2013 AMERICAN PUBLIC WORKS ASSOCIATION PROFESSIONAL AWARDS
SUSTAINABILITY PRACTICES AWARD

"Sustainable Maplewood"
City of Maplewood, Minnesota
www.ci.maplewood.mn.us
March 4, 2013

Maplewood Junior Green Team

We face a number of complex environmental challenges, and solutions will require the creativity and energy of forward-thinking people and communities. The City of Maplewood is in a unique position to implement and influence solutions to these environmental challenges and is making a conscious effort to lead by example.

The ability to influence change and lead a sustainable approach to infrastructure replacement and operations is driven by a culture that has become ingrained into Maplewood's identity. The success is the result of support from all levels: elected officials, management, staff, and citizens.

Maplewood is excited to provide an outline of our efforts towards promoting sustainability through the efficient delivery of infrastructure projects, design standards, education, and sustainable operations in an environmentally and socially responsible way that ensures the best choice in the long term.

Maplewood's Comprehensive Plan (www.ci.maplewood.mn.us/compplan) is a guide to development related goals and policies to ensure continued orderly, managed growth through the year 2030. Although the emphasis is on land use, the Comprehensive Plan is comprised of

several interrelated elements addressing the natural environment, land use, transportation and community facilities and infrastructure and how those elements can be managed and maintained in a sustainable manner. The Sustainability Chapter outlines how the City outlines a vision for sustainability as follows:

> *The City of Maplewood, in order to ensure stewardship of its environment, will promote sustainable development and practices for the preservation, design, and maintenance of its natural and built environments. Developments and practices should maintain or enhance economic opportunity and community well-being while protecting and restoring the natural environment that people, economies, and ecological systems depend on.*

All City departments have modified policies and procedures and added new initiatives to make this vision of sustainability a reality. The City's Environmental and Natural Resources Commission, Green Team, and Sustainable Operations Work Group are some of the groups involved in creating a "Sustainable Maplewood." Highlights of the City's efforts follow.

ECONOMY

The Maplewood City Council/Management Team retreat held in 2012 resulted in the City's three-year goals, two in the area of economic development and financial stability. The goals are outlined in the City's 2013 budget (http://www.ci.maplewood.mn.us/index.aspx?nid=101). Following is a summary:

1. Economic Development

The City will develop a plan to ensure new economic development in the City with a particular focus on redevelopment. The City's Housing and Economic Development Commission promotes housing, development, and redevelopment in the City. The Commission's 2013 work plan includes the exploration of redevelopment opportunities in two areas of the City where infrastructure improvements are proposed including the Gladstone Neighborhood and Highways 36 and 61 corridors and interchange. Each project is reviewed holistically to determine overall needs including roadways, sanitary and storm sewer, parks, trails, environment, business, and housing. These projects are used as catalysts and stimulus opportunities for economic development in the City. Additional information regarding these projects can be found at the following web links:

- Gladstone Redevelopment/Frost Avenue Bridge Replacement
  http://www.ci.maplewood.mn.us/index.aspx?nid=754

- Gladstone Savanna/Gloster Park Master Plan
  http://www.ci.maplewood.mn.us/index.aspx?nid=821

- Highway 36/English Street Interchange
  http://www.dot.state.mn.us/metro/projects/hwy36maplewood/

2. Financial Stability

The City will continue to provide quality, efficient services to Maplewood citizens while equalizing expenditures and revenues every year in order to make budgeting decisions that comport with the principals of sustainability. Several implementation strategies are outlined to help the City achieve this goal including: the Public Works Department maintaining a steady street reconstruction program in order to revitalize older neighborhoods and generate economic development; and departments working collaboratively with each other and other cities in an effort to provide the most cost-effective services where possible. Both of these strategies help the City maintain financial stability while creating a livable community with good government.

COMMUNITY

1. Education

Maplewood Nature Center

Maplewood's Nature Center opened in 1978 (www.ci.maplewood.mn.us/nc). Since that time naturalists at the Nature Center have led our community in learning about nature and environmental issues. The Nature Center's mission is to enhance awareness and understanding of land, water and wildlife resources; to empower the community to become stewards of the environment.

Maplewood Nature Center

Over the years, programming has evolved to respond to changing technology, new information, and community needs. This includes many methods of engaging residents in learning and action including exhibits, demonstration areas, service programs,

articles, brochures, websites, and a full slate of programs for individuals, families, and school groups.

Maplewood has been especially progressive in its service learning and stormwater education programs. Our Watershed Watchers program, designed for 4th and 5th graders, is now 12 years old. Students have classroom sessions on stormwater pollution and then visit the Nature Center for "pond study," which helps them make the connection between the street and local wetlands. Their final session is a service session to plant shrubs or perennials in a public rainwater garden. We also have a strong service learning program with the Century College biology students who focus on natural resource and stormwater best management practices projects. In addition, the City has taught a popular rainwater gardening series for adults for over ten years.

Demonstration Projects

Demonstration areas and interpretation are a key part of education. The Nature Center has indoor and outdoor exhibits on stormwater management, natural landscaping, and solar energy. A beautifully designed makeover of the Nature Center yard in 2010 became a great way to educate residents on possibilities for a sustainable yard.

An innovative program in 2010, *The Extreme Green Makeover*, presented a series of sustainable landscaping classes and one homeowner won a front yard makeover (www.ci.maplewood.mn.us/index.aspx?nid=672). That residence is now used to demonstrate sustainable landscaping concepts.

Project by project, Maplewood is restoring the natural areas at City Hall campus and creating environmentally friendly landscaping by reducing areas of mowed lawn, adding rainwater gardens, and transitioning to more drought tolerant plantings. One project completed in 2007 is a porous pavement parking lot at our Public Works building. Rain penetrates pores in the pavement, is held in an underground chamber of rocks, and then infiltrates into the soil.

Newsletters

Maplewood has two newsletters, *Maplewood Monthly* published monthly and an environmental newsletter, *Seasons*, published quarterly. *Maplewood Monthly* includes articles on timely City topics including updates on the City's sustainable operations such as the reduction of salt for winter road maintenance (www.ci.maplewood.mn.us/DocumentCenter/Home/View/1826). *Seasons is* a quarterly environmental newsletter that tackles a host of environmental topics to keep our residents informed on City environmental issues, stewardship projects, and ideas on how residents can improve the environment at home and in their neighborhood (www.ci.maplewood.mn.us/sustainability).

Environmental and Natural Resources Commission

The Environmental and Natural Resources Commission establishes environmental priorities and proposes changes necessary to existing environmental ordinances which

ensure that the city's environmental assets are protected, preserved, and enhanced (www.ci.maplewood.mn.us/enr). The Commission is also charged with supporting the Nature Center in promoting environmental awareness through educational programs, communications, and co-sponsored activities. The Commission's 2013 goals include updating the City's tree preservation ordinance as part of implementing the City's new Living Streets Policy, research and recommendations on the reduction or ban of plastic bags at retail facilities, limiting the use of lawn care chemicals in City operations, and creating a more comprehensive strategy for the Commission's environmental education.

Green Team

On June 23, 2008, the City Council adopted the U.S. Mayors Climate Protection Agreement. The agreement commits the City to reducing emissions and pollution in City operations and the community. The Council authorized staff to form a working group to review and make recommendations on how the City can realistically and feasibly reduce emissions and pollution now and in the future.

The working group is called the Maplewood Green Team and is made up of a group of staff who work together on environmental and sustainability issues at a city operations level. There are representatives from each department of the City to ensure full participation. Green Team accomplishments include improvements to the City facility recycling and waste reduction program, creation of an energy efficiency and conservation strategy, fleet audit and policy document that includes a vehicle sharing and no idling policy, creation of an environmental purchasing policy, green meeting and event guides, and a local foods campaign. Each year the team presents a Sustainability Report to the City Council to outline the City's environmental achievements throughout the year.

The Green Team is an example of the City leading by example. It shows our commitment to working on environmental issues in City facilities, and using that work as a demonstration for the public and employees. To view information on the City's Green Team and the annual sustainability reports, visit www.ci.maplewood.mn.us/sustainability.

2. Safety

The Police and Fire Departments work in conjunction with the Public Works Department to ensure the safety and usability of our public streets. Improvements to safety have been made through capital projects and improved operations. Street reconstruction and retrofits now reflect our Living Streets Policy which properly addresses pedestrian travel, right-sizing streets (narrowing to reduce speeds), and installing traffic best management practices such as dynamic display speed signs and bump outs for example. These proactive efforts help improve the traveling conditions for vehicles and pedestrians at the same time taking into account fiscal sustainability.

Maplewood was one of the first cities in Minnesota to install roundabouts. The first roundabout opened to traffic in 2002 at the English Street and Frost Avenue intersection. Since that time we have installed four additional roundabouts to help improve safety and traffic flows while also minimizing life cycle costs when comparing with a traffic signal.

Furthermore, safety is reflected in everything the City does whether it is staff training, public outreach, or updating our snow plow fleet to be more proactive (anti-icing and pre-wetting) than reactive.

3. Enjoyment

The City of Maplewood's extensive park, open space, and trail system adds to the City's enjoyment. The City's park system provides a high quality of life for all residents and contributes to the overall appeal of the City as a desirable place for people to live and recreate. The system includes 36 City parks encompassing 552 acres and 85 miles of trails and sidewalks.

With overwhelming support and foresight, Maplewood residents passed a referendum in the 1990s to purchase open space for neighborhood preserves. Today, in addition to Maplewood's managed park land, the City has 14 neighborhood preserves encompassing 308 acres. The Neighborhood Preserves were set aside by and for the citizens of Maplewood to preserve natural resources, scenic areas, and landscape buffers. They are protected natural areas where people can enhance their understanding and enjoyment of the natural world through passive-use activities such as nature study and hiking.

Overall, the City has 860 acres of park and open space land, with an additional 1,175 acres of county, state, and agency owned park land within the City boundary. The City provides recreational opportunities in the City park and neighborhood preserve system throughout the year, including management of five hockey rinks and ten pleasure skating rinks, thereby providing residents with opportunities in most cases within a half-mile of their homes all seasons of the year.

Wakefield Rink

Our park, open space, and trail system requires extensive management, maintenance and planning. As part of the ongoing management, maintenance and planning the City reviews park improvements each year as part of our street reconstruction program. Street reconstruction in an area of a park might include the construction of a new parking lot within the park, construction of stormwater best management practices within a park to reduce runoff from the street project, or construction or improvement of the park's trail system and connections.

4. Livability

Living Streets Policy

On January 28, 2013 the City Council adopted a Living Streets Policy (www.ci.maplewood.mn.us/index.aspx?nid=954). Living Streets is defined as a complete green street that provides for multiple modes of transportation that reduces environmental impacts by reducing impervious surface, managing stormwater, and providing shade. All future road improvement projects will follow the new policy which will encourage people to travel by walking or bicycling, enhance the safety and security of streets, create livable neighborhoods, maximize the infiltration of stormwater, improve the quality of stormwater runoff, enhance the urban forest, and reduce life cycle costs.

Living Streets Vision

During the creation of the Living Streets Policy in 2012, the City received a $900,000 grant through the Ramsey-Washington Metro Watershed District (RWMWD) to conduct the City's first Living Streets project. The Bartelmy-Meyer Street Improvements project (www.ci.maplewood.mn.us/index.aspx?nid=825) already included many issues which could be addressed by the Living Streets objectives. With the added grant money staff was able to create a revised "Living Streets" design layout for this reconstruction project.

Maplewood took leadership and revised its design and worked actively with neighborhood residents to attain buy-in and produce a street improvement project that:

a. Narrowed streets from 30' down to 24' (improved stormwater quality through footprint reduction, slows traffic).

b. Added sidewalks adjacent to every street (walkability/active living).

c. Made focused efforts to increase rainwater garden participation (clean stormwater).

d. Additional tree plantings throughout the neighborhood.

e. Reduced cost and future maintenance through reduced footprint and enhanced water quality features.

ENVIRONMENT

1. Pollution Prevention or Cleanup

Stormwater Management Ordinance and Standards

In the spring of 2010 the City updated its stormwater management standards to meet the requirements of the surface water management plan. These standards were used as a guide for a new stormwater ordinance, which was adopted by the City Council on June 14, 2010. The stormwater ordinance was enhanced to provide additional protections to water quality. The City also updated its stormwater standards to reflect the new ordinance (www.ci.maplewood.mn.us/stormwater). Following is a summary of the ordinance:

a. All new development and redevelopment on projects which encompass one-half acre or more of disturbed area or 5,000 square-feet or more of new impervious surface will be evaluated based on the new stormwater requirements.

b. Runoff rates shall not exceed the pre-project runoff rates for the 2-year, 10-year, and 100-year critical duration storm events.

c. Total suspended solids will require treatment through infiltration practices for runoff volumes of at least 1.0 inch over all new impervious and redevelopment impervious portions of a project.

d. No person shall throw, drain, discharge into the municipal separate storm sewer system any pollutants or waters containing any pollutants other than stormwater.

e. Coal tar sealers are prohibited (refer to section below).

Ban on Coal Tar Sealers

An important element of the stormwater ordinance is the ban of the use of coal tar sealants. The use of coal tar sealers on asphalt driveways is a common practice. Coal tar sealant products contain polycyclic aromatic hydrocarbons (PAHs), which are a group of organic chemicals formed during the incomplete burning of coal, oil, gas, or other organic substances. Scientific studies have demonstrated a relationship between the use of these products on stormwater runoff and certain health and environmental concerns.

The City of Maplewood was one of the first cities in Minnesota to implement a coal tar sealant ban. We worked with the City of White Bear Lake, Minnesota and officials from Austin, Texas in refining our approach and language for the ban. The City Council was very supportive of this initiative and the ban has led other cities to follow suite within Minnesota. This has influenced change at all levels including the recent news that Jet Black will no longer use a coal tar based product for its driveway sealing operations.

Rainwater Gardens

In 1996, Maplewood installed its first rainwater gardens to help manage stormwater. Today the City has over 700 home rainwater gardens and over 60 rainwater gardens on City land.

Residential Rainwater Garden

We are nationally known for our rainwater gardens and continue the high rate of participation through one-on-one consultations in addition to offering Stormwater (Environmental) Utility Fee incentives for those that opt for a rainwater garden (www.ci.maplewood.mn.us/raingardens).

a. Rainwater gardens on Maplewood street reconstruction projects: When people talk about Maplewood rainwater gardens, they are usually talking about the gardens created as part of street reconstruction projects. Since 1996, the City has installed over 700 boulevard rainwater gardens and over 60 city rainwater gardens as part of street reconstruction projects.

b. Installing a rainwater garden on your own: Maplewood encourages residents that are not on street reconstruction projects to consider installing a rainwater garden on their own. Maplewood Public Works takes care of adding the curb cut to help accomplish stormwater treatment into retrofit rainwater gardens.

c. Rainwater gardens for developments and businesses: Maplewood encourages developers and businesses to consider rainwater gardens when determining how best to infiltrate runoff from their site. Several developers and businesses have created beautiful rainwater gardens in our community.

d. The City Naturalist and Nature Center play a key role in educating residents about rainwater gardens and helping them understand design options, installation methods, and maintenance.

GreenStep Cities

Minnesota GreenStep Cities is a voluntary challenge, assistance and recognition program to help cities achieve their sustainability goals through implementation of 28 best practices (www.mngreenstep.org). Each best practice can be implemented by completing one or more specific actions from a list of four to eight actions. These actions are tailored to all Minnesota cities, focus on cost savings and energy use reduction, and encourage innovation.

The program outlines four “Steps” of recognition: Step One – pass a resolution authorizing the city to participate in the program, register, and provide details of best practices accomplished; Step Two – implement at least 8 best practices; Step Three – implement at least 16 best practices; Step Four – this recognition Step is still being refined by the GreenStep Cities steering committee.

The City of Maplewood has been participating in the Minnesota GreenStep Cities program since December 2010 with the Green Team serving as the coordinating board for the program (www.ci.maplewood.mn.us/sustainability). In June 2012 the GreenStep Steering committee recognized Maplewood as a Step Two GreenStep City for having accomplished 12 best practices, well above the 8 needed to achieve this status. Since that time the City has completed several more best practices and we are well on our way to Step Three status.

Blue Star Award

One of the GreenStep Cities best practices the City recently completed is registration in the Minnesota Blue Star Awards program for Stormwater Management. The program is

a certification and award program that offers municipalities that excel in stormwater management the positive public recognition that they deserve. Communities that are awarded the Blue Star are those taking a leadership role in protecting Minnesota's water resources and public health through excellence in stormwater management (www.bluestarmn.org). The program assesses a City on a wide range of policies and practices in three core areas: 1) Water Friendly Planning and Preservation; 2) Stormwater Management Standards and Practices; 3) Stormwater Pollution Prevention.

After registering and submitting our assessment, the City received a score of 139 of 193 possible points. In August 2012 the Blue Star program recognized Maplewood with an award for Excellence in Community Stormwater Management. The City scored fourth out of 78 cities participating.

Sustainable Operations

Sustainable operations is about planning and carrying out the City's day-to-day work with full consideration of how environmental factors affect long-term goals. It means eliminating waste, lowering long-term maintenance and operating costs, and improving the work environment and the community. It also translates into good economic sense.

In April 2010 City staff formed a Sustainable Operations Work Group to examine our current operations in several areas of the City and determine impacts the operations might have on the environment. The Sustainable Operations Work Groups served as an off-shoot of the Maplewood Green Team, with participation from all levels of the City including maintenance staff in Parks, Streets, Sewers, and Mechanical divisions of Public Works, as well as all other departments.

The groups assessed operations that have the most impact on the environment or that the City has received the most complaints/concerns from the public, and reviewed the operations to determine ways to lessen their impacts. When making the assessments the groups determined the following: 1) are changes needed in operations to reduce impacts to the environment; and 2) will the changes be practical, economical, and meet community needs? Departments have implemented and continue to review the Sustainable Operations recommendations. Highlights of work complete to date include the following:

a. Fleet

The City of Maplewood has 136 vehicles in its fleet. These vehicles are used to meet City service demands including providing public safety and maintaining City roads, sanitary and storm sewer systems, and park land. The City, in an effort to create the most efficient fleet possible, completed a fleet audit and inventory, an important first step in understanding where efficiency might be improved. Strategies outlined in the audit include:

- Right sizing the fleet – matching vehicle type with its intended use
- Conversion to biofuels

- Conversion to high efficiency and hybrid vehicles
- Driver education and behavior programs
- Greening fleet maintenance

Implementing select strategies has allowed us to become a more efficient fleet. These changes have resulted in energy and cost savings, cleaner air, and lower CO_2 emissions. For example, the City adopted a no idling policy, continues to right size its fleet, and upgraded its fleet and fuel system software.

b. Snow and Ice Control

In the past two years snow plow trucks have been retrofitted with upgraded salt spreader controls. This is a significant improvement to the operation because it allows each truck to be calibrated for the specific de-icing material loaded into the trucks whether salt or treated salt. The controllers are then programmed to place a pre-determined amount of de-icing salt per lane mile and that information is then recorded. The programmed amount of salt material the trucks spread is specific to each snow or ice event based on factors such as pavement temperature and weather forecast. This improves application efficiency and reduces salt use, ultimately saving money and minimizing impacts to the environment (reduction in chlorides).

Snow Plow Truck Retrofit Improvements

The mechanics installed “on-spot” chains on all plow trucks which provide on demand traction when conditions warrant. This assures trucks will not get stuck and allows for a more timely and efficient service on plow routes.

At the start of this year liquid de-icing was introduced into the snow and ice program in the form of anti-icing and pre-wetting. Anti-icing is a proactive approach to snow and ice control. It is a chemical freezing-point-depressant that is applied in advance of a storm event. A liquid brine solution is spot applied to areas such as bridge decks, steep hills, curves, shaded areas, and other known trouble spots that we hear about from residents. Anti-icing prevents snow and ice from bonding to the surface making it easier to be plowed off and reduces the demand for salt application. A proactive approach to snow and ice control, rather than reactive, is the right path forward in providing better service to the traveling public.

Pre-wetting also involves a liquid brine solution however it is introduced to the dry salt as it is applied at the spinner when being spread. Pre-wetting has many benefits such as lowering the effective working temperature of salt and jump starting the melting process. It also helps reduce cost and environmental impacts by preventing salt from bouncing or scattering off the street, which otherwise would occur with dry salt. The liquid make the salt sticky allowing it to adhere to the street surface. This has translated into reduced salt use compared to past years.

c. Street Sweeping

Street sweeping is necessary for vehicle and pedestrian safety, water quality, and environmental concerns. Annual street sweeping is also a requirement of the City of Maplewood's National Pollutant Discharge Elimination System (NPDES) permit. In Maplewood, street sweeping in the spring consists of two complete rounds. The first round of sweeping begins as soon as temperatures allow and streets are significantly clear of snow and ice. While some curb lines may still have ice buildup, the objective is to sweep the majority of winter de-icing materials and other road debris prior to spring rainfalls. The second "clean-up round" is in conjunction with the cleaning of right turn islands, center medians, bridge decks, and sidewalks.

Summer sweeping operations occur during street maintenance operations, where erosion problems exist, after heavy rainfall events, and after wind/storm events. These operations could be isolated to certain areas or city-wide.

Fall sweeping commences in mid-October and continues as long as weather permits in an effort to prevent leaves and other materials from entering the storm sewer system, ponds, streams, and lakes.

d. Turf Management

Maplewood's turf management is a balanced approach to ensure recreational use of park areas while addressing environmental impacts of turf management. The plan emphasizes reducing the amount of turf in parks and other City lands, varying maintenance levels according to turf use or classification; and reducing negative environmental impacts of turf maintenance with several different best

management practices such as raising the mower's height and aerating. This saves water and fertilizer, and reduces emissions because there is less mowing.

e. Building Operations

The City of Maplewood continually enters monthly energy use data from city-owned buildings into the Minnesota B3 database. This allows the City to monitor its buildings and improve building efficiency. In addition, the City has begun a retro-commissioning analysis program for all buildings, and continues to make energy efficiency upgrades such as replacing HD lighting fixtures with T-8 fluorescent light fixtures with occupancy sensors to control usage time in the Community Center gymnasium, replacement of heating and cooling circulation pumps with high efficiency motors, and replacement of two air conditioning chillers with high efficiency air cooled chillers as examples.

There has been significant progress at all or our City facilities with energy reductions on both our natural gas and electrical utility bills. In some facilities there are fewer and fewer energy reduction projects which means we are getting closer to our initial goals started in 2005. We utilized Xcel Energy Rebate Programs when applicable and have noted this by putting "Xcel Rebate" in front of the project. The Xcel Energy rebates helped reduce the project overall expenses per the applicable programs with rebates to the City once completed.

The following items or projects have been implemented over the last decade or are currently in the process of implementation. These actions have translated into energy reduction (sustainability). Projects are listed by facility so that there is an understanding of the progress being made for each facility.

Public Works Building:

- Radiant gas heating replacing hot water fan units in lower garage/shop/vehicle parking areas
- Trane HVAC Rooftop Unit, more efficient using Boiler Reheating in heating season
- High Efficiency Hot Water Heater
- New Boilers with 89% efficiency and VAV boxes with boiler reheating,
- Xcel rebate. T-8 fixtures in new expansion office areas with occupancy sensors, T-5 fixtures in new vehicle garage area with control panel. Sensors to be added.
- Facility Heating and cooling completely on Summit Energy Management System with frequency drives for rooftop motor control, implement hours of usage schedules where applicable
- Xcel rebate. Facility Heating Boilers replaced with higher efficiency boilers
- Start implementation of Preventative Maintenance Program tied to Five Step Building Analysis Program "Retro commissioning Study"

- Implement Energy Star or High Efficiency equipment replacement or retrofitting as required
- Xcel rebate. Retrofit old office 2nd floor, garage, and shop areas with T-8 fixtures
- Excel Energy Assessment completed, review and recommendation in process
- Xcel rebate. Upgrade all Park buildings to T-8 lighting either with new fixtures or retrofitting the existing fixtures
- Xcel rebates. Installation of VAV units for zone environmental control on our Summit Management System in the new construction areas as part of the Police Department Expansion Project
- Xcel rebate. Replacing the front exterior entryway lights (wall packs) with LED fixtures
- Xcel rebate. Replacing the three front parking lot light poles and fixtures, utilizing LED lighting fixtures

City Hall / Police Department

- T-8 fixtures installed in facility with occupancy sensors in offices, 10 year payback
- Frequency Drives installed for Air Handler Units 1 & 2 (AHU's)
- UHL Energy Management System installed for AHU's
- Summit Energy Management System replaces UHL System, pneumatic control still on VAV Boxes, and implement hours of usage schedules where applicable
- Start implementation of Preventative Maintenance Program tied to Five Step Building Analysis Program "Retro commissioning Study"
- Implement Energy Star or High Efficiency equipment replacement or retrofitting as required
- Submit proposal to start retrofitting VAV boxes to electronic control for more accurate control of areas, over 3 years
- Investigate replacement of boilers 1 – 2 with high efficiency units and high efficiency pump
- Replacement of 7 Rooftop Exhaust units with more efficient internally accessible direct drive units
- T-8 lamps starting to be replaced with Super T-8's Beta test for usage and output quality
- Investigate utilizing Glycol in heating loop to be able to use Summit system to shut down after hours
- Investigate replacement of Air Conditioning Compressor units 1 and 2 with Multi-Stage fans and High efficiency compressors
- Investigating T-8 and other styles of LED available lamps and fixtures
- Investigating Geo-Thermal system for campus usage

- Investigating Solar Photo-Cells technology to supplement electrical usage for campus
- Xcel Energy Assessment completed, review and recommendation in process
- Stimulus Project. Replaced two (2) City Hall Boilers with High Efficiency Boilers
- Stimulus Project. Upgrade City Hall HVAC Unit Damper Controls with CO2 monitoring enhancements, from pneumatic to electronic on Summit Energy Management System
- 40 KW Ground Mounted Solar Panel system installed with funding from; State AARP, Dept. of Commerce Grant, Made in Minnesota Incentive, Xcel Energy Solar Rewards, Federal Income Tax Credit, and Incremental Lease Program
- Xcel Rebate. Implementation of Trane Building Automation System on AHU#2 devices to switch from Pneumatic to Electronic controls for energy efficiencies and control

Maplewood Community Center

- T-8 fixtures installed during building of facility
- Tracer Energy Management System installed with electronic controls on units, Glycol in system to allow unoccupied time shut down schedules
- Summit Energy Management System replaces Tracer system
    - Start implementation of Preventative Maintenance Program tied to Five Step Building Analysis Program "Retro commissioning Study"
    - Implement Energy Star or High Efficiency equipment replacement or retrofitting as required
- Improper mixing of Glycols caused acidic condition in loop system flushed only treated water put back in, Thermo-Dyne loop only part protected by Glycol, unoccupied time schedule not used
- Investigated adding Glycol back into closed loop system cost to high at time
- Investigate more energy efficient lighting fixtures to replace non-efficient fixtures
- Xcel rebate. Replacement of HD lighting fixtures with T-8 fluorescent light fixtures with occupancy sensors to control the usage time in the court area
- Xcel Rebate. Extensive Building Energy Audit to be used for funding proposals, planning, and implementation of energy reducing projects Xcel
- Xcel Rebate. Commercial Heating Efficiency Tune-Ups for Natural Gas Heating System Equipment (3 boilers)
- Xcel Rebate. Replacement of two heating and two cooling circulation pumps with High Efficiency Motor
- 40 KW Roof Mounted Solar Panel system installed with funding from; State AARP, Dept. of Commerce Grant, Made in Minnesota Incentive, Xcel Energy Solar Rewards, Federal Income Tax Credit, and Incremental Lease Program

- Xcel Rebate. Replacement of two A/C chillers with two new Trane High Efficiency Air-Cooled Chillers and related parts and controls on Summit Energy Management System (part of the Building Energy Audit)

f. City-Wide Organized Trash Hauling and Recycling

Due to environmental and economic concerns regarding multiple waste haulers the City of Maplewood has implemented an organized trash hauling system for all single family homes. After many years of research and preparation by City staff and the Environmental and Natural Resources Commission, the City Council authorized the plan in November of 2011. The organized trash hauling began on October 1, 2012 (www.ci.maplewood.mn.us/trash).

Maplewood's Organized Trash Plan

The City has had an organized recycling system for over 30 years (www.ci.maplewood.mn.us/recycling). Organizing the trash system in addition to recycling will allow the City to better management its solid waste. Benefits of an organized trash collection system includes reduced vehicle emissions, reduced noise, an increase in pavement life, reduced litter and increased aesthetics, a reduction in illegal dumping, and increased safety. There are also cost savings to the residents in the fees for service.

Organizing the City's trash hauling was a challenging and controversial process. However, this shows the determination and leadership of Maplewood's elected officials in transitioning into a "Sustainable Maplewood."

2. Natural Resource Use and Conservation

Maplewood has led the way in urban natural resources conservation in Minnesota. In 1993, we were one of the first cities in the state to pass a bonding referendum to preserve open space. Sites protected through that initiative are now a part of our Neighborhood Preserve system. The City's 2030 Comprehensive Plan lays out ten natural resources goals, including protecting and connecting natural areas, restoring and managing sites, and enhancing public understanding. The City addresses natural resources on three levels: Natural Area Greenways, individual sites, and issues.

Applewood - One of Maplewood's 14 Natural Area Greenways

In 2008, in an effort to better understand our green infrastructure, the City mapped its largest remaining contiguous natural areas. These included both public and private lands and became our Natural Area Greenways. The greenways are the key wildlife and natural resource corridors within the City. Recreation is permitted on public sites within the greenway. The City has developed a greenway brochure to help residents understand the connections between natural areas, special features, and the importance of managing public and private natural lands. Planning for the greenways has meant partnerships with Ramsey County and adjacent cities and has thus far resulted in acquisition of a key parcel for protection called Fish Creek (www.ci.maplewood.mn.us/index.aspx?nid=884) as well as a project by the county for enhanced recreational connection and public access at one site (being constructed in 2013).

On the site level, the City has been actively managing natural areas for over 20 years. Management plans identify target plant communities and restoration strategies. We work to restore and enhance wetlands, oak woodlands, oak savanna, and prairies through activities such as prescribed burning, monitoring and removal of invasive species, biological control of invasive species, prairie restoration, seeding and planting.

The City also manages natural resources on a program or issue level addressing topics such as: stormwater management, turf management, trees and urban forestry, invasive

species, wetlands, sustainable landscaping, and yard care. With invasive species for example, Maplewood was one of the first cities in the region to develop a curbside pickup program for buckthorn (www.ci.maplewood.mn.us/index.aspx?nid=385), a wide-spread invasive in our area. The City was a founding member of Ramsey County Cooperative Weed Association.

In 2011, we initiated a pilot project – The Plant Patrol – to develop a citizen monitoring program for invasive plants. This is a first alert program to find and stop new invasive species before they become widespread. Data collected by our volunteers are entered into a national database and contribute to developing an understanding of the nationwide spread of individual invasive species. Wild parsnip, Japanese knotweed, and oriental bittersweet are a few of the species that we have mapped and managed.

3. Energy Efficiency

Renewable Energy Ordinance

On October 10, 2011, the City Council adopted a Renewable Energy Ordinance (www.ci.maplewood.mn.us/energy). The ordinance promotes energy systems that have positive impacts in energy conservation and includes regulations that will allow for wind, solar, and geothermal energy systems in residential and commercial zoning districts.

Solar Energy Panels

In an effort to reduce our carbon footprint, the City has installed three solar arrays at three sites including the Maplewood Nature Center, on the roof of the Maplewood Community Center, and on the City Hall campus grounds. The funding for these projects was received from grants such as the Solar Energy Legacy Grant from the Minnesota Department of Natural Resources, State ARRA Grants, Made in Minnesota Incentives, and Xcel Energy Solar Rewards Money. Refer to the following photos and information regarding the use of solar energy panels by the City of Maplewood.

Solar Panel Community Center and City Hall Projects General Information:

- Project start: September, 2011
- Main Entity / Lesser: Energy Alternatives Solar, LLC
- Design and Installation Contractor: Energy Alternatives (EA)
- Electrical Sub Contractor: EA - Aid Electric
- Lessee: City of Maplewood
- EA sells Solar Systems (2) to Maplewood for: $625,600
- Department of Commerce ARRA Grant payment to EA: $100,000

Location System #1: Maplewood Community Center, 2100 White Bear Avenue, Maplewood, MN

Community Center Roof Array

- Average Monthly Electricity Produced (AC savings): $220 per month at $.06/Kwh (due to the many energy efficiency initiatives already in place at this building the City pays a reduced rate for power)
- Roof mounted ballasted system above pool area.
- Project Start/Completion Date: September 1, 2011 / May 17, 2012
- RAIS WAVE Solar Panel Manufacture: tenKsolar located in Bloomington, Minnesota
- Number of Solar Panels: 216 with a tilt angle of 45 Degrees for optimum solar efficiency
- Number of Reflector Panels: 198 (used to reflect sunlight in the morning and afternoon for better efficiency) (surface of reflective panels utilize 3M Cool Mirror Film)
- Optimum Solar Generation: 10:00 A.M. to 3:00 P.M. May-August
- Orientation: 180 degrees fixed
- Inverter Manufacture: Sunergy ELV208 (94% efficient rating, 10 year warranty)
- Number of Inverters: 9 (changes DC voltage to AC voltage (electricity) that can be used in the building.)
- Panel Warranty: 25 years
- System Rated for 90 MPH wind stability.
- Solar Panel Efficiency: 18% up to 21% with reflectors
- Solar Panel System connected to Xcel Energy Grid with Reversing Generation Meter.
- Solar Panel Layout Size: 75 feet long x 80 feet wide offset approximately

Predicted System Output

- kW with reflectors: 39.96
- Annual kWh: 48,925

City Project Cost: $308,800.00
Incentive (I)/ Grants (G)/ Rebates (R):

- State AARP, Department of Commerce (G): $50,000
- Made in Minnesota (I): $77,640
- Xcel Energy Solar*Rewards: $89,910
- FITC $92,640

EA guaranteed yearly utility savings: $4,115

Location System #2: Maplewood City Hall, 1830 County Road B East, Maplewood, MN

City Hall Ground Array

- Average Monthly Electricity Produced (AC savings): system has just been implemented, savings estimated to be higher at this location as we pay a slightly higher amount for energy
- Ground Mount System with structural steel and cement footings.
- Project Start/Completion Date: December 1, 2011 / August 31, 2012
- RAIS WAVE Solar Panel Manufacture: tenKsolar located in Bloomington, Minnesota
- Number of Solar Panels: 261 with a tilt angle of 45 Degrees for optimum solar efficiency
- Number of Reflector Panels: 180 (used to reflect sunlight in the morning and afternoon for better efficiency) (surface of reflective panels utilize 3M Cool Mirror Film)
- Optimum Solar Generation: 10:00 A.M. to 3:00 P.M. May-August
- Orientation: 180 degrees fixed
- Inverter Manufacture: Sunergy ELV208 (94% efficient rating, 10 year warranty)

- Number of Inverters: 9 (changes DC voltage to AC voltage (electricity) that can be used in the building.)
- Panel Warranty: 25 years
- System Rated for 90 MPH wind stability.
- Solar Panel Efficiency: 18% up to 21% with reflectors
- Solar Panel System connected to Xcel Energy Grid with Reversing Generation Meter
- Solar Panel Layout Size: 150 feet long x 40 feet wide offset approximately

Predicted System Output
- kW with reflectors: 38.88
- Annual kWh: 47,603

City Project Cost: $316,800
Incentive (I)/ Grants (G)/ Rebates (R):
- State AARP, Department of Commerce (G): $50,000
- Made in Minnesota (I): $80,040
- Xcel Energy Solar*Rewards: $87,480
- FITC $95,040

EA guaranteed yearly utility savings: $4,003

CONCLUSION

Sustainability must come from all levels of an organization. Maplewood's sustainability efforts are lead by the City's policy makers (elected and appointed officials) and implemented by City staff and citizens. There is cooperation from all levels supporting Maplewood's motto that "Together We Can" create a "Sustainable Maplewood."

Maplewood Sustainability Practices Milestones

Maplewood has been an environmental leader for over thirty years. Milestones include:

1978: One of first cities in the Metro area to establish a Nature Center
1993: First city in the region to pass a bonding referendum to preserve open space
1997: First city in the region to use rain gardens to help manage stormwater runoff
2002: One of first cities in region to provide curbside buckthorn pickup
2004: Landscape Ecology Awards Program (LEAP) award for City Hall campus native plantings
2004: Environmental and Natural Resources Committee formed
2005: Nature Center creates new exhibits that focus on water quality and stormwater education
2006: Environmental and Natural Resources Commission created to replace Committee
2007: City installs its first porous asphalt parking lot (now have three)
2008: Environmental Planner position created
2008: University of Minnesota students complete Sustainable Maplewood 2050 project
2008: Natural area greenways mapped
2008: *Seasons*, a quarterly environmental insert, first appears in Maplewood's City newsletter
2009: City becomes a GreenStep City
2009: Green Team established to address environmental issues within the organization
2009: Renewable energy ordinance adopted
2010: Stormwater management standards and ordinance adopted, includes ban on coal tar sealants
2010: Wetland ordinance adopted with improved buffer requirements
2010: Nature Center installs new landscape featuring stormwater BMP's and native landscaping
2010: Snowplows retrofitted and sand/salt mix adjusted
2008: City is founding member of Ramsey Country Cooperative Weed Management Association
2011: Plant Patrol pilot program for citizen monitoring of invasive species
2011: Solar panels and solar interpretive display installed at Maplewood Nature Center
2012: Solar panels installed and City Hall and Community Center
2012: City organizes its single family trash system
2012: Solid Waste Management Standards and Ordinance adopted to allow for organized trash system and better management of solid waste
2012: City becomes a Blue Star Award recipient for special commitment to Minnesota's water (ranked fourth in the state)
2012: City receives Environmental Stewardship Award by Minnesota Chapter of the American Public Works Association
2012: Maplewood has over 700 rainwater gardens
2013: Living Streets Policy adopted