

# Green Infrastructure Planning Model (GIPM) © 2024, Author: Jay Bergeron

A decision-making multi-objective optimization framework, tailored multi-criteria strategy selector for new and redevelopment

Scenario modeling for future development. Model can show most likely BMPs selected on undeveloped or likely redevelopment sites ahead of time to analyze what the future neighborhood and City wide green infrastructure system will look like

## SYNOPSIS

The Green Infrastructure Planning Model (GIPM) serves as a robust framework guiding sustainable development by facilitating green infrastructure planning and decision-making. It expedites the selection of optimal project strategies by evaluating various alternatives through a user-defined survey, ranking them based on project criteria.

1. GIPM swiftly analyzes and ranks green infrastructure project strategies, leveraging user-provided criteria.
2. It meticulously considers site characteristics, spatial constraints, and environmental factors like hydrology and potential impact.
3. The model ensures resilience by addressing economic criteria and climate change implications, fostering holistic and adaptable solutions .

In essence, GIPM empowers stakeholders to make informed decisions, tailoring green infrastructure practices to specific project needs and ensuring sustainable development in both new and redevelopment initiatives.

Here's a summary of the key components of the model:

Criteria and Decision Factors: Includes various factors such as parcel size, slope, soil structure, runoff characteristics, zoning, walkability, etc., which influence the selection of green infrastructure practices.

Data Validation List: Provides a range of values or categories for each criterion to guide decision-making.

Site Green Infrastructure Setting Description: Offers descriptions and considerations based on the selected criteria, providing insights into the specific challenges and opportunities of the site.

Most Suitable Practices Based on Selected Local Criteria: Lists primary green infrastructure BMPs and LID approaches tailored to the site's characteristics and constraints.

Appending Community, Economic, or Climate Criteria Weight: Allows for adjusting weightings for various criteria based on environmental justice, economic criteria, and climate considerations.

Most Appropriate Green Infrastructure Strategies: Recommends top green infrastructure strategies based on the weighted criteria, highlighting the most suitable practices for the project location.

Strategy Occurrences and Top Reoccurring Strategies: Provides a breakdown of the frequency of selected strategies and identifies top choices based on their recurrence.

The GIPM is a comprehensive framework for guiding green infrastructure planning and decision-making processes, helping to ensure sustainable and resilient development practices.

This decision making tool is designed for the layman and the professional alike\*. The very few green infrastructure models today either incorporate complex and expensive software which require significant hydrologic and other engineering know how that is unnecessary. Yet, other models utilize ambiguous and nebulous academic and theoretical community well being models. And others merely explore individual green infrastructure physically constructed strategies. There are no known decision criteria models that provide instantaneous inventory of most suitable strategy.

As discussed, it is a very good rapid decision tool that sorts through the best option for your project based on empirical criterion, however, there may be additional options outside of this survey. It is strongly advised that planners and developers alike integrate the topmost recommended strategies. By integrating several strategies into one, the field of Green Infrastructure can make consequential and ingenuitive solutions.

## **HOW TO USE THIS TOOL (INSTRUCTIONS)**

First: Review the "Criteria Units" and "Criteria Decision Factors" for your particular project or proposed project location.

Next: Near the top, select the most appropriate "Criteria Decision Factors" drop down box.

**\*SEE THE NEXT PAGE TO FOR LIST OF WEB LINKS TO INSERT CORRECT CRITERIA SELECTION\***

Now below, in the section: "Your Site Green infrastructure Setting Description", you will see key guidelines and other suggestions particular to your location that you should keep in mind. These may be useful for charettes, group meetings, other planning decisions and items that should be considered throughout the project.

Next: You will see the "Most Suitable Practices Based on Selected Local Criteria" section that inserts lists of most suitable green infrastructure strategies that will be cross referenced. This allows you to see all the options available for each criterion.

Additionally, below you will see the "Appending Community, Economic or Climate Criteria Weight" section which allows users to add additional weight to Criteria that involve: Environmental justice, Economic Criteria, and Climate concerns. By doing so, the model provides the user to consider other project goals, taking account of unique and distinct communities.

Finally, at the bottom in the "Most Appropriate Green Infrastructure Strategies for your Development / Redevelopment Project Location" section, you will see the list of most suitable green infrastructure practices that were recommended correlated with each criteria.

*\*This model is perfect for the greater public, local cities and community groups to explore the options available to them. It should also be used by developers and architects to provide additional investigative considerations for their projects. The Engineer, Architect or Planner should print out the analysis and provide within the project files for downstream project considerations.*

## WEBLINKS FOR CRITERIA DETAILS

SEE REQUIRED LINKS BELOW TO UNDERSTAND AND FILL IN YOUR CRITERIA SELECTIONS

Parcel / Property size	<a href="https://app.regrid.com/us/mo#">https://app.regrid.com/us/mo#</a>
Existing average slope	Estimate, or <a href="https://enviroatlas.epa.gov/enviroatlas/interactivemap/">https://enviroatlas.epa.gov/enviroatlas/interactivemap/</a> Use elevation profile icon at top
Existing topography landform type	<a href="https://ngmdb.usgs.gov/topoview/viewer/#8/38.363/-91.233">https://ngmdb.usgs.gov/topoview/viewer/#8/38.363/-91.233</a>
Existing soil porosity:	<a href="https://soilexplorer.net/">https://soilexplorer.net/</a> Navigate to "Missouri" "Navigate to Natural Soil Drainage Class"
Existing Hydrologic Soil Group (HSG)	<a href="https://extension.missouri.edu/publications/ipm1038">https://extension.missouri.edu/publications/ipm1038</a>
Depth to water table	<a href="https://maps.waterdata.usgs.gov/mapper/nwisquery.html?URL=https://waterdata.usgs.gov/mo/nwis/current?type=gw&amp;group key=county cd&amp;site no name select=siteno&amp;format=sitofile output&amp;sitofile output format=xml&amp;column name=agency cd&amp;column name=site no&amp;column name=station nm&amp;column name=site tp cd&amp;column name">https://maps.waterdata.usgs.gov/mapper/nwisquery.html?URL=https://waterdata.usgs.gov/mo/nwis/current?type=gw&amp;group key=county cd&amp;site no name select=siteno&amp;format=sitofile output&amp;sitofile output format=xml&amp;column name=agency cd&amp;column name=site no&amp;column name=station nm&amp;column name=site tp cd&amp;column name</a>
Zoning Types	<a href="https://www.stlouis-mo.gov/government/departments/planning/documents/Citywide-Zoning-District-Map.cfm">https://www.stlouis-mo.gov/government/departments/planning/documents/Citywide-Zoning-District-Map.cfm</a> <a href="https://www.sccmo.org/265/GIS-Mapping-Zoning">https://www.sccmo.org/265/GIS-Mapping-Zoning</a> <a href="https://www.stlouis-mo.gov/government/departments/public">https://www.stlouis-mo.gov/government/departments/public</a>
Existing walkability Index:	<a href="https://epa.maps.arcgis.com/home/webmap/viewer.html?webmap=f16f5e2f84884b93b380cfd4be9f0bbav">https://epa.maps.arcgis.com/home/webmap/viewer.html?webmap=f16f5e2f84884b93b380cfd4be9f0bbav</a> <a href="https://www.walkscore.com/explore?q=St.+Louis%2C+mo&amp;v=v3&amp;m=light">https://www.walkscore.com/explore?q=St.+Louis%2C+mo&amp;v=v3&amp;m=light</a>
Percent of Post-Construction proposed hardscaping / site of property	Your Decision
Distance from Waters of the State or environmental sensitive areas of high value	Measure using Google Maps, & <a href="https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/">https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/</a>
Within 500 ft of a known/documented Pollution Hotspot	May be minor loccarecurring incident or historical contamination zone <a href="https://enviroatlas.epa.gov/enviroatlas/interactivemap/">https://enviroatlas.epa.gov/enviroatlas/interactivemap/</a> If preferred, you may call your local City or fire department to see if record of major
Local Neighborhood health index	<a href="https://www.neighborhoodatlas.medicine.wisc.edu/">https://www.neighborhoodatlas.medicine.wisc.edu/</a>
Local educational opportunities	Your Decision <a href="https://www.diversitydatakids.org/maps/#/explorer/tracts/0/15/10,15//xc/n/1.2.3/38.615/-90.318/10.69/">https://www.diversitydatakids.org/maps/#/explorer/tracts/0/15/10,15//xc/n/1.2.3/38.615/-90.318/10.69/</a>
Local cultural sensitivity or distinctiveness	Your Decision
Is business development a consideration	Your Decision
Is local air quality a consideration?	Your Decision <a href="https://www.airnow.gov/?city=Saint%20Charles&amp;state=MO&amp;country=USA">https://www.airnow.gov/?city=Saint%20Charles&amp;state=MO&amp;country=USA</a> <a href="https://www.iqair.com/us/air-quality-map/usa/missouri/saint-louis">https://www.iqair.com/us/air-quality-map/usa/missouri/saint-louis</a>