

Environment & Natural Resources Livability Indicators

Livability Indicator Stormwater Runoff Volume

Vision

Enhancements to the system accommodate larger stormwater runoff volumes and more of the rainfall events which occur. There is greater stormwater reuse. Stormwater runoff into Minnehaha Creek and the Mississippi River is reduced. Neighborhood flooding incidents become more infrequent and there is greater recharge of area groundwater.

Source: Minneapolis Local Surface Water Management Plan, 46th and Hiawatha Station Area Master Plan, Minnehaha Creek Watershed District (MCWD) Resources Management Plan and Mississippi Watershed Management Organization (MWMO) Watershed Management Plan.

Why is this indicator important?

- Helps keep our water resources clean and healthy, contributing to recreation and swimming activities.
- Accommodates current & future volume conditions, reducing potential for direct discharge of untreated sanitary sewage to Mississippi River.
- Increases the amount of water that infiltrates into the soils, maintaining groundwater contributions.
- Prevents property and erosion damage in the neighborhood.
- Supports economic development efforts.

What do things look like?

The existing stormsewer system is well connected; catch basins located along the streets, alleys, and parking lots collect stormwater runoff and discharge it to the Mississippi River via an estimated seven (7) outfalls located on the banks of the Mississippi River.

Eighty-one (81) percent of the corridor land use area is impervious and does not allow stormwater to infiltrate into the ground. Stormwater runoff washes over these impermeable surfaces, picking up dirt and other pollutants, as it enters the stormsewer network prior to discharging to the Mississippi River. This impervious area is largely dominated by residential, commercial, industrial buildings and associated road surfaces.

Nineteen (19) percent of the land is pervious and allows stormwater runoff to be filtered as it travels over vegetated areas or infiltrate into the ground. These pervious open space and undeveloped land use areas have the potential to improve the quality of stormwater being discharged to Minnehaha Creek and the Mississippi River.

The groundwater table ranges from 35 feet below ground surface in the northern portion of the corridor to 25 feet below the ground surface in the southern portion.



Ponding for regional/state highway constructed by Mn DOT.



Impervious Surface Condition: typical of corridor's industrial areas.

What do things look like?

The types of stormwater management facilities which can be used in the corridor will be limited due to areas which have been contaminated through past land uses. The Livability Indicator Contaminated Land provides additional information. The chart below shows recommended Stormwater Best Management Practices (BMPs).

Recommended Stormwater BMPs

BMPs for areas with high & medium contamination potential	BMPs for areas with low contamination potential
wet ponds	Priority should be given to the following practices given the potential to infiltrate stormwater in these areas: permeable pavements, infiltration practices, and bioretention facilities (without under drains)
green roofs	
drought tolerant vegetation (e.g. natives)	
linear wetlands	
bioretention facilities (with under drains)	The following practices can also be used in areas with low potential for contamination although they will not provide volume control: wet ponds, green roofs, drought tolerant vegetation, linear wetlands, bioretention facilities, vegetated swales, underground storage, and rainwater harvesting and re-use
vegetated swales (e.g. bioswales)	
underground storage (consider using existing infrastructure)	
rainwater harvesting & re-use	
useful - landscaping (e.g. Seattle Green Factor)	

Not all areas of the corridor have the potential for infiltration. Clay, silt, and sandy clay located within the central areas of the corridor represent conditions with lower infiltration potential. Infiltration potential exists in portions of the northern and southern corridor where there is approximately 40 ft. of sand and gravel above the bedrock.

A number of stormwater Best Management Practices (BMPs) have already been used in the corridor to address stormwater quantity and quality issues. An example of a regional/state stormwater management facility can be found at the southwest corner of the E. 46th Street and Hiawatha Avenue intersection.

How to measure future success?

1. Cleaner, healthier receiving water bodies.
2. Reduced erosion conditions/potentials.
3. Reduced number of flooding incidents.
4. More green infrastructure in the landscape.

Trends since 2004

Stormwater management standards are currently being revised and/or developed by the Environmental Protection Agency (EPA) and local watershed districts to help manage the stormwater impacts to Minnehaha Creek and the Mississippi River.

Nationwide, programs are being developed to promote and/or require the increased use of 'green' infrastructure in the management of stormwater runoff. Program examples include:



Chicago: impervious alleyway



Chicago: Green Alley pervious alleyway



Seattle: typical flat roof



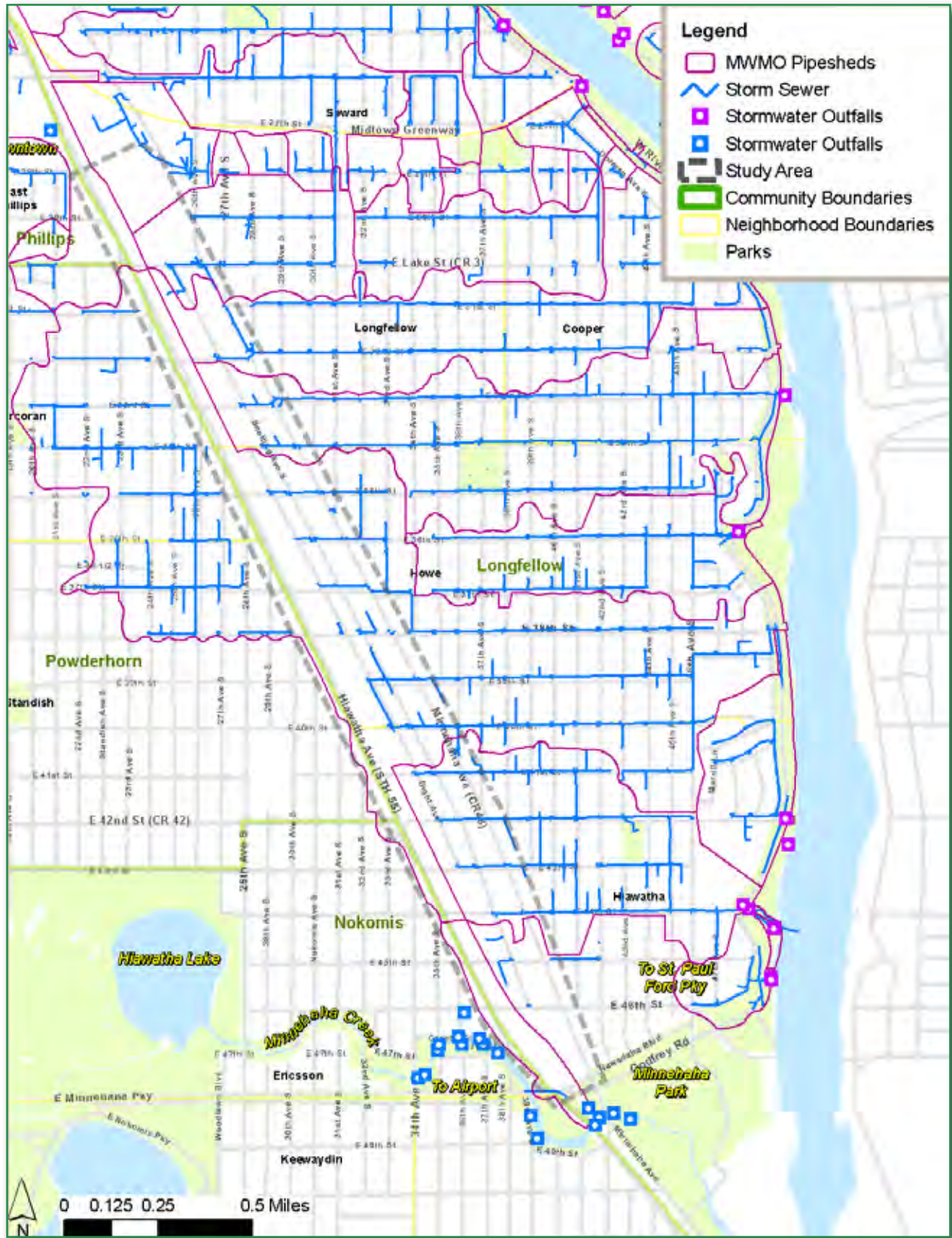
Seattle: Green Factor green roof proposal

Livability Indicator Stormwater Runoff Volume

Land Cover Imperviousness



Stormwater System



Livability Indicator Surface Water Quality

Vision

Water quality of Minnehaha Creek, Mississippi River and lakes improves as a result of better managing stormwater quality. Improvements to stormwater management facilities provide other benefits to the environment including carbon sequestration, improving air quality, addressing urban heat island affect, and increasing wildlife habitat.

Source: Minneapolis Local Surface Water Management Plan, 46th and Hiawatha Station Area Master Plan, Minnehaha Creek Watershed District (MCWD) Resources Mangement Plan and Mississippi Watershed Management Organization (MWMO) Watershed Management Plan.

Why is this indicator important?

- Reducing the amount of pollutants being discharged to Minnehaha Creek and Mississippi River helps reduce the overall pollutant load on the river in general and for those communities downstream.
- The neighborhood would be more desirable for existing residents and potential future residents to live in and invest in if the water resources were improved, clean, and healthy.
- Providing water resources that are usable in terms of outdoor recreation like fishing and swimming promotes use, increasing public health benefits to neighborhood residents.

What do things look like?

- Minnehaha Creek and Mississippi River, resources which receive stormwater discharge from the corridor, are impaired due to a wide variety of water quality indicators, including fecal coliform, mercury, PCBs, PFO's, chloride, and phosphorous.
- Due to these impairments, Total Maximum Daily Load Studies (TMDLs) will be required to address these water quality issues. Once the TMDLs are completed, new stormwater management standards may be established for discharges to these resources.
- The highly developed Hiawatha Corridor (81% impervious) has historically been dominated by commercial and industrial land use that has contributed to poor water quality.
- Lack of parks and limited amount of open space also limits the amount of stormwater quality treatment being provided.



Portion of Minnehaha Creek flowing through the southwestern border of the Hiawatha Corridor before it drains into the Mississippi River.



Pipe outfall discharging into the Mississippi/Minnesota confluence, just south of the Hiawatha Corridor.



Runoff pollutants downstream of the Minnehaha Creek Confluence with the Mississippi River - Fort Snelling Lake, Fall '07.

What do things look like?

The following are examples of Surface Water Quality BMP Strategies within the corridor:

A) As portions of the corridor re-develop, green infrastructure techniques can be applied to address stormwater quality and quantity issues.



Linear infiltration area with curb cuts to allow drainage from the transit lot area.

B) Philips Eco-Enterprise Center (PEEC) green roof; showcasing green roof applications for the corridor.



PEEC green roof with the Hiawatha LRT Trail in the background., roof detail on left.

C) The incorporation of native plants, urban trees, and more consideration for open/green space planning in newly developed areas like the Hiawatha Trail.



Incorporation of open space planning, native planting, and new trees along the Hiawatha Trail.

How to measure future success?

1. Water resources (creeks, rivers and lakes) are no longer impaired.
2. Decreased levels of pollutants in stormwater runoff being discharged to creeks, rivers and lakes.
3. More stormwater treatment with the incorporation of BMPs.
4. Creeks, rivers and lakes are safe to swim in.

Trends since 2004

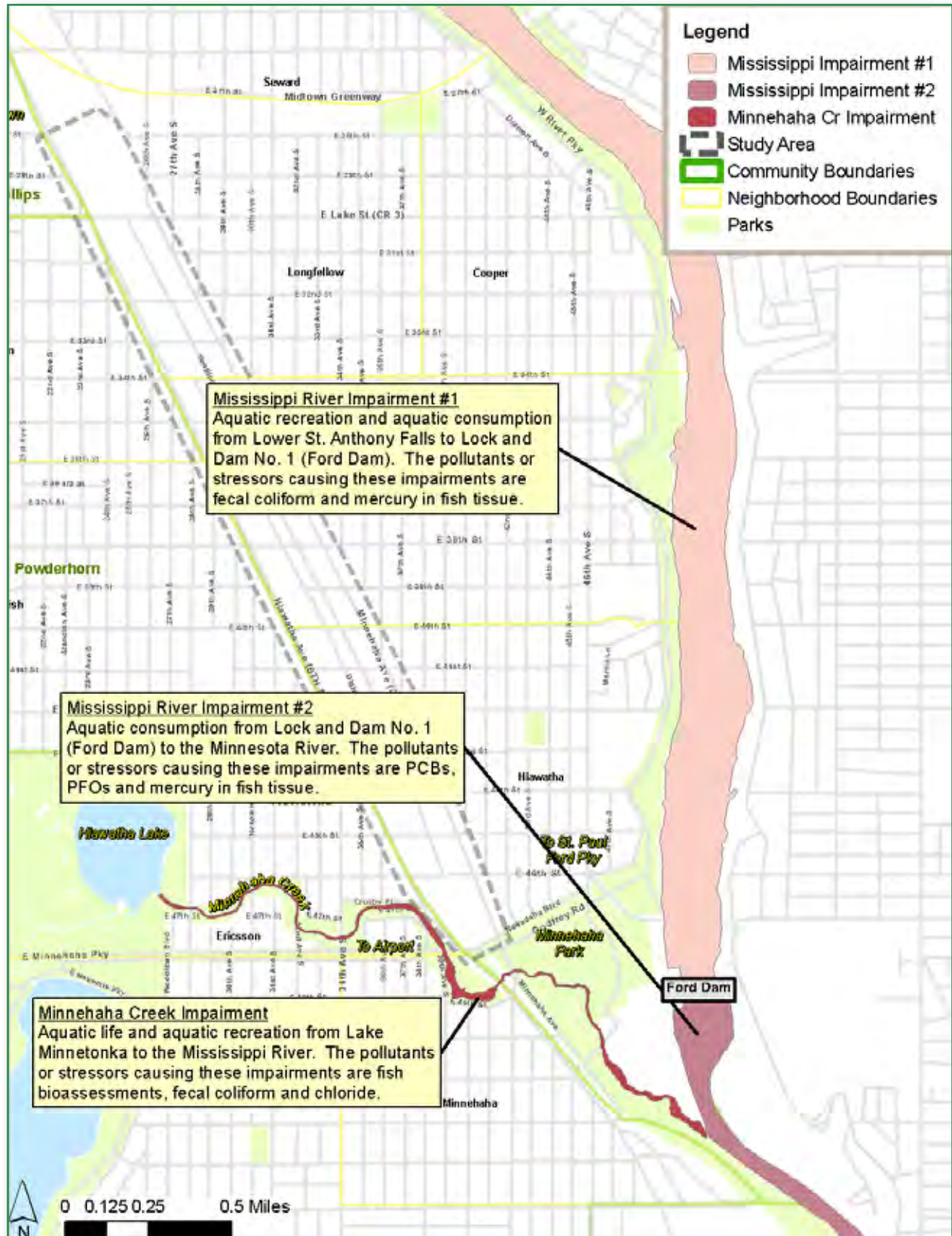
- The City of Minneapolis has been working on separate sanitary sewer connections to the storm sewer system since the 1960's. More than 95% of the City's sewer systems have been disconnected so far.
- The City of Minneapolis Rainleader Disconnection Program has helped reduce residents' stormwater runoff contributions to the sanitary sewer system.
- Phosphorous use banned, reducing pollutant loading to nearby water resources.
- Water quality standards have been developed by the Minnesota Pollution Control Agency, the City of Minneapolis, and local watershed districts.
- Minneapolis Neighborhood Rain Barrel Partnership Program; promotes the use of rain water harvesting in an attempt to reduce runoff and pollutant loads associated with residential land use (e.g. nutrients and fecal bacteria).



City of Minneapolis Neighborhood Rain Barrel Partnership - monitoring site.

Livability Indicator Surface Water Quality

Impairment Summary



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Livability Indicator Contaminated Land

Vision

Environmentally contaminated sites in the corridor are rehabilitated and redeveloped to eliminate continued pollution impacts and reduce development pressures on undeveloped land.

Source: Minneapolis Plan for Sustainable Growth.

Why is this indicator important?

- Many potential building sites in urban locations have been abandoned due to real or suspected contamination.
- Remediation efforts remove hazardous materials from brownfield sites, reduce barriers to redevelopment and prevent groundwater contamination.
- Land is recaptured for productive use including job development, housing, and open space.

What do things look like?

- The 2009 Environmental Inventory Summary Report completed by AMEC Geomatrix screened the corridor to assess the potential for contamination. The screening did not consist of specific soil or water testing. Rather, it reviewed historic and current land use, environmental records and location of sites where there are identified or potential releases of hazardous substances or petroleum.
- The corridor has 80 identified contamination releases and more than 200 potential release sites.
- On the north end of the project area, the South Minneapolis Residential Contamination Superfund site extends both north and south of Lake Street.
- The MPCA, EPA, DEED, Metropolitan Council and Hennepin County offer technical and/or financial assistance for cleanup and revitalization.



*Railway Corridor:
high contamination potential.*



*Automotive Repair:
elevated contamination potential.*

How to measure future success?

1. Suspected sites are evaluated to determine the extent and magnitude of the contamination. (Number of sites assessed)
2. Land areas considered to be brownfields are cleaned up.
3. New development occurs on remediated brownfield sites.
4. Undeveloped contaminated sites are remediated and developed as open green space.
5. Prevention of new leaks.

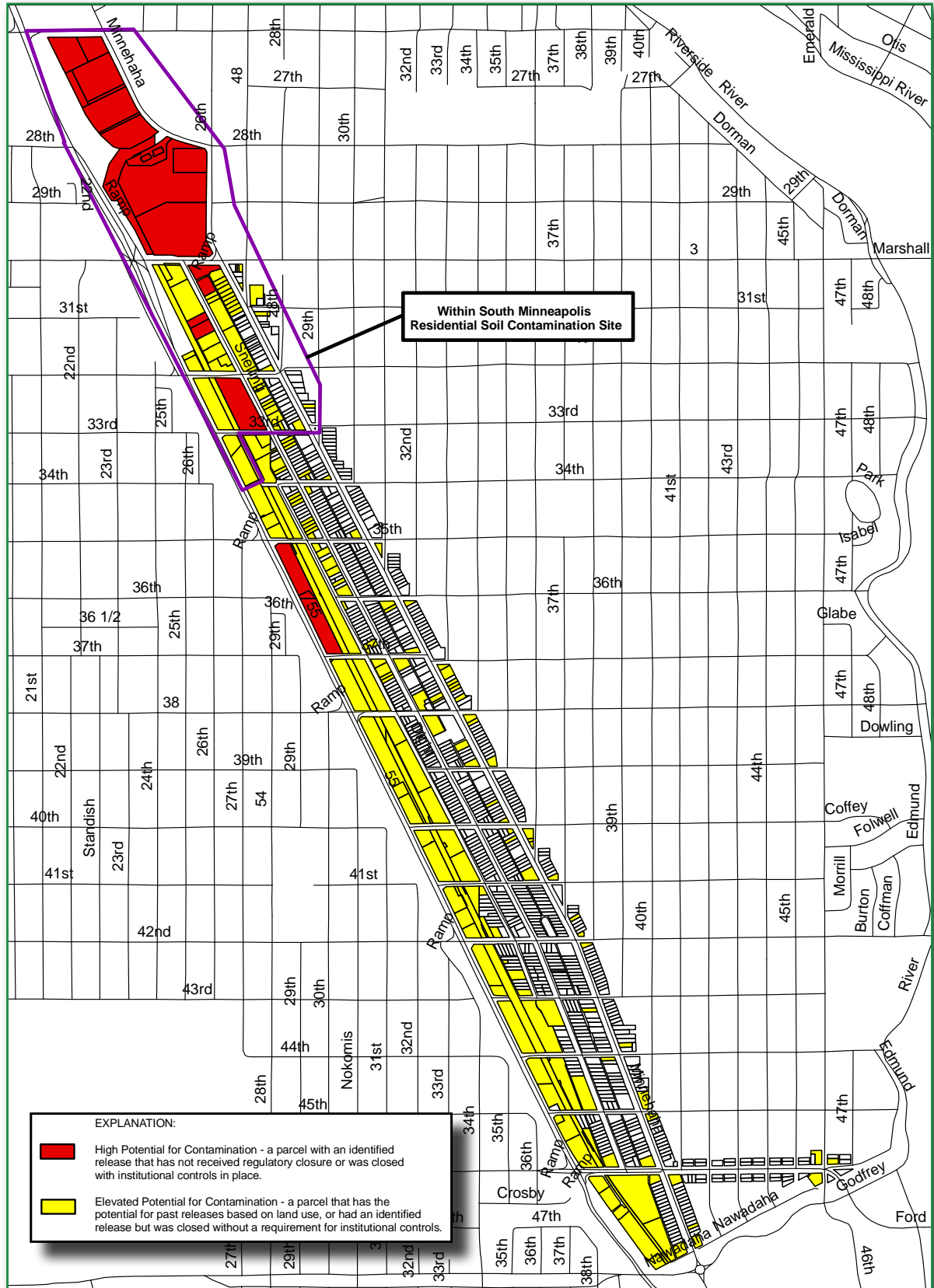
Trends Since 2004

- Hiawatha Flats, 3625 43rd St E, is a 163 multi-building apartment complex with studio, one bedroom and two-bedroom units completed in 2007. The next phase, a 61-unit building is underway and expected to be completed in 2009.
- Hiawatha Business Center, 2020 28th St E, converted a vacant, heavily-contaminated piece of property into a for-lease light industrial center which was completed in 2006.



Brownfield Clean-up.

Phase II Potential Contamination From Regulated Sites and Land Use



Livability Indicator Water Use

Vision

Use of potable water for irrigation, washing, toilet flushing and other uses not requiring drinking water standards is reduced, in order to reduce costs for water treatment, pumping and storage. Rainwater that is collected and used for non-potable needs will also reduce stormwater runoff and improve surface water quality.

Source: Minneapolis Plan for Sustainable Growth.

Why is this indicator important?

- Reduced use of treated water for non-potable needs, such as irrigation or toilet flushing, will conserve our most precious natural resource, our water supply.
- Conservation practices such as rainwater harvesting (the collecting and storing of rainwater) for non-potable uses reduces the amount of stormwater runoff generated in the landscape and enhances water quality by reducing pollutants being discharged to our rivers lakes and streams.
- Rainwater harvesting and greywater reuse (the wastewater which originates from non-toilet plumbing fixtures such as showers, baths, spas, hand basins, laundry, washing machines, sinks and dishwashers) will:
 - ◆ Reduce costs for sanitary sewer treatment
 - ◆ Reduce potential for combined sewer overflows to the Mississippi River
 - ◆ Reduce domestic water bills
 - ◆ Conserve drinking water resources (e.g. for periods of drought conditions)
 - ◆ Reduce the need for water restrictions
 - ◆ Use less energy and chemicals



Rainwater harvesting systems collect and store rainwater for non-potable uses such as irrigation or toilet flushing.

What do things look like?

- According to The 1997-2008 City of Minneapolis Official Web Site the Minneapolis Water Treatment and Distribution Services produces an average 70 million gallons per day (MGD) of potable water. Peak rates during the summer may be as high as 180 MGD. The Metropolitan Council in their technical report: *Water Supply Planning in the Twin Cities Area* projects water demand in Minneapolis to increase by 12% by the year 2050.
- The Mississippi River serves as the primary water source for Minneapolis, St. Paul and the several surrounding communities they serve. The supply of water is adequate for projected demands except under certain circumstances such as drought conditions or contamination of the river.



The new ultrafiltration plant in Columbia Heights is part of the City's water treatment system.

What do things look like?

- Within the corridor, there is one private processing facility that takes water from the groundwater system.
- Currently all water used for non-potable uses such as car and clothes washing, irrigation and toilet flushing is treated to drinking water standards resulting in increased treatment costs, energy consumption, chemical application, etc.
- The City of Minneapolis is promoting the conservation of water by initiating programs such as the Neighborhood Rain Barrel Partnership Program: a program that worked with neighborhood residents to install approximately 2,000 rain barrels throughout Minneapolis. These rain barrels reduce runoff and pollutant loads to downstream receiving water resources. Rain barrels are the most popular form of water harvesting, however, they account for less than one tenth of a percent of the stormwater volume.



Rain barrels reduce runoff and can be used for home watering. Source: picasaweb.google.com/buildgreeninfrastructure

How to measure future success?

1. Combined sewer overflows are reduced to zero.
2. As potable water use in Minneapolis is stabilized or reduced the amount of surface water appropriated from the Mississippi River will decrease.
3. Waste water treatment facilities should see an increase in capacity, a decrease in treatment costs, etc...
4. Less stormwater runoff being discharged to Minnehaha Creek and the Mississippi River.

Trends since 2004

- US Green Building Councils LEED design offers up to 5 credits for water conservancy.
- Minneapolis promotes rain water harvesting through the Neighborhood Rain Barrel Partnership Program.
- Interest in xeriscaping and planting drought resistant landscapes has increased dramatically in the Twin Cities area.
- The installation of water closet fixtures to conserve water is increasing thereby reducing water use by as much as 30 percent or more. Discussions have been initiated regarding changes to the current Minnesota State Plumbing Code to allow for the use of rainwater for non-potable uses (e.g. using rain water and greywater to flush toilets, irrigate green space, fight fires, wash cars, etc...). Rainwater harvesting is a common practice in some semi-arid regions of the United States and they have adapted codes and statutes to allow and control the practice.

Water Savings for Typical Fixtures

Type	Flow/Flush	Daily Use per Person	Total Water Used
Conventional Water Closet	1.6 gallons	6 Flushes	9.6 Gallons
Ultra-Low Flow Water Closet	1.1 gallons	6 Flushes	6.6 Gallons
Conventional Faucet or Shower Head	2.2 gpm	10 Minutes	22 Gallons
Restricted Flow Faucet or Shower Head	0.5 gpm	10 Minutes	5 Gallons

Livability Indicator Urban Forest

Vision

The tree canopy is enhanced in every portion of the corridor with native or adaptive vegetation. Home owners incorporate more trees on their property to help cool their homes and provide windbreaks. Trees are planted along Hiawatha Avenue in rows on each side of the street and in clusters to create key “oasis” areas.

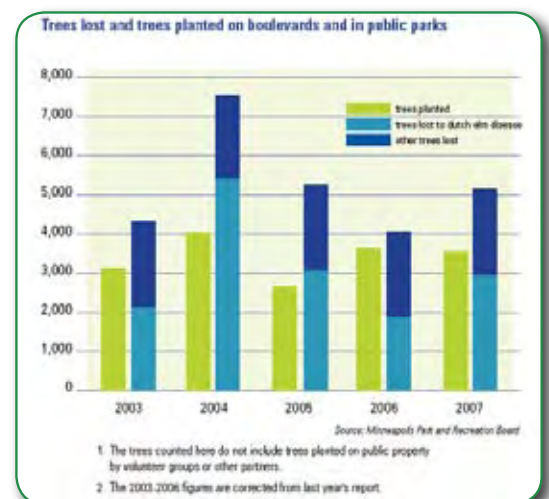
Source: *Minneapolis Plan for Sustainable Growth, Minneapolis Sustainability Initiative, and 46th & Hiawatha Station Area Master Plan.*

Why is this indicator important?

- Trees and plantings provide passive cooling at streets, hardscape and housing, lowering the heat island effect and energy use.
- Trees help to sequester carbon dioxide and manage stormwater at both the canopy and root systems.
- Trees help to reduce windspeeds and noise levels in urban areas, especially in open, high traffic zones.
- A wide variety of trees and plantings provide for a healthier eco-system by breaking down carcinogenic compounds in both air and groundwater.
- Use of native or adaptive plant species are uniquely suited to Minneapolis’ microclimate and require less irrigation and maintenance.

What do things look like?

- There are only two small open spaces, each less than one acre in size. All other open space is largely leftover, with no sense of function and no significant collection of plantings.
- Businesses and the light rail corridor do not incorporate trees and plantings into their site plans or design. The street, LRT rail, freight rail and industrial areas result in a large portion of the corridor being devoid of trees (see tree canopy gap on the map on the next page).
- Boulevard trees are abundant at neighborhood streets but are largely monocultures of a specific tree type in keeping with the City of Minneapolis Master Forestry planting plan.
- There are a few areas of plantings along Hiawatha and Snelling, however they are spaced at large and irregular intervals.
- A U.S Forest Service 2004 study shows the baseline tree canopy covers 26 percent of the city. Since then more than 13,000 public elm trees have died from Dutch elm disease. Because of their age and large stature, their loss has a disproportionately negative impact upon the city’s tree canopy.
- The Minneapolis Park and Recreation Board (MPRB) planted an average of 3,385 trees per year along streets and in parks from 2003 to 2007. In 2007, more than 1,800 additional trees were planted by the City and its partners on public and private land. However, there has still been a net loss of more than 9,000 public trees in the city over the past five years.



Minneapolis GreenPrint Tree Canopy Report.

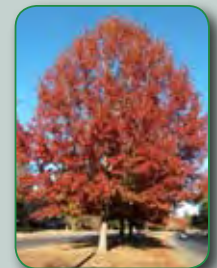
Tree Canopy



- How to measure future success?**
1. Percent of tree coverage on neighborhood streets.
 2. Homes maintain a minimum of 3 deciduous trees on solar faces and 3 to 4 coniferous trees on northwest areas of lots.
 3. All commercial and industrial properties increase number of trees planted.
 4. Tree and plant diversity increases at a block by block level.
 5. All new trees are adaptive or native plant species.
 6. Clusters of trees are planted along Hiawatha at key “oasis” areas and provides a row of boulevard trees on each side of the street at an average spacing of 40 feet.

Trends since 2004

- Groups such as Metro Blooms and Roof Blooms have provided educational outreach and offered grant programs to help increase trees and native species plantings.
- The Minnehaha Watershed District and Mississippi Watershed Management Organization offer educational outreach/grant programs for trees and best management practices.
- The City of Minneapolis provided 1,500 trees to city residents for planting in their own yards through a partnership with Tree Trust, a local nonprofit.



Source: www.mobot.org

Livability Indicator Air Quality

Vision

Air quality is improved through the reduction of ground level ozone, sulfur-dioxide, carbon monoxide and fine particle pollution.

Source: Minneapolis Plan for Sustainable Growth and Minneapolis Sustainability Initiative.

Why is this indicator important?

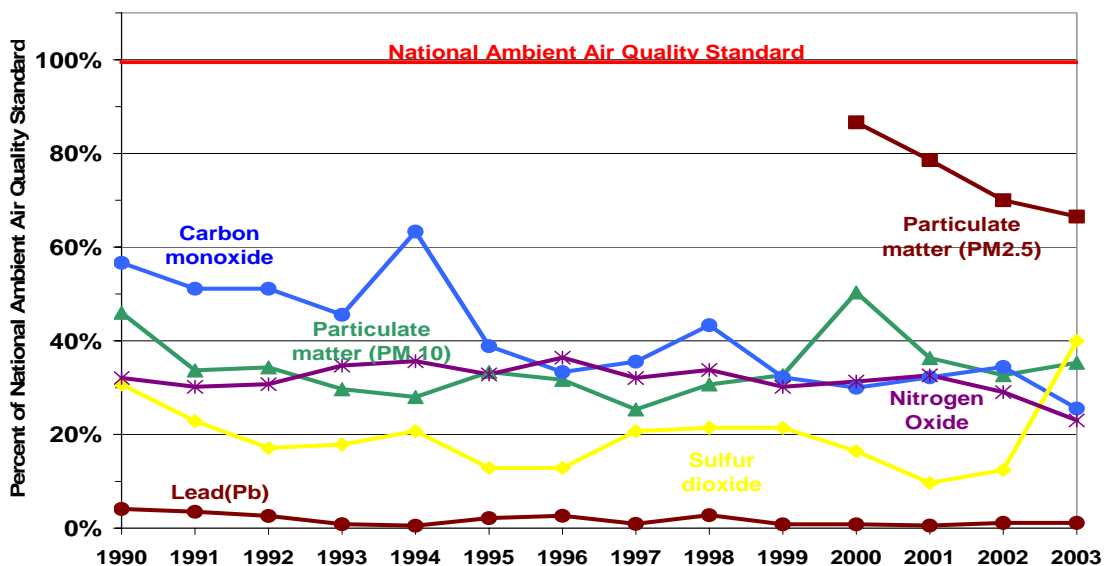
- There are significant links between air quality and health, especially in sensitive groups such as the elderly, children and those with cardiac or respiratory problems.
- Smog occurs primarily during seasons of warmer temperatures. Sensitive groups are especially vulnerable to fine particle pollution resulting from industrial and vehicle combustion.

What do things look like?

Air quality in Minneapolis is among the best in the country when compared to that of other major cities. There are however, reasons to be concerned about the trends of certain air pollutants. According to the Minneapolis GreenPrint Report, the number of moderately unhealthy days increased by five percent from 169 days in 2006 to 178 days. At the same time, the number of days that had even worse air quality increased from three days in 2006 to nine days in 2007. One positive note, however, is that the yearly average levels of benzene, a dangerous air toxin, have been within health benchmarks citywide for the past five years and have declined citywide by 27 percent since 2003.

Minneapolis is committed to the monitoring of these air pollutants to ensure that the air quality in the region is safe and will continually work to reduce the pollutants in the air. Hennepin County is a founding member of the Cool Counties Initiative, which is a coalition of counties across the U.S. that are committed to reducing the causes of climate change and improving air quality. The chart below shows the trends in air pollutants in Minneapolis through 2003.

Trends in Criteria Air Pollutants in Minneapolis



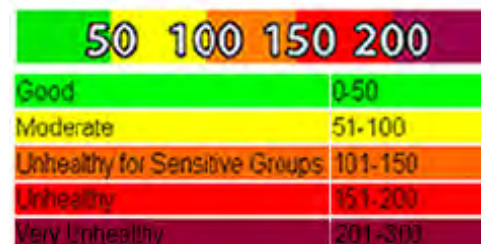
Source: City of Minneapolis Air Quality Report.

Air pollution comes from three major sources: utilities; industry and transportation. Presently, more than half of our air pollution results from transportation. Conversion of the Riverside Coal Plant to natural gas will result in enormous improvements in air quality city-wide. Similarly, toxic releases from industrial sources have shown dramatic decreases in recent years.

Cars and other vehicles, trains and planes, which account for half of the air pollution, have not shown similarly significant reductions in the recent past. Reducing the single occupancy vehicle traffic in the corridor in favor of mass transit modes with cleaner burning fuel would assist with air pollution. Another method of reducing carbon dioxide is to increase the number of trees along Hiawatha and other highly traveled areas of the corridor. One tree can filter up to 60 pounds of pollutants from the air each year.

The Air Quality Index (AQI) reports daily air quality conditions. In Minnesota, four pollutants are used to calculate the AQI: ground-level ozone, sulfur dioxide, carbon monoxide and fine particles (PM2.5). Not all pollutants are monitored at each location. The pollutant with the highest value determines the AQI for that hour. There are nine locations in Minneapolis which are monitored.

The two pollutants of most concern in Minnesota are ozone and PM2.5. Ozone, also called smog, is only a problem in warm weather and so is only monitored from April through September. PM2.5 is monitored year-round. While the AQI in Minnesota cities rarely reaches the “unhealthy” or red range, many citizens are affected by air quality in the orange range, or “unhealthy for sensitive groups.”



MPCA's Air Quality index grid and legend.

Trends since 2004

- City of Minneapolis began monitoring pollutant and air toxin levels in 2001 and completed a series of air quality tests in 2005 and 2006.
- Hennepin County established its Cool County Initiative in 2007 in part to improve air quality.
- City of Minneapolis will conduct annual inspections of facilities and businesses that have MPCA air quality permits to ensure that they are operating properly.
- City of Minneapolis adopted a new anti-idling vehicle ordinance in 2008. The City is also reducing idling times and vehicle emissions by removing NO TURN ON RED signs at 60 intersections.
- Hennepin County's vehicle fleet includes eight hybrid electric vehicles, 186 flexible-fuel vehicles and 175 vehicles using biodiesel fuel.
- City of Minneapolis purchased 18 new hybrid-electric vehicles for a total of 25 and 34 new E85 flex-fuel vehicles for a total of 132.*

How to measure future success?

1. Reduce emissions in Minneapolis by 50% for CO, Pb, PM2.5, PM10, NO2, O3 and SO2
2. Reduce amounts of benzene, formaldehyde, tetrachloroethylene and methylene chloride.
3. Reduce number of Air Quality Health Alerts.
4. Reduce moderately unhealthy days in Minneapolis to fewer than 35 per year by 2015, with more reductions after that.*
5. Reduce all monitored air toxins to levels within state health guidelines by 2015.*

*From Minneapolis GreenPrint

Livability Indicator Waste Reduction

Vision

Waste in the corridor is reduced through increased recycling, composting and waste to energy systems. All homes increase the amount of recycling and composting by 150%. All businesses have separate recycling containers for glass, plastic, metal, paper, cardboard and compostable goods. Minnehaha - Hiawatha corridor has a neighborhood scale mini-digester for combined heat and power system from yard waste and source separated organics.

Source: Minneapolis Plan for Sustainable Growth.

Why is this indicator important?

- Every year 505,000 tons of solid waste ends up in Minnesota landfills - this waste can contaminate our ground, water and air.
- Making new things from recycled ones takes less money, less energy, and less of the Earth's resources. Because less energy is used, factories do not release as much pollution either.
- Recycling saves money and helps fund city services.
- Capturing energy from biomass is cleaner than incineration for energy.

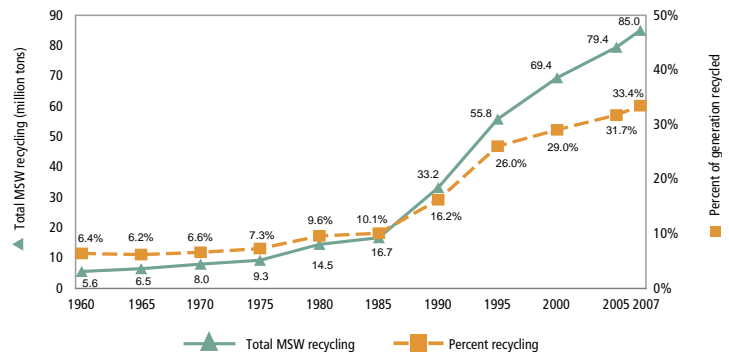
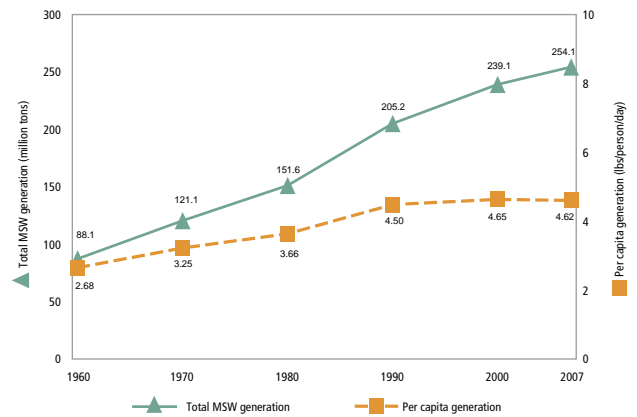


Landfill

Source: www.resourcesystemsconsulting.com/blog.

What do things look like?

- Each of us generates on average 4.4 pounds of waste per day per person. In a lifetime, the average American will throw away 600 times his or her adult weight in garbage. This means that each adult will leave a legacy of 90,000 lbs. of trash for his or her children.
- Statewide, about 43% of solid waste is recycled, 20% is used as Waste to Energy.
- Approximately 5.6 million tons of construction and demolition debris are created in Minnesota annually. Only 13% of that amount was diverted from landfills through recycling.
- The City of Minneapolis generates an average of 1.2 tons of solid waste per household per year. Of that, 0.25 tons are recycled per household, the rest is landfilled or used as recovered resources as waste to energy.
- Curbside recycling in Minneapolis generates about 14,000 tons per year that is diverted from landfills.



Top: MSW Solid Waste Generation, 1960 to 2007

Bottom: MSW Recycling Rates, 1960 to 2007

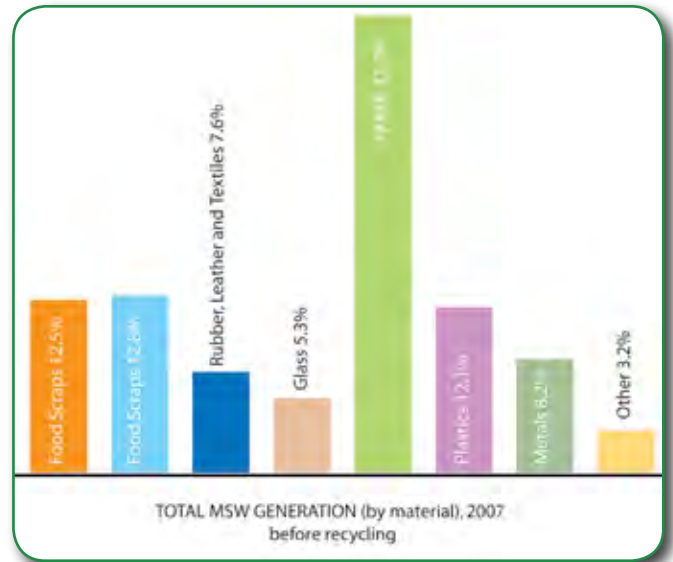
Source: EPA Municipal Solid Waste Generation, Recycling and Disposal in the United States

What do things look like?

- Recycling all of your home's waste newsprint, cardboard, glass, and metal can reduce carbon dioxide emissions by 850 pounds a year.
- In this decade, it is projected that Americans will throw away over 1 million tons of aluminum cans and foil, more than 11 million tons of glass bottles and jars, over 4 and a half million tons of office paper and nearly 10 million tons of newspaper. Almost all of this material could be recycled.



Dumpsters from www.portaransasdumpsters.com.



Amount of waste generated before recycling by material.

How to measure future success?

1. Reduce total amount of solid waste landfilled by 5% each year.
2. Increase recycling rates by 3% each year.

Trends since 2004

- City of Minneapolis offers six clean up vouchers and two tire vouchers per year for South Transfer Station.
- City of Minneapolis provides two - 24 gallon recycling containers per household.
- City of Minneapolis offers a \$7 credit to residents who actively participate in recycling.
- Hennepin County holds one-day neighborhood collection events for household hazardous wastes to make collection more convenient for neighborhood residents.
- In 2010, a site search and feasibility analysis was completed for a combined County-City environmental facility within Minneapolis, which is anticipated to be operational in 2013.



Recycle sign in multiple languages from the City of Minneapolis.



Recycling bins from www.smartplanet.com.

Livability Indicator Energy Use

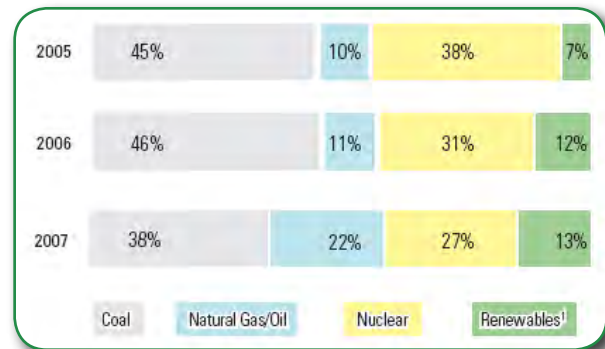
Vision

See an overall reduction in energy use per household and business by 30% by 2020. (**30 by 20 plan**) Institute an energy conservation competition between blocks, neighborhoods and businesses.

Source: Minneapolis Plan for Sustainable Growth and Minneapolis Sustainability Initiative.

Why is this indicator important?

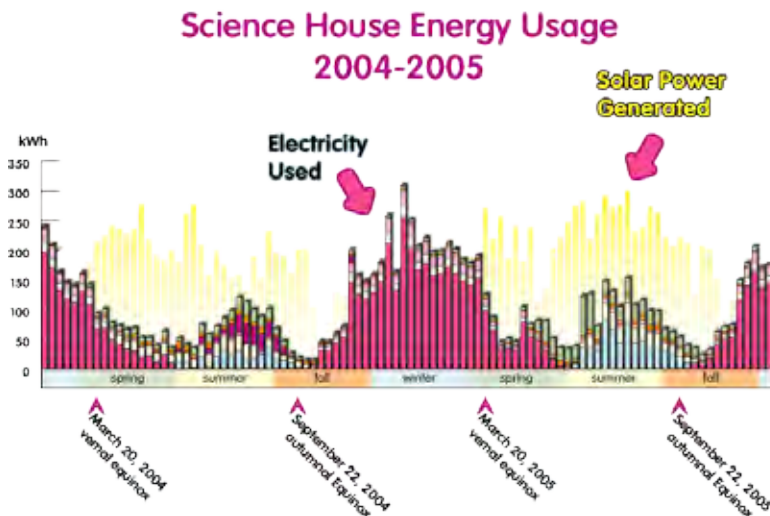
- The ability to secure clean, affordable and renewable energy is one of the greatest challenges facing our generation.
- 63% of Minnesota's energy comes from coal burning electricity plants which have serious negative impacts on our environment.
- Using electricity from coal plants and driving our cars are two of the largest sources of carbon dioxide, the major cause of the greenhouse effect and global climate change.



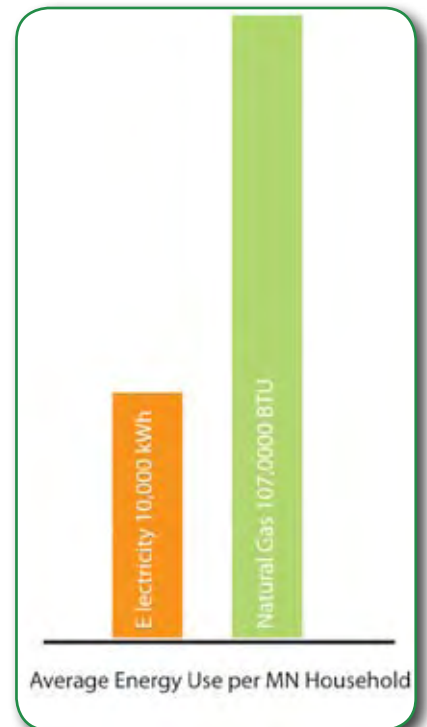
Xcel Energy Electric Power Sources.

What do things look like?

- The City of Minneapolis has a carbon footprint of 2.44 metric tons per capita. 1.9 metric tons is attributable to residential energy use. (2005 Brookings Institute Report)
- In spite of increasing costs, energy use appears to be increasing.



The Science Museum of Minnesota's Science House is a zero-emissions demonstration facility. It runs entirely on solar electricity and on an annual basis it produces more than it generates. It also incorporates a ground-source heat pump for heating and cooling.

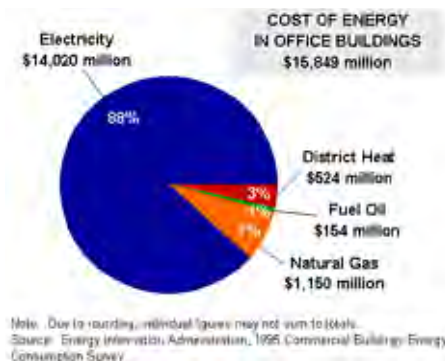


Average Energy Use Per Household.

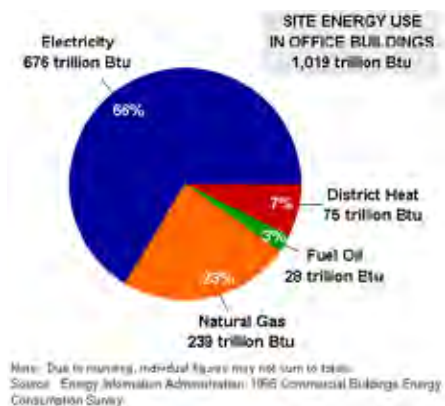
What do things look like?



How Office Building Energy is Used



Cost of Office Building Energy Use



Source of Office Building Energy

How to measure future success?

1. Reduce total kwh and Btuh hours by 3% each year.
2. Increase the percentage of homes qualifying for energy efficient mortgages.
3. Neighborhood participation in the Minnesota Energy Challenge (www.mnenergychallenge.org).

Trends since 2004

- The average Minneapolis resident emitted 1.094 tons of carbon from residential energy use (rank 62nd). The average 100-metro resident emitted 0.925 tons and the average American emitted 1.16 tons of carbon from residential energy use.
- Xcel Energy has is converting the Riverside Electric Plant from coal burning to natural gas for its electrical power generation.
- HOURCAR car-sharing program placed a solar-powered hybrid car at the 46th Street LRT station.
- Hennepin County libraries in Maple Grove and Plymouth, which are both scheduled to open in mid-2010, will incorporate a variety of energy-efficient design features and sustainable concepts that meet or exceed the Minnesota Sustainable Building Guidelines.
- Hennepin County Libraries have easy-to-use Power Check energy meters from Xcel Energy available for check out.
- Recommissioning studies, intended to optimize operating efficiencies of building systems, have been implemented or will be implemented by Hennepin County for many County buildings.



Source: apps.carleton.edu

Livability Indicator Energy Production

Vision

Homes and businesses with good solar exposure install solar pv and hot water panels as on site renewable energy sources. Large, open areas and unused buildings will be converted to geo -thermal, solar or urban wind farms to produce electrical energy needs for 50% minimum of all power needs for homes and businesses. The Minnehaha - Hiawatha corridor has a neighborhood scale mini-digester for combined heat and power system from yard waste and source separated organics.

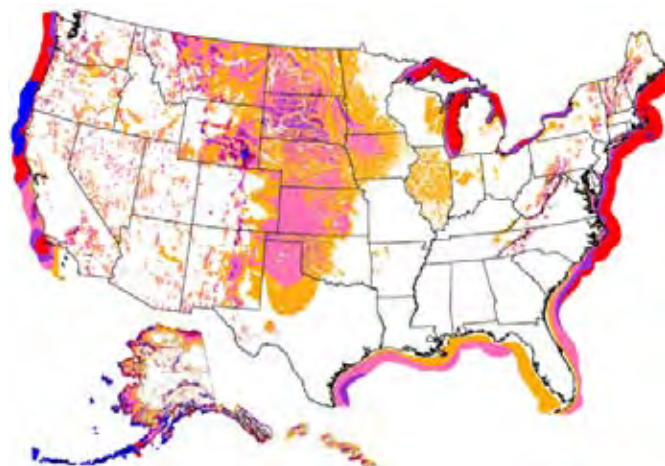
Source: Minneapolis Plan for Sustainable Growth and Minneapolis Sustainability Initiative.

Why is this indicator important?

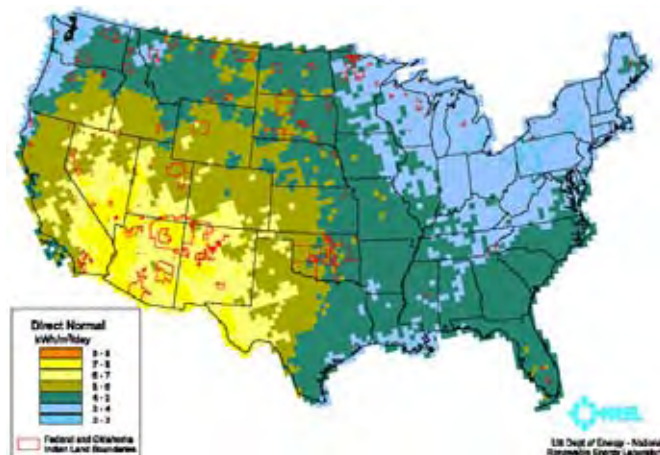
- Renewable energy technologies are clean sources of energy that have a much lower environmental impact than conventional energy technologies
- Renewable energy will not run out. Ever. Other sources of energy are finite and will some day be depleted.
- Utilizing a variety of energy sources provides flexibility, greater security at lower costs than conventional means of production.

What do things look like?

- There are no large scale renewable energy production areas within the corridor.
- There are no residential and one commercial solar pv or hot water installations in the corridor.
- The Phillips Eco-Enterprise Center is located just beyond the corridor area and features solar pv and geothermal heating systems,
- According to the Minnesota State Energy Office, over the last few years, 67 solar energy systems have been installed on homes and businesses in Minneapolis.
- More than 7,600 Minneapolis customers participated in Xcel Energy's Windsorce program, buying enough wind-generated electricity for almost 2,800 homes for a year. This is an increase from about 5,100 customers in 2005. This ensures additional Minnesota-produced wind power, which helps our economy and environment. (www.xcelenergy.com)



Wind Power Potential



Solar Power Potential

How to measure future success?

1. 50% of all businesses and residences participate in Xcel Energy's Windsource program.
2. 25% of all power needs for homes and businesses is produced from on-site renewable energy sources.

Trends since 2004

- Patrick's Cabaret installed 36 solar panels in September 2008.
- The State of Minnesota offers tax rebates for both solar pv and solar hot water systems for residents and businesses alike.
- The federal tax credits for energy efficiency and renewable energy investments have been extended until 2016.
- Low interest funds are available for renewable energy production.
- Minneapolis received a \$2 million grant to build a 600kW solar array at the City Public Works Currie Maintenance Facility.
- In 2009, Hennepin County installed a solar photovoltaic array (more than 500 panels) on the roof of its public works facility in Medina, which is one of the largest solar installations in the Upper Midwest region.
- A 1,600-foot steam line, constructed as a joint venture between Hennepin County and NRG Energy Center, Minneapolis, supplies steam produced at the Hennepin Energy Recovery Center (HERC) to NRG Energy Center's downtown district heating system and Target Field.



Solar Hot Water Panels.



Solar PV Panels.



Wind Turbines from TSP Adventures Blog.

Livability Indicator Night Sky

Vision

Provide secure neighborhood lighting while minimizing light trespass from buildings and sites to neighbors and the night sky. Reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction. Reduce development impact on nocturnal environments.

Why is this indicator important?

- Light trespass from poorly designed outdoor lighting produces glare (which inhibits visibility) and light pollution which limits our ability to see the stars in the night sky. Light trespass from area businesses increase light levels in residential zones.
- Through appropriate design, outdoor lighting can address safety, site illumination concerns and night sky access while minimizing our environmental impact.

What do things look like?

- The predominant light fixtures in use along Hiawatha is 150 watt high pressure sodium lamps spaced 200 feet apart. Street lighting in Business Districts, such as along Hiawatha, average 1.5 to 2.0 footcandles.
- Street lighting along pedestrian routes, such as Minnehaha, average between 0.8 to 1.2 footcandles.
- The predominant light fixture in use within the corridor's residential area is 100 watt HPS spaced 150 - 200 feet apart at streets and alleys with light levels averaging 0.3 to 0.6 footcandles.



Night sky above a rural area
Source: [farm.static.flickr.com](https://www.flickr.com/photos/farmstatic/).



Night sky above city
Source: [blogs.yogajournal.com](https://yogajournal.com/blog/).



Satellite image of North America at night.
Source: www.3ap.org

Trends Since 2004



Non cut-off fixtures contribute to light pollution.



*Full cut-off fixtures help control light pollution.
Source: www.astronomybuff.com.*

- Low level ornamental lighting has been replacing the taller, higher output light fixtures since 2004.
- Minneapolis encourages the use of full cut off fixtures on all exterior site lighting.
- The Minnesota state legislature is sponsoring a bill that will determine a model lighting ordinance for the entire state.

How to measure future success?

1. Light levels at residential property areas are no more than .01 footcandles 10 feet beyond the property line.
2. Light levels at industrial/commercial areas are no more than .20 footcandles at property line and .01 footcandles 15 feet beyond.

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