ComEd
Energy Efficiency Program

GREEN STORMWATER INFRASTRUCTURE ENERGY SAVINGS PILOT

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Greenprint Partners in Partnership with MIST Environmental

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GLOSSARY OF ACRONYMS

CJM: Customer Journey Map

CSO: Combined Sewer Overflow

CSR: Corporate Social Responsibility

CSS: Combined Sewer System

EPA: Environmental Protection Agency

FSI: Flood Susceptibility Index

GI2: Green Infrastructure Incentive

GP: Greenprint Partners

GSI: Green Stormwater Infrastructure

GWH: Gigawatt Hours

kWH: Kilowatt Hours

MS4: Municipal Separate Storm Sewer System

MWRD: Metropolitan Water Reclamation District of Greater Chicago

NEI: Non-Energy Impact

PR: Public Relations

SSS: Separated Sewer System

TIF: Tax Increment Financing

TRM: Technical Resource Manual

WWTP: Wastewater Treatment Plant

YR: Year

This is a research and program design report for novel program design and outreach strategies piloted through the Emerging Technologies initiative. This report should provide an overview of the research question and existing program needs that the pilot is designed to address. The report should clearly outline the goals, methodology, key findings and lessons learned. The findings of this report will be used to inform current and future ComEd Energy Efficiency Program offerings.

1.0 EXECUTIVE SUMMARY

Background

The latest versions of the Illinois Technical Resources Manual (TRM v7 and v8) allow electric utilities to claim a range of deemed energy savings for every one million gallons of water prevented from entering wastewater treatment plants (WWTPs). According to the US Environmental Protection Agency (EPA), WWTPs can account for a third of a typical municipality's electricity expenditures, making energy savings opportunities a high priority.[1] This report investigates the potential to quantify and account for energy savings associated with preventing stormwater from entering WWTPs by utilizing ***green stormwater infrastructure*** (GSI) in communities with a combined sewer system. As ComEd explores paths to new claimable energy savings, especially within the energy-water nexus, it should fully explore the possibility of adopting GSI as a measure within future energy efficiency program portfolios.

Green Stormwater Infrastructure
Green stormwater infrastructure is the use of vibrant natural systems to manage water where it falls. It is being embraced around the world because of its rich social, economic and ecological benefits. For energy utilities seeking to create ratepayer value while driving substantial energy savings, GSI offers an attractive solution. It:

- Supports utilities' ecological CSR initiatives, from land preservation, to carbon sequestration, to air quality improvement, to biodiversity.
- Creates tangible benefits for utility ratepayers, including beautification, increased property values, new jobs, public safety, health improvements and more.
- Is at the heart of the energy-water nexus, reducing demand for irrigation, reducing pressure on energy-intensive wastewater treatment plants and more.
- Supports equity goals. Communities get the most good out of GSI by locating it in low-to-middle, majority-minority income areas, particularly co-locating it with low income housing developments, schools, community development organizations and more.

[1] https://www.epa.gov/sustainable-water-infrastructure/energy-efficiency-water-utilities

Project Scope

Through funding from ComEd Emerging Technologies, Greenprint Partners has executed a Phase 1 feasibility study and produced a report to help ComEd decision-makers assess market potential for a GSI incentive program in the region. This included the following activities:

1. Creating a scoring tool to assess which municipalities have need and interest in GSI.
2. Interviewing leadership at the top nine municipalities.
3. Quantifying the energy savings potential of GSI within municipalities.
4. Understanding the non-energy impacts that are most attractive to municipalities.
5. Summarizing this work to establish recommendations for next steps needed to build out a GSI- based energy efficiency program.

Findings

The following criteria were used to assess 363 municipalities in ComEd territory and the top ranking cities were selected for in-depth interviews with municipal leaders.

Scoring Tool Criteria

- Population
- Presence of a combined sewer system
- CMAP Flood Susceptibility Index score
- Presence of combined sewer outfall(s)
- Number of combined sewer overflow events annually
- Collects a stormwater fee to fund system improvements
- WWTP energy use

Top Ranked Cities Interviewed

1. Aurora
2. Calumet City
3. Elgin
4. Evanston
5. Highland Park
6. Joliet
7. Niles
8. Waukegan
9. Wilmette

Interviews included discussions with municipal managers, chiefs of staff, public works directors, city engineers, parks directors and others who expressed an interest in GSI. The key takeaways are detailed within this report but can be summarized by the following three statements:

1. When exploring reasons why municipal leaders are interested in GSI, the most frequently cited pain point is localized flooding. Interviewees expressed strong interest in solutions that help reduce their constituents' flood risk.

Figure 1 : Bioswale in Greendale, WI © Aaron Volkening

2. When exploring barriers that prevent municipal leaders from scaling GSI, the most frequently cited challenges are the upfront and long-term maintenance costs. In general, municipal leaders would install more GSI if these costs were defrayed.

3. All interviewees reported being generally familiar with GSI terminology and technology at a foundational level, but the majority cited the need for expert support and/or added capacity at key points throughout the planning and implementation process.

Potential Energy Savings

Using rainfall and other key data, the team determined the annual volume of water GSI has the potential to capture, then calculated the range of energy savings associated with Illinois TRM v7 and v8 for the nine municipalities interviewed.

- TRM v7: Uniformly applying 2,439 kWh saved / million gallons of water prevented from entering the sewer resulted in 2.8 to 8.3 GWh of potential claimable savings per year. Assuming that a typical GSI installation is functioning for an average of 40 years, the lifetime potential claimable savings are 110 to 331 GWh of savings. This would represent between 0.2% and 0.5% of the ComEd Annual Savings Goal.

- TRM v8: Applying 2,439 kWh saved / million gallons of water prevented from entering the sewer *outside of Cook County* and 366 kWh saved / million gallons of water prevented from entering the sewer system *within Cook County* resulted in 1.4 to 4.2 GWh of potential claimable savings per year. Assuming that a typical GSI installation is functioning for an average of 40 years, the lifetime potential claimable savings are 56 to 167 GWh of savings. This would represent between 0.1% and 0.3% of the ComEd Annual Savings Goal.

Table 1: Potential Energy Savings from GSI

MUNICIPALITIES	POTENTIAL ENERGY SAVINGS RANGE (KWH/YR)	
	TRM v7	TRM v8
Aurora	530,225 to 1,590,674	530,225 to 1,590,674
Calumet City*	322,001 to 966,003	48,320 to 144,960
Elgin*	280,484 to 841,452	42,090 to 126,269
Evanston*	449,955 to 1,349,866	67,521 to 202,563
Highland Park	4,993 to 14,979	4,993 to 14,979
Joliet	600,960 to 1,802,880	600,960 to 1,802,880
Niles*	434,674 to 1,304,022	65,228 to 195,684
Waukegan	11,294 to 33,882	11,294 to 33,882
Wilmette*	121,425 to 364,276	18,221 to 54,664
Total	**2,756,011 to 8,268,033**	**1,388,851 to 4,166,554**

*The municipalities within Cook County that are subject to the 10MW exemption in which ComEd can count only 15% of energy savings according to the TRM v8.

Implications of TRM Changes from v7 to v8

The change in the TRM between versions 7 and 8 results in a 50% reduction in energy savings potential among the early adopters without strong outcomes-based justification and disproportionately impacts potential energy savings measures like GSI that would be best suited for the older systems found in Cook County. Like LED lighting, GSI is a distributed energy saving measure that is installed on sites throughout a community. While the energy savings accrue to community members through reduced peak energy demand at WWTPs, the intervention (and any financial incentive) is directed at the landowner where the measure is installed. As an example, in a future scenario where a GSI incentive program serves schools in northern Illinois, a school in Cook County that installs GSI in their parking lot would receive an incentive 85% lower than an equivalent school outside of Cook County. In this scenario, an individual school is penalized for a rule intended to impact institutions subject to the 10MW exemption.

Potential for Scale

There are 363 municipalities in ComEd territory, but the energy saving potential calculations in this report reflect a subset of cities that — in the near term — fit communities with many of the enabling conditions for GSI at scale. As the Midwest continues to experience more frequent and intense rainstorms, as political shifts impact regulations and as stormwater utilities become increasingly common, it's possible, or even likely, that a growing number of these 363 municipalities will be well suited to join a GSI Energy Efficiency program.

Potential Non-Energy Impacts

The assessment of five non-energy impacts (NEIs) were included in this study: property beautification, pollinator/wildlife habitat, economic development, public use and crime reduction. Across these nine cities, GSI could:

- create $30M in economic development value over 40 years if robustly deployed.
- achieve an average crime reduction of 2 percent.
- add an average of 150 acres of natural and green spaces to each municipality.

Next Steps and Recommendations

1. Investigate Viability of Incentive: ComEd incentives must meet rigorous cost effectiveness tests. Determining this for GSI incentives falls outside the scope of this Phase 1 study. Based on energy savings potential, a Phase 2 study is warranted. Greenprint proposes conducting a study to 1) determine the potential incentive structures that ComEd could offer cost-effectively and 2) help determine if these incentives would influence municipal decisions to invest in GSI.

2. Modify the Statewide TRM to allow GSI as a Measure: Work with Illinois electric utilities and Stakeholder Advisory Group to pursue formal adoption of GSI as an approved measure within the Illinois TRM to ensure savings can be claimed. Ensure consistent savings can be claimed across all Illinois counties to avoid arbitrarily penalizing landowners within Cook County.

3. Understand GSI Program Best Practices: If warranted by the results of the prior two recommendations, conduct a follow-up study to understand which types of GSI program structures are in use across the country and work with local municipalities to analyze which would be most beneficial to municipalities in ComEd territory.

4. Invest in a Program Pilot: Working with a subset of interviewed municipalities, conduct a GSI incentive program with the potential to scale the program if successful.

If a GSI program/incentive will be pursued, consider the following recommendations:

- Act as GSI Convener: Every town has at least one GSI champion already, but they are largely tackling this alone. The GSI program framework should serve as a repository and connector to GSI best practices and resources across the region.
- Provide Funding: Provide gap and matching funds to upgrade typical projects to community benefit-driven GSI.
- Provide In-kind Support and Education: Use GSI experts to provide facilitation at key points in the project process to ease burden on capacity-constrained cities.
- Framing and Communications: While saving energy in WWTPs is the prime interest for ComEd, speaking directly to the needs of constituents will be the key to success. Marketing this work as a flood alleviation program and emphasizing the full suite of benefits (economic, beautification, crime reduction, energy efficiency) will lead to more community buy-in.
- Residents: Resident complaints and demands frequently shape municipal investments in infrastructure upgrades, so resident buy-in is critical to program success. Local advocacy groups are a focused extension of residents and are often connected to municipal leaders; they are an important partner in building resident buy-in.
- Help Municipalities Maximize Public Relations Opportunities: Municipal leaders see GSI as an opportunity to communicate and celebrate visible municipal investments in resident quality of life. As a potential GSI supporter, ComEd has the opportunity to participate in related press and community relations activities.

2.0 BACKGROUND

For the first time, Illinois utilities can claim energy savings associated with reducing the water flowing into wastewater treatment plants (WWTPs). According to the EPA, WWTPs can account for a third of a typical municipality's electricity expenditures.[2] In cities with combined sewers, as opposed to separate sanitary and stormwater sewers, stormwater increases the energy demand at WWTPs. In some cases, rainstorms cause peaks in energy demand that require costly and/or polluting backup energy sources to be enabled.

TRM v7 provides a potential path to claim 2,439 kWh in energy savings for every one million gallons of stormwater prevented from flowing to the WWTP. This project investigates using that formula to account for energy savings from installing Green Stormwater Infrastructure (GSI). This study's findings suggest the nine municipalities interviewed represent 2.8 to 8.3 GWh of potential claimable savings per year. This would equate to between 0.2% and 0.5% of the ComEd Annual Savings Goal.[3] Assuming that a typical GSI installation is functioning for an average of 40 years, the lifetime potential claimable savings are 110 to 331 GWh.[4]

Unfortunately, TRM v8 (due for adoption in 2020) impacts the potential savings from participants within Cook County. Any landowner savings that accrue to Cook County-based WWTPs will be discounted to 15% of those accrued outside Cook County. This represents a 50% reduction in potential savings that may be claimed from the early adopter communities.

Figure 2: Rain gardens in Aurora, IL © Center for Neighborhood Technology

GSI is the use of functional natural systems to manage water where it falls, a proven supplement to traditional sewers. It is being embraced around the world because of its social, economic and ecological benefits. GSI allows rainwater and snowmelt to infiltrate the ground, thereby preventing water from entering the sewer and being processed at energy-intensive WWTPs. Examples of GSI include bioswales, bioretention, permeable pavements, green roofs, urban tree canopies, rain gardens, rainwater harvesting and native plant selections.

[2] https://www.epa.gov/sustainable-water-infrastructure/energy-efficiency-water-utilities

[3] http://ilsagfiles.org/SAG_files/Evaluation_Documents/ComEd/ComEd_CY2018_Evaluation_Reports_Final/ComEd_CY2018_Summary_Evaluation_Report_2018-04-30_Final.pdf

[4] https://www1.villanova.edu/content/dam/villanova/engineering/vcase/vusp/Flynn-THesis-11.pdf and https://www.ucsusa.org/sites/default/files/attach/gw-smart-infrastructure-table-life-expectancy.pdf

In addition to energy savings, GSI produces other non-energy impacts (NEIs). GSI:

1. Supports utilities' ecological corporate social responsibility (CSR) initiatives, from land preservation, carbon sequestration, air quality improvement, to biodiversity.
2. Creates tangible benefits for utility ratepayers, including beautification, new jobs, increased property values, public safety and health improvements.
3. Helps utilities meet their goals of serving disadvantaged communities by targeting GSI services to low-to-middle income, majority-minority communities and properties such as low-income housing developments, community development organizations, prisons and schools. [5]

3.0 PROJECT GOAL, SCOPE AND METHODOLOGY

This work was made possible through the generous funding support of ComEd Emerging Technologies. Greenprint Partners, in partnership with MIST Environmental, executed a Phase 1 feasibility study to help ComEd decision-makers assess:

- Market potential for a regional Green Infrastructure Incentive (GI2) program in ComEd territory.
- Energy savings potential from investment in municipal GSI interventions.
- Potential value of non-energy impacts associated with municipal GSI implementation.
- Municipalities' current barriers to adoption of GSI projects, via interviews with target cities.
- Likelihood that a cost-effective intervention, or program support, may influence municipalities' decisions to pursue GSI.
- If a pilot program (Phase 2) should be developed.

The following table outlines Phase 1 scope and deliverables.

Table 2: Phase 1 Scope

TASK	DESCRIPTION	DELIVERABLE
TASK 1	Define regulatory, economic and structural criteria that influence the decision to pursue GSI and develop a scoring tool to assess potential for a municipality to substantially benefit from GSI.	Municipal Scoring Tool
TASK 2	Via desk-research, assess every municipality with 25,000-200,000 residents (or that are strategically prioritized) within ComEd territory and rank according to their likelihood to benefit from GSI.	Ranked List of Municipalities
TASK 3	Select the top municipalities on the ranked list and conduct primary (e.g., interviews) and secondary (e.g., desk analysis) research to determine: 1. How likely they are to pursue GSI on their own and in what time frame.	Interview Reports Customer Journey Map

[5] https://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

	2. Their barriers to adopting GSI. 3. The level of intervention needed to accelerate adoption of GSI. 4. How income eligible and private/public business participation can be prioritized. Build a customer journey map to demonstrate how ComEd builds and deepens relationships with municipalities and their local water utilities.	
TASK 4	Model the GSI potential in the top municipalities to quantify the energy saving potential and non-energy impacts (NEIs).	Energy Savings Calculations and NEI Analysis
TASK 5	Develop a report that synthesizes the results of Tasks 1-4, helping ComEd decision makers to assess: 1. energy savings potential from investment in municipal interventions. 2. barriers to adoption of GSI. 3. likelihood that a cost-effective intervention could be shown to influence the decision to pursue GSI.	Comprehensive Report of Data and Findings

4.0 HOW MUNICIPALITIES WERE CHOSEN FOR INTERVIEWS

With 363 municipalities in ComEd's territory, the team needed to narrow the list of potential target municipalities for interviews and potential pilot participation. To accomplish this, the regulatory, economic and structural criteria needed to be defined, a scoring tool developed and then that tool needed to be applied to the 363 municipalities to assess the potential for a municipality to substantially benefit from GSI installations.

The first step in the narrowing process was to filter by two yes/no factors:

1. Is the municipality population between 25,000 and 200,000? (For Phase 1, municipalities with a population below 25,000 do not have sufficient regulatory drivers to invest in GSI at scale. Above 200,000 and the city is more likely to be able to execute a GSI program without ComEd intervention.)
2. Is at least part of the municipality's sewer system a combined sewer system (CSS)?

Applying these two questions narrowed the list of 363 municipalities to 35 potential targets.

Secondly, Greenprint, in conjunction with ComEd, reviewed nine potential scoring criteria. Five of those criteria were determined to be highly relevant, readily available and reliably accurate. These were then weighted based on which criteria were the most critical for assessing a municipality's viability as a pilot participant.

Table 3: Municipal Scoring Methodology

SCORING CRITERIA	WEIGHT
Rating on CMAP's Flood Susceptibility Index (FSI)? Reason: Higher FSI scores can inform which municipalities are at greater risk of flooding and stormwater infrastructure issues and serve as one indicator of public demand for new solutions to stormwater challenges.	3
Does the municipality have a combined sewer outfall within its boundary? Reason: Outfall locations are valuable to determine how much control and motivation municipalities have to increase local water quality by decreasing Combined Sewer Overflow events.	1
Number of Combined Sewer Overflow events occurring? Reason: The number of overflow events is quantified by the EPA as a way to judge the performance of a municipality's current stormwater infrastructure.	1.5
Does municipality charge a stormwater fee? Reason: Municipalities with a stormwater fee are more likely to have the long-term dedicated revenue streams needed to financially support a GSI program.	5
Ranking of municipality's WWTP energy use? Reason: Municipalities with high WWTP energy use are good targets for a GSI-related energy savings pilot.	3

The full municipal scoring methodology and data sources can be found in Appendix A.

These five weighted criteria were applied via the scoring tool and reduced the number of target municipalities from 35 to 18.

Once the list was narrowed to 18, the team used knowledge of municipal staff, capacity, attitudes towards GSI and similar judgement factors to rank which municipalities and which particular municipal staff would be interview candidates to discuss GSI and the factors that drive decision-making around it in their cities. That allowed the project team to narrow the list to 11 municipalities, of which nine agreed to meet for an interview, one declined and one failed to respond.

The final list of municipalities interviewed were:

1. Aurora
2. Calumet City
3. Elgin
4. Evanston
5. Highland Park
6. Joliet
7. Niles
8. Waukegan
9. Wilmette

A high-level primer of the ComEd GSI Feasibility Study (Phase 1) was developed by Greenprint and approved by ComEd (Appendix B). When interview requests were made, the primer was sent with the request to introduce potential interviewees to the project.

5.0 INTERVIEW FINDINGS

After the interviews were completed, the team distilled key takeaways, with a particular emphasis on identifying municipal barriers to installing GSI and key opportunities or benefits the municipalities believe GSI could provide. Below is a summary of those findings.

Key Findings:

1. When exploring reasons why municipal leaders are interested in GSI, the most frequently cited pain point is localized flooding. Interviewees expressed strong interest in solutions that help reduce their constituents' flood risk.

2. When exploring barriers that prevent municipal leaders from scaling GSI, the most frequently cited challenge is the upfront and long-term maintenance costs. In general, municipal leaders would install more GSI if these costs were defrayed.

3. All interviewees reported being generally familiar with GSI terminology and technology at a foundational level, but the majority cited the need for expert support and/or added capacity at key points throughout the planning and implementation process.

Other Secondary Takeaways Include:

Figure 3: Touring Green Infrastructure and Urban Farm in Peoria, IL
© Greenprint Partners

- Combined Sewer Systems (CSS) tend to be concentrated in the older (pre-1950s) portions of towns, which often are densely residential. The implication of this is that land use should be considered to identify likely available land for GSI installations.
- Resident awareness of GSI is a barrier/concern for some municipalities; vocal residents have a strong influence on local infrastructure investments, so they need to understand the value of GSI and what it looks like to support it.
- State and local grant funding is the source of almost all GSI projects that have been done in the communities interviewed.
- There is little-to-no sharing of GSI best practices, lessons learned, across the region.
- Every municipality interviewed reported having at least one GSI champion. These champions can serve as partners in building public support for the program.
- Local community groups may be friendly advocates in some municipalities.
- Language used by municipal staff to describe GSI demonstrated the need for clarity to ensure shared understanding and alignment. For example, depending on the municipality, the terms “green infrastructure”, “green stormwater infrastructure”, “infiltration”, “GSI”, or “GI” were preferred to describe the solution. Conversely, the term “green infrastructure” meant different things in different cities. In some cases, it was specific to stormwater infiltration technologies, whereas in others it referred to any infrastructure that was considered environmentally sustainable (e.g., LED lighting).
- It will be helpful in moving this program forward to emphasize and frame the benefits to the municipality and its residents, rather than the energy benefits accrued to the WWTPs.

6.0 CUSTOMER JOURNEY MAPPING

Understanding Municipal Stakeholders Involved in GSI Decisions and Implementation

Customer journey maps (CJMs) help product or service design teams understand and empathize with potential customers. Specifically, CJMs break down the steps and corresponding highs and lows a customer may feel when interacting with a product or service, or as in this case, a program. It maps customer emotions through their interactions with a given product or service over time. Designers use these maps to adjust programs, services and products to proactively reduce the negative and increase the positive experiences for customers.

Knowing that CJMs have been used in other established energy efficiency programs to create a successful ratepayer relationship, this tool can help facilitate future program design discussions. It seeks to highlight critical issues and demonstrate how ComEd might strengthen relationships with municipalities and their local water utilities.

Customer Profiles

Aligned with project interviewees, three different potential customer types were identified and their journeys mapped. The profile of each customer type is outlined below.

1. Municipal Leadership
    - Senior leadership in the Mayor's Office or equivalent. Potential titles include: Deputy Mayor, City Manager or City Council.
    - Chief pain points of new GSI: budget, credibility and PR risk.
    - Chief opportunity of new GSI: PR, happy constituents via reduced flooding and increased city beautification.
2. Public Works / Water Utility
    - Leadership and management in Public Works or equivalent. Potential titles include: Director of Public Works, Assistant Director of Operations or Village Utility Manager.
    - Chief pain points of new GSI: budget, time burden for staff, lack of GSI experience and knowledge.
    - Chief opportunity of new GSI: reduced sewer loads and flooding, impress municipal leadership, team learns new methods for flood prevention and CSO event reduction.
3. Large Private Landowner
    - Property managers or owners of large properties or campuses. Examples: universities, religious, or healthcare institutions.
    - Chief pain points of new GSI: budget, time burden for staff, lack of knowledge.
    - Chief opportunity of new GSI: reduced costs, beautification, innovation.

Analysis & Recommendations

Detailed graphic journey maps for each of the three customer types are included in Appendix C. These should be reviewed to understand specific steps in the GSI process, from the perspective of each customer type.

Following is a summary of key high points, low points and corresponding recommendations.

Municipal Leadership

Overall, municipality leadership interact with GSI projects only at a few high-level touchpoints, including identifying funding for projects, giving their approval for staff to execute, signing off on the completed work and PR communications. They will get involved pre-project to align funding and then largely stay out of it until the project is complete, when dedications and other close-out PR opportunities present themselves.

High points (benefits, opportunities) in the process:

- PR opportunity when the project is green-lit.
- PR opportunity when project is complete and publicly open.
- Chance for new public-private partnerships leading to municipal improvement.

Figure 4: Municipal leaders in Hobart, IN discussing GSI project locations ©Ben Shorofsky

Low points (barriers, risks) in the process:

- Pre-project, when trying to identify municipal funding to support budget and trying to identify municipal staff to work on it (assuming staff have little capacity for additional work).
- Cutting through bureaucracy and formal municipal or ComEd approvals needed to study feasibility and green-light project. Frustration with associated waiting periods.
- Actual and perceived public-relations risk if project goes awry.

Recommendations for the audience:

- During the initial feasibility review period where ComEd and the municipality are assessing project viability and identifying funding, ComEd should provide resources to the municipality to speed the feasibility review and shorten the overall review period. This will help alleviate a negative perception that the waiting period brings. Support could be in the former of in-kind services by GSI experts who understand the approval process, as well as ComEd needs and requirements.
- ComEd can provide in-kind services to help cities identify third-party funding opportunities to increase the financial viability of project and alleviate stress (negative perceptions) from municipal leadership when they try to identify funding sources. This includes facilitating the connection of municipalities to third-party funders for GSI grants.
- Provide PR materials and talking points to municipalities. Streamline and reduce the work required of municipalities. Consider providing in-kind PR support to maximize positive perceptions of the projects for ComEd and the municipality.

Figure 5: Water collecting © creative commons

Public Work / Water Utility

These individuals are largely responsible for the day-to-day management and oversight of GSI projects. They are deeply involved at all points of the process, which makes them critical stakeholders because if they become disengaged or disenchanted, project progress can stall. It also means tools and support for GSI project execution provided by ComEd should be tailored to their needs. Operations and maintenance are primary concerns, as opposed to communications and PR, which are secondary.

High points (benefits, opportunities) in the process:

- When project is green-lit, excitement to have another tool to reduce flooding in their jurisdiction. Chance to promote to their network and residents.
- PR opportunity when project is complete, particularly as it relates to making sure residents know about reduced flooding impacts as a result.
- Professional development opportunity for operations and maintenance staff to gain familiarity with GSI projects and how to operate through participation in the process.

Low points (barriers, risks) in the process:

- Anxiety waiting for formal municipal or ComEd approvals needed to study feasibility and green-light project.
- Worry that their current staff won't understand the nuances of how to operate GSI installations or will feel overburdened by additional responsibilities.
- Value engineering, budget and installation challenges necessitate changes that reduce the project's resilience and effectiveness. Elicits long-term operations and maintenance concerns.

Recommendations for the audience:

- ComEd to conduct recurring GSI outreach to public works teams to familiarize them with GSI, its benefits and to build awareness.
- During the initial feasibility review period where ComEd and the municipality are assessing project viability and identifying funding, ComEd should provide resources to the municipality to speed the feasibility review and shorten the overall review period. This will help alleviate a negative perception that the waiting period brings.

- Support could be in the former of in-kind services by GSI experts who understand the approval process, ComEd needs and requirements.
- During the project development process, ComEd is to provide in-kind expertise to review design options to ensure that GSI project designs don't become downgraded below minimum effectiveness due to budget constraints. Coordinate with public works operations and maintenance teams to make sure they are comfortable with the process.

Large Private Landowner

Figure 6: Urban Overland Flooding © Ben Shorofsky

These individuals are responsible for stewarding large property, building and campus portfolios. Their allegiance is to their students (if an educational property), residents (if a residential property), their congregants (if a religious institution) or similar. They must maintain beautiful and functional grounds, which includes landscaped and natural areas. Avoiding flooding and reducing operational costs are primary concerns and in this regard, they are similar to city and public works leaders. They may be unaware of the potential for public-private partnerships from which their institutions might benefit.

High points (benefits, opportunities) in the process:

- PR opportunity when property is green-lit to announce innovative public-private partnership leading to a more beautiful property.

- When operational cost savings is predicted based on a specific design, budget planning for future years is positively impacted.
- PR opportunity when project is complete and open.

Low points (barriers, risks) in the process:

- Need to seek internal budget approval or fundraise to make the project viable.
- Worry their current staff won't understand the nuances of operating GSI installations.
- Value engineering, budget and installation challenges necessitate changes that reduce the project's resilience and effectiveness. Elicits long-term operations and maintenance concerns.
- Actual and perceived public-relations risk if project goes awry.

Recommendations for the audience:

- ComEd to conduct recurring GSI outreach to large private landowners' leadership teams to familiarize them with GSI, its benefits and build awareness.
- ComEd to provide in-kind services to help large private landowners identify third-party funding opportunities to increase the financial viability of project and alleviate stress (negative perceptions) for property management leadership when they try to identify funding sources. This includes facilitating the connection of private landowners to utility funding, as well as the specific identification of GSI grants.
- During the project development process, ComEd is to provide in-kind expertise to review design options to ensure that GSI project designs don't become downgraded below minimum effectiveness due to budget constraints. Coordinate with operations and maintenance teams to make sure they are looped into and comfortable with, the process. Consider providing training to O&M staff as well.

Detailed Customer Journey Maps are found in Appendix C.

7.0 POTENTIAL ENERGY IMPACT OF IMPROVING GSI IN CITIES

While GSI provides many benefits, the critical one for any ComEd incentive program is the potential energy savings. The potential energy savings calculations are detailed here as a range, depending on the scale of the GSI implementation.

Calculating Energy Savings from GSI

The team collected and analyzed the following data points for each municipality interviewed to calculate the potential energy savings from GSI, illustrated in Table 4 and Table 5 below.

- Percentage of Municipal Sewer Systems that are Combined or Separated
- Percentage of Municipal Land Area (acres)
- Percentage of Municipal Land Area (acres) that is Impervious Surface
- Average Annual Rainfall (gallons)

Table 4: Municipal Data

MUNICIPALITY	SEWER SYSTEM	CSS AREA	MUNICIPAL AREA (SQ ACRES)	AVERAGE IMPERVIOUS AREA
Aurora	Combined & Separated	25%	29,408	35%
Calumet City	Combined & Separated	75%	4,672	44%
Elgin	Combined & Separated	14%	24,282	40%
Evanston	Combined & Separated	95%	4,994	45%
Highland Park	Mostly Separated	1%	7,834	31%
Joliet	Combined & Separated	20%	41,664	35%
Niles	Combined & Separated	50%	7,283	57%
Waukegan	Mostly Separated	1%	14,778	37%
Wilmette	Combined & Separated	46%	3,464	36%
Source	*Interview Responses*	*Interview Responses*	*U.S. Census Bureau*	*National Land Cover Database*

Using average annual rainfall data, coupled with the total land area of the municipality that is impervious and has combined sewer systems, the total gallons of rainwater managed by GSI was calculated under three different implementation scenarios. Converting impervious surface to GSI prevents rainwater from entering sewers (and thus saves energy at WWTPs) and based upon our experience with municipal deployment, the three scenarios are described as followed:

Conservative	10 percent of impervious surface managed with GSI
Moderate	20 percent of impervious surface managed with GSI
Robust	30 percent of impervious surface managed with GSI

By applying TRM v7 and v8 savings coefficients, the project team estimated the potential range of claimable energy savings per municipality.[6, 7]

Table 5: Potential Annual Energy Savings Range (kWh/yr) TRM v7

MUNICIPALITY	ROBUST	MODERATE	CONSERVATIVE
Aurora	1,590,674	1,060,450	530,225
Calumet City	966,003	644,002	322,001
Elgin	841,452	560,968	280,484
Evanston	1,349,866	899,911	449,955
Highland Park	14,979	9,986	4,993
Joliet	1,802,880	1,201,920	600,960
Niles	1,304,022	869,348	434,674
Waukegan	33,882	22,588	11,294
Wilmette	364,276	242,850	121,425
TOTAL	8,268,033	5,512,022	2,756,011

[6] 2019 Illinois Statewide Technical Reference Manual (2019 TRM) for Energy Efficiency Version 7.0

[7] 2020 Illinois Statewide Technical Reference Manual (2020 TRM) for Energy Efficiency Version 8.0

Table 6: Potential Annual Energy Savings Range (kWh/yr) TRM v8

MUNICIPALITY	ROBUST	MODERATE	CONSERVATIVE
Aurora	1,590,674	1,060,450	530,225
Calumet City*	144,960	96,640	48,320
Elgin*	126,269	84,180	42,090
Evanston*	202,563	135,042	67,521
Highland Park	14,979	9,986	4,993
Joliet	1,802,880	1,201,920	600,960
Niles*	195,684	130,456	65,228
Waukegan	33,882	22,588	11,294
Wilmette*	54,664	36,442	18,221
TOTAL	4,166,554	2,777,702	1,388,851

*The municipalities within Cook County that are subject to the 10MW exemption in which ComEd can count only 15 percent of energy savings according to the TRM v8.

Full calculations are found in the spreadsheet in Appendix D.

With annual efficiency goals of 1,553,053,000 kWh per year, a GSI energy efficiency program with these nine initial municipalities has the potential to meet between 0.2 percent and 0.5 percent of the overall annual savings goal under v7 and 0.1 percent and 0.3 percent under v8. If the program continued to integrate additional municipalities, the energy savings achieved through GSI would also grow.

Implications of TRM Changes from v7 to v8

The change in the TRM between versions 7 and 8 result in a 50 percent reduction in energy savings potential among the early adopters, without strong outcomes-based justification and disproportionately penalizes potential energy savings measures like GSI that are best suited for the older systems found in Cook County. Like LED lighting, GSI is a distributed energy saving measure that is installed on sites throughout a community. While the energy savings accrue to community members through reduced peak energy demand at WWTPs, the intervention (and any financial incentive) is directed to the landowner where the measure is installed. This also means that the non-energy benefits discussed in the next section reach multiple residents throughout the community, not just the WWTP. As an example, in a future scenario where a GSI incentive program serves schools in northern Illinois, a school in Cook County that installs GSI in their parking lot would receive an incentive 85 percent lower than an equivalent school outside of Cook County. In this scenario, an individual school is penalized for a rule intended to impact institutions subject to the 10MW exemption.

8.0 NON-ENERGY IMPACTS OF IMPROVING GSI IN CITIES

Non-energy impacts (NEIs) are outcomes, positive or negative, associated with energy efficiency activities other than direct energy savings. More than 20 years of research and measurement of NEIs has provided increasingly robust and consistent test methodologies to inform portfolio decision-making. The literature on NEIs consists of more than 300 studies of various types and more than a dozen states currently include some NEI-related elements in their regulatory benefit-cost testing procedures.[8]

Fourteen non-energy impacts were considered for analysis and five were assessed by the Greenprint and ComEd teams to be highly relevant and feasible for inclusion in the study. For these calculations, the same Robust and Conservative scenarios were utilized to show the range of impacts. All calculations can be found in Appendix E.

Beautification

GSI often adds visible areas of plants, trees and natural materials to cities. These additions not only provide enjoyment for residents but have documented mental and physiological health benefits. Whether converting an asphalt parking lot to one with trees and permeable pavers, or installing green roofs visible to occupants in nearby buildings, or increasing the urban tree canopy, GSI makes people feel better about the places they live, work and play.

How is it measured?

- New Acres of Installed GSI

  Formula:

  New Acres of Installed GSI = {Municipal Area (Acres)} x {% Impervious} x {% Converted from Impervious to GSI} x {Loading Ratio}

- Percentage increase in Green Space

  Formula:

  Current Parks and Rec Green Space = {% of Land Used for Parks and Rec} * {Municipal Acres}

  New percentage of Community Green Acres = {Acres of Vegetated GSI + Current Parks and Rec Green Space} / Municipal Acres = Area of Installed GSI x Percentage Vegetated GSI

  Percentage Increase in Greenspace = [{New percentage of Community Green Acres} – {Current Parks and Rec Green Space}]/{Current Parks and Rec Green Space}

  Assumptions:

  50 percent of all GSI would be vegetated.

  Percentage of Land Used for Parks and Rec from Trust for Public Land Parkscore Data.[9]

[8] https://www.energyefficiencyforall.org/resources/non-energy-benefits-non-energy-impacts-nebs-neis-and-their-role-and-values/

[9] https://www.tpl.org/parkscore

Table 6: Potential Beautification Impacts

MUNICIPALITY	NEW ACRES OF INSTALLED GSI		PERCENTAGE INCREASE IN MUNICIPAL GREEN SPACE	
	ROBUST	CONSERVATIVE	ROBUST	CONSERVATIVE
Aurora	304	102	7.4%	2.5%
Calumet City	62	21	4.4%	1.5%
Elgin	288	96	9.9%	3.3%
Evanston	68	23	11.3%	3.8%
Highland Park	72	24	6.5%	2.2%
Joliet	431	144	7.4%	2.5%
Niles	125	42	12.2%	4.1%
Waukegan	162	54	6.1%	2.0%
Wilmette	38	13	9.1%	3.0%
Total	1,550	519	-	-

Pollinator and Wildlife Habitat

GSI has many ecological benefits, including increasing wildlife habitat and biodiversity. When incorporating native vegetation, GSI provides food and protection to ecologically important bird and insect pollinator species.[10] GSI can also provide wildlife new habitat and corridors for migration, thereby increasing opportunities for residents to interact with nature in a positive way.[11]

How is it measured?

- Acres of Vegetated GSI

  Formula:

  Acres of Vegetated GSI = {Area of Installed GSI} x {Percentage Vegetated GSI}

  Assumptions:

  50 percent of all GSI would be vegetated.

[10] http://www.wildlifehc.org/wp-content/uploads/2017/10/WHC-White-Paper_Green-Infrastructure_web.pdf

[11] https://www.epa.gov/green-infrastructure/benefits-green-infrastructure#habitatandwildlife

Table 7: Potential Pollinator and Wildlife Habitat Impacts

MUNICIPALITY	NEW ACRES OF VEGETATED GSI		PERCENTAGE INCREASE IN MUNICIPAL GREEN SPACE	
	ROBUST	CONSERVATIVE	ROBUST	CONSERVATIVE
Aurora	152	51	7.4%	2.5%
Calumet City	31	10	4.4%	1.5%
Elgin	144	48	9.9%	3.3%
Evanston	34	11	11.3%	3.8%
Highland Park	36	12	6.5%	2.2%
Joliet	216	72	7.4%	2.5%
Niles	62	21	12.2%	4.1%
Waukegan	81	27	6.1%	2.0%
Wilmette	19	6	9.1%	3.0%
Total	775	258	-	-

Public Use

GSI can increase the amount of green space by creating more publicly available recreation areas. This, in turn, encourages outdoor physical activity for residents and reduces health risks. Additionally, permeable pavements can reduce noise pollution by damping traffic, train and plane noise.[12] GSI such as green roofs provide opportunities for urban agriculture and other forms of engagement.[13]

[12] https://www.epa.gov/green-infrastructure/benefits-green-infrastructure#communities

[13] https://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

How is it measured?

- Increased User-Days of Green Space (over 40 years)

  Formula:

  Increased User-Days = {27,650 user days over 40 years} X [{Population Density of Municipality} / {Philadelphia Population Density}] X {Acres of Vegetated GSI}

  Assumptions:

  50 percent of all GSI would be vegetated.

  1 additional vegetated acre provides approximately 27,650 user days over a 40-year period in Philadelphia.[14]

  Population Density of a Municipality impacts user days over a 40-year period.

Table 8: Potential Public Use Impacts

INCREASED USER-DAYS OF GREEN SPACE OVER 40 YEARS		
MUNICIPALITY	**ROBUST**	**CONSERVATIVE**
Aurora	1,697,358	565,786
Calumet City	401,898	133,966
Elgin	1,086,535	362,178
Evanston	828,727	276,242
Highland Park	222,619	74,206
Joliet	1,259,392	419,797
Niles	410,743	136,914
Waukegan	782,124	260,708
Wilmette	244,959	81,653
Total	6,934,354	2,311,451

[14] Stratus Consulting, Inc. (2009). "A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds: Final Report." Prepared for the Office of Watersheds, City of Philadelphia Water Department, Philadelphia, PA. Boulder, CO.

Economic Development

Economic Impacts of increased GSI implementation are calculated in two ways based upon industry standards. First, the increase in user days of green space is converted to an economic generation value utilizing available methods described below.[15] Adding GSI such as tree canopy can increase (or stabilize) property values as well, which benefits homeowners and municipalities as proximity to green space is considered of value. To identify the impact of this increase, a 3.5 percent increase was assumed based on averages of available models.

How is it measured?

- Economic Value of Green Space Usage ($ over 40 years)

  Formula:

  Economic Value of Usage = $0.71 X {Increased User-Days}

  Assumptions:

  1 user-day provides ~$0.71 in present value for 40-year project period.[16]

- Created Economic Value in Housing ($)

  Formula:

  Housing Units Impacted by GSI = [{Acres of Installed GSI} / {Municipal Area}]*{# of Housing Units}

  Created Economic Value in Housing = {Housing Units Impacted by GSI} X {Median Home Value} X {Property Value Increase to Adjacent Properties from GSI}

  Assumptions:

  Housing Units Impacted by GSI is directly proportional to the percentage of the municipality impacted by GSI.

  Property Values will increase between 2 and 10 percent from GSI Implementation depending on installation.[17] A conservative 3.5 percent was used.

[15] https://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

[16] https://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

[17] https://www.cnt.org/sites/default/files/publications/CNT_Value-of-Green-Infrastructure.pdf

Table 9: Potential Economic Development Impacts

MUNICIPALITY	ECONOMIC VALUE OF GREEN SPACE USAGE ($ OVER 40 YEARS)		CREATED ECONOMIC VALUE IN HOUSING ($)	
	ROBUST	CONSERVATIVE	ROBUST	CONSERVATIVE
Aurora	$1,205,124	$401,708	$3,873,453	$1,291,151
Calumet City	$285,348	$95,116	$631,574	$210,525
Elgin	$771,440	$257,147	$2,548,499	$849,500
Evanston	$588,396	$196,132	$6,776,304	$2,258,768
Highland Park	$158,059	$52,686	$2,112,543	$704,181
Joliet	$894,168	$298,056	$2,856,177	$952,059
Niles	$291,628	$97,209	$1,744,218	$581,406
Waukegan	$555,308	$185,103	$1,347,509	$449,170
Wilmette	$173,921	$57,974	$2,424,277	$808,092
Total	$4,923,392	$1,641,131	$24,314,553	$8,104,851

Crime Reduction

Studies have linked GSI to decreased crime. For example, a study by the U.S. Forest Service compared Philadelphia GSI sites with non-GSI control sites and found a significant decrease in crime. Researchers believe that since GSI increases public green spaces and people tend to frequent these and they are maintained by government officials, the result is a decrease in criminal activity in those areas .[18]

How is it measured?

- Percentage decrease in Community Crime

  Formula:

  Percentage decrease = 10 percent Reduction X {Implementation Scenario Percentage}

  Assumptions:

  Overall crime will reduce approximately 10 percent in nearby properties.[19]

  Nearby property is directly related to the percentage of the municipality managed by GSI.

[18] https://www.vibrantcitieslab.com/case-studies/a-water-department-reduces-crime/

[19] https://www.pnas.org/content/115/12/2946.long

Table 10: Potential Community Crime Reduction Impacts

SCENARIO	% DECREASE IN COMMUNITY CRIME
Robust (30%)	3%
Moderate (20%)	2%
Conservative (10%)	1%

9.0 NEXT STEPS AND RECOMMENDATIONS

Next Steps

- Investigate Viability of Incentive: Conduct a follow-up study to determine the potential incentive structures that ComEd could offer in a cost-effective way and determine if these potential incentives would influence municipal decisions to invest in GSI.

- Modify the Statewide TRM to allow GSI as a Measure: Work with Illinois electric utilities and Stakeholder Advisory Group to pursue formal adoption of GSI as an approved measure within the Illinois TRM to ensure savings can be claimed.

- Understand GSI Program Best Practices: Conduct a follow-up study to understand which types of GSI program structures are in use across the country and work with local municipalities to analyze which would be most beneficial to cities in ComEd territory.

- Invest in a Program Pilot: Consider piloting a GSI incentive program with a subset of interviewed municipalities.

GSI Program Structure, Goals and Benefits

If ComEd elects to pursue further research into GSI as a potential energy efficiency measure and ultimately invest in a pilot, there are several key insights gathered from the municipal interviews that should shape program design. These insights are summarized below.

- Educate Stakeholders:
    - The GSI program should provide clear and consistent educational materials to explain GSI to municipal elected officials, staff, landowners and residents. Experts well-versed in explaining GSI's benefits should perform regular outreach.
    - Discuss cost upfront with all stakeholders. It is critical to preemptively address concerns about long-term maintenance requirements and associated costs, otherwise program uptake will suffer.
    - Provide education and training to municipal staff who interface with residents so they can explain the benefits of GSI when questions arise.
- Act as GSI Convener: Every town has at least one GSI champion already, but they are largely tackling this alone. The ComEd GSI program framework should serve as a repository and connector to GSI best practices and resources across the region.
    - ComEd will be seen as innovative and also leverage existing but fragmented resources, such as EPA grants and local watershed groups.
    - The program could offer GSI participants connection to greater resources (and incentive to participate) than ComEd alone could reasonably provide.
- Provide Funding: By far, the number one barrier to GSI implementation is cost.
    - Offer gap funding to municipalities to upgrade typical infrastructure projects to full GSI projects. This can be critical to prevent value engineering when there is a budget shortfall.
    - Fund the GSI portion of commercial property redevelopment projects in economically depressed areas.
    - Provide matching incentive funds in cases where multiple funding sources, such as TIF funds and grants, can be bundled.
- Provide In-kind Support:
    - During initial feasibility review when ComEd, the municipality and private landowners are collectively assessing viability and identifying funding, ComEd provides support from GSI experts (who understand the process and requirements) to speed the feasibility and review periods.
    - During the project development process, ComEd to provide experts to review potential project sites and design options to ensure that GSI project achieves desired effectiveness, even with budget constraints, similar to the ComEd New Construction incentive program. Coordinate with maintenance and operations teams to make sure they are aligned.

Framing, Voice and Communications

GSI must be simply positioned to make audience engagement strong. While energy savings at WWTPs is the prime interest for ComEd, it is an unnecessary distraction to discuss it in this context. The program must be framed to address existing pain points of stakeholders only.

- Program purpose:
    - When communicating with municipalities, position and market the GSI program as a flood alleviation program, which is the biggest pain point all parties interviewed noted. Secondary benefits include beautification and economic development.
- Consistent terminology:
    - Language used for GSI demonstrated that across interviewees, there are different meanings for the same word or phrase. Simple, accessible language is required.
- Resident and local group focus:
    - Resident awareness of GSI is a barrier/concern for some municipalities; vocal residents have a strong influence on local infrastructure investments, so they need to understand the value of GSI and what it looks like to support it.
    - Local advocacy groups are a more focused extension of residents and often connected to municipal leaders. They can be an important partner in building public support.
- Help municipalities maximize public relations opportunities
    - During a GSI project there are several points at which municipal leaders and private landowners can have a PR moment to build public support.
    - Provide PR materials and talking points. Streamline and reduce the work required of municipalities in this area by bringing the materials to them rather than having to research and develop on their own. Consider providing in-kind PR support to maximize positive perceptions of the projects for ComEd and the municipality.

10.0 APPENDICES

Appendix A: Data Sources & Scoring Tool

The project team researched publicly available data points on the 363 municipalities in ComEd territory to assess the potential for GSI interest and applicability. To prioritize the list of interview candidates, the team built a scoring tool to organize and weigh the criteria. A summary of that data and scoring tool is shown in this appendix.

Data Sources

DATA POINT	SOURCE	LINK
Municipal population	2017 US Census	https://www.illinois-demographics.com/cities_by_population
Municipality has combined sewer system	US EPA / ArcGIS	https://www.arcgis.com/home/webmap/viewer.html?webmap=004909c6679a4289b629a1c26278224c
Flood Susceptibility Index score	CMAP	https://www.cmap.illinois.gov/programs/water/stormwater/flood-index
Municipality has a combined sewer outfall in its boundary	US EPA MWRD / ArcGIS	https://www.epa.gov/npdes/combined-sewer-overflows-great-lakes-basin https://www.arcgis.com/home/webmap/viewer.html?webmap=756e5356baff4a74898e97f571e9d58c
Annual number of combined sewer overflow events	US EPA / ArcGIS MWRD MWRD	https://www.arcgis.com/home/item.html?id=9598ac2082284bf284c6edbc273f5caa http://geohub.mwrd.org/pages/cso http://apps.mwrd.org/csoreports/
Municipal stormwater fee	Western Kentucky University 2018 Study	https://www.wku.edu/seas/undergradprogramdescription/swusurvey2018.pdf
Municipality wastewater treatment plant energy use	US EPA / ArcGIS	http://www.arcgis.com/home/webmap/viewer.html?url=https%3A%2F%2Fgeodata.epa.gov%2Farcgis%2Frest%2Fservices%2FOEI%2FFRS_Wastewater%2FMapServer&source=sd

Scoring Tool

Total Weighted Score	Municipality	Pop	Sewer System Type	Flood Susceptibility			CSO Outfall in Boundary			# CSO Events Occurring			Stormwater Fee			WWTP Energy	
				Index Score (1-10)	Raw Score	Wgt Score	Y/N	Raw Score	Wgt Score	# Events	Raw Score	Wgt Score	Fee ($) /mo/ home	Raw Score	Wgt Score	Raw Score	Wgt Score
210	Aurora	200,946	C & S	8	100	60	Y	100	20	16	100	30	3.45	100	100	0	0
200	Highland Park	29,796	C & S	3	50	30	N	50	10	NA	0	0	6.00	100	100	100	60
195	Arlington Heights	75,911	C & S	9	100	60	Y	100	20	1	50	15	6.25	100	100	0	0
195	Park Ridge	37,810	C & S	10	100	60	Y	100	20	4	50	15	2.75	100	100	0	0
190	Elgin	112,628	C & S	8	100	60	Y	100	20	13	100	30	NA	50	50	50	30
190	Des Plaines	58,805	C & S	7	75	45	Y	100	20	1	50	15	NA	50	50	100	60
165	Waukegan	87,999	C & S	7	75	45	N	50	10	NA	0	0	NA	50	50	100	60
160	Evanston	75,557	C & S	8	100	60	Y	100	20	14	100	30	NA	50	50	0	0
160	Joliet	148,172	C & S	9	100	60	Y	100	20	13	100	30	NA	50	50	0	0
155	Wheeling	38,264	C & S	6	75	45	N	50	10	NA	0	0	2	100	100	0	0
152.5	Calumet City	37,091	C & S	9	100	60	Y	100	20	7	75	22.5	NA	50	50	0	0
152.5	Harvey	25,685	C & S	8	100	60	Y	100	20	7	75	22.5	NA	50	50	0	0
152.5	Niles	29,823	C & S	9	100	60	Y	100	20	10	75	22.5	NA	50	50	0	0
145	Wilmette	27,393	C & S	8	100	60	Y	100	20	1	50	15	NA	50	50	0	0
175	Glen Ellyn	27,983	C	6	75	45	Y	100	20	unk	100	30	NA	50	50	50	30
130	Lansing	28,308	C & S	5	75	45	Y	100	20	1	50	15	NA	50	50	0	0
130	Melrose Park	25,447	C & S	7	75	45	Y	100	20	1	50	15	NA	50	50	0	0

120	Cicero	83,735	C	10	100	60	N	50	10	NA	0	0	NA	50	50	0	0
120	North Chicago	30,013	C	7	75	45	N	50	10	NA	0	0	NA	50	50	25	15
120	Berwyn	56,367	C	10	100	60	N	50	10	NA	0	0	NA	50	50	0	0
120	Oak Park	52,229	C	10	100	60	N	50	10	NA	0	0	NA	50	50	0	0
145	Addison	37,104	C & S	7	75	45	Y	100	20	unk	100	30	NA	50	50	0	0
145	Lombard	43,776	C	7	75	45	Y	100	20	unk	100	30	NA	50	50	0	0
105	Carol Stream	40,231	C	5	75	45	N	50	10	NA	0	0	NA	50	50	0	0
105	Lockport	25,198	C & S	5	75	45	N	50	10	NA	0	0	NA	50	50	0	0
105	Oswego	33,759	C	3	50	30	N	50	10	NA	0	0	NA	50	50	25	15
105	Elk Grove	33,180	C & S	7	75	45	N	50	10	NA	0	0	NA	50	50	0	0
105	Mundelein	31,786	C	6	75	45	N	50	10	NA	0	0	NA	50	50	0	0
90	Algonquin	30,664	C	4	50	30	N	50	10	NA	0	0	NA	50	50	0	0
90	Naperville	146,431	C	4	50	30	N	50	10	NA	0	0	NA	50	50	0	0
90	New Lenox	25,701	C	4	50	30	N	50	10	NA	0	0	NA	50	50	0	0
90	Gurnee	30,971	C	4	50	30	N	50	10	NA	0	0	NA	50	50	0	0
100	Mount Prospect	54,493	C & S	NA	0	0	Y	100	20	unk	100	30	NA	50	50	0	0
100	Pekin	33,747	C	NA	0	0	Y	100	20	unk	100	30	NA	50	50	0	0
60	Dekalb	43,141	C & S	NA	0	0	N	50	10	NA	0	0	NA	50	50	0	0

Appendix B: Green Stormwater Infrastructure (GSI) Primer

The team developed a high-level primer of the GSI Feasibility Study (Phase 1) to introduce potential interviewees to the project. The primer was the same for each municipality, as is shown in this example for the City of Highland Park.

Connecting Wastewater Treatment Plants and Energy Usage

Background

On average, wastewater treatment plants (WWTPs) account for one-third of a municipality's electricity expenditures. If stormwater is prevented from reaching the WWTP, the municipality can avoid the energy costs to treat it.

Green stormwater infrastructure (GSI) is the use of natural systems to manage water where it falls; it is a supplement to traditional sewers. Examples of GSI: green roofs, rain gardens and permeable pavement.

Informational Interview

Highland Park is one of ten Illinois municipalities, served by ComEd, identified to discuss GSI efforts. Greenprint Partners, on behalf of ComEd, is requesting a 90-minute informational interview with stormwater leadership to learn the history of Highland Park in pursuing GSI and limitations to implementing it. Participation in the interview process is voluntary and will contribute to a research report which will inform ComEd of their municipal customers' interest in this topic area through three key findings:

1. Current barriers to the adoption of GSI projects by municipalities.
2. The energy savings potential from GSI.
3. The likelihood that ComEd GSI incentive funding or program support may influence municipalities' decisions.

How Highland Park Will Benefit from Participating

Greenprint will provide a complementary analysis of Highland Park's GSI opportunities to determine energy saving potential and other benefits. A comprehensive report of these anonymized findings will be submitted to ComEd. Should ComEd further develop a municipal energy savings program, Highland Park may be able to participate in a pilot program.

Participating Municipalities

The informational interview phase of this research includes eleven municipalities each with high potential to benefit from GSI improvements.

ComEd's Stormwater Expert

Greenprint Partners is a green infrastructure delivery partner that helps cities achieve high-impact, community-driven stormwater solutions at scale. Its mission-driven team of project managers, community organizers, landscape architects, engineers and finance professionals are dedicated to helping communities get the most good out of green infrastructure.

Example GSI Projects

- Green Roofs/Living Walls
- Bioswales/Bioretention
- Pervious/Permeable Pavements
- Urban Tree Canopies/Planter Boxes
- Rain Gardens/Rainwater Harvesting
- Native Plant Selections

Appendix C: Customer Journey Mapping

Understanding stakeholders involved with Green Stormwater Infrastructure in cities

The GSI Pilot team developed customer journey maps (CJMs) to help ComEd envision how a future program could deepen relationships with ratepayers (both municipalities and landowners). These CJMs highlight critical issues and demonstrate how ComEd might strengthen relationships with municipalities and their local water utilities. Aligned with the project interviewees, three different potential customer types were identified (City Leadership, Public Works /Water Utility, Large Private Landowner) and their journeys mapped. The journey of each customer type is shown below.

City Leadership

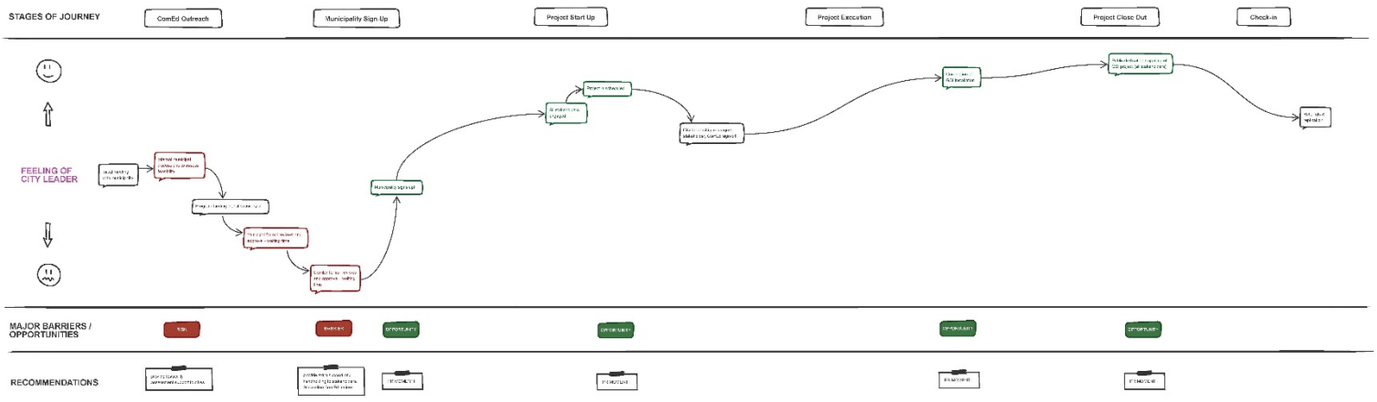
Overall, city leadership interacts with GSI projects only at a few high-level touchpoints, including identifying funding for projects, giving their approval for city staff to execute, signing off on the completed work and PR communications. They will get involved pre-project to align funding and then again when the project is complete, when dedications and other close-out PR opportunities present themselves.

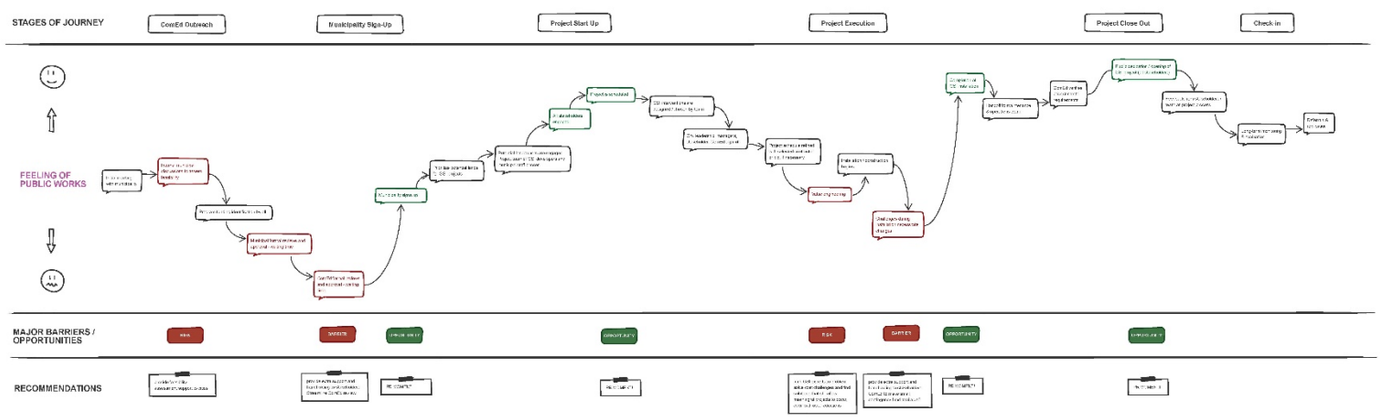
Public Work / Water Utility

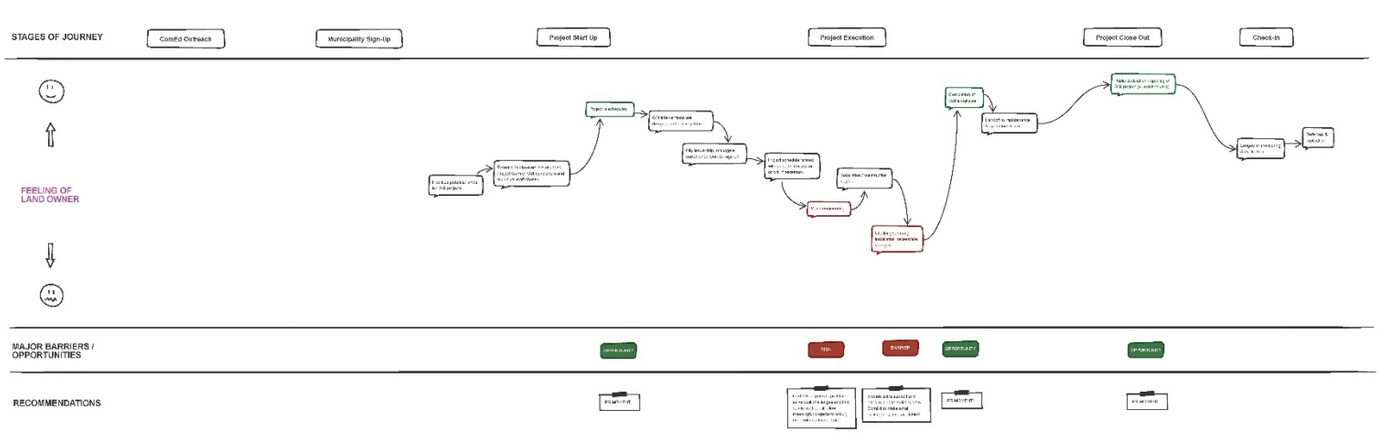
These individuals are largely responsible for the day-to-day management and oversight of GSI projects. They are deeply involved at all points of the process, which makes them critical stakeholders because if they become disengaged or disenchanted, project progress can stall. It also means tools and support for GSI project execution provided by ComEd should be tailored to their needs. Operations and maintenance are primary concerns, as opposed to communications and PR, which are secondary.

Large Landowners

These individuals and organizations are often ideal targets for GSI retrofits. They are responsible for stewarding large properties, buildings and campus portfolios. Their allegiance is to their students (if an educational property), residents (if a residential property), their congregants (if a religious institution) or similar. They must maintain beautiful and functional grounds, which includes landscaped and natural areas. Avoiding flooding and reducing operational costs are primary concerns and in this regard they are similar to city and public works leaders. They may be unaware of the potential for public-private partnerships from which their institutions might benefit.







Appendix D: Energy Impact Analysis

This section covers the potential GSI energy savings data and calculations for the nine municipalities.

Data was collected on each municipality's:

- sewer system type (combined or separated)
- linear mileage of their combined and separate sewers
- the percentage of CSS
- city area (acres)

Percentage of impervious surfaces (calculated using the National Land Cover Database (NLCD) and the Multi-Resolution Land Characteristics (MRLC) consortium)

The potential gallons of stormwater managed by GSI and the resulting energy savings, were calculated using average annual rainfall, impervious municipal land area and percentage of combined sewer system.

Potential Annual Energy Savings (kWh/yr) and Stormwater Managed (gal)

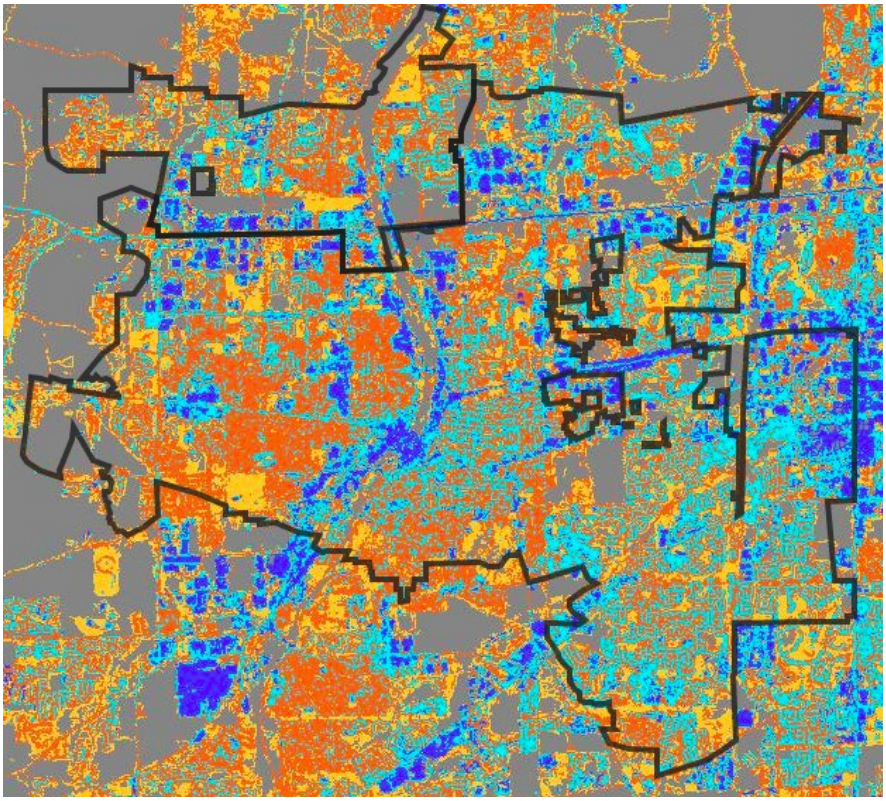
CITY	POTENTIAL ANNUAL ENERGY SAVINGS RANGE (KWH/YR)				POTENTIAL ANNUAL STORMWATER MANAGED (GAL)	
	TRM V7		TRM V8			
	ROBUST	CONSERVATIVE	ROBUST	CONSERVATIVE	ROBUST	CONSERVATIVE
Aurora	1,590,674	530,225	1,590,674	530,225	652,182,982	217,394,327
Calumet City*	966,003	322,001	144,960	48,320	396,065,168	132,021,723
Elgin*	841,452	280,484	126,269	42,090	344,998,599	114,999,533
Evanston*	1,349,866	449,955	202,563	67,521	553,450,564	184,483,521
Highland Park	14,979	4,993	14,979	4,993	6,141,348	2,047,116
Joliet	1,802,880	600,960	1,802,880	600,960	739,188,024	246,396,008
Niles*	1,304,022	434,674	195,684	65,228	534,654,489	178,218,163
Waukegan	33,882	11,294	33,882	11,294	13,891,686	4,630,562
Wilmette*	364,276	121,425	54,664	18,221	149,354,473	49,784,824
Total	**8,268,033**	**2,756,011**	**4,166,554**	**1,388,851**	**3,389,927,331**	**1,129,975,777**

*The cities within Cook County that are subject to the 10MW exemption in which ComEd can count only 15 percent of energy savings according to the TRM v8.

Aurora

POPULATION	199,602
SEWER TYPE	Combined & Separated
CSS	25%
SSS	75%
CITY AREA (ACRES)	29,408
PERCENTAGE IMPERVIOUS AREA	35%
PERCENTAGE IMPERVIOUS AREA RANGE	20-49%

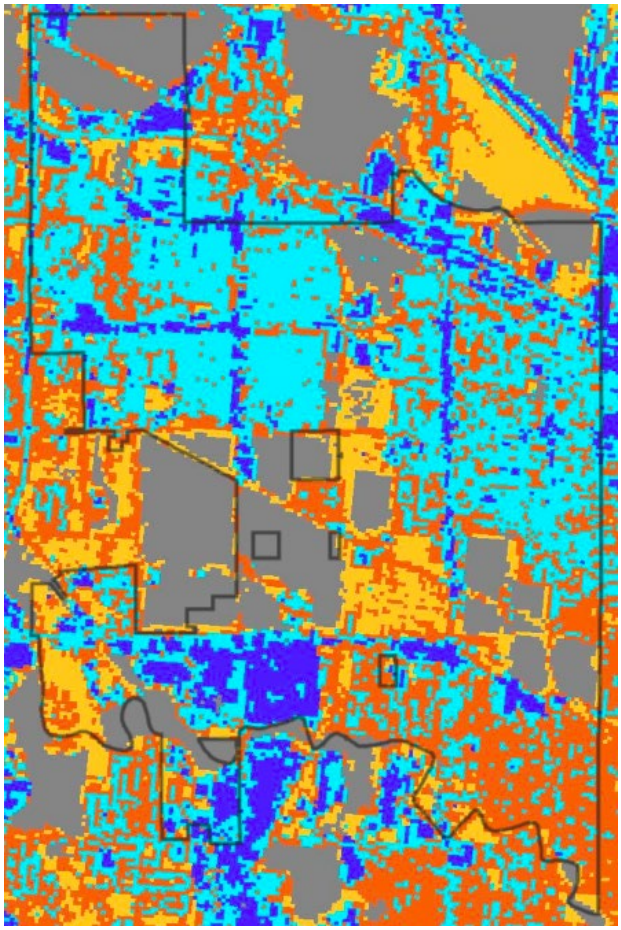
SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr)- TRM v7	1,590,674	1,060,450	530,225
Annual Energy Savings (kWh/yr) - TRM v8	1,590,674	1,060,450	530,225
Potential Annual Gallons Managed	652,182,982	434,788,655	217,394,327



Calumet City

POPULATION	37,091
SEWER TYPE	Combined & Separated
CSS	75%
SSS	25%
CITY AREA (ACRES)	4,672
% IMPERVIOUS AREA	44%
% IMPERVIOUS AREA RANGE	50-79%

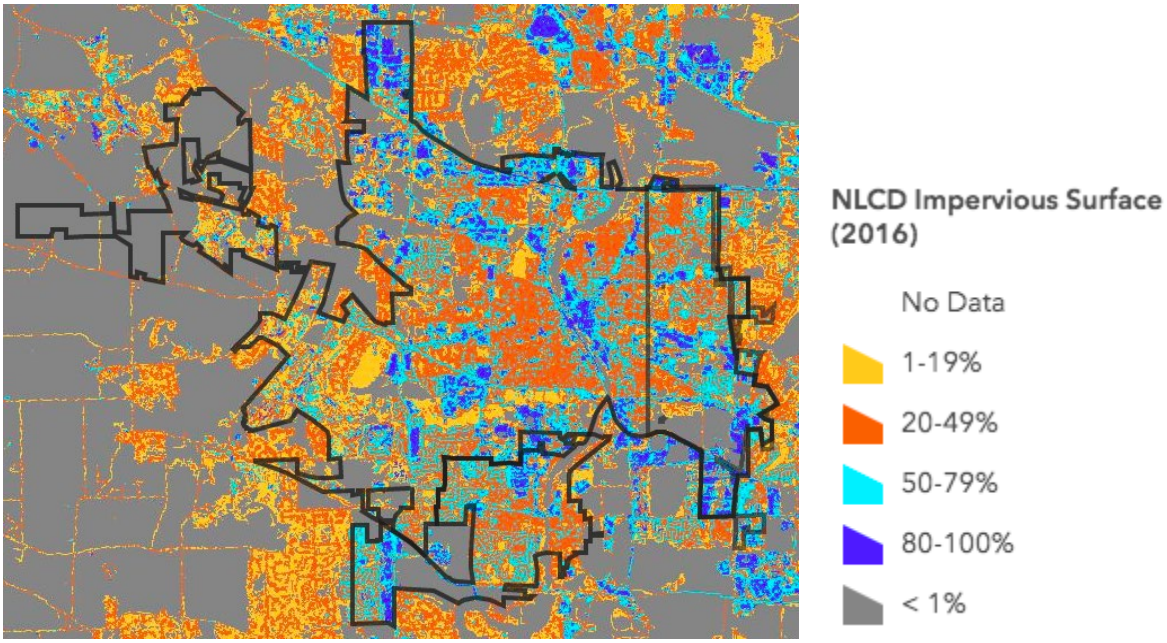
SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr)- TRM v7	966,003	644,002	322,001
Annual Energy Savings (kWh/yr) - TRM v8	144,960	96,640	48,320
Potential Annual Gallons Managed	396,065,168	264,043,445	132,021,723



Elgin

POPULATION	111,683
SEWER TYPE	Combined & Separated
CSS	14%
SSS	86%
CITY AREA (ACRES)	24,282
% IMPERVIOUS AREA	40%
% IMPERVIOUS AREA RANGE	20-49%

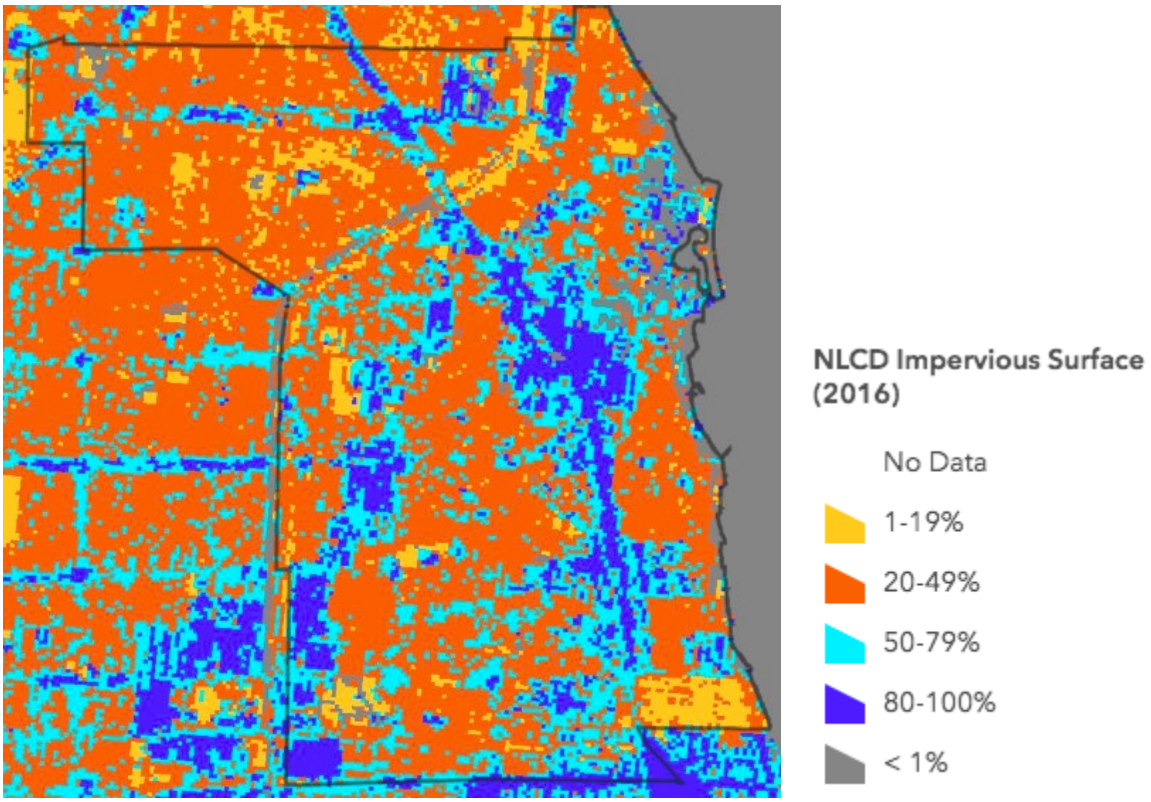
SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr)- TRM v7	841,452	560,968	280,484
Annual Energy Savings (kWh/yr) - TRM v8	126,269	84,180	42,090
Potential Annual Gallons Managed	344,998,599	229,999,066	114,999,533



Evanston

POPULATION	74,106
SEWER TYPE	Combined & Separated
CSS	95%
SSS	5%
CITY AREA (ACRES)	4,994
% IMPERVIOUS AREA	45%
% IMPERVIOUS AREA RANGE	20-49%

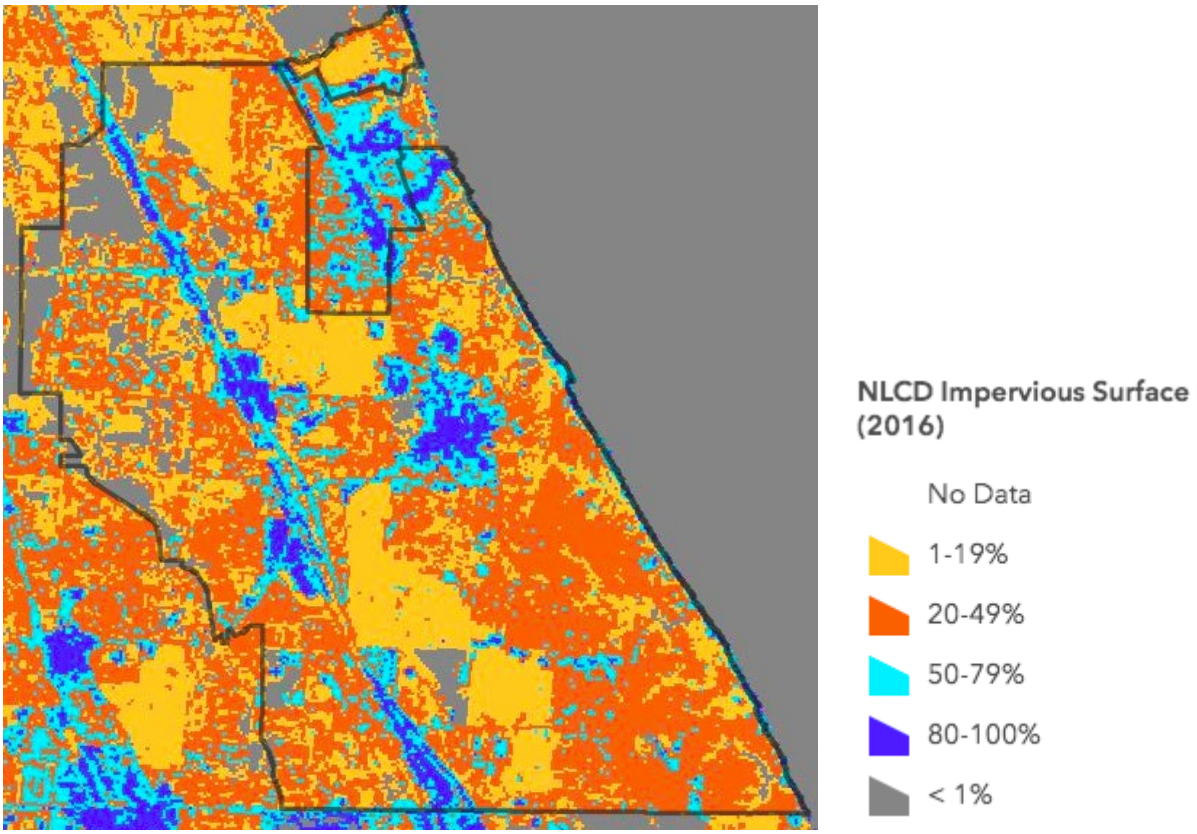
SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr) - TRM	1,349,866	899,911	449,955
Annual Energy Savings (kWh/yr) - TRM	202,563	135,042	67,521
Potential Annual Gallons Managed	553,450,564	368,967,042	184,483,521



Highland Park

POPULATION	29,622
SEWER TYPE	Mostly Separated
CSS	1%
SSS	99%
CITY AREA (ACRES)	7,834
% IMPERVIOUS AREA	31%
% IMPERVIOUS AREA RANGE	20-49%

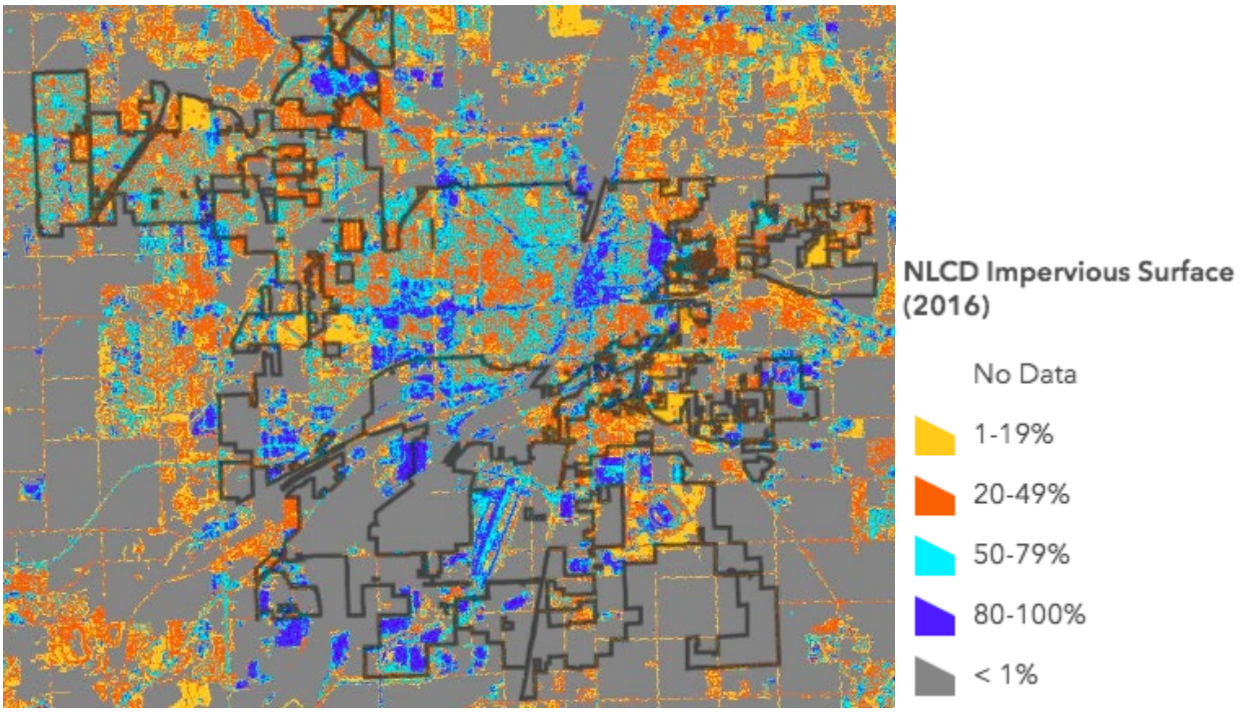
SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr) - TRM v7	14,979	9,986	4,993
Annual Energy Savings (kWh/yr) - TRM v8	14,979	9,986	4,993
Potential Annual Gallons Managed	6,141,348	4,094,232	2,047,116



Joliet

POPULATION	148,099
SEWER TYPE	Combined & Separated
CSS	20%
SSS	80%
CITY AREA (ACRES)	41,664
% IMPERVIOUS AREA	35%
% IMPERVIOUS AREA RANGE	20-49%

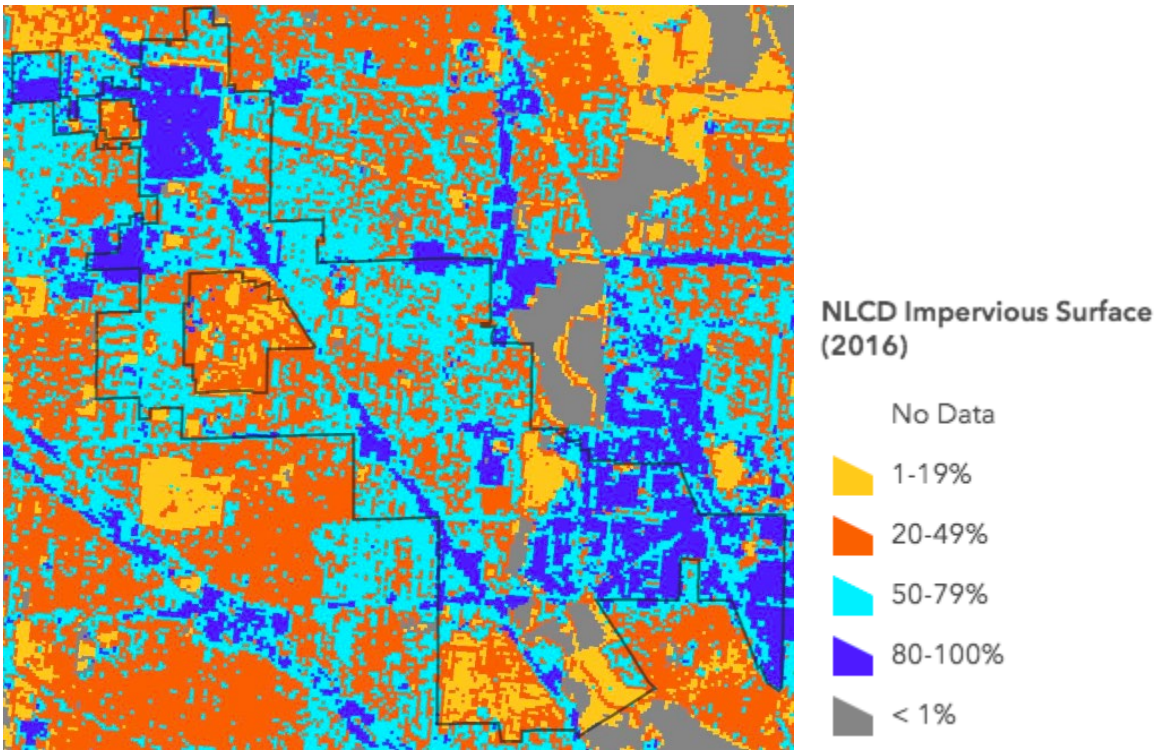
SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr) - TRM v7	1,802,880	1,201,920	600,960
Annual Energy Savings (kWh/yr) - TRM v8	1,802,880	1,201,920	600,960
Potential Annual Gallons Managed	739,188,024	492,792,016	246,396,008



Niles

POPULATION	29,184
SEWER TYPE	Combined & Separated
CSS	50%
SSS	50%
CITY AREA (ACRES)	7,283
% IMPERVIOUS AREA	57%
% IMPERVIOUS AREA RANGE	50-79%

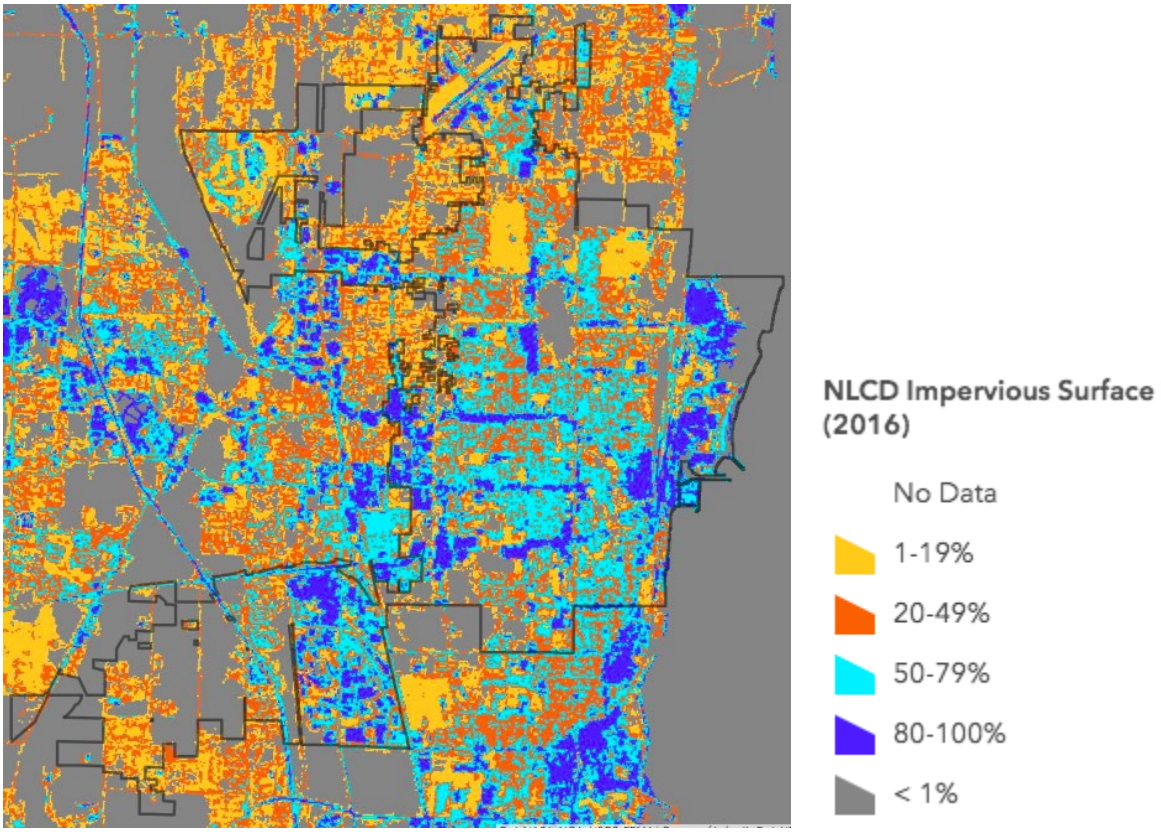
SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr) - TRM	1,304,022	869,348	434,674
Annual Energy Savings (kWh/yr) - TRM	195,684	130,456	65,228
Potential Annual Gallons Managed	534,654,489	356,436,326	178,218,163



Waukegan

POPULATION	86,792
SEWER TYPE	Mostly Separated
COMBINED SEWERS (MILES)	1%
SEPARATED SEWERS (MILES)	99%
CITY AREA (ACRES)	14,778
% IMPERVIOUS AREA	37%
% IMPERVIOUS AREA RANGE	20-49%

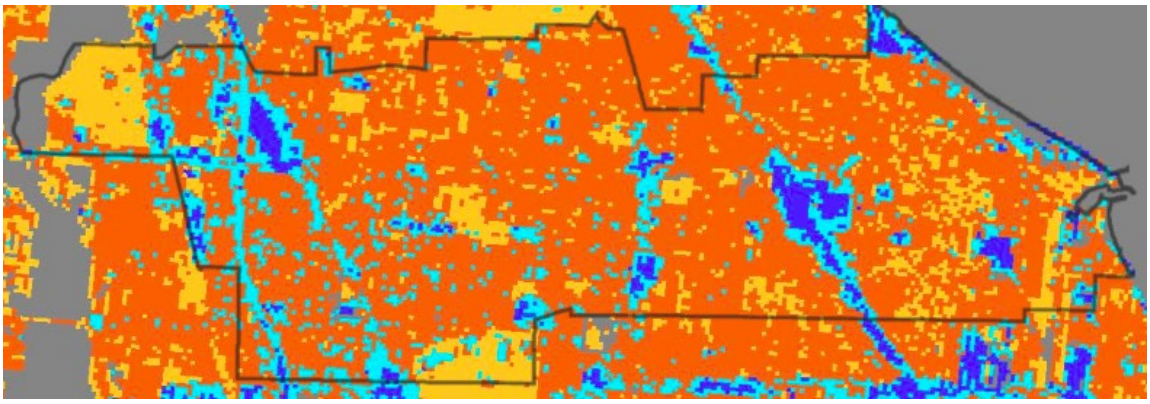
SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr) - TRM v7	33,882	22,588	11,294
Annual Energy Savings (kWh/yr) - TRM v8	33,882	22,588	11,294
Potential Annual Gallons Managed	13,891,686	9,261,124	4,630,562



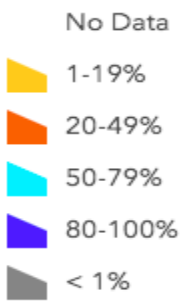
Wilmette

POPULATION	27,265
SEWER TYPE	Combined & Separated
CSS	46%
SSS	54%
CITY AREA (ACRES)	3,464
PERCENTAGE IMPERVIOUS AREA	36%
PERCENTAGE IMPERVIOUS AREA RANGE	20-49%

SCENARIO	ROBUST	AVERAGE	CONSERVATIVE
Annual Energy Savings (kWh/yr) - TRM v7	364,276	242,850	121,425
Annual Energy Savings (kWh/yr) - TRM v8	54,664	36,442	18,221
Potential Annual Gallons Managed	149,354,473	99,569,649	49,784,824



NLCD Impervious Surface (2016)



Appendix E: Non-Energy Impact Analysis

MUNICIPALITY	PERCENTAGE OF RESIDENTS WITHIN 10 MIN OF A PARK/ RECREATIONAL AREA	PERCENTAGE OF LAND USED FOR PARKS AND RECREATION	PERCENTAGE IMPERVIOUS SURFACE	PERCDENTAGE VEGETATED GSI	LOADING RATES (XX:1)	POPULATION DENSITY (PPL/ACRE)	MEDIAN HOME VALUE (OWNER OCCUPIED)	# OF HOUSEHOLDS
Aurora	85%	7%	35%	50%	10	6.8	$170,800	62,604
Calumet City	94%	15%	44%	50%	10	7.9	$101,100	13,534
Elgin	71%	6%	40%	50%	10	4.6	$171,200	35,919
Evanston	100%	6%	45%	50%	10	14.8	$367,300	38,727
Highland Park	92%	7%	31%	50%	10	3.8	$574,100	11,494
Joliet	80%	7%	35%	50%	10	3.6	$165,600	47,612
Niles	86%	7%	57%	50%	10	4.0	$265,900	10,941
Waukegan	85%	9%	37%	50%	10	5.9	$120,300	29,179
Wilmette	96%	6%	37%	50%	10	7.9	$659,200	9,609
Source	https://www.tpl.org/parkscore	https://www.tpl.org/parkscore	National Land Cover Database	Assumption	Assumptions	https://www.census.gov/quickfacts/	https://www.census.gov/quickfacts/	https://www.census.gov/quickfacts/

Aurora

CURRENT PERCENTAGE OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	85%
PERCENTAGE OF LAND USED FOR PARKS AND RECREATION	7%
CITY AREA (ACRES)	29,408
CURRENT PARKS AND REC GREEN SPACE	2,059
PERCENTAGE IMPERVIOUS	35%
PERCENTAGE OF GSI ASSUMED TO BE VEGETATED	50%
POPULATION DENSITY (POP/ACRE)	6.8
MEDIAN HOME VALUE	$170,800
# OF HOUSING UNITS	62,604
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

DEPLOYMENT LEVEL	ROBUST	CONSERVATIVE
Percentage Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	3,044	1,015
Area of Installed GSI	304.4	101.5
Acres of Vegetated GSI	152.2	50.7
Increased User-Days of Green Space	1,697,358	565,786
Economic Value of Usage (over 40 years)	$1,205,124	$401,708
New Percent of Community Green Acres	7.5%	7.2%
Percentage Increase in Green Space	7.4%	2.5%
Housing Units Impacted by GSI Implementation	648	216
Created Economic Value in Housing	$3,873,453	$1,291,151

Calumet City

CURRENT % OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	94%
% OF LAND USED FOR PARKS AND RECREATION	15%
CITY AREA (ACRES)	4,672
CURRENT PARKS AND REC GREEN SPACE	701
% IMPERVIOUS	44%
% OF GSI ASSUMED TO BE VEGETATED	50%
POPULATION DENSITY (POP/ACRE)	7.9
MEDIAN HOME VALUE	$101,100
# OF HOUSING UNITS	13,534
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

DEPLOYMENT LEVEL	ROBUST	CONSERVATIVE
% Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	616	205
Area of Installed GSI	61.6	20.5
Acres of Vegetated GSI	30.8	10.3
Increased User-Days of Green Space	401,898	133,966
Economic Value of Usage (over 40 years)	$285,348	$95,116
New Percent of Community Green Acres	16%	15%
% Increase in Green Space	4.4%	1.5%
Housing Units Impacted by GSI Implementation	178	59
Created Economic Value in Housing	$631,574	$210,525

Elgin

CURRENT % OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	71%
% OF LAND USED FOR PARKS AND RECREATION	6%
CITY AREA (ACRES)	24,282
CURRENT PARKS AND REC GREEN SPACE	1,457
% IMPERVIOUS	40%
% OF GSI ASSUMED TO BE VEGETATED	50%
POPULATION DENSITY (POP/ACRE)	4.6
MEDIAN HOME VALUE	$171,200
# OF HOUSING UNITS	35,919
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

DEPLOYMENT LEVEL	ROBUST	CONSERVATIVE
% Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	2,875	958
Area of Installed GSI	287.5	95.8
Acres of Vegetated GSI	143.8	47.9
Increased User-Days of Green Space	1,086,535	362,178
Economic Value of Usage (over 40 years)	$771,440	$257,147
New Percent of Community Green Acres	6.6%	6.2%
% Increase in Green Space	9.9%	3.3%
Housing Units Impacted by GSI Implementation	425.3	141.8
Created Economic Value in Housing	$2,548,499	$849,500

Evanston

CURRENT % OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	100%
% OF LAND USED FOR PARKS AND RECREATION	6%
CITY AREA (ACRES)	4,994
CURRENT PARKS AND REC GREEN SPACE	300
% IMPERVIOUS	45%
% OF GSI ASSUMED TO BE VEGETATED	50%
POPULATION DENSITY (POP/ACRE)	14.8
MEDIAN HOME VALUE	367,300
# OF HOUSING UNITS	38,727
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

DEPLOYMENT LEVEL	ROBUST	CONSERVATIVE
% Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	680	227
Area of Installed GSI	68.0	22.7
Acres of Vegetated GSI	34.0	11.3
Increased User-Days of Green Space	828,727	276,242
Economic Value of Usage (over 40 years)	$588,396	$196,132
New Percent of Community Green Acres	6.7%	6.2%
% Increase In Green Space	11.3%	3.8%
Housing Units Impacted by GSI Implementation	527.1	175.7
Created Economic Value in Housing	$6,776,304	$2,258,768

Highland Park

CURRENT % OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	92%
% OF LAND USED FOR PARKS AND RECREATION	7%
CITY AREA (ACRES)	7,833.6
CURRENT PARKS AND REC GREEN SPACE	548
% IMPERVIOUS	31%
% OF GSI ASSUMED TO BE VEGETATED	50%
POPULATION DENSITY (POP/ACRE)	3.8
MEDIAN HOME VALUE	$574,100
# OF HOUSING UNITS	11,494
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

DEPLOYMENT LEVEL	ROBUST	CONSERVATIVE
% Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	717	239
Area of Installed GSI	71.7	23.9
Acres of Vegetated GSI	35.8	11.9
Increased User-Days of Green Space	222,619	74,206
Economic Value of Usage (over 40 years)	$158,059	$52,686
New Percent of Community Green Acres	7.5%	7.2%
% Increase in Green Space	6.5%	2.2%
Housing Units Impacted by GSI Implementation	105	35
Created Economic Value in Housing	$2,112,543	$704,181

Joliet

CURRENT % OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	80%
% OF LAND USED FOR PARKS AND RECREATION	7%
CITY AREA (ACRES)	41,664
CURRENT PARKS AND REC GREEN SPACE	2,916
% OF GSI ASSUMED TO BE VEGETATED	35%
POPULATION DENSITY (POP/ACRE)	3.6
MEDIAN HOME VALUE	$165,600
# OF HOUSING UNITS	47,612
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

SCENARIO	ROBUST	CONSERVATIVE
% Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	4,312	1,437
Area of Installed GSI	431.2	143.7
Acres of Vegetated GSI	215.6	71.9
Increased User-Days of Green Space	1,259,392	419,797
Economic Value of Usage (over 40 years)	$894,168	$298,056
New Percent of Community Green Acres	7.5%	7.2%
% Increase in Green Space	7.4%	2.5%
Housing Units Impacted by GSI Implementation	493	164
Created Economic Value in Housing	$2,856,177	$952,059

Niles

CURRENT % OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	86%
% OF LAND USED FOR PARKS AND RECREATION	7%
CITY AREA (ACRES)	7,283.2
CURRENT PARKS AND REC GREEN SPACE	510
% IMPERVIOUS	57%
% OF GSI ASSUMED TO BE VEGETATED	50%
POPULATION DENSITY (POP/ACRE)	4.0
MEDIAN HOME VALUE	$265,900
# OF HOUSING UNITS	10,941
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

SCENARIO	ROBUST	CONSERVATIVE
% Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	1,248	416
Area of Installed GSI	124.8	41.6
Acres of Vegetated GSI	62.4	20.8
Increased User-Days of Green Space	410,743	136,914
Economic Value of Usage (over 40 years)	$291,628	$97,209
New Percent of Community Green Acres	7.9%	7.3%
% Increase in Green Space	12.2%	4.1%
Housing Units Impacted by GSI Implementation	187.4	62.5
Created Economic Value in Housing	$1,744,218	$581,406

Waukegan

CURRENT % OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	85%
% OF LAND USED FOR PARKS AND RECREATION	9%
CITY AREA (ACRES)	14,777.6
CURRENT PARKS AND REC GREEN SPACE	1,330
% IMPERVIOUS	37%
% OF GSI ASSUMED TO BE VEGETATED	50%
POPULATION DENSITY (POP/ACRE)	5.9
MEDIAN HOME VALUE	$120,300
# OF HOUSING UNITS	29,179
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

DEPLOYMENT LEVEL	ROBUST	CONSERVATIVE
% Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	1,621	540
Area of Installed GSI	162.1	54.0
Acres of Vegetated GSI	81	27
Increased User-Days of Green Space	782,124	260,708
Economic Value of Usage (over 40 years)	$555,308	$185,103
New Percent of Community Green Acres	9.6%	9.2%
% Increase in Green Space	6.1%	2.0%
Housing Units Impacted by GSI Implementation	320.0	106.7
Created Economic Value in Housing	$1,347,509	$449,170

Wilmette

CURRENT % OF RESIDENTS WITHIN 10 MIN OF A PARK OR RECREATIONAL AREA	96%
% OF LAND USED FOR PARKS AND RECREATION	6%
CITY AREA (ACRES)	3,464.3
CURRENT PARKS AND REC GREEN SPACE	208
% IMPERVIOUS	36%
% OF GSI ASSUMED TO BE VEGETATED	50%
POPULATION DENSITY (POP/ACRE)	7.9
MEDIAN HOME VALUE	$659,200
# OF HOUSING UNITS	9,609
PROPERTY VALUE INCREASE TO ADJACENT PROPERTIES	3.5%

SCENARIO	ROBUST	CONSERVATIVE
% Converted from Impervious to GSI	30%	10%
Acres of Area Managed by GSI	379	126
Area of Installed GSI	37.9	12.6
Acres of Vegetated GSI	18.9	6.3
Increased User-Days of Green Space	244,959	81,653
Economic Value of Usage (over 40 years)	$173,921	$57,974
New Percent of Community Green Acres	6.6%	6.2%
% Increase in Green Space	9.1%	3.0%
Housing Units Impacted by GSI Implementation	105.1	35.0
Created Economic Value in Housing	$2,424,277	$808,092