting day.

These objectives were designed to meet the goals of creating an engaging scientific ecological improvement program that included both in-class workshops and an environmental planting day. This model was based on previous IES projects and gave TRAILS students at Kullerstrand Elementary the opportunity, knowledge, and tools to improve their environment, while receiving critically needed science lessons.

Group photo at GREEN planting day, April 2016

4. The Greenbelt ecosystem will improve through planting of native trees, shrubs, and grasses, and removal of invasive species. Planting will increase habitat for native species and improve the ecological health of the Greenbelt by reducing pollutants and improving storm water runoff management.

The fourth objective was designed to achieve the IES Tree Project's mission of improving local environments and communities through collaborative projects and sound tree science. IES evaluated the site and, with the leadership of University of Colorado-Denver Master of Urban and Regional Planning student, Andrew Rasmussen, created a comprehensive plan to improve the ecology of the Greenbelt.

5. IES will evaluate the first-year program to assess its successes and the possibility of continuing to engage the Kullerstrand TRAILS students in tree stewardship and science through a multi-year program and will produce a final report and project video.

The last objective of GREEN was created to give IES and WRPRD the ability to evaluate the project and improve on any problems with this project for future years. It also gives the opportunity for donors and interested community members to learn about the project's development and implementation.

Kullerstrand TRAILS program

GREEN introduced students from Kullerstrand Elementary School's TRAILS program to their natural environment through hands-on science education. The Kullerstrand TRAILS program works with at-risk students to provide behavioral, emotional, social, and academic support. TRAILS is a specialized program that supports students with behavioral, emotional, social, and learning disabilities that have struggled in traditional special education settings. Students in TRAILS are instructed in designated SED classrooms because of their emotional disabilities and social behavior. GREEN provides new opportunities for these students to learn about science and ecology while growing social skills through interaction in meaningful real-world social situations. Kullerstrand students include 47% minority ethnic students. The free and reduced lunch rate for Kullerstrand Elementary School is 70.2%. More than 15% of students are enrolled in an English Language Learning program compared to the district average of a little over 10%.

Project design

TRAILS students participate in a classroom activity, May 2016

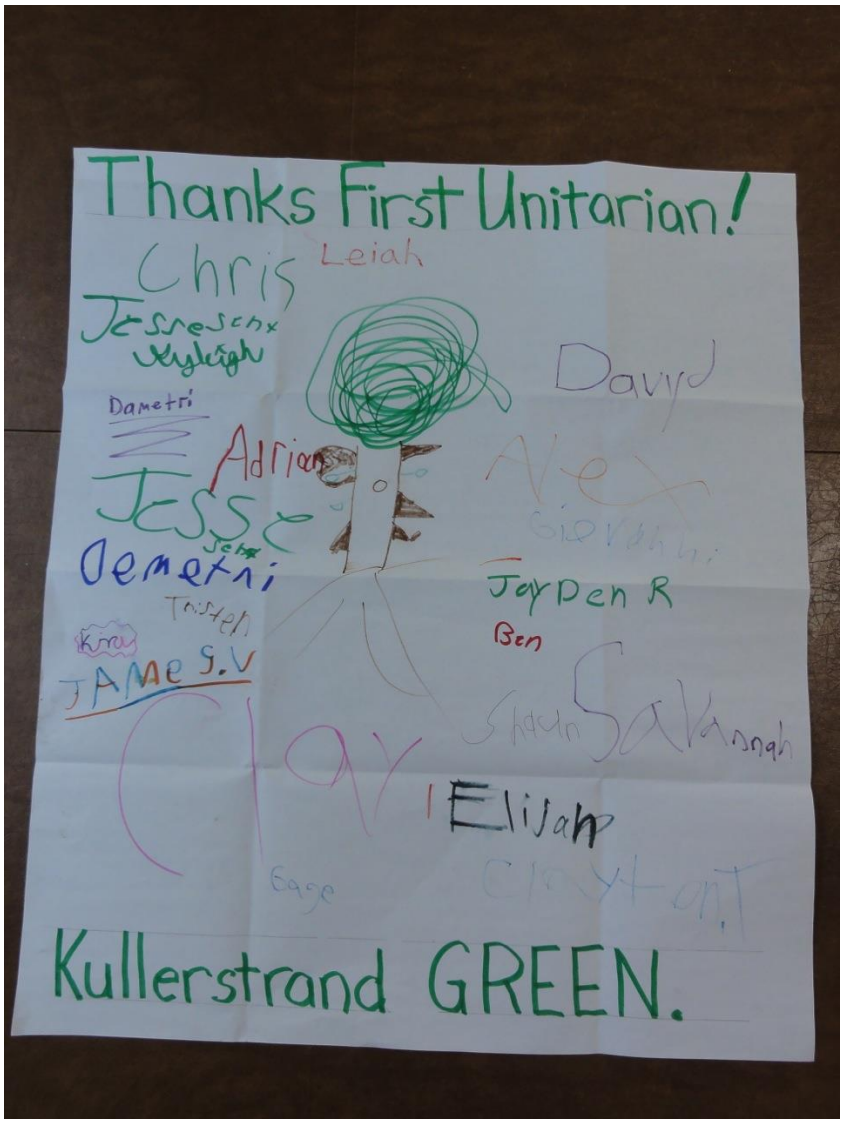
Andrew Rasmussen, University of Colorado-Denver (UCD) Master of Urban and Regional Planning (MURP) student, volunteered with IES during the spring 2016 to develop the planting plan for GREEN. This partnership provides IES with graduate level support for a specific initiative while providing a graduate student with a real-world project to fulfill the capstone requirement. Andrew's expertise in the area of site evaluation, natural species selection, and landscape architecture included the necessary skills to plan a comprehensive planting design the incorporated both ecological improvements and esthetical appeal. His project developed a three-year planting plan that will be used by IES and WRPRD to complete planting along the new trail section over the next three years. Andrew conducted a detailed site and plant analysis before preparing a detailed plan for the spring 2016 planting. He worked in close collaboration with WRPRD so that plant selection and siting fully met

WRPRD's standards, while addressing IES goals to improve the environment with plants suitable for this open space landscape. His full report can be found in Appendix E.

Project partners and donors

IES continued its partnership with WRPRD and reinstated its partnership with Kullerstrand Elementary School for this project. Margaret Paget, Wheat Ridge Forestry and Open Space Supervisor, has been a key project partner and provided critical expertise in site planning, event planning, tree selection and purchase, and educational workshop content development. Ms. Paget organized support and participation of WRPRD staff members and provided planting day supplies. Jane Reuteler, school psychologist at Kullerstrand Elementary School, was a key project partner who helped develop educational content for TRAILS students and aided in planning the planting day.

IES received grant funding from the First Unitarian Society of Denver Giving in Action program. FUSD's donation was used for educational and planting supplies for TRAILS students.



Thank-you from TRAILS Students to First Unitarian Society of Denver

5. Project Organization

Initial partnership among IES, WRPRD, and Kullerstrand Elementary School

IES met with project partners in the fall 2015 to plan the project and ensure that their expertise was used in the initial planning of the project. WRPRD and Kullerstrand Elementary School were the main project partners. Margaret Paget was excited to continue the partnership between WRPRD and IES. Ms. Paget was active in project planning and implementation. Her leadership was a key part of the project's success.

IES associates and Margaret Paget during a planting site planning visit, March 2016

Community and stakeholder involvement

Having regular partner meetings kept the planning process on schedule and ensured that GREEN project goals and objectives were completed. IES ensured that all project events and materials supported the improvement of local science lessons and the ecological health of the Greenbelt. IES met multiple times with Margaret Paget and Jane Reuteler to plan and develop the program. The meeting agendas are in Appendix A.

IES drew from the expertise of the IES Tree Project Steering Committee during the development and implementation of GREEN. The Steering Committee consists of professionals in related fields and meets every three months. IES Tree Project staff members took advantage of these meetings to describe the vision for the project and receive advice, ideas, and guidance to improve the project. Agendas for the Tree Project Steering Committee meetings are in Appendix B.

Collaborative funding model

The funds for GREEN came from a donation from the First Unitarian Society of Denver (FUSD) Giving in Action program and from in-kind contributions from WRPRD and Kullerstrand Elementary School. The FUSD Giving in Action committee selected IES to be a recipient of donations from the congregation. IES Associates presented the GREEN project to the FUSD congregation on January 17, 2016. These funds were used to purchase education and planting materials for the TRAILS students. Kullerstrand and WRPRD provided in-kind contributions to the project, including time, expertise in planning and education materials. WRPRD provided all the planting materials, plants, and tools for the planting day. IES provided custom embroidered

ball caps for all the students and community volunteers. Because of the extremely limited funds raised for the project, IES staff members, graduate interns, and Institute Associates contributed hundreds of volunteer hours to project planning, implementation, evaluations, public relations, project promotion, and volunteer recruitment leading up to and throughout project events.

Sponsors were acknowledged in the IES quarterly e-newsletter, IES social media platforms, the Wheat Ridge Connections newsletter, and in kiosks in the Greenbelt. FUSD was thanked by students, with a thank-you poster for the congregation prepared during the second classroom workshop. More information about the dissemination of project information and public outreach is in Chapter 9 of this report.

Margaret Paget teaching TRAILS students how to plant a tree, March 2016

IES worked diligently to raise funds and obtain donated materials for the project. This included grant writing and a business outreach program. We were unsuccessful in engaging the Wheat Ridge business community in supporting the project or in obtaining additional grants. The limited funds were not adequate to pay for the project supplies, so IES contributed the funds needed to cover project expenses.

Project plan

The IES GREEN Project Plan presents the timeline for the project and explains each component of the project from the planning stages to the project evaluation and production of the final report. The project plan was based on past projects administered by IES and can be found in Appendix C. The project plan was prepared by Tree Project Team Manager, John Kelly, who used previous project plans to help shape the GREEN plan. Tree Project team members brainstormed the project's objectives and goals before deciding on key project components that needed to be planned. The Tree Project presented the project plan to the IES Tree Project Steering Committee for advice on the timing and components of the project plan.

The project had seven major components:

- Stakeholder identification and involvement
- Sponsor recruitment and business outreach

- Plan and implement classroom workshops
- Plan and implement ecological planting day
- Tree Steward program
- Community outreach
- Evaluate success of project and Final Report

The project plan was used by the team and the project partners during the project. The IES Tree Project followed the plan throughout project planning and implementation, following the steps laid out in each component to ensure that all goals and objectives were met. When planning for a project of this size, it was important to be realistic with time and resources available for each task because students can only accomplish a certain amount on a planting day.

The project timeline is available in the project plan. Planning for GREEN began in the fall of 2015. IES met with Wheat Ridge Forestry and Open Space Supervisor Margaret Paget, and Kullerstrand Elementary School Psychologist Jane Reuteler and TRAILS teachers throughout the fall, winter, and spring. Agendas for these meetings are in Appendix A. It was key to the success of the program to have multiple meetings with educators from Kullerstrand Elementary School given the students' extensive and complex needs and limits. This was the first project in which IES has worked with SED students. Normal classroom activities often cannot hold their attention. Special activities needed to be designed by the IES team to keep students participating and focused on the workshop material.

6. Community Collaboration

Community members and organizations in Wheat Ridge aided in the development and implementation of GREEN. The collaborating groups provided the project with valuable knowledge, experience, time, and effort. Kullerstrand Elementary School participated in education workshops and a planting event. WRPRD provided experience for the planting event and education workshops. IES Tree Stewards provided help during the planting day by chaperoning and coaching groups of students. The Wheat Ridge Sun Camp provided campers and counselors to help water and care for the site during the summer months. Without these resources, the project would not have been a success.

The IES Tree Stewards team is a group of dedicated community volunteers that graciously give their time in support of IES projects. Tree stewards help to care and maintain for IES sites. They mulch, weed, and water IES tree planting sites. Their hard work has been a key part of IES projects, and played a big role in GREEN. Tree stewards helped plan the summer watering program and watered the site during the spring and fall when IES could not get student help in Wheat Ridge.

Partnership among IES, WRPRD, and Kullerstrand Elementary

The partnership among IES, WRPRD, and Kullerstrand Elementary was the cornerstone for the project. This multi-year partnership plays an important role in providing the project with multiple sources of knowledge, funds, and leadership. GREEN marks the fourth year of partnership between IES and WRPRD. All four IES Wheat Ridge Greenbelt tree projects have yielded successful planting programs with tree survival rates much higher than previous planting projects in the Greenbelt. This is due in large part to IES's program oversight, and the dedication of WRPRD staff members and IES Tree Stewards to care and maintain planting sites after the initial plantings. It is a testament to the importance of multi-year partnerships for successful long-term revegetation efforts for open space areas.

TRAILS students and IES Tree Project Manager John Kelly at Planting Day, April 2016

GREEN is the second partnership between IES and Kullerstrand Elementary. The first partnership, during *2014 Preserve the Greenbelt Environmental Education Program*, produced an award winning pilot project that involves elementary age students in improving their environment. GREEN marked a shift from the general education population of the school to the TRAILS students. Both IES and Kullerstrand agreed that TRAILS students need more tangible science lessons than their regular classroom peers. TRAILS students provide an opportunity

for IES and Kullerstrand to partner for multiple years since TRAILS students range in age from kindergarten to 6th grade, and stay with TRAILS throughout their time at Kullerstrand Elementary.

IES Tree Ambassadors program

GREEN was the first year that IES linked to young community members outside of Wheat Ridge Schools. IES partnered with the Wheat Ridge Recreation Center Sun Camp to provide summer day campers the opportunity to help care for their environment. The new program, named the *IES Tree Ambassadors*, trained elementary aged children to care for tree planting sites, and gave them the opportunity to get outdoors and make a real difference. Campers participated in bi-weekly watering events throughout the summer under the supervision of IES Associates and camp counselors. IES Tree Steward Betty Jo Page directed the program with the help of Wheat Ridge Recreation Supervisor Beth June. Sun campers would walk over from the Wheat Ridge Rec Center every Tuesday and Friday morning, where they would meet Betty Jo Page and other IES team members including John Kelly, Don Mangus, Elizabeth Morgan, Lindsay Nerad, and Patti Venneman. The sun campers would then water all plants on site and help with noxious weed removal.

Margaret Paget teaching Tree Ambassadors how to mulch, June 2016

The Tree Ambassador program was a success despite some problems with the implementation of the watering events. The students were excited to be involved in the program and worked hard throughout the summer to help the site. However, due to a lack supervision by Sun Camp counselors and IES team members at the beginning of the summer, there were certain plants that were almost entirely neglected and did not survive. Sun campers misbehaved during the later events in the summer because many were tired of watering and only wanted to weed the site. IES tried to combat these problems by assigning certain students to counselors and by getting students to water prior to any other activities on site. Overall, however, the first Tree

Ambassador program was a successful initiative that got even more Wheat Ridge children involved in caring for their environment.

Project Video

IES commissioned local videographer Jesse Johnson of IOTK Media to record the classroom workshops and planting day, and to produce a video to document the project. Mr. Johnson was present at the second school workshop and the planting event. He sent a substitute in his place to record the first classroom workshop. To ensure the video accurately covered all aspects of the project, IES worked closely with Mr. Johnson while planning the video. The video plan is in Appendix U. The draft video was reviewed by the IES project team, Margaret Paget, and Jane Reuteler.

IES Associates, WRPRD and Kullerstrand staff members, and community volunteers were interviewed for the video during the project events. Those interviewed included IES Tree Project Manager John Kelly, IES Executive Director Carol Lyons, Kullerstrand School Psychologist Jane Reuteler, TRAILS teacher Michelle Ray, and Margaret Paget. Most importantly, students were interviewed for the video. Students voiced their opinions on the project and explain to their community why the project was important to them. Mr. Johnson created short and long versions of the video designed to reach different audiences in the Wheat Ridge community. The short video is meant to be a promotional video to grow excitement about the project, and the long video is meant to be an in-depth presentation of the entire project. The project video was sent to all project stakeholders in DVD format and can be found on the IES YouTube channel.

Jesse Johnson and IES Executive Director Carol Lyons photograph TRAILS students during planting day, April 2016

Educational collaboration between IES and Kullerstrand

GREEN was the first IES project that needed extensive interaction between educators and IES Associates to ensure that students were engaged in science lessons that were appropriate for students. TRAILS students presented a special challenge for IES Associates because of their designation as SED and their age range. It presented challenges to present hands-on activities for students of different ages and science backgrounds. The collaboration by IES Associates and Kullerstrand educators on all educational materials was key to the students' ability to engage with materials and enjoy the workshops and planting day. TRAILS students invited one friend

from Kullerstrand mainstream classrooms to help increase the opportunity for meaningful socialization outside of the classroom. However, there were several challenges that IES did not foresee with TRAILS students, especially that many of the kids had problems reading and writing. For example, students had trouble reading and answering the evaluation forms during the second workshop. These challenges are discussed further below in the project challenges section.

Importance of community collaboration

IES projects rely on community members and organizations that are willing to participate in the planning and implementation of a project. Community collaboration helped to make GREEN a success. Collaboration among IES, WRPRD, and Kullerstrand Elementary was the key factor in the project's main successes: students received hands-on science and tree planting education, a new Greenbelt trail section received much needed green infrastructure improvement, and that this three-member partnership will continue to be strong for future projects to continue to improve the Wheat Ridge Greenbelt.

7. Project Design and Events

The Wheat Ridge Greenbelt is a 300-acre woodland open space bordering Clear Creek. It is a cherished community space for the citizens of Wheat Ridge and many surrounding communities. The Greenbelt has experienced ecological decline due to drought, extreme weather, and limited municipal resources. Threats to Greenbelt include:

- Lack of buffer zone which enables an edge effect, degrading the native vegetation. An edge effect refers to the changes in structures and ecology that occur at the boundary of two habitats. With the growing population of Wheat Ridge, more community members use the Greenbelt, causing a greater degradation of the zone directly between the community and the Greenbelt.
- Past grazing, haying, and gravel mining caused considerable disturbance to the natural flora and topography of the floodplain and creek.
- Artificial lakes from gravel quarrying dominate the western portion of the floodplain. Clear Creek, which flows through the Greenbelt, is now largely isolated from its floodplain.
- Ineffective mitigation efforts to stop erosion along the creek banks in many areas, such as the area south of Prospect Lake, have altered the natural hydrology of the creek system.
- Severe storms such as the 2009 hailstorm cause significant canopy loss.

Margaret Paget teaching TRAILS students how to plant a tree, March 2016

IES is committed to advancing the City of Wheat Ridge's Open Space Management Plan (OSMP). Wheat Ridge identifies the Greenbelt as a jewel in the community and values it for wildlife, social, and economic importance. The OSMP requires the city to improve and encourage the composition and structure of the Greenbelt through the distribution of native vegetation types that naturally occur in the area. The City of Wheat Ridge and IES have worked in past projects to remove invasive and non-native species including Russian olive (*Elaegnus angustifolia*), common teasel (*Dipsacus fullonum*), yellow toadflax (*Linaria vulgaris*), and mullein (*Verbascum thapsus*).

Workshop 1 design and event

The goal of the first workshop for TRAILS students at Kullerstrand on April 11, 2016 was to familiarize students with the Greenbelt's ecosystem, demonstrate how plants and animals depend

on one another, and introduce them to the species they would be planting, how to plant trees properly, and how to be safe on the planting day. The workshop plan is in Appendix G.

IES Executive Director Carol Lyons started the workshop by introducing students to the project and giving a brief overview of what and where the Greenbelt is. She introduced what the students would be doing during the workshop and on planting day. The PowerPoint presentation from the first workshop is in Appendix H.

Wheat Ridge Forestry and Open Space Supervisor Margaret Paget led a discussion about the planting day event, including details of each activity students would be completing. Ms. Paget discussed proper planting techniques, including digging an appropriate size hole, placing the root ball gently into the ground, watering and mulching, and the need to carefully bag invasive species so their seeds cannot spread further. She described the ways that protective cages are built and why they are necessary for the survival of young saplings. Ms. Paget discussed the need for safety on the planting day so students understood the risks of working with tools and the need to pay attention while they were working at the planting day.

TRAILS students discuss safety during Workshop 1, March 2016

Ms. Lyons led the students in an activity call the "Web of Life." During the game, students were given 8 1/2" by 11" laminated sheets that depicted trees and animals from the Greenbelt. Students were asked to stand in a circle. The activity started with one student holding the end of a roll of string. The student was asked to explain what their organism was and how it connected with another organism. Kullerstrand teachers and paraprofessionals helped roll the string out and connect students. This continued until all students were in the web. Students who had tree cards were asked to drop their string to represent what would happen if trees were removed from the Greenbelt's ecosystem. Students discussed the importance of trees in the ecosystem and why planting new trees are important to the health of an open space.

The workshop ended with Ms. Lyons giving a brief conclusion to the students and reminding them about what they should bring to the planting day.

Workshop 2 design and event

The goal of the second workshop on May 10 was to teach students about watering and tree care, explain the summer watering program, and get student feedback about the project. The plan for workshop 2 is in Appendix I.

Carol Lyons began the workshop by telling students about the goals of the project and reminding students about the rules of participating in the workshop. Ms. Lyons then reviewed the previous workshop with the students, reminding them about the Web of Life game, the importance of balance to ecological health, and congratulate the students on a successful planting day.

TRAILS student drawing the trunk of a tree during Workshop 2, May 2016

IES Tree Project Manager, John Kelly, led the students in a project evaluation activity. Students were asked to list all the parts of the tree. Each student that answered correctly came up and drew that part of the tree on a flipchart at the front of the classroom. Students were then given a project evaluation form. The evaluation included questions about how much they learned and enjoyed the project, and had students draw pictures of them planting their tree and what their tree might look like in five years. Many students in the class had trouble with the evaluation form, especially the written answers. IES needs to be better informed about student limitations in the future, and how to better evaluate student feedback through either forms or group discussions. When students were finished with their evaluations sheets they were asked to hand them in to either Mr. Kelly or Ms. Lyons and then sign their name to the tree drawing on the flipchart. The flipchart with the drawing and signatures was used as a thank you from the class to project funders First Unitarian Society of Denver. Student evaluations are in Appendix K and the flipchart is in Appendix J.

Students reconvened for an activity about tree stewardship. Mr. Kelly asked students what they thought were good and bad things they could do to their trees. He guided answers so students understood that regular care such as watering and mulching were good for their trees, and neglect in the form of insect damage or not watering could harm their trees. To help the students further understand tree stewardship, they played an interactive board game about tree stewardship. Students were divided into groups of four and were given instructions about the game. Each student had a game-piece representing an animal from the Greenbelt. Students placed their pieces at the start position on the board and began to draw playing cards one-by-one. Students would read their card aloud to the rest of the players and then follow the cards instructions. Half the cards contained positive tree stewardship activities that moved players forward on the board, the other half contained negative tree stewardship activities that moved students back on the board. Once all students had finished, the game was over. Similar to the student evaluations, IES needs to tailor all activities to accommodate the students that have problems with reading. This would

make the game more enjoyable for the students and should improve the quality of feedback IES could receive about future programs. Furthermore, IES needs to restructure the board game to make sure all students can finish the game and can finish in the allotted time for the game in the workshop outline.

The workshop ended with Ms. Lyons asking if the students had any other questions or comments about the project. She then reminded students about how they could help water the site during the hot summer months, while Mr. Kelly handed out a summer watering flier for students to take home. Ms. Lyons concluded the workshop by asking students to email solutions@i4es.org with any questions during the summer and that IES was looking forward to seeing them next year to continue the project.

TRAILS students play a board game about tree care, May 2016

There was no response from TRAILS students or teachers about helping IES to water the planting site. Since there was no response, IES sought help through other channels which resulted in the first IES Tree Ambassador project, which is discussed in further detail below.

GREEN planting site, February 2016

Planting planning

The GREEN planting site is located along a new trail section in the Wheat Ridge Greenbelt. The new paved trail section was constructed by WRPRD between October 2015 and February 2016. It attaches the paved trail north of the Miller Trailhead to the new Greenbelt parking lot located just north of

41st Avenue on the west side of Kipling Street. During construction, WRPRD removed many mature trees and shrubs from the Greenbelt.

IES began planning the planting in January 2016. The Tree Project accepted a proposal from University of Denver Master of Urban and Regional Planning Student, Andrew Rasmussen, to complete a comprehensive three-year planting plan for the entire new trail section. Mr. Rasmussen worked with IES and Margaret Paget to map the entire site's elevation and soil composition, plan a three-year plan that focused on using native species for improving ecological health and improving the trails aesthetic appeal, and produced a final report that including directions on implementing each year's planting with TRAILS students.

The report was a key part of the project's planning and implementation. It was designed to present planting plans for the entirety of the new trail section, which provides IES, WRPRD, and Kullerstrand the opportunity to continue its partnership for two more years of spring plantings. The report was very helpful to the IES Tree Project team and Margaret Paget of WRPRD because of the multi-year focus and the use of native species to help improve the ecology of the Greenbelt and help improve the degradation of the Greenbelt's ecology along the new path. Native species in the plan include peachleaf willow, red-osier dogwood, golden currant, and purple poppy mallow. Mr. Rasmussen's full report is in Appendix E.

Tree planting event

The planting site was prepared on April 19 by John Kelly, Carol Lyons, Andrew Rasmussen, and Margaret Paget. The planting plan was followed as carefully as possible, with all 90 trees, shrubs, flowers, and grasses placed in correct spaces along the trail. IES used color-coded flags labeled with the species name to aid students during the planting. IES used orange tape for tree species, red tape for shrubs, and white tape for flowers and grasses. Tape was tied to either a red or orange flag, which would mark the two planting groups on planting day. The planting plan is in Mr. Rasmussen's MURP Report in Appendix E and site photos before the planting are in Appendix M.

Carol Lyons, Margaret Paget, and Andrew Rasmussen preparing planting site, April 2016

The planting day was April 22, Earth Day. WRPRD employees, community volunteers, and IES Associates arrived at 8:30 am to prepare the site for the students. Students, Kullerstrand educators, and parent volunteers arrived around 9 am. Students were given a project hat and were reminded about the steps about how to plant a tree. They were divided into

two groups, with the first group planting their section of the trail and the second group helping to remove invasive species, pick up litter, and improve habitat by moving debris near the creek. At the halfway point of the planting day, students took a 15-minute break to rest and eat snacks. After the break the groups switched activities. Students and adult volunteers were able to plant all 90 trees, shrubs, grasses, and flowers. The planting day volunteer list, agenda, group assignments, and materials list are in Appendices O, P, Q, and R respectively.

TRAILS students and parents listen to a safety presentation from Margaret Paget, April 2016

The planting day was overall a success. TRAILS students worked hard and they planted all the trees that were planned for them. Students enjoyed the planting day immensely and told IES team members many times how much fun they were having. However, there were some problems with the planting day, including there were more parents there then IES had planned for, IES forgot to introduce some the volunteers prior to the start of planting, and that a few of the TRAILS students needed more guidance and supervision during the planting day. These problems will be discussed further in the project challenges section below.

Photos from the trail prior to and after the planting day are included in this section. For a full set of pictures of the site prior to and after the planting day please go to Appendices M and N.

<u>IES Tree Ambassador program</u>

IES actively sought out volunteers for tree stewardship to care for the new plants for the GREEN Project. IES sent home fliers with TRAILS students and put up new fliers in kiosks around the Greenbelt. These attempts did not result in new tree stewards to care for the site. IES then widened its

TRAILS students take a break during planting day, April 2016

search. With the help of Wheat Ridge Social Media Specialist, Kara Martin, we contacted Beth June, Recreation Coordinator, at WRPRD to see if we could create a new partnership with the Wheat Ridge Recreation Center summer day camp. Ms. June was enthusiastic to include the summer campers in site care. IES met with Ms. June and the Sun Camp Counselors on June 1 to walk the site and introduce the program. John Kelly, Tree Steward Coordinator Don Mangus and Tree Ambassador Coordinator Betty Jo Page created and planned the project for the summer campers. Campers were trained by WRPRD staff members and IES Associates on June 9. The campers watered the site every Tuesday and Friday throughout the summer months under the supervision of WRPRD staff members and IES Associates. IES provided gloves, buckets, and popsicles for the campers. WRPRD provided extra buckets and a secondary water tank on-site. At the end of the summer camp program, IES handed the site back to four dedicated Tree Stewards, so it will receive the care it needs through the fall and winter months.

8. GREEN Project Evaluation

Project outcomes

IES achieved its initial objectives for the project.

Objective 1: All TRAILS students from Kullerstrand Elementary will learn concepts of ecology, tree science, and stewardship in two classroom workshops and one planting day.
Thirty-six children from Kullerstrand Elementary participated in the planting day and hands-on classroom science lessons. TRAILS students have severe emotional disabilities and are in what is called their "last chance" at formal education within the public schools. Students might have issues such as learning disabilities, difficulties with interpersonal relationships, inappropriate behavior for the current situation, depression and anxiety associated with personal or social issues (Education Corner, 2016). This was a rare opportunity for TRAILS students to receive hands on classroom science lessons and participate in an outdoor classroom setting.

Objective 2: Educators at Kullerstrand will learn a replicable education and planting program to teach at-risk SED students about local ecology and stewardship.
Seven Kullerstrand educators learned how to implement a hands-on science education and planting event.

TRAILS student at planting day, April 2016

Objective 3: Local Tree Stewards will learn about tree care through stewardship training and a planting day.
Eighteen Kullerstrand educators and parents participated in the planting event and learned how to plant and care for trees. Seven IES Tree Stewards helped students, educators, and parents plant trees at the planting event.

Objective 4: The Greenbelt ecosystem will improve through planting of native trees, shrubs, and grasses, and removal of invasive species. Planting will increase habitat for native species and improve the ecological health of the Greenbelt by reducing pollutants and improving storm water runoff management.
Ninety native trees, shrubs, grasses and flowers were planted on the planting day. Andrew Rasmussen produced a detailed analysis of the planting site to ensure that native species were planted in the areas that would produce the highest survival rates. Regular watering and maintenance will help ensure the survival of the plants, improving the ecosystem.

Project successes

This was the fourth successful partnership for IES with the WRPRD and the second with Kullerstrand Elementary. Teacher evaluations show that the classroom workshops were well received by students and teachers. These evaluations can be found in Appendix L. The planting day brought together IES associates, WRPRD staff members, Kullerstrand students, teachers, and parents as well as IES Tree Stewards. The children were excited to get outside and plant the trees, flowers, grasses and shrubs.

Communication among IES, WRPRD, and Kullerstrand Elementary School was very successful during GREEN. Margaret Paget was readily available throughout the planning and implementation of the project, and was very supportive of the project. The teachers were open and receptive to the program. The school was flexible when changes in the schedule were necessary. Communication is a key to project success, and the high quality of communication and collaboration among project stakeholders allowed for all planning and events to be implemented successfully.

Problems and challenges

The TRAILS students were engaged in all classroom and planting day activities. The students worked better in smaller groups. The teachers and counselors had to work diligently to make sure the kids were safe and staying with the group.

More parents than anticipated attended the planting day. IES was not prepared for the large number of parents. The parents were not as helpful as we needed them to be. Younger siblings may have distracted them, or the parents were not adequately trained and organized to help their children plant trees. Teachers and counselors in the TRAILS program want the students to learn independence. If too many parents are helping or doing most of the work, the children are not learning the skills that are vital for independence.

Sign-in at the planting day, April 2016

Funding was a major challenge for the GREEN project. More needs to be achieved in the areas of fundraising and grant writing. A new fundraising model needs to be developed and implemented. As of June 30, 2016, the budget has a deficit of $4,251.78. Securing funding for program planning and implementation needs to be a priority if the project is

to continue successfully. Despite the community involvement on planting day, local businesses and organizations declined to donate money or supplies to the organization.

Recommended for next steps

The hands-on interaction with the students in the workshops should be increased. Classroom workshops would be more effective if the children could see and handle the tools they will be working with on planting day, have more saplings for the children to see and touch, and could visualize the difference between a bucket of soil and a bucket of mulch. IES should discuss what the students could expect on planting day, what wildlife they might see, and safety precautions. Children with emotional disabilities need to know what to expect. They do not do well with unexpected change or a lack of transition. Safety needs to be emphasized. This includes safety with the tools and safety around any animals and Clear Creek.

Students playing board game during workshop 2, May 2016

Participation with the parents needs to be clearly organized. This can be addressed in several ways. One option is to have a sign up for the parents through an online sign up site like "Sign Up Genius". Teachers create an account, and then schedule a day and a sign up. Another solution is to limit the number of parents allowed to participate. Limiting the number of parents will allow for better planning. Finally, there should be a concrete decision regarding siblings. They should either not be permitted, or there should be a minimum age requirement.

IES should plan better instructions for the community volunteers participating at the planting day. The IES Tree Stewards wanted to know what was expected of them. They asked to be introduced to the students and parents as experts so when they were assisting a student and their parent helper they would be taken seriously. They also wanted a clear understanding of the agenda and a definition of their roles on planting day.

IES should revamp the second workshop. The final workshop was a post-planting program day discussion and evaluation. The board game needs to be more dynamic. Expectations need to be lowered on the evaluations. Several of the younger children had trouble writing evaluations. It

would be a better expectation to ask them to use pictures to communicate. There is a large age and ability range amongst the children. Feedback expectations should be age/ ability appropriate. If IES wants to keep a written record of students' responses for improvements to the program, it would be better to have one-to-one conversations with the students while an IES member takes notes of the conversation.

IES would like to continue the relationship with WRPRD and Kullerstrand Elementary. IES needs to continue to work with stakeholders to improve future plantings. IES also needs to explore different avenues for funding. Workshops should be evaluated to ensure appropriateness for a large age range and ability. Finally, business outreach needs to be implemented before the end of November, with follow-up occurring in the spring.

9. Conclusion

IES GREEN was successful. The project was made possible due to the collaboration among IES, WRPRD, and Kullerstrand Elementary School. The project would not have been completed without the generosity and support of these project partners. IES is honored to work in Wheat Ridge, a community that has dedicated civil servants and community members who care about improving their trail sections, school properties, and open spaces. IES looks forward to successful continued partnerships with WRPRD and Kullerstrand Elementary School.

The mission of the IES Tree Project is to improve Colorado cities using tree science. Through collaborative multi-disciplinary partnerships and programs, we restore natural systems and urban green infrastructure, educate children and adults to become environmental stewards, rehabilitate, improve, and maintain critical urban natural resources, and improve community health and economy.

Based on this experience in Wheat Ridge, IES confirmed that five critical factors go into successful tree planting and survival:

- Collaboration with the full range of interested stakeholders
- Careful planning of the education and planting program
- Careful selection of the planting sites and plant species to optimize survival rates
- Good instruction and proper planting with well-organized volunteer participation
- Appropriate maintenance plans and implementation

IES looks forward to building on this experience and continuing to work in the Wheat Ridge Greenbelt. IES also looks forward to continuing to train the next generation of tree stewards. We welcome comments, feedback, and volunteers. Please contact us at Solutions@i4es.org.

Plans for printing, binding and distributing this report

This report will be available electronically via the IES website, www.i4es.org. A limited number of printed and bound copies will be distributed to project stakeholders.

10. Appendices

Appendices are available online at www.i4es.org/publication-login/.
For a printed copy, please contact Solutions@i4es.org.