



**PRIMARY RESEARCH** *on*  
**PLANNING & ZONING** *for*  
**SOLAR ENERGY SYSTEMS**  
*in the state of Michigan*

September 24, 2020

Jason Derry • Emma Gilbert  
Faculty Advisor: Wayne Beyea, AICP

**MICHIGAN STATE**  
**UNIVERSITY**

Extension

**MICHIGAN STATE**  
**UNIVERSITY**

School of Planning, Design  
and Construction

## TABLE OF CONTENTS

<b>Background</b>	<b>1</b>	<b>Common and Unique Language</b>	<b>6</b>
<b>Methodology</b>	<b>1</b>	Common Language.....	6
Overall.....	1	Unique Language.....	7
<b>Co-location, District Density, and the Development Transect</b>	<b>2</b>	<b>Conclusions</b>	<b>8</b>
Utility-, Personal-, and Community Scale.....	2	Regional Variations.....	8
Regulating Solar Along the ‘Development Transect’.....	2	Further Research.....	9
Marginal Lands: Parking Lots, Grayfields.....	3	Additional Research Questions.....	9
Special Considerations: Airports and Public Right-of-Ways.....	3	<b>Appendices</b>	<b>10</b>
<b>Different Scales and Configurations of Solar Energy Systems</b>	<b>3</b>	<i>Appendix A: Solar Installation Types and Allowances Across the Development Transect.....</i>	<i>10</i>
Ground-mounted vs. Roof-mounted Solar.....	3	<i>Appendix B: Map of Michigan Communities Researched.....</i>	<i>11</i>
Utility- vs. Community- vs. Personal-scale Solar.....	4	<i>Appendix C: Communities Allowing Co-location by Population Density Category.....</i>	<i>12</i>
<b>Community-scale Solar</b>	<b>5</b>	<i>Appendix D: Michigan State University Extension District Map.....</i>	<i>13</i>
Urban-scale vs. Rural-scale.....	5	<i>Appendix E: Index of Cited Communities.....</i>	<i>14</i>
Transect Approach to Standards.....	5	<i>Appendix F: Solar Carport Case Studies from Outside the State.....</i>	<i>15</i>
		<i>Appendix G: Common and Unique Language Addendum.....</i>	<i>18</i>

## BACKGROUND

The purpose of this report is to provide a summary of ordinance provisions related to the regulation of solar energy systems (SES) in Michigan. It is based on research conducted by Emma Gilbert and Jason Derry, Urban and Regional Planning students at MSU, under the guidance of Wayne Beyea, AICP, faculty advisor (Urban and Regional Planning), School of Planning, Design, and Construction. The presented findings are based on the research of 159 community zoning ordinances — 123 townships, 30 cities/villages, and 6 counties (governing a total of 61 townships). This report provides a snapshot of the current zoning conditions for solar energy systems as they stand today with regards to co-location, the development transect, district density, configurations and scales, and community-scale development.

Research for this report began with a collaborative meeting between the Michigan State University and University of Michigan teams on May 13, 2020. Research roles were assigned and appropriate resources were shared between the teams, including the Michigan Zoning Database developed by Dr. Sarah Mills, Graham Sustainability Institute, University of Michigan. The database served as the starting point by which relevant communities were selected and reviewed, and can be found at <http://graham.umich.edu/climate-energy/energy-futures>.

A progress update meeting was held on July 14, 2020 to share emerging trends in the observations acquired thus far between the teams. A progress report was developed to summarize the Michigan State University team's progress to accompany this meeting.

Research on the selected communities concluded on September 10, 2020 prior to a final meeting on September 17, 2020. This document serves as the final report of the research project and was presented as a summary of the observations and conclusions made by the Michigan State University team.

## METHODOLOGY

1. Review zoning ordinances from the Michigan Zoning Database that have the selected criteria—featuring both utility- and small-scale SES regulation identified within their ordinance (159 ordinances). The total number of communities planned for review has changed throughout the research process as some ordinances and documents were not available online via municipality websites, reducing the total number of ordinances reviewed from 183 to 159.
2. Record definitions for different types and scales of SES projects (i.e., utility v. community v. personal).
3. Identify the zoning districts in which each community permits the development of solar energy systems.
4. In districts that permit solar energy systems, identify what kind of solar infrastructure is allowed (ground-mounted v. roof-mounted), how much infrastructure is allowed, and the setback requirements.
5. Identify, by district, what land use solar energy systems are in each community (i.e. special land use, principal use, or accessory use).
6. Identify in which districts communities allow for co-location:
  - ◆ What scale of solar development is permitted for co-location?
  - ◆ What is the density of the district in which co-location is permitted?
  - ◆ Account for special considerations: airports, rights-of-way, etc.
8. Identify how district density and solar development are addressed along the transect:
  - ◆ Search for allowance and form of permitted use of both roof-mounted and ground-mounted solar installations by zoning district, keeping in mind district densities as locally defined.
  - ◆ Search for the amount of solar related infrastructure (area, coverage, etc.) allowed by zoning district, keeping in mind district densities as locally defined.

- ◆ Search for eligibility of solar energy systems to be co-located as either a principal use within a district defined to permit unrelated principal uses or an accessory use to a lot with an unrelated principal purpose, keeping in mind district densities as locally defined.
9. Identify how communities of different densities address community-scale solar development:
- ◆ Where do they allow for community-scale solar development?
10. Identify how community-scale solar development is regulated in different districts.

## CO-LOCATION, DISTRICT DENSITY, AND THE DEVELOPMENT TRANSECT

### Utility-, Personal-, and Community-Scale

*How do communities of different densities allow for solar co-location (rural, suburban, urban)?*

- Out of our 159-municipality sample, the tallied results show that 86 municipalities meet the requirements for solar co-location<sup>1</sup> at least somewhere within their jurisdiction. No communities, however, explicitly use the term “co-location” anywhere within their ordinance.

### Regulating Solar along the ‘Development Transect.’

*Define densities of districts.*

- The following findings are extracted from data presented in Tables 1-3 of Appendix A (Solar Installation Types and Allowances Across the Development Transect). Each table exhibits a loose trend in which communities of a higher density have fewer permitted solar energy system types, use types, and district allowances than communities of a lower density. Table 1 shows the Detroit metropolitan area, Table 2 shows the Grand Rapids metropolitan area, and Table 3 shows the Lansing metropolitan area.
- As districts become denser (e.g. increasingly dense residential districts from R-1 to R-5), ground-mounted allowances tend to become less common. In more dense districts, it has been observed that, frequently, small-scale or roof-mounted systems are the only configurations of solar energy systems permitted. For example, in less permissive communities, such as the **City of Royal Oak** (Table 1), small-scale systems are permitted in all districts, but only by accessory use, serving to diminish the possibility of utility- and community-scale solar development from both permitted uses and maximum allowed infrastructure standpoints. Other, denser communities such as the **City of East Lansing** (Table 3) allow quite a bit of freedom for solar installations, permitting them in all districts by right. This provision, however, only applies to personal-scale solar energy systems; Utility-scale solar development is restricted to the municipality’s small Residential Ag district.
- In contrast, lower-density communities tend to be more permissive and open in their SES allowances. **Armada Township** (Table 1), for instance, permits solar energy systems of roof-mounted and ground-mounted, personal-scale and utility-scale configurations in every district by right; Rural districts, however, have fewer overall districts. Likewise, **Byron Township** (Table 2), in the suburbs of Grand Rapids, permits roof-mounted systems of any size by right across all districts; however, the township permits ground-mounted systems of any size in the same districts by special land use. Additionally, **Byron Township** excludes all solar development from maximum lot coverage and infrastructure size restrictions, creating a more permissive ordinance for the development of utility-scale solar sites.

<sup>1</sup> Co-location, as used in this research, is defined as the deliberate, by-right placement of solar energy facilities in districts with unrelated principle use allowances, whether as a principal use in a district of otherwise unrelated primary use, or an accessory use to a parcel with an otherwise unrelated primary use.

## Marginal Lands: Parking Lots, Grayfields

*How do communities plan and zone for co-location of parking lots and grayfields along the development transect?*

- We have found that explicit language dedicated to the adaptation of grayfield sites and parking lots for solar development is nearly non-existent. In fact, Armada Township was the only community with a solar ordinance that referenced co-location. Armada Township's ordinance provides a brief explanation that among the permitted ways to install ground-mounted solar panels is the parking lot canopy strategy. No other ordinance produced such explicit wording.
- Along with exact use of the term "grayfield," we also searched for a number of permissive regulatory provisions that would open up opportunities for grayfield development. These provisions are the allowance of ground-mounted solar development in commercial, business, industrial, or other zoning districts of substantial urban build-up (**Manchester Township**), a maximum height tall enough to accommodate development of "solar carports" (**Sanborn Township**), and the allowance of accessory or special land use permitted building-mounted solar installations (**Maple Valley Township**).
- Along the development transect, rural and suburban communities typically have the provisions in place to host grayfield development, while urban areas tend to lack thorough solar language, in general.

## Special Considerations: Airports and Public Right-of-Ways (ROWS)

*How do communities plan and zone for solar co-location in areas with special uses, such as airports and public ROWs?*

- Many communities offer little to no insight as to what should be done for these special areas. The most popular consideration, however, is the restriction of placing solar installations in such ways that the glare will shine into the ROW and cause visibility problems, usually referring specifically to roof-mounted panels (**the City of Rochester Hills, the City of Royal Oak, Roscommon Township, Manchester Township**).
- Other communities take these concepts a step further, such as **Frankenlust Township**, which bans the construction of SES that are within 100 ft of ROWs altogether, and the **City of Troy** and **Bridgeport Charter Township**, which both have specific language and definitions for concepts, such as a *solar easement* and *solar skyline*<sup>1</sup>, both terms to describe one's access to direct sunlight on their property. These definitions are used as the basis for language prohibiting one party from invading another's access to sunlight without the legal consent and transfer of rights from the latter to the former.
- Only one municipality, **Grosse Ile Township**, permits utility-scale solar installations in airport districts as an accessory use.

## DIFFERENT SCALES AND CONFIGURATIONS OF SOLAR ENERGY SYSTEMS

### Ground-mounted vs. Roof-mounted Solar

*Different solar development types (i.e., ground mount v. building mount) and their allowances in different districts.*

- In general, roof-mounted solar energy systems are permitted in more districts than ground-mounted solar energy systems. Many communities allow for roof-mounted systems in all districts. For example, **Lamotte Township**, a rural community in Sanilac County, permits roof-mounted systems in all its districts as an accessory use. In less permissive communities, roof-mounted systems are typically allowed in residential, commercial, and industrial districts. To illustrate, the **Village of Blissfield**, permits roof-mounted solar in its R-1, R-2, I-1, I-2, C-1, C-2, and C-3 districts as a special land use.

<sup>1</sup> Full definitions for the terms *solar easement* and *solar skyline* as they appear in the City of Troy zoning ordinance can be found in the Unique Language section on page 7.

- Some communities also permit ground-mounted systems in all districts, though less frequently than roof-mounted systems. In **Grosse Ile Township**, for example, ground-mounted systems are permitted in all districts as an accessory use. More frequently, however, ground-mounted systems are limited to specific districts, such as agricultural, residential, and/or industrial districts. Specifically, they tend to stay contained within lower density levels of these common district types. For example, **Port Austin Township** permits ground-mounted systems in its R-1 and R-2 residential districts as a special land use.

*How are solar configurations permitted by district: special use v. accessory use v. principal use?*

- Roof-mounted and ground-mounted SES are usually permitted as accessory uses regardless of district, such as in **Au Sable Charter Township** where roof-mounted systems are permitted as an accessory use in all districts. It is less common to see these developments permitted as special land uses and principal uses; however, utility-scale solar facilities are more frequently permitted as special or principal land uses. In addition, utility-scale solar is most commonly permitted in agricultural, commercial, manufacturing, and industrial districts. The **City of West Branch**, for example, permits utility-scale, ground-mounted solar development as a special land use in its manufacturing, office space, and industrial districts.

### Utility- vs. Community- vs. Personal-Scale

*How are scales permitted by district: special use v. accessory use v. principal use?*

- Generally, personal- and small-scale solar energy systems are permitted in more districts than ground-mounted and large-scale systems. Most communities researched have zoned small-scale solar energy systems as an accessory use. For example, the **City of Bay City**, **Lyon Charter Township**, and **Almont Township** all permit roof-mounted systems as an accessory use in all districts. Furthermore, **Van Buren Charter Township**, **Albert Township**, and **Chester Township (Ottawa County)** all permit personal-scale ground-mounted systems in all districts as an accessory use. Another significant portion of researched communities permit small-scale systems by right, such as in **Conway Township** where small-scale systems are permitted in the AR, C, I, and R districts by right. In less permissive communities, small-scale systems tend to be permitted in residential, commercial, and/or industrial districts as a special land use. The **Village of Blissfield**, for example, permits small-scale systems in industrial, commercial, and residential as a special land use.
- Large-scale solar energy systems tend to have a wider variety of use types. The research sample yielded a varied mix of communities zoning large-scale systems as special land uses, principal uses, and accessory uses. For example, **Kalamazoo Charter Township**, **Grand Haven Charter Township**, and **Saline Charter Township** permit utility-scale solar systems as a special land use. **Coldwater Township** and **China Charter Township** permit large-scale systems as a principal use, and **Roscommon Township** and **the City of Ypsilanti** permit utility-scale systems as an accessory use. Furthermore, on-site ground-mounted systems are frequently permitted as accessory uses, whereas off-site systems, such as solar farms, tend to be zoned as principal or special land uses. To illustrate, all the communities in **Mecosta County** permits on-site ground-mounted solar energy systems as an accessory use. Off-site systems are permitted as a special land use. Large-scale systems are largely permitted as special land uses or principal uses in agricultural, commercial, industrial and/or manufacturing districts. In **Holland Charter Township**, for example, utility scale systems are permitted in agricultural, commercial, and industrial districts as a special land use. Moreover, in **Armada Township**, solar farms are permitted as a principal use in the M-1 manufacturing district. Communities very infrequently permit large-scale systems in all districts, as an accessory use, or by right.

## COMMUNITY-SCALE SOLAR

*What is the definition of community-scale (if given)?*

- Two ordinances provide a definition for community-scale solar:
  - **Blackman Charter Township**, in Jackson County, determines that a, “Community Solar Energy System (CSES) (also called "Solar Garden") [is] a large scale facility that converts sunlight into electricity by photovoltaics (PV) array, for the primary purpose of providing retail electric power (or financial proxy for retail power) to multiple community members or businesses residing or located off-site from the location of the solar energy system. Roof- or ground-mounted CSES or Solar Gardens are designed to supply energy for off-site users on the distribution grid. A large scale CSES or Solar Garden system exceeds 20kW, and can occupy, in total, more than five (5) acres.”
  - ◆ **Tompkins Township**, also in Jackson County, provides an identical definition: “Community Solar Energy Systems (CSES) (also called “Solar Garden”): A large scale facility that converts sunlight into electricity by photovoltaics (PV) array, for the primary purpose of providing retail electric power (or financial proxy for retail power) to multiple community members or businesses residing or located off-site from the location of the solar energy system. Roof or ground-mounted CSES or Solar Gardens are designed to supply energy for off-site users on the distribution grid. A large scale CSES or Solar Garden system exceeds 20 kW, and can occupy, in total, more than five (5) acres.”

### Urban-Scale vs Rural-Scale

*How do communities of different densities treat community solar?*

- **Blackman Charter Township** is a suburban community outside of Jackson, MI while **Tompkins Township** is a rural community in the same county. Both communities have identical definitions for community-scale solar and similar district allowances. Both townships permit community-scale solar in all of their agricultural, commercial, and industrial districts. **Tompkins Township**, however, allows community-scale solar in its residential districts (except RMH); whereas, **Blackman Charter Township** does not. In both communities, CSES require planning commission approval to install. Both communities also classify large CSES as systems that exceed 20 kW and denote that they can occupy more than five acres of land.

### Transect Approach to Standards

*How is community scale addressed in districts of different densities?*

- **Blackman Charter Township** is a mid-density community permitting community-scale solar in three different district types—all agricultural, commercial, and industrial districts. Typically, commercial and industrial districts have similar density allowances and lot coverage limits, while agricultural districts allow a much lower lot coverage; however, **Blackman Charter Township’s** zoning ordinance says that maximum lot coverage requirements by district do not apply to solar panels.
- **Tompkins Township** is a low-density community permitting community-scale solar in all of its agricultural, residential (except RMH), commercial, and industrial districts.

*Where are communities putting community solar? What districts?*

- **Blackman Charter Township** permits community-scale solar in all of its agricultural, commercial, and industrial districts.
- **Tompkins Township** permits community-scale solar in all of its agricultural, commercial, residential (except RMH), and industrial districts.

# COMMON AND UNIQUE LANGUAGE

## Common Language

Many similarities appear in the zoning ordinance language used by communities throughout the state. However, there are some distinctions (often occurring by region) as noted on the following page.

### **“Solar Energy System (SES)”**

- Monitor Charter Township
- Lincoln Township (Clare County)
- The City of Royal Oak
- Etc.

- Referring to solar installations as a Solar Energy System is a commonly used term among Michigan communities, though many also include similar terms with minor differences.
  - ◆ **“Solar Energy System:** An aggregation of parts including any base, mounts, tower, solar collectors, and accessory equipment such as utility interconnections and solar storage batteries, etc., in such configuration as necessary to convert solar radiation into thermal, chemical or electrical energy.”
    - \* Definition from the City of Royal Oak, Michigan, Municipal Code Art. II, § 770-8 (2009)

### **“Solar Farm”**

- Isabella County\*
- Clinton County\*\*
- Gratiot County\*\*\*
- Etc.

- Though not an exclusive trait of county-level ordinances or central-lower peninsula terminology, these three mid-Michigan counties each show the commonplace nature of the term “solar farm” as a substitute for commercial- or utility-scale solar structures.
  - ◆ **“Solar Farm:** A utility-scaled commercial facility that converts sunlight into electricity, whether by photovoltaics, concentrating solar thermal devices or any other various experimental solar technologies for the primary purpose of wholesale or retail sales of generated electricity off-site.”
    - \* Definition from Gratiot County\*\*\*, Michigan, Zoning Ordinance Ch. I, § 119 (2018)

### **“Screening”**

- Eureka Charter Township
- Albert Township
- Lenox Township
- Etc.

- Many communities include a provision that states that, for aesthetic reasons, solar installations should be fenced off, made invisible to outside passersby, or covered with vegetative barriers.
  - ◆ **“Screening:** Any mechanical equipment used as part of the solar system shall be screened from view from any public street, residential district or agricultural district by use of a masonry screen wall, evergreen vegetation or other screening of a similar effectiveness and quality, as determined by the Planning Commission.”
    - \* Definition from Lenox Township, Michigan, Zoning Ordinance Art. 03, § 339 (2014)

\*Applies to Gilmore, Vernon, Sherman, Nottawa, Isabella, Denver, Broomfield, Rolland, and Lincoln Townships.  
\*\*Applies to Lebanon, Essex, Greenbush, Duplain, Bengal, Bingham, Westphalia, Riley, Olive, Victor, and Eagle Townships.  
\*\*\*Applies to Sumner, Newark, North Star, Lafayette, Hamilton, and Elba Townships.



## Unique Language

From the dozens of ordinances researched, outliers emerged featuring unique ideas and definitions. Some are strictly more detailed explanations of common terms while others define unique approaches that are worth close review.

### **“Not Prime Farmland; Fifty Decibels”** • **Chester Township (Ottawa County)**

- Chester Township of Ottawa County has some of the most unique provisions of the whole database, writing regulation to protect prime farmland from solar development and nearby residents from noise.
  - ◆ *“Solar energy equipment shall only be located in an area determined to be **“not prime farmland” by the U.S. Department of Agriculture (USDA)**, per the USDA’s Farmland Classification Map as of the date of Special Use Application for a Utility-Scale Solar Energy Collector System.*
  - ◆ *Noise emanating from the solar energy collector system shall be a **maximum of fifty (50) decibels (dBA)** as measured from any lot line of the lot on which the system is located.”*
    - \* Definition from Chester Township, Michigan, Zoning Ordinance Ch. 2, § 1912 (2019)

### **“Direct, Primary, Secondary”** • **Holly Township** • **The Village of Port Sanilac**

- While most municipalities approach solar regulation from a roof-mount v. ground-mount, personal v. utility take on categorization, both Holly Township of Oakland County and the Village of Port Sanilac of Sanilac County have adopted a different method, opting to use a “Direct, Primary, and Secondary Use system”, defined as follows:
  - ◆ *“**Direct Use:** A SEF designed and installed to provide on-site energy demand for any legally established use of the property.*
  - ◆ ***Primary Use:** A SEF that uses over 50 percent of the parcel(s) and is devoted to solar electric power generation primarily for use off-site.*
  - ◆ ***Secondary Use:** A SEF that is not the primary use of the property and uses less than 50 percent of the parcel(s) land area.”*
    - \* Definition from Holly Township, Michigan, Municipal Code Ch. 32, Art. IV, § 32-165 (2019)

### **“Skyscape, Skyspace, Solar Access Easement”** • **The City of Troy** • **Bridgeport Charter Township**

- The City of Troy, in Oakland County, and Bridgeport Charter Township, in Saginaw County, have included language specific to the issue created when one property owner blocks another property owner’s access to sunlight. They have employed such terms as “Solar Skyscape” and “Solar Access Easement” to explain this phenomenon:
  - ◆ *“**Solar Access Easement:** A right, expressed as an easement, covenant, condition or other property interest in any deed or other instrument executed by or on behalf of any landowner, which protects the solar skyspace of an actual, proposed or designated solar energy collector at a described location by forbidding or limiting activities, land uses, structures and/or trees that interfere with access to solar energy. The solar skyspace must be described as the three (3) dimensional spaces in which obstruction is prohibited or limited. Any property owner may give or sell his right to access to sunlight. Such Solar Access Easements shall be recorded and copies shall be kept on file with the Troy Clerk’s Department.*
  - ◆ ***Solar Skyspace:** The space between a solar energy collector and the sun which must be free of obstructions that shade the collector to an extent which precludes its cost-effective operation.”*
    - \* Definition from the City of Troy, Michigan, Zoning Ordinance Art. 2, § 2.02 (2018)

\*Also see Appendix G for expanded common and unique language.

## CONCLUSIONS

The following are some of our high level observations after reviewing all 159 zoning ordinances. These conclusions build on the collection of observations and analysis provided throughout the report. Furthermore, our conclusions draw upon and make connections between interrelated trends found in zoning ordinances across communities in Michigan as they relate to Solar Energy Systems (SES).

- In general, there was very minimal variation among definitions related to solar regulations across communities.
- Only two ordinances (**Blackman Charter Township** and **Tompkins Township**) out of the 159 analyzed contain language for community-scale solar energy systems (**1.3%**).
- Most communities (**66.0%**) permit small scale solar energy systems by right, as an accessory use, in all districts.
- Non-utility ground-mounted systems are explicitly permitted by **89.9%** of communities. Out of those 89.9% of communities, **61.0%** permit non-utility ground-mounted systems in all districts.
- Non-utility roof-mounted systems are explicitly permitted by **88.7%** of communities. Out of those 88.7% of communities, **73.6%** permit non-utility ground-mounted systems in all districts.
- Communities permitting both non-utility ground-mounted and roof-mounted solar energy systems in specifically listed districts generally include only agricultural, commercial, and industrial districts.
- **56.6%** of communities included explicit language for large, utility, commercial, industrial, or other such scaled solar energy systems. **85.6%** of those communities exclusively permit utility-scale solar as a conditional use or special land use compared to **10.0%** that permit utility-scale systems as a use by right.
- Rural communities tend to be more permissive and allow large-scale solar energy systems in a wider variety and higher number of districts compared to suburban and urban communities.
- Trends of similar language within and between regions lead to similar restrictions and permissions among community ordinances.

### Regional Variations

- Different regions of Michigan have different densities, needs, and geographies that all play a role in the development of solar regulation. Using the Michigan State University Extension 14 District system of categorization (see Appendix D), several areas can be grouped together to find trends:
  - ◆ **Districts 6 and 8** (mid-Michigan) tend to have language permitting large-scale solar installations, often referring to them as “solar farms”, but have far fewer zoning districts and density levels per community. Many of these regulations are developed at the county level and applied to all townships who do not develop their own zoning ordinances.
  - ◆ **Districts 4 and 14** (northeast Michigan) tend to lack solar ordinances with far fewer ordinances containing language for SES than other regions in Michigan.
  - ◆ **Districts 1 and 2** (upper peninsula) are likewise lacking in ordinances. Most ordinances found here are centralized within Marquette County, with a pair of outliers in Gogebic County.
- Many of mid-Michigan’s rural townships are governed by countywide zoning ordinances — a system not unique to the region. What is unique, however, is the large quantity of land and municipalities under jurisdiction of county ordinances that permit development of solar energy systems across many zoning districts. This approach to zoning has provided the multi-county region with a comprehensive way to encourage solar development while enforcing uniform standards and regulations.
  - ◆ These ordinances tend to share many similarities in their language, frequently permitting solar facilities in all districts, defining large-scale solar as “solar farms,” and exempting solar facilities from minimum lot sizes and maximum area limits.

## Further Research

- Best practice research is needed for community-scale solar energy systems as only two communities, **Blackman Charter Township** and **Tompkins Township**, have featured language for community-scale solar in their zoning ordinances.
- Best practice research is needed for urban community zoning ordinances with language for utility-scale and small-scale solar energy systems to get a representative sample of how urban centers zone for solar infrastructure. Michigan does not provide a representative sample of urban zoning ordinances with solar provisions, due to its limited number of urban communities.
- Few communities reviewed explicitly use “co-location” in their ordinance. More research needs to be conducted to determine the necessity of its inclusion as a concept in local planning, how best to introduce the concept, and find existing examples of its prominent inclusion in local zoning law.
- Best practice research is needed for where and how communities are implementing the use of “solar carports”. This type of solar development refers to panels installed over parking spaces with the intent of diversifying the productivity of single-use land and providing basic weather shelters for cars.
  - ◆ Michigan State University actualized this concept in 2017 by installing ground-mounted solar panels over 5,000 campus commuter parking spaces. The project is designed to produce 10.5 Megawatts during peak operation and 15 million kilowatt-hours annually. More information can be found at <https://ipf.msu.edu/environment/energy/energy-generation>.

## Additional Research Questions

1. Why have few communities added language about community-scale solar regulation to their ordinances? What are the advantages and disadvantages of adding provisions for community-scale solar regulation to their ordinances?
2. What could communities provide in their zoning ordinances that would incentivize residents/business-owners etc. to invest in solar development?
3. What would it take for communities to adopt co-location in more districts along the development transect?

## Appendix A:

# Solar Installation Types and Allowances Across the Development Transect

Referred to in *Regulating Solar along the 'Development Transect'*

- The communities presented below were chosen because they best represent different levels of urbanization from three metropolitan areas in Michigan. As each row of the tables descends through the Development Transect, the selected communities represent areas of less urbanization, moving further from the urban cores of Detroit, Grand Rapids, and Lansing.

A = Accessory  
P = Principal

P / A = Use by Right  
— = Prohibited

SLU = Special Land Use  
Unstated = Could not be Found

City	Development Transect	Installation Type	Ag-1	Ag-2	Ag-3	R-1	R-2	R-3	R-4	R-5	Com-1	Com-2	Com-3	I-1	I-2		
						Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated
Metro Detroit Region	Detroit T6 Urban Core	Roof, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated		
		Roof, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	-	-	-	-	-	-	-	SLU*	SLU*	-	-	
		Ground, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	Unstated	
		Ground, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	-	-	-	-	-	-	-	-	-	-	-	
	Royal Oak T5 Urban Center	Roof, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	-	
		Roof, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	-	-	-	-	-	-	-	-	-	-	SLU	NO DISTRICT
		Ground, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A	
		Ground, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	-	-	-	-	-	-	-	-	-	-	SLU	NO DISTRICT
	Troy T4 General Urban	Roof, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	
		Roof, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	
		Ground, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	
		Ground, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	
	Rochester Hills T3 Suburban	Roof, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A	
		Roof, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A	
		Ground, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A	
		Ground, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A	
	Washington Charter Township T3 Suburban	Roof, Personal	A	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A	
		Roof, Utility	A	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A	
Ground, Personal		A	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A		
Ground, Utility		A	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A	A		
Armada Township T2 Rural	Roof, Personal	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	NO DISTRICT	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	NO DISTRICT	NO DISTRICT	P / A	NO DISTRICT		
	Roof, Utility	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	NO DISTRICT	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	NO DISTRICT	NO DISTRICT	P / A	NO DISTRICT		
	Ground, Personal	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	NO DISTRICT	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	NO DISTRICT	NO DISTRICT	P / A	NO DISTRICT		
	Ground, Utility	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	NO DISTRICT	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	NO DISTRICT	NO DISTRICT	P / A	NO DISTRICT		

\*Solar Energy Facilities are only allowed in Planned Unit Developments and Parks Department land. Neither of these are representable on the chart, but are significant enough to be included, so Com-2 and Com-3 arbitrarily represent them.

Table 1. Solar Installation Types and Allowances Across the Metro Detroit Region Development Transect

City	Development Transect	Installation Type	Ag-1	Ag-2	Ag-3	R-1	R-2	R-3	R-4	R-5	Com-1	Com-2	Com-3	I-1	I-2
						A	A	A	A	A	A	A	A	A	A
Wyoming	T4 General Urban	Roof, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A
		Roof, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A
		Ground, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A
		Ground, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	A	A	A	A	A	A	A	A	A
Byron Township**	T3 Suburban	Roof, Personal	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	P / A
		Roof, Utility	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	P / A
		Ground, Personal	SLU	NO DISTRICT	NO DISTRICT	SLU	SLU	SLU	NO DISTRICT	NO DISTRICT	SLU	SLU	SLU	SLU	SLU
		Ground, Utility	SLU	NO DISTRICT	NO DISTRICT	SLU	SLU	SLU	NO DISTRICT	NO DISTRICT	SLU	SLU	SLU	SLU	SLU
Thornapple Township	T2 Rural	Roof, Personal	A	A	NO DISTRICT	A	A	A	A	A	A	A	NO DISTRICT	A	NO DISTRICT
		Roof, Utility	A	A	NO DISTRICT	A	A	A	A	A	A	A	NO DISTRICT	A	NO DISTRICT
		Ground, Personal	A	A	NO DISTRICT	P / A	P / A	P / A	P / A	P / A	P / A	P / A	NO DISTRICT	P / A	NO DISTRICT
		Ground, Utility	SLU	SLU	NO DISTRICT	SLU	-	-	-	-	-	SLU	SLU	NO DISTRICT	-

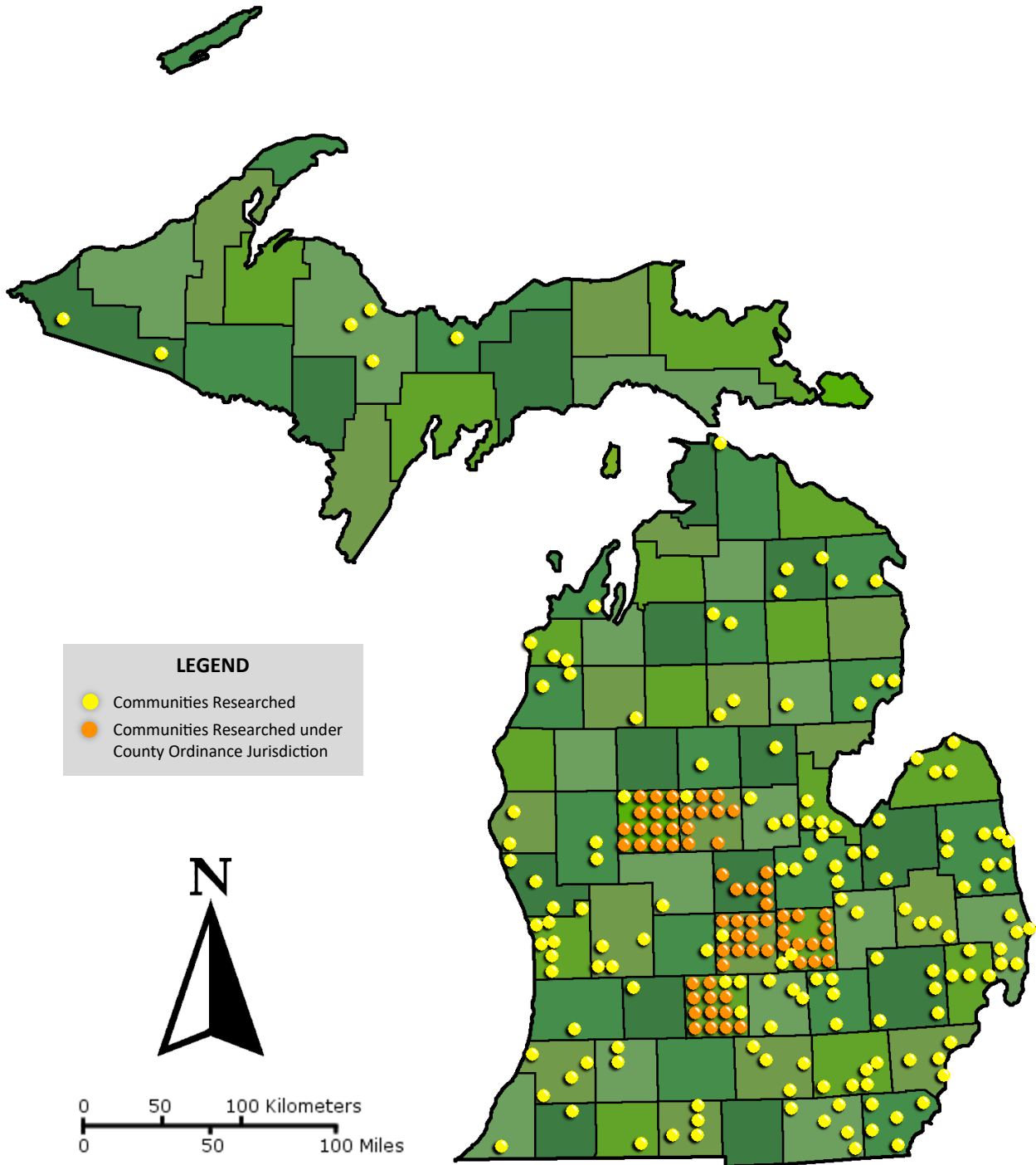
\*\*Despite only allowing ground-mounted installations by SLU, Byron Township excludes all solar development from maximum area restrictions. This information is not representable on the chart but is significant enough to be mentioned.

Table 2. Solar Installation Types and Allowances Across the Metro Grand Rapids Region Development Transect

City	Development Transect	Installation Type	Ag-1	Ag-2	Ag-3	R-1	R-2	R-3	R-4	R-5	Com-1	Com-2	Com-3	I-1	I-2
						P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A
East Lansing	T4 General Urban	Roof, Personal	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A
		Roof, Utility	P / A	NO DISTRICT	NO DISTRICT	-	-	-	-	-	-	-	-	-	-
		Ground, Personal	P / A	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A	P / A
		Ground, Utility	P / A	NO DISTRICT	NO DISTRICT	-	-	-	-	-	-	-	-	-	-
Williamston	T3 Suburban	Roof, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	NO DISTRICT	P / A	P / A	P / A	P / A	P / A
		Roof, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	NO DISTRICT	P / A	P / A	P / A	P / A	P / A
		Ground, Personal	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	NO DISTRICT	P / A	P / A	P / A	P / A	P / A
		Ground, Utility	NO DISTRICT	NO DISTRICT	NO DISTRICT	P / A	P / A	P / A	P / A	NO DISTRICT	P / A	P / A	P / A	P / A	P / A
Conway Township	T2 Rural	Roof, Personal	A	NO DISTRICT	NO DISTRICT	A	NO DISTRICT	NO DISTRICT	NO DISTRICT	NO DISTRICT	A	NO DISTRICT	NO DISTRICT	A	NO DISTRICT
		Roof, Utility	SLU	NO DISTRICT	NO DISTRICT	-	NO DISTRICT	NO DISTRICT	NO DISTRICT	NO DISTRICT	SLU	NO DISTRICT	NO DISTRICT	SLU	NO DISTRICT
		Ground, Personal	SLU	NO DISTRICT	NO DISTRICT	SLU	NO DISTRICT	NO DISTRICT	NO DISTRICT	NO DISTRICT	SLU	NO DISTRICT	NO DISTRICT	SLU	NO DISTRICT
		Ground, Utility	SLU	NO DISTRICT	NO DISTRICT	-	NO DISTRICT	NO DISTRICT	NO DISTRICT	NO DISTRICT	SLU	NO DISTRICT	NO DISTRICT	SLU	NO DISTRICT

Table 3. Solar Installation Types and Allowances Across the Metro Lansing Region Development Transect

## Appendix B: Map of Michigan Communities Researched



## Appendix C:

### Communities Allowing Co-Location by Population Density Category

- The categories presented below are sourced from the Michigan Zoning Database, developed by the Graham Sustainability Institute, University of Michigan. Every municipality reviewed throughout this research project was found in the Michigan Zoning Database, along with several measures of basic information about them including population, square mileage, and density (along with the classification of density into one of three groups as seen below).
- The Graham Sustainable Institute Michigan Zoning Database categorizes population density as either “Low<100”, “Mid”, or “High>800”. Thirty-one researched communities were deemed low-density, 41 were deemed mid-density, and 22 were deemed high density (see Appendix C).

#### Low-Density (<100 persons per mi<sup>2</sup>)

Aetna Township
Akron Township
Albert Township
Au Sable Charter Township
Bellevue Township
Blumfield Township
Bridgehampton Township
Buel Township
Chester Township (Ottawa County)
Clam Lake Township
Claybanks Township
Clyde Township
Cohoctah Township
Colfax Township
Conway Township
Custer Township
Elba Township
Forsyth Township
Frederic Township
Fremont Township
Golden Township
Grayling Charter Township
Keeler Township
Lakefield Township
Lamotte Township
Lincoln Township (Clare County)
Olive Township
Oliver Township
Ovid Township
Riga Township
Roscommon Township
Saline Township
Shiawassee County*
Summerfield Township
Tawas Township
Tompkins Township
Trowbridge Township
Volinia Township
Watersmeet Township
Weldon Township
Wilber Township

#### Mid-Density (100 – 800 persons per mi<sup>2</sup>)

Adrian Charter Township	Homer Township
Almont Township	Howell Township
Armada Township	Ishpeming
Attica Township	Lapeer Township
Berlin Charter Township	Leroy Township (Ingham County)
Blackman Charter Township	Lexington Township
Bridgeport Charter Township	Lincoln Township (Midland County)
Brooks Township	Lyon Charter Township
Byron Township	Manchester Township
Casco Township (St. Clair County)	Marshall Township
Caseville Township	Millington Township
China Charter Township	Monitor Charter Township
Clinton Township	Montrose Charter Township
Coldwater Township	Mt. Morris Charter Township
Columbia Township (Jackson County)	Oneida Charter Township
Columbus Township (St. Clair County)	Oregon Township
Copemish	Paw Paw Township
Dalton Township	Perry
Denton Township	Port Sanilac
Dundee Township	Putnam Township
Eaton Township	Raisinville Township
Erie Township	Robinson Township
Eureka Charter Township	South Haven Charter Township
Farwell	Taymouth Township
Frankenlust Township	Thompsonville
Gaines Charter Township	Thornapple Township
Grand Haven Charter Township	Washington Charter Township
Grass Lake Charter Township	Williams Charter Township
Hillman	Woodstock Township
Holly Township	York Charter Township

#### High-Density (>800 persons per mi<sup>2</sup>)

Bay City
Bear Lake
Bronson
Coleman
Delta Charter Township
East Lansing
Frankfort
Grand Haven
Grosse Ile Township
Holland Charter Township
Kalamazoo Charter Township
Marshall
Midland
Pittsfield Charter Township
Port Huron
Port Huron Charter Township
Royal Oak
Spring Lake Township
Troy
West Branch
Wyoming
Ypsilanti

\*Excluding Perry, Vernon, and Woodhull Townships, which are deemed mid-density.

# Appendix D: Michigan State University Extension District Map



## Appendix E: Index of Cited Communities

Community Name	Page Number				
Adrian Charter Township	12	Elba Township	12	Olive Township	12
Aetna Township	12	Erie Township	12	Oliver Township	12
Akron Township	12	Eureka Charter Township	12	Oneida Charter Township	12
Albert Township	4, 6, 12	Farwell	12	Oregon Township	12
Almont Township	4, 12	Forsyth Township	12	Ovid Township	12
Armada Township	3, 5, 12	Frankenlust Township	3, 12	Paw Paw Township	12
Attica Township	12	Frankfort	12	Perry	12
Au Sable Charter Township	4, 12	Frederic Township	12	Pittsfield Charter Township	12
Bay City	4, 12	Fremont Township	12	Port Austin Township	4
Bear Lake	12	Gaines Charter Township	12	Port Huron	9, 12
Bellevue Township	12	Golden Township	12	Port Huron Charter Township	12
Berlin Charter Township	12	Grand Haven	12	Port Sanilac	7, 12
Blackman Charter Township	5, 6, 8, 9, 12	Grand Haven Charter Township	5, 12	Putnam Township	12
Blissfield	4	Grass Lake Charter Township	12	Raisinville Township	12
Blumfield Township	12	Gratiot County**	6	Riga Township	12
Bridgehampton Township	12	Grayling Charter Township	12	Robinson Township	12
Bridgeport Charter Township	3, 7, 12	Grosse Ile Township	3, 4, 12	Rochester Hills	3
Bronson	12	Hillman	12	Roscommon Township	3, 5, 12
Brooks Township	12	Holland Charter Township	5, 12	Royal Oak	2, 3, 6, 12
Buel Township	12	Holly Township	7, 12	Saline Township	5, 12
Byron Township	3, 10, 12	Homer Township	12	Sanborn Township	3
Casco Township (St. Clare County)	12	Howell Township	12	Shiawassee County*****	12
Caseville Township	12	Isabella County***	6	South Haven Charter Township	12
Chester Township (Ottawa County)	4, 7, 12	Ishpeming	12	Spring Lake Township	12
China Charter Township	5, 12	Kalamazoo Charter Township	5, 12	Summerfield Township	12
Clam Lake Township	12	Keeler Township	12	Tawas Township	12
Claybanks Township	12	Lakefield Township	12	Taymouth Township	12
Clinton County*	6	Lamotte Township	4, 12	Thompsonville	12
Clinton Township	12	Lapeer Township	12	Thornapple Township	12
Clyde Township	12	Lenox Township	6	Tompkins Township	5, 6, 8, 9, 12
Cohoctah Township	12	Leroy Township (Ingham County)	12	Trowbridge Township	12
Coldwater Township	5, 12	Lexington Township	12	Troy	3, 7, 12
Colfax Township	12	Lincoln Township (Clare County)	6, 12	Van Buren Charter Township	4
Columbia Township (Jackson County)	12	Lincoln Township (Midland Township)	12	Volinia Township	12
Columbus Township (St. Clare County)	12	Lyon Charter Township	4, 12	Washington Charter Township	12
Conway Township	4, 12	Manchester Township	3, 12	Weldon Township	12
Copemish	12	Maple Valley Township	3	West Branch	4, 12
Custer Township	12	Marshall	12	Williams Charter Township	12
Dalton Township	12	Marshall Township	12	York Charter Township	12
Delta Charter Township	12	Mecosta County****	5	Ypsilanti	5, 12
Denton Township	12	Midland	9, 12	Watersmeet Township	12
Detroit	9, 10	Millington Township	12	Wilber Township	12
Dundee Township	12	Monitor Charter Township	6, 12	Woodstock Township	12
East Lansing	2, 12	Montrose Charter Township	12		
Eaton Township	12	Mt. Morris Charter Township	12		

\*Applies to Bengal, Bingham, Duplain, Eagle, Essex, Greenbush, Lebanon, Olive, Riley, Victor, and Westphalia Townships.

\*\*Applies to Elba, Hamilton, Lafayette, Newark, North Star, and Sumner Townships.

\*\*\*Applies to Broomfield, Denver, Gilmore, Isabella, Lincoln, Nottawa, Rolland, Sherman, and Vernon Townships.

\*\*\*\*Applies to Aetna, Austin, Chippewa, Colfax, Deerfield, Fork, Grant, Hinton, Martiny, Millbrook, Morton, Sheridan, and Wheatland Townships.

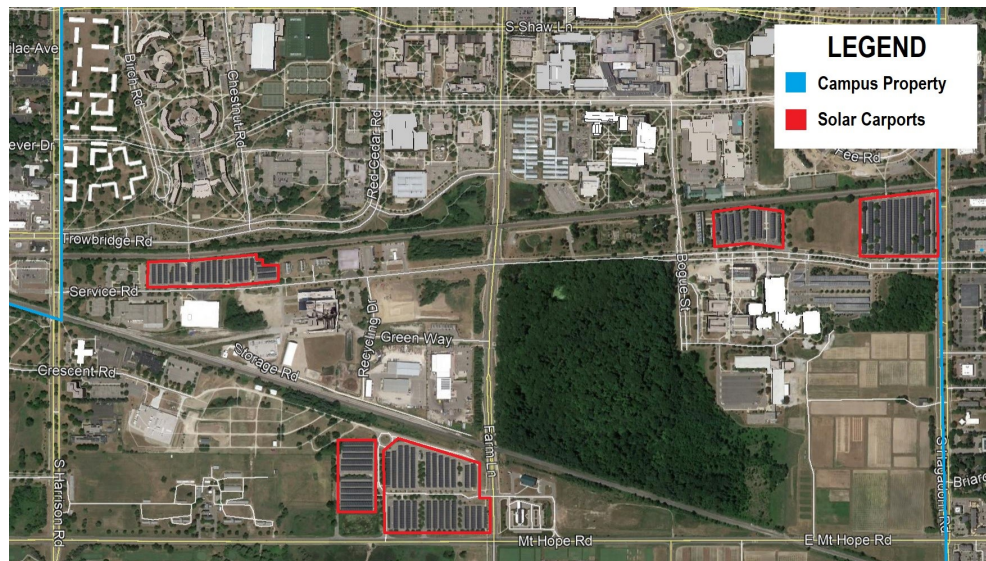
\*\*\*\*\*Applies to Antrim, Bennington, Burns, Fairfield, Hazelton, Perry, Rush, Scotia, Shiawassee, Venice, and Vernon Townships.



## Appendix F: Solar Carport Case Studies from Outside the State

The use of parking lots for co-location of solar energy systems (SES) has been a growing trend around the country. These co-location situations provide both unique opportunities and challenges to local governments interested in encouraging their installation. In many situations regulations are silent on co-location opportunities and communities sometimes struggle to identify the land use regulations that should apply. The following are a few examples from three different underlying land uses (e.g. university commuter lot, industrial facility, and museum) on how co-location opportunities can be encouraged on surface parking infrastructure for existing uses.

### Case Study — Michigan State University (MSU), East Lansing, MI

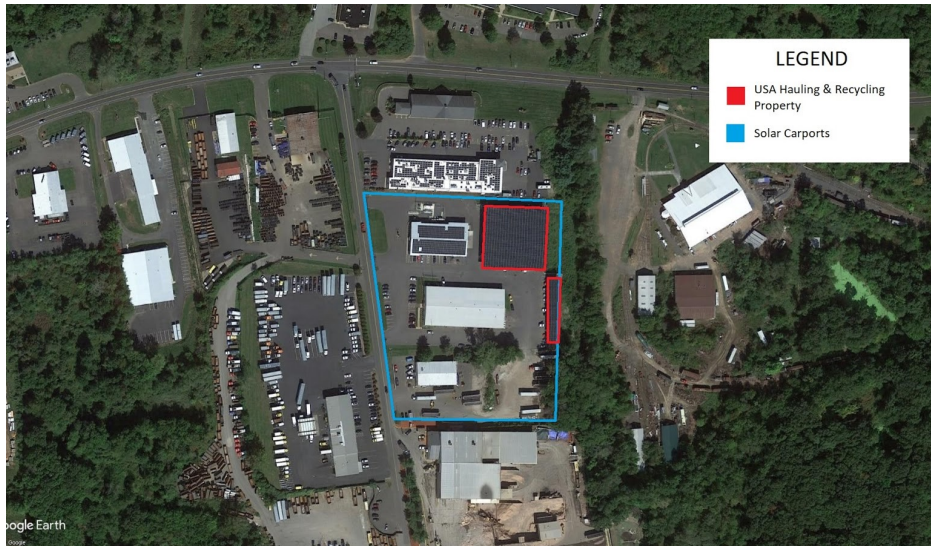


*Michigan State University solar carport installations around campus*

Michigan State University (49,000 students) has the largest solar carport development project in the state (2020). The project involves over 5,000 parking spaces fitted with ground-mounted solar carports across five large commuter parking lots. These lots account for a total of 34 combined acres and provide students, faculty and visitors with covered space to leave their cars to walk, bike, or use public transit to traverse the campus. The project can generate up to 10MW (nearly 20 percent of total campus electricity generation) and is a key part of the university's Energy Transition Plan, a process by which MSU reduces its dependency on fossil fuels and expands its renewable energy portfolio.

MSU Director of Planning, Design, and Construction John LeFevre notes that preserving green space was a large selling point for the project. The university's built environment, one of the largest contiguous college campuses in the U.S. with over 5,200 acres and 500 buildings, highlights the opportunity to use land that had been underutilized such as large surface parking lots. This strategy helps to preserve MSU's extensive agricultural land on the south side of campus, adjacent to the parking facility. The solar carports help achieve the land use and energy goals by providing additional utility to an existing developed site where the design inherently provides enough structural repetition to be an efficient layout. This approach to SES development is applicable not only to universities, but also other large commuter parking lots and developed grayfield sites present in many communities.

## Case Study — USA Hauling & Recycling, East Windsor, CT

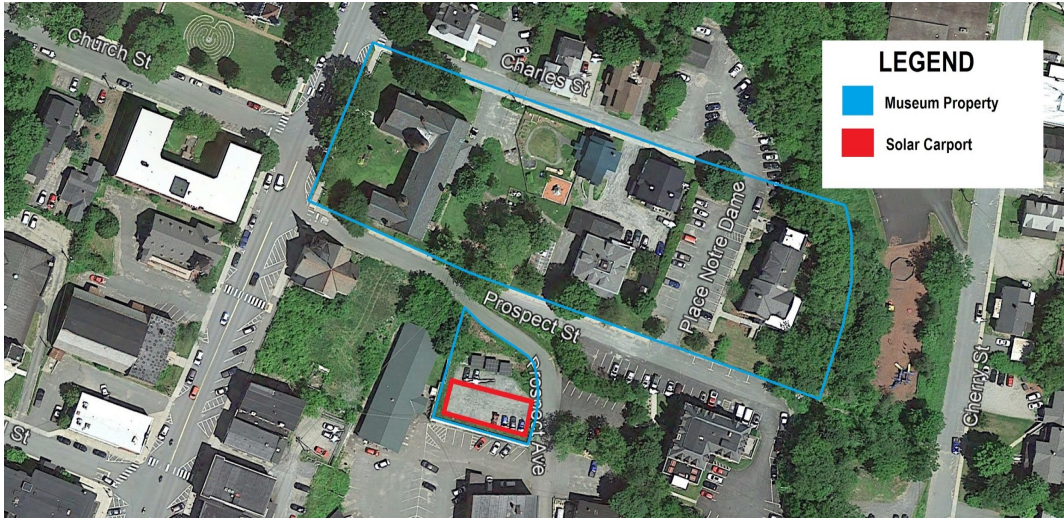


*USA Hauling & Recycling solar carports in relation to property lines*

East Windsor is a town in northern Connecticut with 11,375 residents (U.S. Census Bureau, 2018) and is home to the local waste management firm USA Hauling & Recycling. In 2018, the company requested and received permission to enact a site plan change for their industrial property, whereby they installed two solar carports of 25,000 and 45,000 square feet. They now operate their large compressors and recycling processes through 743kW of solar energy and protect their truck fleet with carport canopies.

The company received a prompt review from the town in amending their site plan with final approval in just months. East Windsor Town Planner and Consultant Mike D'Amato, AICP, CZEO, states East Windsor made a conscious effort to keep the administrative cost for both the applicant and the town minimal. He suggests that the success to the town's smooth approval process is in how they regulate carports, which is a class of accessory structures that retain enough distinction to be exempt from any regulation that is not applicable. Within this framework, solar carports are permitted in any zoning district that allows accessory structures. A key provision of carports is that they are exempt from setbacks and lot coverage. The net result is that there are many places in the community where solar carports are now permitted.

**Case Study — Fairbanks Museum & Planetarium, St. Johnsbury, VT**



*Fairbanks Museum & Planetarium solar carport in relation to property lines*

St. Johnsbury is a town of 5,685 residents (U.S. Census Bureau, 2018) in northeastern Vermont, within which is home to the Fairbanks Museum & Planetarium. The museum undertook an energy efficiency campaign in 2015, resulting in the installation of a 27.36kW solar carport over an auxiliary parking lot, connected to underground batteries, in December of 2020. The project marks the end of their renewable energy transformation, as Museum Director Adam Kane states that energy costs have gone from around \$15,000 per year in 2010 to zero in 2020.

Both Kane and St. Johnsbury Zoning Administrator Paul Berlejung make special mention of the town’s flexible solar regulations. There is no “restricted” or specifically permitted zoning districts in the town’s section on solar collectors. Instead, they are defined as accessory uses with a few provisions pertaining to setbacks, build heights, and burial of utility lines. Berlejung specifically notes how smooth interactions between solar suppliers and the town are in part due to the clarity of the local requirements. Kane affirms this position, offering that his interaction with local administration has been more straightforward in every regard than other levels of government. He and Berlejung both conclude that municipalities looking to incentivize solar carport construction should consider reducing the barrier to entry at the local level.

## Appendix G:

### Common and Unique Language Addendum

#### EXPANDED COMMON AND UNIQUE LANGUAGE

##### Common Language

Many similarities occur between the zoning ordinance language used by communities throughout the state. However, there are some distinctions (often occurring by region) as noted below.

##### **“Abandoned SES”**

- **Denton Township**

- **Oneida Charter Township**

- A definition specifically for solar energy systems no longer in service, to be almost exclusively used in “decommissioning” subsections of the zoning ordinance:
  - ◆ **“Abandoned Solar Energy System:** Any Solar Energy System, Solar Array or combination of Photovoltaic Devices that remains nonfunctional or inoperative to the extent that it is not used to generate electric energy for a continuous period of six months.”
    - \* Identical definitions taken from the Denton Township (Roscommon County) and Oneida Charter Township (Easton County) zoning ordinances.

##### **“Active/Passive SES”**

- **City of Troy**

- **Caseville Township**

- Both the City of Troy (Oakland County) and Caseville Township (Huron County) have definitions specifying active and passive solar energy systems as separate facilities with widely differing purposes. The following are both municipalities’ definitions for “active solar energy systems.”
  - ◆ **“Active Solar Energy Structure:** A structure which utilizes mechanically-operated solar collectors to collect, transfer or store solar energy.
    - \* Definition taken from the City of Troy zoning ordinance.
  - ◆ **“Active Solar System:** A solar system that transfers solar energy into electricity typically via a photovoltaic process.”
    - \* Definition taken from the Caseville Township zoning ordinance.
- The following are both municipalities’ definitions for “passive solar energy systems.”
  - ◆ **“Passive Solar Structure:** A structure which utilizes mechanically-operated solar collectors to collect, transfer or store solar energy.
    - \* Definition taken from the City of Troy zoning ordinance.
  - ◆ **“Passive Solar Collection System:** A system that captures solar light or heat, typically for the purpose of heating water.”
    - \* Definition taken from the Caseville Township zoning ordinance.

## **“Improved Area”**

• **Fremont Township**

• **Lamotte Township**

- This definition refers to the area containing the mechanical and ancillary equipment that frequently accompany solar energy systems. It is found only in two Sanilac County townships sharing identical wording:

- ◆ **“Improved Area:** *Area containing solar panels, electrical inverters, storage buildings and access roads.”*

- \* Identical definitions taken from the Fremont Township and Lamotte Township zoning ordinances.

## **“Direct, Primary, Secondary”**

• **City of Bronson**

• **Holly Township**

• **Lexington Township**

• **Village of Port Sanilac**

- This classification system is previously introduced in the body of this report, where it’s structure and function are the main purpose of its section. This section is then an extension of that previous inclusion, where all instances of the classification system appearing in Michigan zoning ordinances is compared to find trends in the exact wording of each individual definition.
- Below is a comparison of Accessory Use definitions between the three ordinances (Holly Township in Ottawa County does not have an Accessory Use definition), where all municipalities similarly specify accessory systems to serve on-site needs:

- ◆ **“Accessory Use:** *A SEF designed primarily for serving on-site needs or a use that is related to the Primary Use of the property.”*

- \* Identical definitions taken from the City of Bronson (Branch County) and Lexington Township (Sanilac County) zoning ordinances.

- ◆ **“Accessory Use:** *A Solar Energy System (SES) designed and installed to capture solar energy and convert it to electrical energy for on-site use primarily to reduce onsite consumption of utility power or fuels related to the property.”*

- \* Definition taken from the Village of Port Sanilac (Sanilac County) zoning ordinance.

- The following is a comparison of Direct Use definitions between the four ordinances. Bronson, Lexington Township, and Holly Township similarly specify direct use systems to serve on-site , legally established uses whereas Port Sanilac specifies that they serve as the primary source of on-site power:

- ◆ **“Direct Use:** *A SEF designed and installed to provide on-site energy demand for any legally established use of the property.”*

- \* Identical definitions taken from the City of Bronson, Lexington Township, and Holly Township zoning ordinances.

- ◆ **“Direct Use:** *A Solar Energy System (SES) designed and installed to capture solar energy and convert it to electrical energy as the primary source of on-site consumption of utility power or fuels related to the property.”*

- \* Definition taken from the Village Port Sanilac zoning ordinance.

- Following is a comparison of Primary Use definitions between the four ordinances. All ordinances identically specify that primary use systems use over 50% of parcel area and serve off-site power consumption needs:

- ◆ **“Primary Use:** *A SEF that uses over 50% of the parcel(s) and is devoted to solar electric power generation primarily for use off-site.”*
  - \* Identical definitions taken from the Bronson, Lexington Township, and Holly Township, and Port Sanilac zoning ordinances.
- Below is a comparison of Secondary Use definitions between the four ordinances. All ordinances identically specify that secondary use systems are not the primary use of the property and use less than 50% of parcel area:
  - ◆ **“Secondary Use:** *A SEF that is not the primary use of the property and uses less than 50 percent of the parcel(s) land area.”*
    - \* Identical definitions taken from the City of Bronson, Lexington Township, and Holly Township, and Port Sanilac zoning ordinances.

### **“Solar Heating/Cooling”**

- **Caseville Township**
- **City of Grand Haven**
- **Shiawassee County**

- Oftentimes these definitions come as a subsection of existing “passive solar system” provisions. These definitions all differ slightly, but address the same concept of providing heating and cooling through ambient solar energy:
  - ◆ **“Solar Hot Water System:** *A system that includes a solar collector and a heat exchanger that heats or preheats water for building heating systems or other hot water needs, such as residential domestic hot water or hot water for commercial processes.”*
    - \* Definition taken from the Caseville Township (Huron County) zoning ordinance.
  - ◆ **“Solar-Thermal Systems:** *Solar energy system which directly heats water or other liquids using sunlight. The heated liquid is used for such purposes as space heating and cooling, domestic hot water, and heating pool water.”*
    - \* Definition taken from the Shiawassee County zoning ordinance.
  - ◆ **“Solar Heating and Air Conditioning Units:** *A design or assembly consisting of a solar energy collector, an energy storage facility (where used), and components for the distribution of transformed energy for the purposes of heating and cooling a building.”*
    - \* Definition taken from the Grand Haven (Ottawa County) zoning ordinance.

### **Unique Language**

*Among the dozens of ordinances researched, outliers have emerged featuring unique ideas and definitions. Some are strictly more detailed explanations of common terms while others are for unique systems that are worth further reviewing.*

### **“Categories”**

- **Custer Township**

- A unique system of solar energy system size classification in which all facilities are categorized as either:
  - ◇ **Category I:** 0-20 Kilowatts
  - ◇ **Category II:** 21-100 Kilowatts
  - ◇ **Category III:** 101 Kilowatts or larger

- ◆ **“Solar Energy System Categories:** *A Solar Energy System is categorized by the amount of kilowatts that it can produce: Category I: 0-20 Kilowatts Category II: 21 -100 Kilowatts Category III: 101 Kilowatts or larger”*

\* Definition taken from the Custer Township (Sanilac County) zoning ordinance.

## “Classes”

- Colfax Township
- Weldon Township
- Village of Thompsonville

- Though adopted by three different municipalities, this solar energy system size classification system comes from just one zoning ordinance governing over the “Greater Thompsonville Area” in Benzie County, making it a single, unique provision whereby all facilities are categorized as either:

◇ **Class 1:** Serves one dwelling or business through systems no more than 1,000 sq. ft.

◇ **Class 2:** Characterized by one or more of the following:

- Serves more than one dwelling or business.
- Serves users located off-site from the SES location.
- Serves through collection systems more than 1,000 sq. ft.

- ◆ **“Class 1 Solar Energy System (Class 1 SES):** An SES that serves one (1) dwelling or business and relies on roof mounted and/or ground mounted collection systems that rely on no more than 1,000 sq. ft. of solar panel surface area.

- ◆ **Class 2 Solar Energy System (Class 2 SES):** An SES that is characterized by one (1) or more of the following:

- a. serves more than one (1) dwelling or business including multiple family developments.
- b. serves users not located on the lot where the SES is located including utility-scale systems.
- c. relies on roof mounted and/or ground mounted collection systems that rely on more than 1,000 sq. ft. of solar panel surface area.”

\* Definition taken from the Greater Thompsonville Area zoning ordinance.

## “Self-Contained SES”

- Blumfield Township

- A definition specific to solar energy systems whose sole user of power is a single, small on-site device:

- ◆ **“Self-Contained Solar Energy Systems:** *Solar energy systems that do not exceed four (4) square feet in total solar collector panel area, intended to provide energy to operate a device to which such panel is attached such as in the case of a panel powering an exterior light or an attic fan”*

\* Definition taken from the Blumfield Township (Saginaw County) zoning ordinance.

## **“Solar Generation Station”** • **City of Detroit**

- A definition specific to solar energy systems whose sole user of power is a single, small on-site device:
  - ◆ **“Solar Generation Station:** *An energy generation facility in excess of one acre comprised of one or more freestanding, ground-mounted devices that capture solar energy and convert it to electrical energy for use in locations other than where it is generated. (Also known as "solar farm.")*
    - \* Definition taken from the City of Detroit (Wayne County) zoning ordinance.