

SOLAR RESOURCE PROTECTION

LOCAL PLANNING HANDBOOK

SOLAR RESOURCE PROTECTION REQUIREMENT

The [Metropolitan Land Planning Act](#) requires that the Comprehensive Plan shall contain “an element for the protection and development of access to direct sunlight for solar energy systems.”

To satisfy the solar resource protection requirement within statute, the Council has provided the Minnesota Solar Suitability Analysis map clipped to your community, along with calculations of your community’s gross solar and rooftop solar resource. To adequately plan for solar energy systems, communities should assess their existing, or baseline, conditions. The solar map and calculations provide baseline conditions for solar protection which will assist communities in creating appropriate solar policies and implementation strategies through the identification of key sites or land uses suitable for solar development, while correspondingly limiting solar development for other land uses or locations.

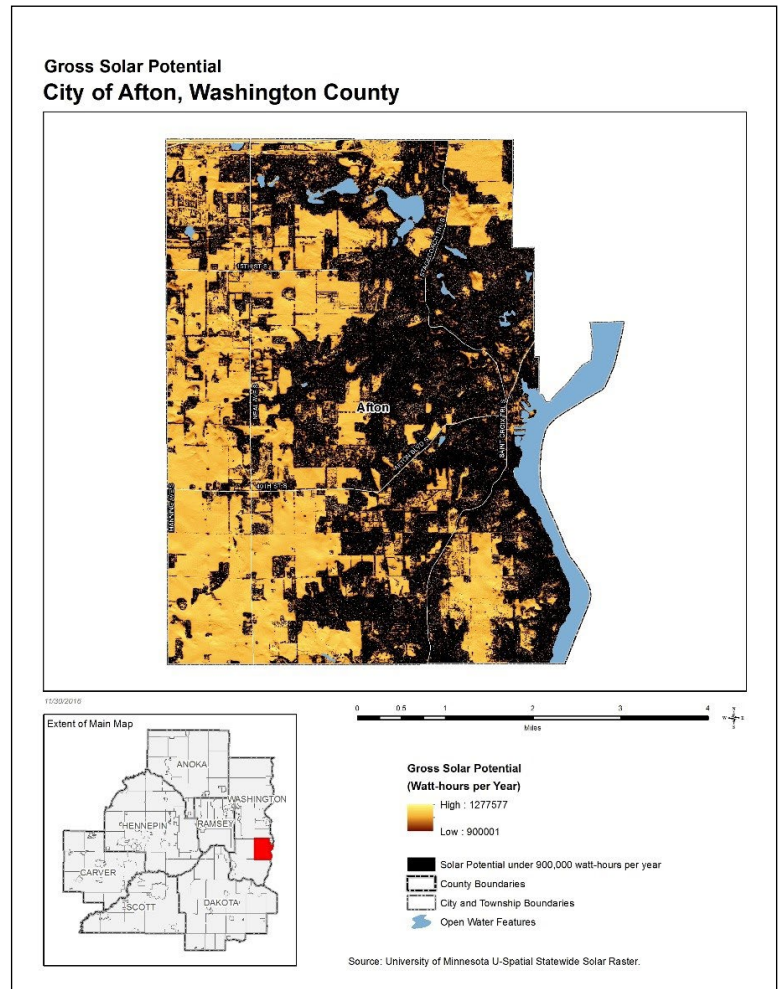
The sample map and calculations below are for the City of Afton, in Washington County. The solar map and calculations will differ based on the existing natural and built environment.

SOLAR MAP

In recent years, the declining prices and growing demand for solar panels have not been matched with publicly-available information for site suitability analysis to determine ideal solar panel placement. To better plan for solar development, communities need baseline solar resource information. The baseline provides necessary information for adopting appropriate solar policies and implementation strategies.

The Minnesota Solar Suitability Analysis Map, developed by the University of Minnesota and maintained by the Department of Commerce, provides solar insolation (total annual sun energy, measured in watts) data at a high resolution (1 meter). These data can be used to estimate total potential energy production of solar installations. Solar insolation varies, but the most important factor affecting small-scale photovoltaic solar installations is intermittent shading due to nearby structures and trees. More information on the methodology for creating the Solar Suitability Analysis Map can be found [on the project website](#).

The Metropolitan Council has clipped the MN Solar Suitability Analysis Map to your community so that the map, along with the solar resource calculations, can meet the statutory requirement for the protection of the solar resource.





The map produced for each community includes a legend that displays a ‘high-end’ insolation number per square meter in yellow (this will vary by community) and a ‘low-end’ insolation minimum of 90,001 watt hours per year. Solar potential below 90,000 watt hours per year is expressed in black. Since the map shows the solar potential at the community-wide scale, it does not capture the 1-meter granularity of the data. Areas at the community scale may appear black, but a closer examination will reveal smaller areas of solar potential, particularly on rooftops.

GROSS AND ROOFTOP SOLAR RESOURCE CALCULATIONS

These solar resource calculations provide an approximation of each community’s solar resource. This baseline information can provide the opportunity for a more extensive, community-specific analysis of solar development potential for both solar gardens and rooftop or accessory use installations. More detailed GIS information is available if communities wish to create additional maps or conduct assessments at a finer grain than the city-wide map provided.

For most cities, the rooftop generation potential is equivalent to between 30 and 60% of the community’s total electric energy consumption. Cities with dense development and large energy commercial or institutional energy users (such as Minneapolis and Saint Paul) will have rooftop generation potential between 25-35% of total electric use. Cities with less commercial development and less density, such as many second- and third-tier suburbs, will have rooftop generation potential equivalent to 50-70% of total community electric use. Very few communities’ rooftop generation potential reaches or exceeds 100% of their energy usage.

The gross solar potential and gross solar rooftop potential are expressed in megawatt hours per year (Mwh/yr). These values represent gross totals; in other words, they are not intended to demonstrate the amount of solar likely to develop within each community. Instead, the calculations estimate the total potential resource before removing areas unsuitable for solar development or factors related to solar energy efficiency.

The gross solar generation potential and the gross solar rooftop generation potential for each community are estimates. A conversion efficiency of 10% is based on benchmarking analyses for converting the Solar Suitability Map data to actual production, and solar industry standards used for site-level solar assessment. The rooftop generation potential does not consider ownership, financial barriers, or building-specific structural limitations.

A sample community total is shown in the table below:

Community ¹	Gross Potential (Mwh/yr)	Rooftop Potential (Mwh/yr)	Gross Generation Potential (Mwh/yr) ¹	Rooftop Generation Potential (Mwh/yr) ²
Afton	37,140,717	213,664	3,714,072	21,366

¹ There are a few communities where generation potential calculations could not be produced. There are areas within some maps where data was unusable. These areas were masked and excluded from gross rooftop potential and generating potential calculations.

² In general, a conservative assumption for panel generation is to use 10% efficiency for conversion of total insolation into electric generation.

APPLYING ROOFTOP GENERATION POTENTIAL TO YOUR COMMUNITY

The table below serves as a point of reference for how three communities of three different designations within the Twin Cities metropolitan area may view their Rooftop Generation Potential (Mwh/yr). For the Lake Elmo community, their Rooftop Generation Potential could potentially meet 95% of their community's electricity needs over the course of a year. The community of Hopkins is nearly 12 times as dense as Lake Elmo; however, they may still benefit from 55% of their electricity needs being met by their Rooftop Generation Potential. The benchmarking of the electricity use in these communities will allow them to more accurately understand, analyze, and plan around the benefits of their individual Rooftop Generation Potential.

Community (Designation) ¹	Rooftop Generation Potential (Mwh/yr)	Electricity Consumption (Mwh/yr) ²	Potential Electricity Consumption met by Rooftop Generation (%)
Oakdale (Suburban)	155,503	204,845	76%
Lake Elmo (Rural Residential & Emerging Suburban Edge)	51,949	54,935	95%
Hopkins (Urban Center)	111,590	203,524	55%

¹ Community Designation by the Metropolitan Council per "*Thrive MSP 2040*."

² Total electricity use across the Residential and Commercial/Industrial sectors within each community in the year 2011 as reported in "Final Minnesota Pollution Control Agency Report on: Regional Indicators Initiative Measuring City-Wide Performance, An Inventory of Energy, Potable Water, Travel, Waste, Greenhouse Gas Emissions and Costs for Twenty Minnesota Cities from 2008-2011."

MEETING THE MINIMUM REQUIREMENTS

- Please refer to the Energy Infrastructure and Resources Minimum Requirements in the [Resilience](#) plan element section of the Local Planning Handbook to learn more about the solar protection and development minimum requirements and how to get more out of your 2040 Comprehensive Plan Update.
- Access your [Community Page](#) to find solar maps and calculations.

Please contact [your Sector Rep](#) if you have any questions.

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