

TECHNICAL MEMORANDUM

To: Development Suitability Index File

From: Diane Desotelle, Natural Resources Coordinator, Ben Van Tassel, Community Planning, Chad Ronchetti, Business Development, Heidi Timm-Bijold, Business Development, Bryan Pittman WSB & Associates, Inc.

Re: Methodology for City-Wide GIS Development Suitability Index

Date: December 27, 2018

The City of Duluth used agreed upon variables and a scoring/ranking matrix to determine suitable areas for development across the city. The result is a GIS layer that shows areas on a continuum from lowest to highest for development suitability. This memo describes the variables included in the analysis. The data is stored with the city's GIS department. If the analysis is amended or adapted in the future, this memo should be updated as well.

The variables and the weights used for the analysis include:

Slope

Source: Lidar Elevation, Arrowhead Region, NE Minnesota, 2011. Minnesota Department of Natural Resources (MnDNR)

Weight:

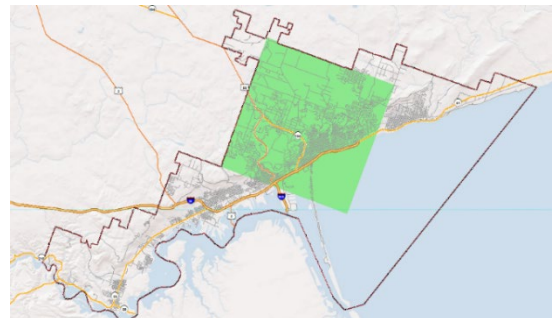
- 20% or Greater (score = 0)
- 10.00% - 19.99% (score = 3)
- 9.99% - 0% (score = 5)

Natural Heritage Information System (NHIS)

Source: Rare Natural Features – Polygons, 1800's to Present. The Natural Heritage & Nongame Research Program of the MnDNR, Division of Ecological Services

Weight:

- The land associated with a threatened, endangered or special concern species and its buffer area. (score = 0)
- A historic piece of data attributed all of Township 50 Range 14 of the Public Land Survey System as a distorted buffer (see figure), and therefore, the team decided it was appropriate to increase the development potential in that area. (score = 1)
- The land not associated with a threatened, endangered or special concern species. (score = 3)



Highways

Source: City of Duluth, Classification based on the Route System and Route Number provided by Minnesota Department of Transportation

Weight:

- Under ¼ mile from Interstate (score = 5)
- ½ mile from Principal Arterial (score = 3)
- everything else (score = 0)

City Parks, Duluth Natural Areas, and MN Science and Natural Areas

Sources: City of Duluth's Parks and DNAP areas and MnDNR, 2003 - MN Scientific and Natural Areas

Weight:

- Inside any of these areas (score = 0)
- Outside any of these areas (score = 1)

Sensitive Lands Overlay

Source: City of Duluth's sensitive lands overlay resulting from the report associated with the 2006 Comprehensive Land Use Plan. Report: Brown, Terry and Tom Hollenhorst, [A Natural Resources Analysis for Duluth's Natural Resources Inventory](#), University of Minnesota, Duluth – Natural Resources Resource Institute, 2006.

Weight:

- Inside the sensitive lands overlay (score = 0)
- Outside the sensitive lands overlay (score = 1)

Union of both the Shoreland Overlay and the 500 year Floodplain

Floodplain Source: Federal Emergency Management Agency (FEMA), Digital Data Created in the 1980s & 1990s

Shoreland Overlay Source: City of Duluth, 2010 revision as part of the development of the Unified Development Chapter. These are Lands within 1,000 feet of a lake or within 300 feet of a river and its floodplain and is designated on the City's Natural Resources Overlay (NR-O) map. *(Note: The limits of shorelands may be less than the above limits whenever the waters involved are bounded by topographic divides that extend landward from the waters for lesser distances and when approved by the commissioner.)*

Weight:

- Inside the total merged area of these two data sets (score = 0)
- Outside the total merged area of these two data sets (score = 5)

National Wetlands Inventory

Source: MnDNR, Ducks Unlimited, and St. Mary's University of Minnesota, 2018.

Weight:

- Wetland (score = 0)
- Not a wetland (score = 1)

Soils

Source: Natural Resource Conservation Service (NRCS), United States Department of Agriculture (USDA). Accessed November 2018.

Weight:

- A or B Hydrologic Group (score = 3)
- C or D Hydrologic Group (score = 0)

Depth to Bedrock

Source: Minnesota Geological Survey (MGS), 2010. These depths were chosen for the feasibility of constructing a foundation or putting in utilities. Bedrock within 8 feet of the surface makes it difficult to put in a foundation and utilities, bedrock 8-14 feet under the surface may cause some disruption with construction, bedrock more than 14 feet under the surface typically doesn't cause any disruption.

Weight:

- 0 feet – 7.99 feet (score = 0)
- 8.00 feet – 13.99 feet (score = 2)
- 14.00 feet or Greater (score = 5)

Brownfield Sites

Source: Brownfield sites were inventoried (2014) in the West Port Area Neighborhood Plan (Irving and Fairmont) and digitized (2017) as a part of the Area Wide Plan. Brownfield inventories were limited to those neighborhoods.

Weight:

- Inside a brownfield (score = 3)
- Outside a brownfield (score = 0)

Core Investment Areas (CIAs)

Source: City of Duluth, 2018 - Twelve initial CIAs were identified during the Imagine Duluth, Comprehensive Plan 2035. The CIA boundaries have not been officially determined. Intersections identified were buffered by 500-ft to create an estimated boundary. The Kenwood CIA has been refined through rezoning, and was included, but it was not officially adopted at the time of this analysis.

Weight:

- Within 500 feet of a core investment area (score = 3)
- Greater than 500 feet from a core investment area (score = 0)

Sewer & Water Utilities

Source: City of Duluth, 2018. The average depth of utilities in the City is 7.5 feet and the minimum depth to prevent freezing is 6 feet, which is a 1.5-foot difference. Using an average slope of 0.5%, which is standard for the City of Duluth, utilities can be extended outwards 300 feet (1.5 feet/.005) before reaching minimum depth. Therefore, locations within 300 feet of a sanitary sewer or watermain pipe are more suitable for development.

Weight:

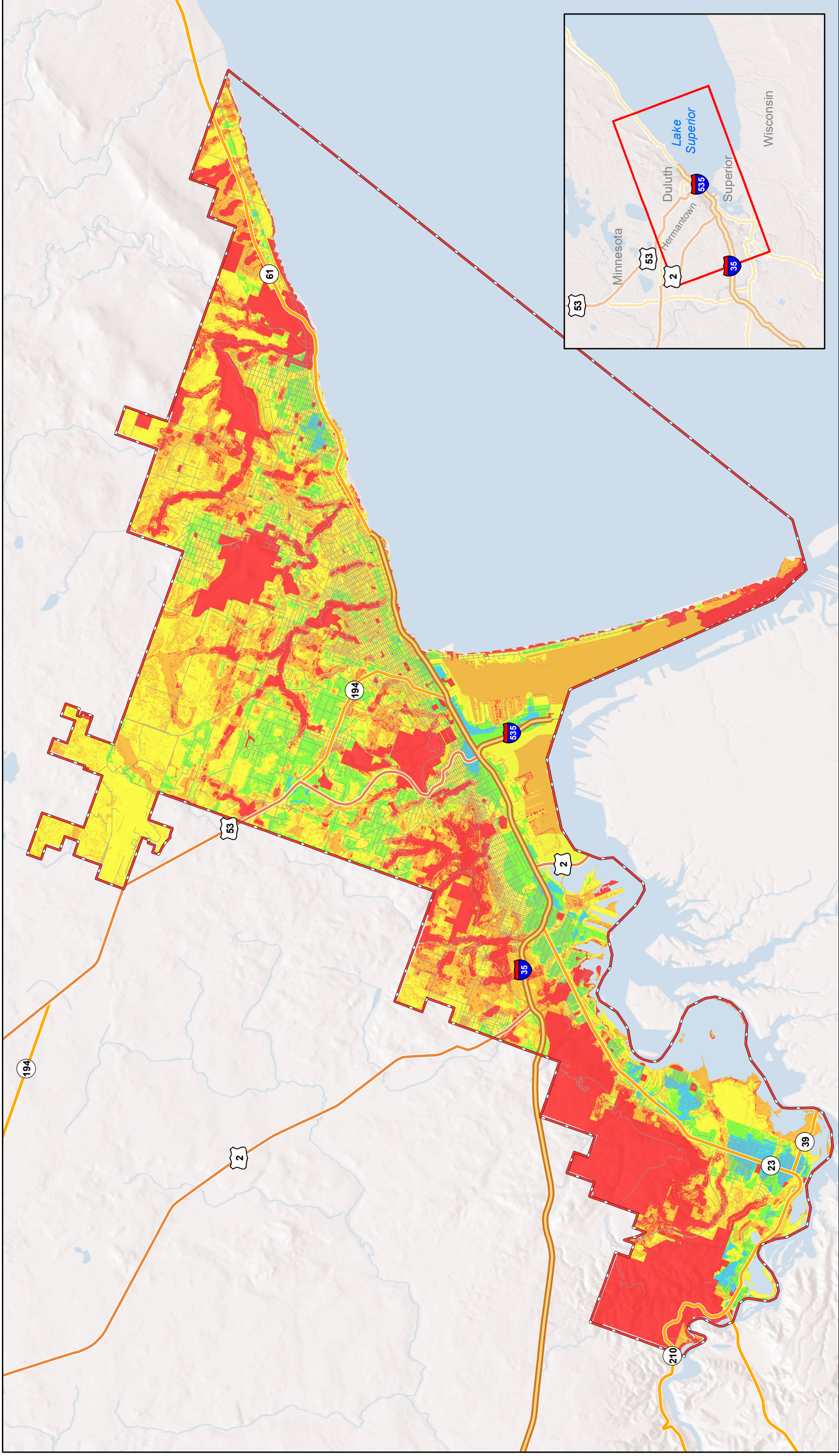
- Within 300 feet of a sanitary sewer or watermain (score = 3)
- Greater than 300 feet from a sanitary sewer or watermain (score = 0)

GIS Analysis

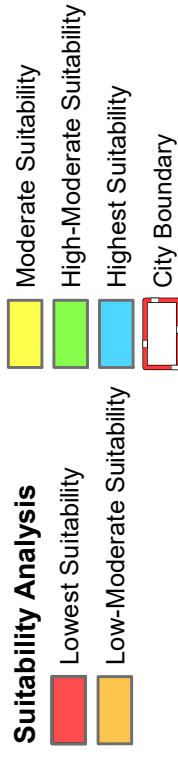
The GIS methodology used to assess the matrix of variables involved converting all data layers into raster data. All layers started as vector data except slopes and depth to bedrock. The raster data was then reclassified to match the agreed upon scoring values, for example anything within a brownfield was reclassified to 3 and everything in the city outside a brownfield was reclassified to 0. These reclassified raster data layers were then overlaid and summed together using the raster calculator tool within ArcGIS.

The final suitability layer can be shown using both a 5-class and 3-class breakdown. The 5-Class breakdown shows areas in the city as Lowest Suitability, Low-Moderate Suitability, Moderate Suitability, High-Moderate Suitability, and Highest Suitability. These break points were chosen to show approximate percentages per class, with the lowest 2 classes comprising half of the city, and the highest 3 classes comprising the other half. The 3-Class breakdown shows areas in the city as Recreational Development, Low Impact Development, and Standard Development. These break points were also chosen as an approximate percentage per class, with the lowest class (Recreational Development) comprising about 40% of the city, the middle class (Low Impact Development) comprising the next 30%, and the highest class (Standard Development) also comprising 30% of the city.

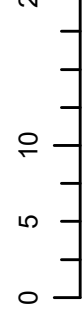
Core Investment Area Name	Approximate Location
Gary New Duluth	Commonwealth & Gary
Morgan Park	88 th & Edward
Spirit Valley	Central & Grand
Piedmont	Morris Thomas & Chambersburg
Lincoln Park	Superior St. – 22 nd to 17 th Ave. W.
Mall Area	Matterhorn / Decker
Duluth Heights	Central Entrance & Arlington
Hillside	4 th St. – Lake to 6 th Ave. E.
Kenwood	Kenwood & Arrowhead
Mount Royal	St. Marie & Woodland
Woodland	Calvary & Woodland
Lakeside	Superior St. – 43 rd to 46 th Ave. E.

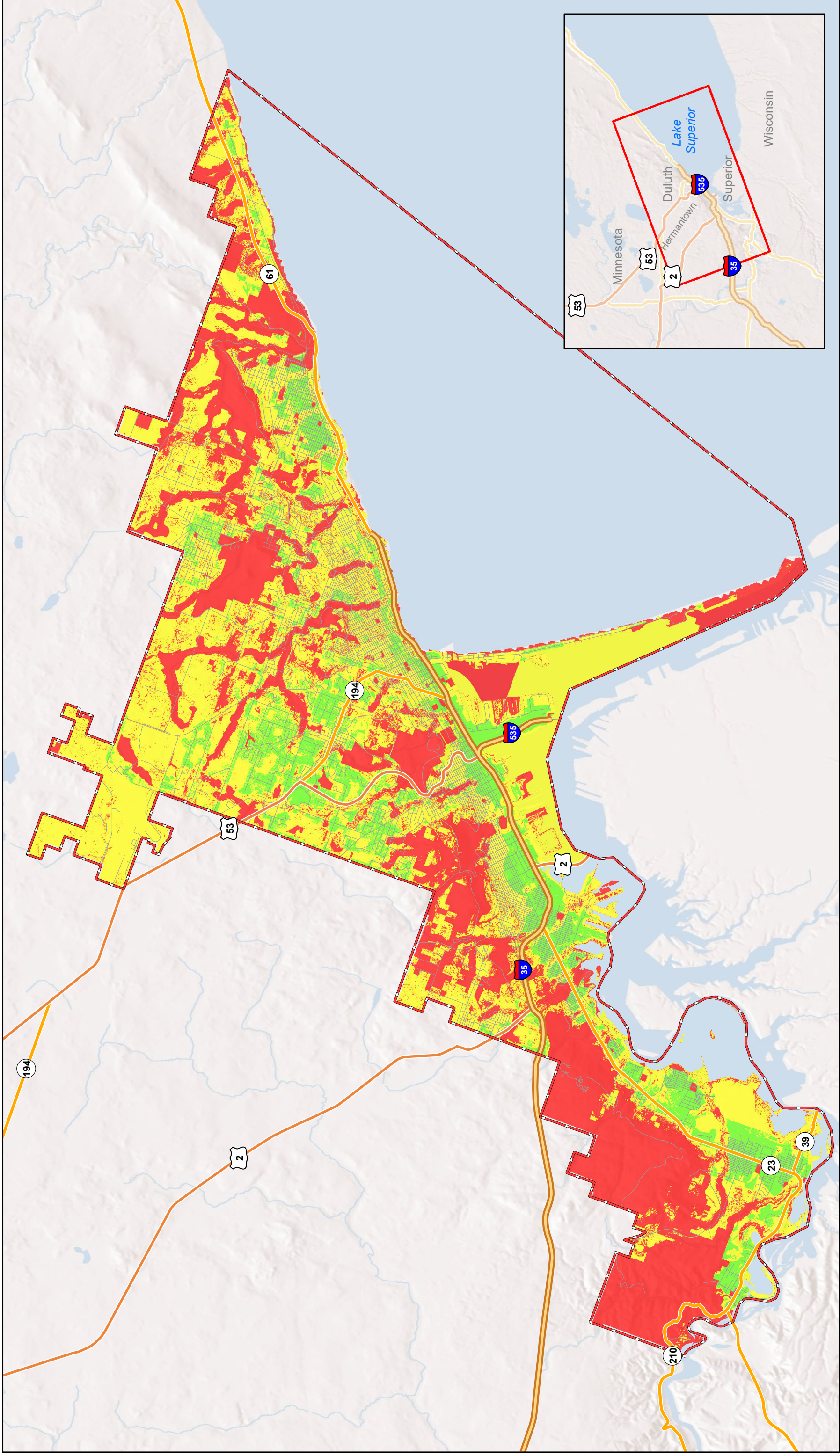


Development Suitability Analysis City of Duluth, MN



0 5 10 20 Miles





- Suitability Analysis**
- Recreational Development
 - Low Impact Development
 - Standard Development
 - City Boundary

