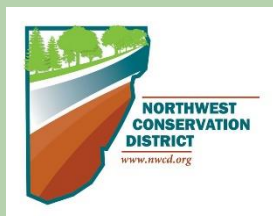


Final Grant Report

“Building Municipal Resilience and Climate Adaptation through Low Impact Development”

Respectfully Submitted: January 30, 2019

Northwest Conservation District



This report is made possible by a grant from the Connecticut Institute for Resilience and Climate Adaptation.

“The mission of the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) is to increase the resilience and sustainability of vulnerable communities along Connecticut’s coast and inland waterways to the growing impacts of climate change on the natural, built, and human environment.”

More information about CIRCA can be found at circa.uconn.edu



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A. INTRODUCTION

The Northwest Conservation District (NWCD), is a 501c-3 non-profit soil and water conservation service located in Torrington. NWCD works to conserve natural resources by delivering technical services and educational programs to 34 northwest Connecticut towns. As part of its focus, NWCD has worked for over ten years to educate and provide technical guidance on new and improved stormwater management practices in land use development using Low Impact Development (LID) techniques.

B. EXECUTIVE SUMMARY

In 2016, NWCD, in partnership with CIRCA and the Northwest Hills Council of Government (NHCOG), started work promoting the creation of a model Low Impact Development design manual to address stormwater management. The prototype manual was to be developed for the Town of Morris, a small rural town containing Bantam Lake, Connecticut's largest natural lake and substantial drinking supply watershed lands.

Studies have shown that current practices of stormwater management in land use changes have many adverse impacts on the natural environment including water quality impairment and degradation of water resources. Currently pollution from stormwater, (precipitation including rain, snow and ice) is ranked as the number one cause of degradation of rivers, lakes and streams and drinking water supplies. We are all aware of the increase in intensity of local rain events and flooding, erosion and sedimentation are growing concerns for Connecticut towns.

Current land use practices often mandate extensive clearing that removes existing vegetation and alters hydrology. Conventional hard engineering design and practices with expensive pipe-to-waterbody designs only move the problems of pollution and flooding from one place to another, but do not solve them. On an undisturbed vegetated site 90% of a one inch rainfall will infiltrate into the soils with only 10% becoming runoff. When a site is developed in the conventional manner, this relationship reverses to only 10% infiltrating and 90% becoming runoff. A more holistic, natural approach to stormwater management and development is urgently needed. LID is that approach and has become the common sense, lower cost set of tools and practices that retain, filter and clean stormwater on site before it reaches our waterways or returns to groundwater.

For over ten years, NWCD has worked with elected officials, Land Use commissions and staff as well as the design/build community to build broad understanding and support for the use and adoption of LID techniques and practices in local land changes. NWCD has successfully worked with many municipalities and environmental non-profits to procure local, state and local funding for demonstration projects to support the change to LID in their local communities. In working with these many partners, it became apparent that a professionally prepared LID Manual was the best method to incorporate LID into future development. A LID Manual, if adopted into local land use regulatory agencies, would establish clear expectations for all land use changes, enhance cooperation among all parties and improve environmental protection. The Manual would empower town regulators to require effective environmental protection. It would give developers

consistent standards, the technical framework and specifications to design environmentally protective projects. It would become the standard to make positive environmental changes in northwestern Connecticut.

In partnership with CIRCA and funding from the Connecticut Community Foundation, the project was extended to support the creations of customized LID manuals to three additional northwestern CT towns, Washington, Warren and Woodbury. Community leaders in these towns are strongly committed to protecting all of their local natural resources, including Lake Waramaug, the Shepaug and Pomperaug Rivers and all local water resources.

C. PROJECT BACKGROUND AND CONTEXT

The Northwest Conservation District (NWCD) working in partnership with Northwest Hills Council of Governments (NHCOG) and the town of Morris used grant funding from CIRCA to create and adopt a Low Impact Development (LID) Design Manual. This LID Design Manual was developed as a model for stormwater management for other small towns in Connecticut with its initial target audience being the small towns mutually served by NWCD and the NHCOG. NWCD serves 34 northwestern CT towns and NHCOG serves as a regional planning agency for 21 towns. Twenty of the NHCOG's towns are in the NWCD's service area with the exclusion of Burlington.

NWCD worked with the Town of Morris for years prior to the CIRCA grant opportunity building a foundation for land use regulation changes that would require low impact development stormwater management strategies. These strategies are designed for permanent land use change proposals. NWCD initially focused on Morris because of their sensitive water resources which include Bantam Lake. Approximately one third of Morris lies within drinking water watersheds. Several waterbodies within Morris cross municipal boundaries into Litchfield, Thomaston, Watertown, Washington and Bethlehem. The consideration of the LID Design Manual was discussed over the years and gained the support of the Morris land use commissions. It was agreed that they will willing to incorporate a town specific LID manual to be used as a tool in all of their land use regulations. Serving as a model, this design manual when implemented in Morris, would immediately benefit water resources in the other 5 surrounding towns.

The proposal for combined support and funding between NWCD and NHCOG to design a model LID Design Manual that could be used for other NHCOG town's received unanimous approval from 21 NHCOG service towns, (including Burlington) at their meeting on October 8, 2015. Both the Morris Planning and Zoning Commission and the Inland Wetlands and Watercourses Commission provided letters of support for NWCD to assist them with pursuing the regulation changes that require low impact stormwater management strategies for permanent land use change proposals and the creation and adoption of the town specific manual.

The reason for the town specific manual was also supported by the fact that while Connecticut does have a DEEP Stormwater Manual with an LID Appendix, this general document does not contain the actual site specific "how to" guidance needed by engineers and designers to apply LID in the field. A town specific LID Design Manual designed by a professional engineer provides actual specifications and site specific sizing calculations needed for storm water management designs

and practice to benefit local water resources. The manual is a how-to-guide for municipal –wide implementation of LID into land use regulatory processes.

Several Connecticut cities and larger towns have used their financial resources to develop their own LID Design Manuals. This would be a very difficult financial burden for a small town. The Morris manual creates a template that could be modified as needed to accommodate local land use regulations in other towns. Although small towns do not typically experience repeated large-scale development, any development in a small town can have a significant impact on the surrounding environment. Stormwater run-off may not be of the same scale as in urban areas; however, its impacts may be more devastating. Years of LID projects implemented in both the United States and abroad have shown that LID techniques are simple and affordable, offering significant short and long-term returns for small investment.

NWCD’s assembled team included, Steven Trinkaus, PE and Principal of Trinkaus Engineering, LLC and Morris’s town planner, Tom McGowan. Steven Trinkaus, PE and design professional, has experience in preparing LID manuals for other Connecticut towns as well as consulting on LID in other states and abroad. Tom McGowan had worked in Morris as well as numerous other northwestern Connecticut towns for over 30 years. Acting in his planning capacity, Mr. McGowan has helped many northwestern CT towns lay the foundation for LID in their land use practices either through regulations or local Plans of Conservation and Development (POCAD).

As part of this project, Mr. Trinkaus and Mr. McGowan reviewed Morris’s municipal planning and zoning regulations, town ordinances, and inland wetlands and watercourses regulations for changes needed to implement the manual. While the manual contains the majority of the LID strategy, the municipal regulations and ordinances would require changes to definitions, impervious surface coverage allowances, and approval procedures to implement the manual completely. In addition, as part of 2009 Morris POCAD, the actual term LID had been included in the POCAD, a term seen in very few other POCAD’s from that time period. The inclusion of the term LID in the POCAD served to expedite the process as the adoption of any new regulations being proposed must show consistency with the POCAD in place in the town at the time. The combination of a professional engineer and planner well versed in LID and land use regulatory process served as a model for other small towns to follow.

Additionally, Northwest Conservation District worked and continues to work with numerous regional stakeholders including members of the ‘design/build’ community, land use commission members of neighboring towns, and environmental conservation groups to continue to increase their familiarity with LID techniques and the manual’s contents. This educational outreach is both hands-on and through electronic and written media.

As a tool for land use commission and agencies, an LID Design Manual provides the technical framework to implement stormwater management strategies on new development that protect local water resources from adverse impacts. Engineers, property owners, developers, homeowners, and municipal officials at the onset of a project to increase compliance. This LID Design Manual will assist homeowners and individuals to understand the adverse impacts of stormwater on their environment and the importance of designing site and project-appropriate

systems. Without the implementation of the requirements in an LID Design Manual, long-term adverse impacts to both surface and groundwater are likely to occur.

According to the 2010 report, “Impacts of Climate on Connecticut Agriculture, Infrastructure, Natural Resources and Public Health”, weather events in Connecticut will become more severe with intense but less frequent precipitation. The proper capture, filtration, and management of stormwater will recharge groundwater, reduce erosion, and protect sensitive habitats. LID will increase local resilience to climate change by mitigating the impacts of drought, protecting drinking water reserves, reducing flooding, and reducing stress on infrastructure. In fact, LID was a best management practice highlighted in the 2011 Connecticut Climate Preparedness Plan. “Using alternative LID construction and landscaping practices can help support ecosystems by build [stet] resiliency. These LID practices start with minimizing the footprint of any construction project, especially minimizing the disturbance of native vegetation and soils.”

LID regulations are such a vital and timely tool for land use. LID offers solutions that make projects less costly to install, more attractive in the landscape and much more effective at protecting clean water. This manual will streamline the land use process in towns by providing a clear guidebook to reference and follow. This project will also advance CIRCA’s mission by creating a model that could be implemented in all the smaller Connecticut towns and bringing adaption tools directly to decision-makers. In short, use of LID principles and techniques deliver major contributions to climate adaptation and resiliency. This project increases local adaptive capacity by directly educating the decision makers and immediately reducing the impacts of development on the landscape.

D. PROJECT DESCRIPTION, INCLUDING GOALS AND METHODS

This project consisted of three primary goals focused on producing technical information, educating stakeholders, and incorporating the technical information into municipal practices.

Below are the goals of the project and the methods used to achieve these goals:

- 1) Draft a Low Impact Design Manual for the town of Morris.

Steven Trinkaus, PE, of Trinkaus Engineering LLC, prepared a draft “Morris Low Impact Sustainable Development and Stormwater Management Design Manual”. The inclusion of the “Sustainable” component was addressed by Mr. Trinkaus in his 2016 document “Why the Change to Low Impact “Sustainable Development”. It states *“while the initial focus of LID was on stormwater management, the idea of identifying, evaluating and preserving the more sensitive natural resources gained traction as this approach would lead to creating sustainable development practices. Therefore, a more appropriate name for this approach is “Low Impact sustainable development (LISD).”* According, with agreement that the change was consistent with CIRCA goals, the sustainable approach was incorporated into the document. Mr. Trinkaus reviewed the local land use patterns and hydrologic points of interest in Morrisa to create a tailored LID manual with a sustainable component. The manual includes information to assist regulatory bodies in managing LISD systems such as a draft maintenance agreement, a plant list for LISD treatment, and a step by step process to develop on-site hydrologic modeling.

Available on the CIRCA website, the NWCD website, and most recently, the SustainableCT website, the manual discusses the water resources in the town of Morris, how to apply the manual, descriptions of water quality issues, the goals and benefits of LISD, specific design strategies for LISD, and specific performance criteria and design standards for LISD strategies. The Manual also includes information to assist regulatory bodies in managing LISD systems such as a draft maintenance agreement, a plant list for LISD treatment, and a step by step process to develop on-site hydrologic modeling.

- 2) Educate residents, design build community, local officials, and other interested parties in the goal and specifics of Low Impact Development.

As shown in Appendix B and C, Northwest Conservation District presented the goals and specifics of LID to a variety of audiences and in many formats. Specific events (2016 – October 2017) and (October 2017 – November 2018) are listed in Appendix B and C respectively.

As part of this goal, NWCD applied for funding support from the Connecticut Community Foundation (CCF) to extend the overall project to three additional towns, Warren, Washington and Woodbury, during 2017 and 2018. The goals, consistent with CIRCA goals were:

1. Educate, promote and guide smart land use and development practices
2. Protect drinking water supplies, streams, rivers and other water resources
3. Protect natural vegetation, hydrology, wildlife habitat, and other resources on development sites
4. Promote healthy attractive human landscapes and
5. Reduce stormwater damage to local roads, bridges, agricultural resources and the built environment. The ultimate outcome was the adoption of a LISD manual, similar to Morris but addressing the specific needs of the three towns.

Educational outreach, to a number of audiences and in many formats, concurrently with outreach to Morris, continues in Warren, Washington and Woodbury. All three towns have committed to the adoption of a town specific LISD manual and NWCD is providing funding and support to achieve that goal by the end of 2019.

- 3) Assist the town of Morris to integrate the Low Impact Sustainable Design Manual into the existing municipal regulatory framework.

Steve Trinkaus presented the draft LISD manual on March 13, 2017 to the Planning & Zoning Commission. Commission members and attendees were able to discuss the manual, the need for LISD practices, and the path to implement, enforce, and support the plan components.

To reduce conflicting regulatory requirements, Tom McGowan, planner for the town of Morris, reviewed the manual and suggested changes. On April 20, 2017, Sean Hayden of the Northwest Conservation District met with Tom McGowan, Steve Trinkaus, and Joanna Wozniak-Brown of the Northwest Hills Council of Governments to review the potential

conflicts, discuss mitigation strategies, and review the implementation process. It was agreed that the manual should clarify the reasoning behind the buffer area from the Bantam Lake shoreline and the size of a project that would require use of the LISD standards. Tom McGowan also suggested ways to incentivize the use of LISD. The town planner and the engineer also reviewed the local regulations and ordinances for consistency with the new manual.

The commission held a public hearing on September 25, 2017 where the manual was officially approved.

In January 2018, NWCD program administrator, Karen Griswold Nelson, worked with the Morris Inland Wetlands Agency to implement LID language and the manual component into the Inland Wetlands regulations. Currently, NWCD director and professional soil scientist, Cynthia Rabinowitz, is providing “technical review” for applications submitted to the Agency in order to provide the level of technical assistance needed for application review.

E. EXPLANATION OF HOW PROJECT ADVANCED CIRCA MISSION AND PRIORITY AREAS

The mission of the Connecticut Institute for Resilience and Climate Adaptation (CIRCA) is to increase the resilience and sustainability of vulnerable communities along Connecticut’s coast and inland waterways to the growing impacts of climate change on the natural, built, and human environment.

This project can increase the resilience of Connecticut’s small inland towns to the growing impacts of climate change on the natural, built and human environment. The installation of LID stormwater infrastructure measures increases small town resiliency in many ways, including:

- Protect drinking water supplies, streams, rivers and other water resources
- Protect natural vegetation, hydrology and other resources on development sites
- Improve and protect water quality throughout the watershed
- Produce healthy, attractive human landscapes
- Reduce damage to local roads, bridges, and built environment
- Reduce damage to agricultural resources
- Reduce damage to human environment

The development of a Low Impact Design Manual deployed natural science, engineering, legal and best policy practices for climate resilience. It focuses on deliverables achievable by municipalities with maximum effect.

Further, the development of a small town LID Design Manual offers maximum return for dollars invested by producing a product easily transferrable to many towns.

F. PROJECT OUTCOMES & LESSONS LEARNED

Although other LID/stormwater management manuals exist, hiring a professional engineer experienced in this topic was critical to the success of the overall project. The design of an effective and defensible LISD system requires careful calculations and design standards. Contracting with a professional engineer for the project increases the reliability and accuracy of the information. Coupled with a review of a town's specific land use patterns, the manual connects the planning and zoning regulations with defensible and effective design. The manual, with discrete sections, may be modified to address the specific geography and zoning regulations in another municipality while maintaining its technical integrity.

The hiring of a professional planning consultant was also critical to the project partners. Neither a regional planning agency nor a Conservation District can require, implement or enforce changes in a town's regulatory process. Both entities, a regional planning agency i.e. NHCOG or a conservation district i.e. NWCD, can serve as partners to provide technical and educational assistance and support. However, a professional planning consultant, hired by a town provides the additional technical assistance and support for town land use boards and commissions to enact regulatory changes that are both protective of the environment and the town and its volunteer commissions.

Laying the groundwork for changes on a local level, such as the change from traditional stormwater practices to LID is multi-level. Too often land use boards and commissions face seemingly insurmountable challenges from their own constituency. Often long held town practices by town public works departments may not align with current stormwater management standards. In addition, many small towns have long stretches of state highways crossing their landscape with systems designed to handle stormwater through conventional methods, e.g. hard pipe drainage to local streams and lakes. Such is the case in Morris (Bantam Lake) and Warren and Washington (Lake Waramaug). It is vital that land use decisions made on a local level take into account conditions that, while not currently within their control, are opportunities for encouraging change on other levels. The Morris LISD manual requires a higher level of regulation within 700 feet of Bantam Lake to address the impact of the state highway drainage on the lake and from uphill properties to the state highway. In this way, the manual addresses the need for town specific regulations to mitigate conditions beyond their immediate control. The inclusion of this "lake-specific" requirement further supports changes in other communities with unique but similar circumstances. This added consideration may require additional educational outreach to empower the public to make positive environmental changes in the area that they consider home. Whether it be for a home site, a driveway, one part of a water resource, or even a backyard, it becomes increasingly important to educate the public that one small individual action can make a difference.

In recent years, climate change and its causes and effects, are being discussed in communities and the media. In November 2018, the state of Connecticut was experiencing heavy rain events with rivers and streams swollen and overflowing. Two years prior, the state was recovering from a record drought that resulted in cyanobacteria outbreaks in lakes and communities simultaneously engaged in raging "water rights" fights over shrinking drinking water supplies. In NWCD's

November 2018 fall newsletter, NWCD staff presented an article entitled, “Addressing our changing climate...what can we do”. NWCD intends to focus first on the evidence that our state’s climate is changing and how we (NWCD) can assist the 34 communities that NWCD serves. The article addressed terms becoming familiar in the discussion of a changing climate: “resiliency/resilience”, sustainability/sustainable” and “adaptation”. The article addressed programs formed at state and regional levels to address “our” changing climate. (Appendix D)

The first referenced, was CIRCA and its mission to “increase the resilience and sustainability of vulnerable communities along Connecticut’s coast and inland waterways to the growing impacts of climate change on the natural, built, and human environment.” Link’s to CIRCA’s website and the LISD manual were provided. A second program, Sustainable CT, a program “created by towns for towns” was also referenced. This program was created during 2016 and 2017 by municipal leaders, residents, the Connecticut Conference of Municipalities and people from key, agencies, non-profits, and businesses. Roll-out to all of Connecticut’s 160 plus cities and towns in 2018 resulted in many towns registering, including NHCOC and NWCD service towns. Their mission statement reads “To provide municipalities with a menu of coordinated, voluntary actions, to continually become more sustainable; to provide resources and tools to assist municipalities in implementing sustainability actions and advancing their programs for the benefit of all residents; and to certify and recognize municipalities for their ongoing sustainability achievement”. One of those resources and tools is the Morris LISD manual, listed in Section 2, “Well-stewarded Land and Natural Resources” (Subsection 2.08 – “Implement Low Impact Development”). By the end of November 2018, the Morris LISD manual, created by funding from CIRCA, became a “go-to” tool to address LID in municipalities of all sizes across the Connecticut landscape. The incorporation of this valuable document has effectively spread NWCD’s and NWCOG’s partnership with CIRCA far beyond our service areas.

The first Earth Day in 1970 activated 20 million Americans from all walks of life to care for the environment and by the end of 1970, led to the creation of the Clean Air, Clean Water and Endangered Species Acts. For over 35 years, NWCD has conducted an Annual Earth Day Plant Sale. The sale achieves several goals besides the plants themselves. Information is presented on the use of native plants, sound horticultural techniques and information on low impact landscape designs such as rain gardens, designing for pollinator, butterfly and bird habitats. In this way, NWCD continues a less technical brand of low impact design to complement the engineering designs codified in the LISD Manual.

NWCD remains committed to working in partnership with similar-minded agencies such as CIRCA and NWCOG. We are especially grateful for the opportunity to work on the specific goal of producing the LISD Manual which is having a positive impact in our service area and beyond.

G. FINAL PROJECT SCHEDULE & BUDGET SUMMARY

Table 1: Final Project Schedule		
1	Project Team will work with Morris Land Use Commission throughout the process of developing and adopting the Low Impact Development Design Manual including public hearings/comment periods.	Spring 2016 to Fall 2017
2	LISD Development, NHCOC and NWCD will deliver public education workshops for Morris residents, Land Use Staff, Engineer and Design Community on the principles and benefits of Low Impact Development.	Spring 2016 to Summer 2017
3	LISD Development will provide draft Morris LID Design Manual for Commission Review.	Spring 2017
4	Tom McGowan will work with Land Use Commissions to ensure that the LID Design Manual is tailored to existing regulations and resolve any conflicting regulatory requirements.	Summer 2017
5	NWCD and NHCOC will conduct demonstration tours of successful local LID projects for the design community, land use staff and commissioners.	Throughout project
6	Town of Morris adopts LID Design Manual and incorporates the Manual into town regulations.	Fall 2017
7	NWCD will develop and deliver education workshops, educate the design/build community on the benefits of low impact development, educate local environmental conservation organizations and a demonstration low impact development project.	November 2017 to November 2018

Table 2: Final Budget Summary	
NHCOC	\$4,000
Northwest Conservation District	\$7,000
Trinka Engineering LLC	\$9,000
Total Project Budget	\$20,000

H. PROJECT PRODUCTS

Appendix A: Morris Low Impact Sustainable Development and Stormwater Management Design Manual (available online)

Appendix B: Northwest Conservation District Interim Report (dated September 25, 2017)

Appendix C: Northwest Conservation District Final Report (dated January 30, 2019)

Appendix D: Fall 2018 Northwest Conservation District Newsletter

APPENDIX A

**MORRIS LOW IMPACT SUSTAINABLE DEVELOPMENT AND STORMWATER MANAGEMENT
DESIGN MANUAL**

Available at:

<http://northwesthillscog.org/environmental-planning>

and

<https://nwcd.org/wpsite/low-impact-development-lid/>

APPENDIX B

NORTHWEST CONSERVATION DISTRICT INTERIM REPORT



Northwest Conservation District
1185 New Litchfield Street, Torrington CT 06790
Telephone (860)-626-7222

Joanna Wozniak-Brown, PhD, Regional Planner
Northwest Hills Council of Governments
59 Torrington Road, Suite A-
1 Goshen, CT 06756

September 25, 2017

Re: Final Report: Northwest Hills Council of Governments and Northwest
Conservation District Agreement for Small Town Low Impact Design
Manual Creation

Completed Tasks

Task – Develop and Deliver Educational Workshops – NCD and Trinkaus Engineering have designed and delivered workshops that include educating a broad based audience on the process of developing and adopting Low Impact Design Regulations and Design Manual principles and benefits of Low Impact Developments at the following public education events.

- 1) Bantam Lake Day at the Morris Town Beach – Sponsored by the Bantam Lake Protective Association. August 20, 2016. Targeted audience/lake front property owners. NCD staff (Sean Hayden and Karen Griswold Nelson) in attendance.
- 2) How Can We Grow and Still Protect Lakes, Rivers and Wetlands – Sponsored by the Woodbury and Roxbury Land Use Departments. Town of Woodbury Senior Center, August 24, 2016. Presentation by Sean Hayden) Approximately 30 attendees including all Woodbury Land use boards & Pomperaug Watershed.
- 3) Northwest Connecticut Community College Ecology Class Lab site tour and demonstration – LID Permeable Paver Parking Lot, Torrington. August 26,

2016. Tour and presentation by Sean Hayden to 21 students, City of Torrington officials and the general public. LID is being used in a comparative study of the rivers of the northwest corner of CT to look at the impact of paved surfaces and other development on river health. Class being taught by Tara Jo Holmberg, Biology Department and Professor of Environmental Science and Biology, recently named Connecticut Community Engaged Educator of 2016 by Connecticut Campus Compact, and longtime NCD Board of Director.
- 4) Maintaining a Healthy Waterfront – Morris Inland Wetlands Commission and Morris residents. September 8, 2016. Presentation by Sean Hayden- 20 attendees. Start of ongoing and continuing outreach by NCD (Hayden and Griswold Nelson) to the Morris Inland Wetlands Commission and enforcement staff regarding partnering with the Morris Planning and Zoning Commission to remove impediments to LID in the Morris Inland Wetlands Regulations to further support and strengthen the standards set forth in the LISD manual. Ongoing staff review of inland wetlands applications town wide to educate Morris property owners on implementing LID into site designs for wetlands consideration.
 - 5) Climate Change Resiliency Workshop at the Litchfield Community Center – Sponsored by River Alliance of Connecticut. September 23, 2016. Presentation by Sean Hayden. Approximately 50 attendees from surrounding towns including Morris, Litchfield, Warren and Washington.
 - 6) Minimizing the Impacts of Stormwater on our Communities – Sponsored by White Memorial Foundation and Connecticut Community at White Memorial Foundation September, 2016. Presentation by Sean Hayden - 50 attendees.
 - 7) Primary Stormwater Treatment for Difficult Sites – Annual Meeting of the Connecticut Association of Conservation and Inland Wetlands Commissions. November 12, 2016. Seminar by Sean Hayden – 60 plus conservation, inland wetlands and land use members and staff attendees/statewide.
 - 8) CT Envirothon Steering Committee Meeting, November 17, 2016, Arethusa Farm, Litchfield followed by tour of subsurface gravel wetlands in Morris and Litchfield. Attendees included CT Conservation District executive directors and staff, DEEP representatives, and interested parties.
 - 9) How Can We Grow and Still Protect Lakes, Rivers and Wetlands - Sponsored by Steep Rock Association and Lake Waramaug Task Force, November 6, 2016, Washington. Presentation by Sean Hayden. Approximately 50 attendees including Washington land use boards, Lake Waramaug Task force, developers and lakefront (Waramaug) and town residents.
 - 10) Morris Planning and Zoning Regular Meetings – formal meetings, March 13, May 8, 2017, September 6 and September 25, 2017 (and additional staff

- meetings (NCD staff Hayden and Griswold Nelson, Planning Consultant Tom McGowan, and Design engineer Steve Trinkaus, P&Z chairman Robert McIntosh). Overview of current development practices and impacts on the natural environment, current stormwater management practices and impacts on the natural environment and Description of Low Impact Development and discussion of how the implementation of LID can address environmental impacts as a result of development and the discharge of stormwater
- 11) 2017 Connecticut Lakes Conference and Annual Meeting, April 29, New Haven. Presentation by Sean Hayden to all attendees on “Low Impact Development” with cover of Morris LISD draft manual as part of presentation.
 - 12) NCD Earth Day Plant Sale, April 20-23. Educational outreach through the UConn Master Gardener program regarding the implementation of LID practices in landscape designs. Volunteer Master gardeners and NCD staff distributed LID literature, directed the public to specific “rain garden” plants and planting plans for implementation of residential LID structures, with emphasis on “rain gardens”. Literature created by and distributed by NCD staff attached. Estimated attendees at Earth Day Plant sale – 1500 to 1700 people from all socio-economic strata. On-site LID and soils presentation to South Kent School volunteers (15 students and 5 staff) by Sean Hayden as part of curriculum for classes taught by Professor MaryAnn Haverstock, Director of Sustainability. Ms. Haverstock is former DEEP Long Island Sound project employee, including creating grant opportunities for the removal of barriers to LID in land use and municipal regulations and ordinances (2008).
 - 13) Follow up LID rain garden presentations by NCD staff (Griswold Nelson) to garden clubs in collaboration with the UConn Master Gardener program (as a result of Earth Day Plant Sale volunteers) Harwinton Senior Center May 11, Kent Memorial Library July 25, and Sullivan Senior Center, Torrington, June 21
 - 14) Bantam Lake Task Force Annual meeting, September 16, 2017, Bantam Lake, Morris. Presentation of draft LID Design Manual by NCD staff and request for support for regulatory changes being brought forward by the Morris Planning & Zoning Commission.

Additional educational outreach:

- ❖ NCD Winter 2016, Spring 2016, and Fall 2016 newsletters with distribution to NCD mailing list containing first 3 of 5 technical articles written by Steven Trinkaus, “Why the Change to Low Impact Development” – mailed to NCD data base (5,000 plus) with distribution of Spring 2016

newsletters to libraries and municipal offices in NWHCOG towns.
(Copies attached)

- ❖ Spring 2017 newsletter with distribution to NCD mailing list and targeted additional mailing to lake communities in Morris, Washington, Warren, and Kent (total newsletter mailed 7400 in addition of 1,000 distributed to libraries, municipal offices, etc.) containing part 4 of 5 technical articles written by Steven Trinkaus, “Why the Change to Low Impact Development”. Newsletter cover “Rain Garden Design” by Richard Rosiello, Meadowbrook Landscaping and president of “Mad Gardeners” in support of LID practices on residential site. (Copies attached)

Task – Educate the Design / Build Community on the Benefits of Low Impact Development - NCD has discussed (in-house NCD office/Torrington), on-site and third party review and consultation) the approach of creating a LID Design Manual and incorporating it into town regulation and received positive responses from the following professionals in the Northwester Connecticut Design/Build community including;

- Dennis McMorro PE – Berkshire Engineering. In-house and on-site meetings for design and construction of LID structures in residential and commercial settings including subsurface graveled wetlands in Morris, Litchfield. Now third party review engineer for NCD projects.
- Tom Grimaldi PE - RR Hiltbrand Engineers & Surveyors LLC. In-house and on-site meetings for design and construction of LID structures including subsurface graveled wetlands in Morris, Litchfield. Now third party review engineer for NCD projects.
- Ken Hrica PE– Hrica and Associates. In-house and on-site meetings for design and construction of LID structures including residential and commercial site (Dunkin Donuts, New Hartford)
- Ron Wolff PE– Wolf Engineering. In-house and on-site meetings for design and implementation of LID in cluster/affordable income housing subdivision in Woodbury.
- Dainius Virbickas PE – Artel Engineering. On-site meetings for implementation of LID measures in single family residential development in Brookfield.
- Earthtones Native Plant Nursery and Landscaping. On-site meetings and shared workshop meetings with Earthtones principals Liza and Kyle Turoczi and their clients to implement LID practices in lakefront (Bantam Lake, West Hill Lake, and First Light lakes, Candlewood, Zoar and Lillinonah and Lake Wononscopomuc) residential development and re-development site. Partners with NCD to conduct their own educational seminars showing LID structures as

part of their designs (including West Hill Lake property owners annual meeting, June 2017)

- Richard Rosiello – Meadowbrook Landscaping. On-site meetings (Warren, Washington and First Light lakes) to implement LID practices in lakefront (Lake Waramaug and First light lakes) property residential development and re-development, residential sites and commercial development. Mr. Rosiello is the current president of the Mad Gardeners, (a group of passionate, amateur–professional gardeners in Southern New England. Southern Litchfield County in west central Connecticut), that supports NCD with members on numerous western Connecticut land use boards.
- Paul Szymanski PE– Howland Engineering. On-site meetings (Warren, Washington and Cornwall) to implement LID practices in lakefront (Lake Waramaug) property residential development and re-development and commercial development.
- Pat Hackett PE– Hackett Engineering. In-house meetings to implement LID practices in lakefront (Lake Wononscopomuc) property residential development and re-development and residential sites (Cornwall, Salisbury).
- Dave Wilson PE- Village Associates. In-house meetings to implement LID practices in residential development in area towns. (Litchfield, Warren and Cornwall)
- Todd Parsons PE, Roger Hulbert PE and David Batista PE – Lenard Engineering. Consultation on town projects with town and shared town/NCD staff to implement LID practices (New Hartford and Cornwall)
- Bart Clark PE– Oakwood Engineering. Consultation on town projects to implement LID practices (Warren and Cornwall)
- Kleinschmidt Associates. NCD Third party review. Implementation of LID design in the final site design of the “Bend Project” in West Cornwall, CT through the collaborative efforts of the NCD/Housatonic Valley Association staff. Review of site design features at a September 13, 2016 P&Z meeting with members of the Housatonic River Commission, town officials, and interested parties.
- Laurel Engineering, Winsted. On-site meetings to design and construct a subsurface graveled wetlands structure on a new commercial development site in Winsted.
- Brian Neff PE, Roxbury, CT. On-site meetings for implementation of LID measures in single family residential development, Cornwall.
- Michael Mazzuco PE – Mazucco Engineering. Consultation on and review of Brookfield residential and commercial subdivision projects.
- Douglas Divesta PE - Divesta Engineering. Consultation and design of rain gardens in Fairfield.

- Steve Sullivan PE – CCA Engineering and Surveyors. Consultation and third party review of residential and commercial subdivisions in Brookfield.
- Ralph Stanton PE – Certified Soil Scientist. On-site meetings and consultation of LID practices in design of Stormwater Park, Town of Norfolk village center.
- Robert Green PE – Robert Green Associates. Third party review and consultation (Trinkaus) of redevelopment of lakefront properties incorporating LID features, New Hartford.
- Curtis and Emily Jones PEs – Civil 1. Consultation and review for the implementation of LID practices in an affordable housing project, Watertown.
- Curtis Smith and Mark Riefenhauser, PE, Smith and Company. Consultation and review of single family subdivisions lots in Woodbury, CT
- Jason Dismukes PE, Goshen. In-house and collaborative work to implement LID practices in residential and recreational projects in Goshen and Cornwall
- Jones Engineering, Southbury, CT. Collaborative (Lenard third party review for town staff) for implementation of LID practices on a residential site in Cornwall.

Task – Educate Local Environmental Conservation Organizations

NCD has discussed the approach of creating a, LID Design Manual and incorporating it into town regulations and received positive response and support from the following organizations as part of educational workshops, tours and outreach:

- Steep Rock Association – Washington
- White Memorial – Morris and Litchfield
- Housatonic Valley Association - Housatonic River Watershed
- Farmington River Watershed Association, Farmington River Watershed
- Rivers Alliance of Connecticut (state wide lake protection non-profit)
- First Light Power Resources – Housatonic River Watershed.
- Lake Waramaug Task Force -Washington and Warren
- Lake Wononscopomuc Association - Salisbury
- West Hill Lake Association – New Hartford
- Bantam Lake Protective Association - Morris
- Candlewood Lake Authority, Lake’s Zoar, Lillinonah and Candlewood.
- Various town Conservation Commission including Cornwall, Bethlehem and Woodbury.

Task – Demonstration Low Impact Development Project – NCD assisted the Town of Morris Highway Department with a LID design to keep stormwater runoff from running through a road salt storage area and contaminating a nearby wetland. NCD worked with the Public Works foreman to create a conceptual design to capture and divert salt shed roof and parking area runoff to a bioswale/infiltration trench. NCD worked directly with the Town of Morris Inland Wetland Commission to permit the

project and assisted the Public Works foreman to install the structure in early May. All materials needed for construction have been supplied and the project completed.
(Photos attached)

Ongoing Tasks

Task – Adopt Low Impact Design Manual into Planning Regulations – Fall 2017

Respectfully submitted,

Northwest Conservation District

APPENDIX C

NORTHWEST CONSERVATION DISTRICT FINAL REPORT



January 30, 2019

Re: Final Report: Northwest Hills Council of Governments and Northwest Conservation District Agreement for Small Town Low Impact Design Manual Creation - Activities between November 2017 and November 31st, 2018

Completed Tasks

Task – Develop and Deliver Educational Workshops – NWCD (with support from Trinkaus Engineering) designed and delivered workshops that included educating a broad-based audience on the process of developing and adopting Low Impact Design regulations and design manuals, and principles and benefits of Low Impact Developments at the following public education events.

- 1) NWCD Earth Day Plant Sale, April 20-22, 2018, Goshen Fairgrounds. Educational outreach through the UConn Master Gardener program regarding the implementation of LID practices in landscape designs. A demonstration rain garden was set up at the Plant Sale entry point with rain garden specific plants in the garden and literature. Volunteer Master Gardeners and NWCD staff distributed LID literature, directed the public to the demonstration rain garden, and gave instructions on specific rain garden plants and planting plans for implementation of residential LID structures. Estimated attendees at Earth Day Plant Sale – 1500 to 1700 people from all socio-economic strata.

Additional educational outreach:

- ❖ NWCD Spring Earth Day Plant Sale 2018 newsletter with distribution to NWCD mailing list database (5,500 plus) and extended bulk mailing to selective NWCD towns (9,000 total mailed) with staff distribution of newsletters to libraries and municipal offices in NWHCOG/NWCD towns. Newsletter contained information regarding rain gardens and associated plants available at the April 2018 Earth Day Plant Sale.
- ❖ August 30th, 2018 NWHCOG 5th Thursday meeting with main subject SustainableCT. Attendance with NWHCOG/NWCD service towns with hands-on exercises educating attendees as to the tools and processes for SustainableCT towns.
- ❖ Summer 2018 newsletter with distribution to NWCD donor mailing list and targeted additional mailing to subject towns (Bethlehem, Cornwall, Falls Village/Canaan and Watertown) with article entitled “A Low Impact Development Design Manual” with links to the CIRCA site.

- ❖ October 13, 2018 NWCD “Leadership Training for Sustainability” workshop in Woodbury, CT to help town staff and citizens work within the SustainableCT program. Information and links provided to address the Morris LISD manual as a tool cited for the advancement of LID practices and techniques in the landscape.
- ❖ Fall 2018 newsletter (mailed in early November 2018) to NWCD donor mailing list and target mailing with article entitled “Addressing our Changing Climate... what can we do.” (Attached as appendix D)
- ❖ Re-designed website nwcd.org to include updated LID information and the link to the Morris LISD manual.

Task – Educate the Design / Build Community on the Benefits of Low Impact Development - continuing from November 2017, NWCD discusses (in-house NWCD office/Torrington, on-site and third party review and consultation) the guidelines adopted in the Morris LISD Design Manual and the incorporation of similar documents into other town regulations.

- ❖ Technical services were provided by NWCD to the Town of Morris Inland Wetland Agency and Professional Engineers involved in land use applications. These include the review of 4 separate applications to assess and provide assistance on stormwater management, and erosion and sedimentation control plans. For each application, NWCD was able to provide LID design alternatives to improve stormwater management solutions for the projects, in both the wetland and upland areas in accordance with the Morris LISD manual.
- ❖ Technical review services of a large subdivision application for the Town of Woodbury.

Task – Educate Local Environmental Conservation Organizations

NWCD continues to discuss the approach of creating town specific LISD Design Manuals and incorporating them into individual town regulations, and receives positive response and support from the following organizations as part of educational workshops, tours and outreach:

- ❖ Steep Rock Association – Washington
- ❖ White Memorial – Morris and Litchfield
- ❖ Housatonic Valley Association - Housatonic River Watershed
- ❖ Farmington River Watershed Association, Farmington River Watershed
- ❖ Rivers Alliance of Connecticut (state wide lake protection non-profit)
- ❖ First Light Power Resources – Housatonic River Watershed
- ❖ Lake Wononscopomuc Association - Salisbury
- ❖ Bantam Lake Protective Association - Morris
- ❖ Candlewood Lake Authority, Lake’s Zoar, Lillinonah and Candlewood.

- ❖ Lake Waramaug Task Force -Washington and Warren: NWCD is currently working with Task Force to support changes to Warren Town Plan of Conservation and Development to support a LISD manual with specific guidelines to protect Lake Waramaug. Similar work is being undertaken with the Town of Washington land use staff.
- ❖ West Hill Lake Association – New Hartford: NWCD is currently working with property owners on West Hill Lake to voluntarily implement LISD measures into project designs that exceed the regulatory requirement in place (Zoning Regulations and Inland Wetlands Regulation)
- ❖ Various town Conservation Commissions including Cornwall, Bethlehem and Woodbury.

Task – Demonstration Low Impact Development Project –

- ❖ Summer 2018. Collaborative work with the Housatonic Valley Association, the Town of Cornwall land use boards, and the Housatonic River Commission for regulatory approvals needed to construct the “The Bend”, an LID project on the banks of the Housatonic River designed and constructed by Earthtones, Woodbury. Project completed November 2018.

Respectfully submitted,

Northwest Conservation District

APPENDIX D

NORTHWEST CONSERVATION DISTRICT NEWSLETTER

Available at:

https://nwcd.org/wpsite/wp-content/uploads/2018fall_NWCDnewsletter.pdf