

Identifying and Quantifying Development Potential for the Townships of Birchwood, Long Lake, and Madge

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**Douglas Miskowiak, Outreach Specialist
Center for Land use Education
College of Natural Resources
University of Wisconsin – Stevens Point**

Abstract

Development Potential Analysis (DPA) was conducted to identify the potential for future development based upon the proximity of land to roads and surface water. The analysis was conducted for the Townships of Birchwood, Long Lake, and Madge, in Washburn County, Wisconsin. GIS software, land information, spatial buffers, and simple overlay logic was used to identify and quantify total land available for development, land available near surface water, and land available near roads. DPA reveals that 64,720 total acres are available to accommodate future development, 17,700 acres are near water only, 7,660 acres are near roads only, and 6,010 acres are near both water and roads. This analysis is functional for general land planning, and is not meant for site-specific applications, such as plotting a subdivision. Results are rounded to the nearest 10-acre.

Introduction

DPA identifies and quantifies land available to accommodate future development, and prioritizes development potential based on proximity to preferred resources (roads and surface water).

DPA was conducted for the project area, defined by the public land survey one-mile section surrounding the townships of Birchwood, Long Lake, and Madge, and including those townships (see Figure 1). The project area is located within Washburn County, Wisconsin (see Figure 2).

Figure 1: Long Lake Project Extent

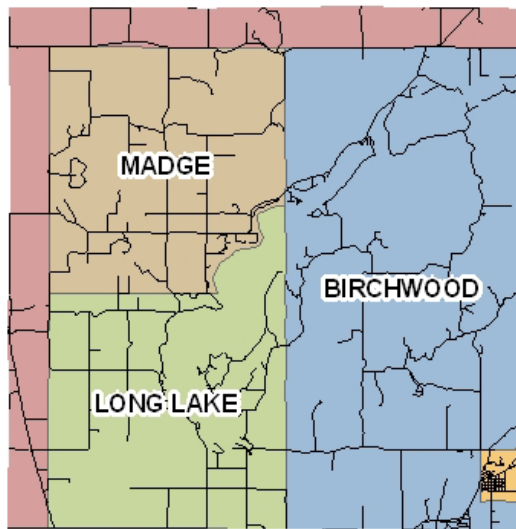
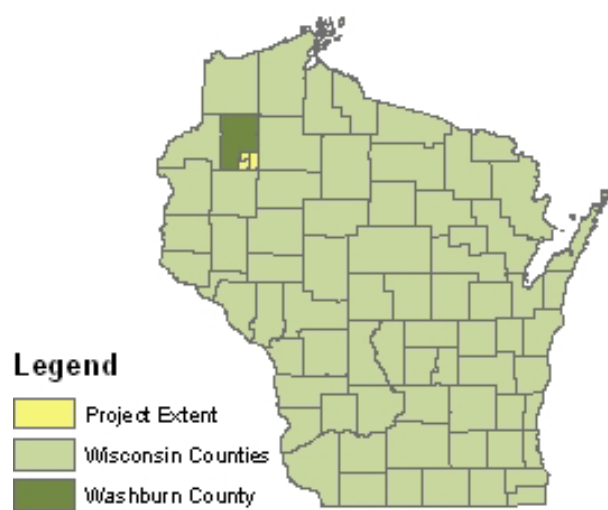


Figure 2: Long Lake Context



Statistics and maps, resulting from this analysis, are meant to guide land use planning and decision-making (see Table 1 and Map, Development Constraints).

They are meant to help:

- Identify land restricted and land available for development.
- Recognize how much future development is possible using various development density strategies.
- Choose development strategies that protect the resources they are adjacent to.

Background

Development patterns within the project extent indicate that the majority of residential development occurs in close proximity to existing roads or surface water (see Table 1).

Table 1: Proximity of Residential Uses to Surface Water and Road Right of Ways

Distance from surface water

46% are within 100ft from surface water

70% are within 660ft from surface water

Distance from all road right of ways

52% are within 50ft from roads

63% are within 100ft from roads

85% are within 330ft from roads

These statistics support that homeowners, within the project extent, prefer to build homes near roads and surface water. As long as land remains available, development is likely to continue near these features.

Methods

Step 1: Compile Data

The Northwest Wisconsin Regional Planning Commission (NWRPC) provided data in Washburn County coordinates. Units were defined in feet. The following list defines data used for DCA.

- Surface Water
- Wetlands
- Slopes
- DNR owned land
- County forest owned land
- Industrial forests
- Minor civil divisions
- Public Land Survey
- Land Use (1997)
 - Residential, Commercial, Industrial, Parks and Open space, Government and Institutional, Utilities, and Road right of ways

Land use data created by NWRPC from 1997 orthophotography. All other data from the Wisconsin Department of Natural Resources (WDNR).

A) *Create surface water file:* Surface water data arrived as two files, a polygon file showing major water bodies, and a line file, showing the outlines of major water bodies and streams. For analysis, the two files were combined into one polygon shapefile. The BUFFER function was used to give the line file area. A 15-foot buffer was applied. The UNION function combined the features of the polygon file and the buffer file into a single surface water shapefile. The result was used for all analyses and statistics.

B) *Create slope file:* ArcMap, spatial analyst and the 30-meter digital elevation model were used to create a slope grid in percent slope. Slopes greater than 20 percent were converted to a shapefile for analysis.

C) *Clip data to project extent:* All data were geographically clipped to the project extent using ArcMap, geo-processing wizard CLIP function.

D) *Calculate acreage:* ArcView 3.3, X-Tools extension was used to update area, perimeter, and acreage of all shapefiles. Acreage defined by X-Tools was used to quantify constraints.

Step 2: Calculate Development Constraints

To identify land available for future development, development constraints were calculated (see Development Constraints Analysis). Acreage was calculated for the project extent, land restricted from development, and land available for development (see Table 2).

	Acres	Percent of Project Extent
Total project extent	= 107, 380 acres	100 percent
Development constraints	= 42, 670 acres	40 percent
Available land	= 64,720 acres	60 percent

Step 3: Buffer Amenity Features (Roads & Surface Water)

Based on current residential development patterns that illustrate close proximity to road right of ways and surface water, road and surface water features were buffered (see Background, page 2). Surface water was buffered at 660 feet, or 1/8 mile. Roads were buffered 330 feet or 1/16 mile. ArcMap 8.2, BUFFER function was used to buffer features. The result was two shapefiles:

1. road-buffer
2. water-buffer

Step 4: Erase Development Constraints from Buffered Areas

To estimate how much land was available for development near roads and water, development constraints were erased from the road-buffer and water-buffer shapefiles. X-Tools ERASE function, using ArcView 3.3, eliminated development constraints from both files. The result was two shapefiles:

1. road-buffer, minus constraints
2. water-buffer, minus constraints

Using X-Tools, acreage was calculated for both files. The results illustrated how much land remains to accommodate future development.

Results

Results are summarized in Table 3 (see also, Development Potential Map).

Table 3: Development Potential

Feature Measured	Acres Calculated	Percent of Project Extent
All developable areas	64,720	60
Developable areas within 660 feet of water, only	17,700	16
Developable areas within 330 feet of roads, only	7,660	7
Developable areas near both roads and water	6,010	6
Remaining developable areas not near water or roads	33,350	31

Discussion

Overestimating Areas Available for Future Development

Areas available for future development are overestimated for several reasons.

1. Land use data is from 1997 and land use change has occurred since then.
2. Land use data is manually interpreted from orthophotography, and some development shown on the photos are missed in interpretation.
3. Development occurring under the tree canopy is not detectable using orthophoto interpretation and is not mapped.
4. Manual interpretation of development only records those visible hard surfaces and detectable adjacent yards. This method underestimates the extent of developed ownership, and overestimates land yet open to development.

Using These Results

Care should be taken when using these results, because calculations of land available for future development are overestimated. Manual inspection of the visual map should be used to identify the true extent of development based on ownership. Ownership, in many cases, determines the availability of land for development. We contend that a 5-acre residential parcel is just as developed as a 1-acre parcel. Land use data used for this analysis cannot show the ownership extent.

Future Analyses

Further analysis should attempt to interpret the ownership extent and connect land uses to the property ownership boundaries. Buffering current land use data may help to interpret ownership by estimating parcel size. Tax parcel data, currently unavailable for Washburn

County, is preferred for this analysis. Land use attributes are linked to ownership boundaries and updated on a regular basis (yearly).