Parcel-Scale Surface Drainage & Terrain Assessment

Hydrologic Screening Analysis

Prepared by: Touch of Green Environmental GIS, 2025
Location: Client Parcel – Milan, Illinois
Scale: Parcel-level, screening analysis

---

1. Purpose of Analysis

This analysis evaluates surface drainage behavior and terrain conditions within the subject parcel in Milan, Illinois, to identify where surface water naturally concentrates and where terrain conditions may increase erosion risk during rainfall events.

The objective is screening-level insight, not engineering design. Results are intended to support:

- Preliminary drainage and grading considerations
- Identification of erosion-prone areas
- Land management and conservation planning
- Early-stage site feasibility evaluation

2. Study Area & Data Overview

The analysis focuses exclusively on the parcel boundary provided by the client. High-resolution elevation data was used to model surface flow behavior at the parcel scale.

Data sources included:

- High-resolution Digital Elevation Model (DEM)
- Parcel boundary geometry
- Derived terrain and hydrologic surfaces

All processing was performed using consistent spatial resolution, projection, and raster alignment to ensure accurate spatial comparison and interpretation.

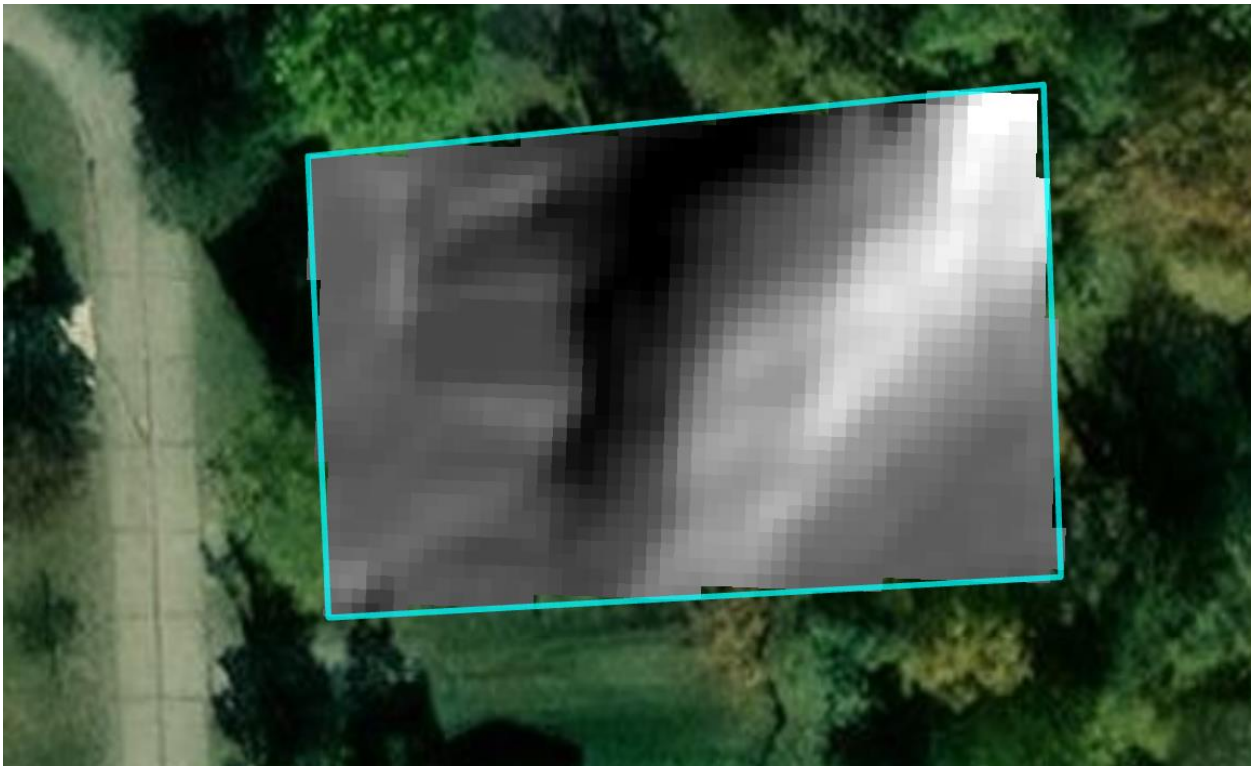

Figure 1. Study parcel boundary over high-resolution elevation surface used for hydrologic modeling. The analysis is limited strictly to the parcel extent.

3. Analytical Approach

3.1 Elevation Conditioning

The elevation surface was hydrologically conditioned to remove minor surface depressions that can interfere with flow modeling. This step ensures that modeled runoff reflects realistic downslope movement rather than data artifacts.

3.2 Surface Flow Direction & Accumulation

Using the conditioned elevation surface, surface flow direction and flow accumulation were calculated. Flow accumulation identifies locations where surface runoff from upslope areas converges.

Multiple accumulation thresholds were tested to isolate meaningful surface flow patterns at the parcel scale. Unlike very flat parcels, this site exhibits sufficient relief to produce clearly defined drainage corridors.

A threshold of ≥200 contributing cells was selected to represent the primary surface drainage pathways across the parcel.

Figure 2. Primary surface flow corridors derived from flow accumulation modeling, showing concentrated runoff pathways across the parcel.

3.3 Slope Analysis

Slope was calculated from the elevation surface to evaluate terrain steepness and identify areas where runoff velocity may contribute to soil erosion.

Slope values were classified to distinguish gentle terrain from steeper areas that may be more susceptible to erosion when combined with concentrated flow.

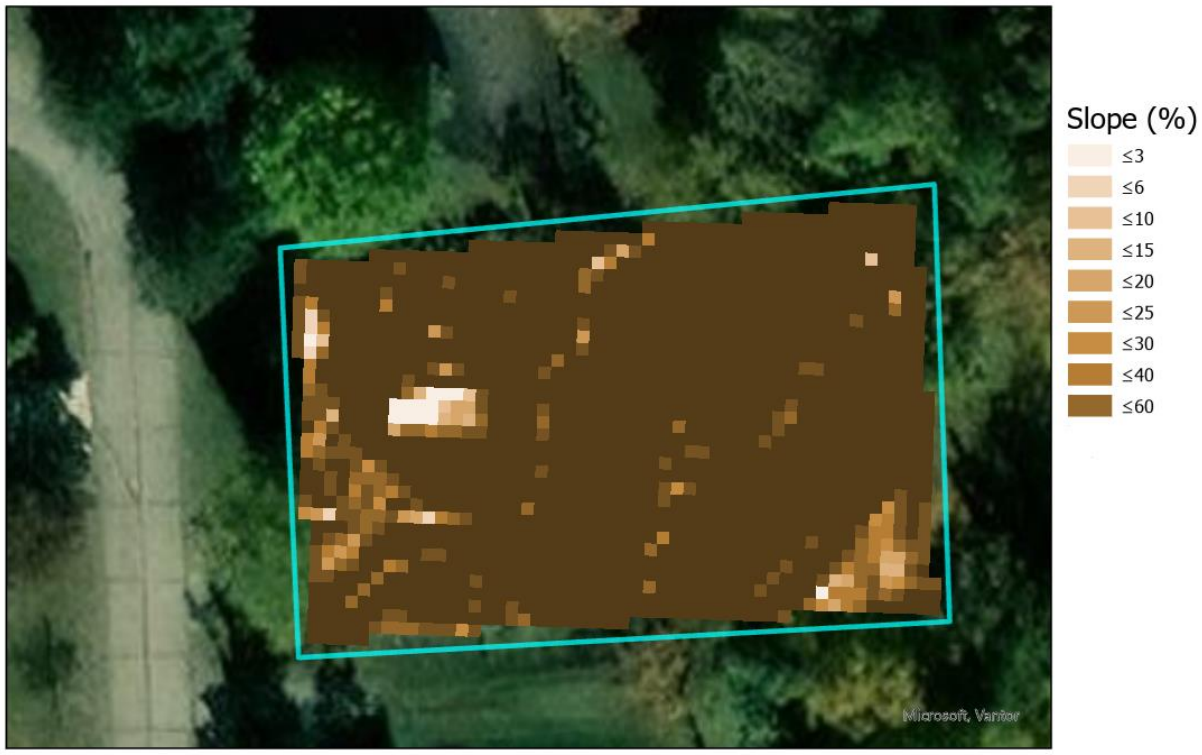

Figure 3. Slope classification of the parcel highlighting areas of increased terrain steepness relevant to erosion potential.

4. Combined Drainage & Erosion Suitability Result

To identify erosion-prone locations, areas of concentrated surface flow were combined with areas of increased slope using a logical raster intersection.

This approach isolates locations where:

- Surface water is likely to concentrate, **and**
- Terrain steepness increases erosion risk

The resulting raster identifies distinct erosion-risk corridors, rather than isolated or incidental cells.

Figure 4. Final erosion-risk screening result identifying locations where concentrated surface runoff coincides with steeper terrain.

5. Interpretation of Results

The analysis indicates that the parcel contains well-defined surface drainage pathways driven by existing topography. These pathways represent areas where surface water naturally concentrates during rainfall events.

Several of these drainage corridors coincide with steeper terrain, increasing the potential for soil erosion if left unmanaged. Unlike flat parcels where runoff is diffuse, surface water movement on this site is spatially organized and predictable.

These results suggest that erosion risk is localized and corridor-based, making targeted mitigation or management approaches feasible.

6. Limitations & Considerations

This analysis is subject to the following limitations:

- Results are based on raster-derived elevation data and represent relative, not surveyed, conditions.

- Small-scale micro-features (e.g., vegetation, minor grading, drainage improvements) are not captured.
- This screening does not replace site-specific engineering or soil analysis.

Despite these limitations, the spatial patterns identified are consistent with the parcel's terrain and provide a reliable basis for preliminary decision-making.