



Earth Science Education Activity

Exploring Organic Matter in Soil

Background: Organic matter in soil is indispensable for soil health and ecosystem vitality, as it actively participates in nutrient cycling, soil structure maintenance, water retention, erosion prevention, and carbon sequestration. It fosters a thriving community of soil organisms, supports robust plant growth, and significantly contributes to mitigating climate change by storing carbon dioxide. Comprehensive knowledge of organic matter dynamics is crucial for implementing sustainable land management practices, optimizing agricultural productivity, and safeguarding ecosystem resilience against environmental stressors worldwide.



Diverse species and planned grazing are significantly improving soil health indicated by increased organic matter and earthworms. Credit: USDA-NRCS photo by Ron Nichols

Key Question: How does the organic matter vary in soil around Chicago and in my community?

STANDARDS

NGSS: [MS-ESS3-3](#)

SDG 2: Zero Hunger

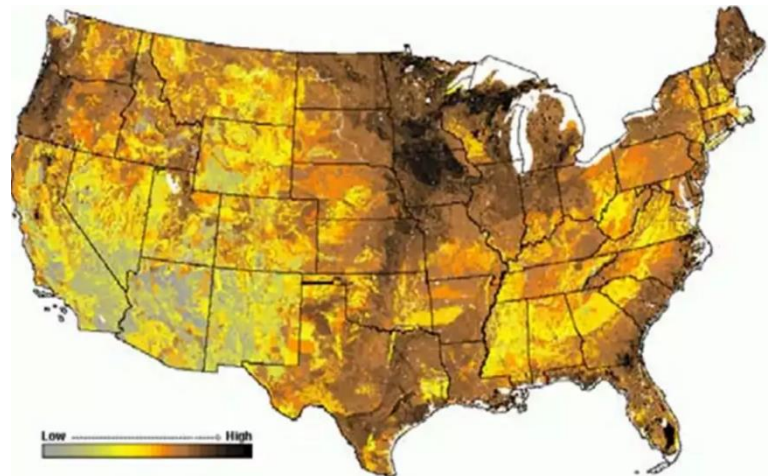
SDG 13: Climate Action

SDG 15: Life on Land

Learn more about the United Nation's Sustainable Development Goals (SDGs) and explore resources for educators from UNESCO:
<https://en.unesco.org/themes/education/sdgs/material>

MATERIALS

- ◆ Web Soil Survey map handouts



Relative amounts of soil organic matter. Credit: Hargrove and Luxmore, 1988, released to USDA.

PROCEDURE

1. Examine soil organic matter depletion maps near three areas: 1) Downtown Chicago, 2) The western suburbs of Chicago, and 3) An area in northern Illinois. Think about and discuss each area. How might the soil be different in these areas, considering human populations and land use in these areas?
2. Examine all three soil maps and make notes of any differences and/or similarities you see across the different areas.
3. Discuss the following questions with a partner or group:
 - a. What color indicates there are high amounts of soil organic matter? What color indicates low amounts?
 - b. Identify areas on each map with high or low levels of soil organic matter. What potential factors might be contributing to these patterns and their impact on the local environment?
 - c. How does soil organic matter depletion vary across the different locations? Hypothesize why these variations might occur.
 - d. Identify any natural factors and human interventions that might influence organic matter content in the maps.
4. As a class, discuss questions you have about organic matter depletion or organic matter in general after examining the maps individually and making comparisons between the three locations. What might you want to continue exploring about soil organic matter, organic matter depletion, and/or Chicago and its surrounding areas?

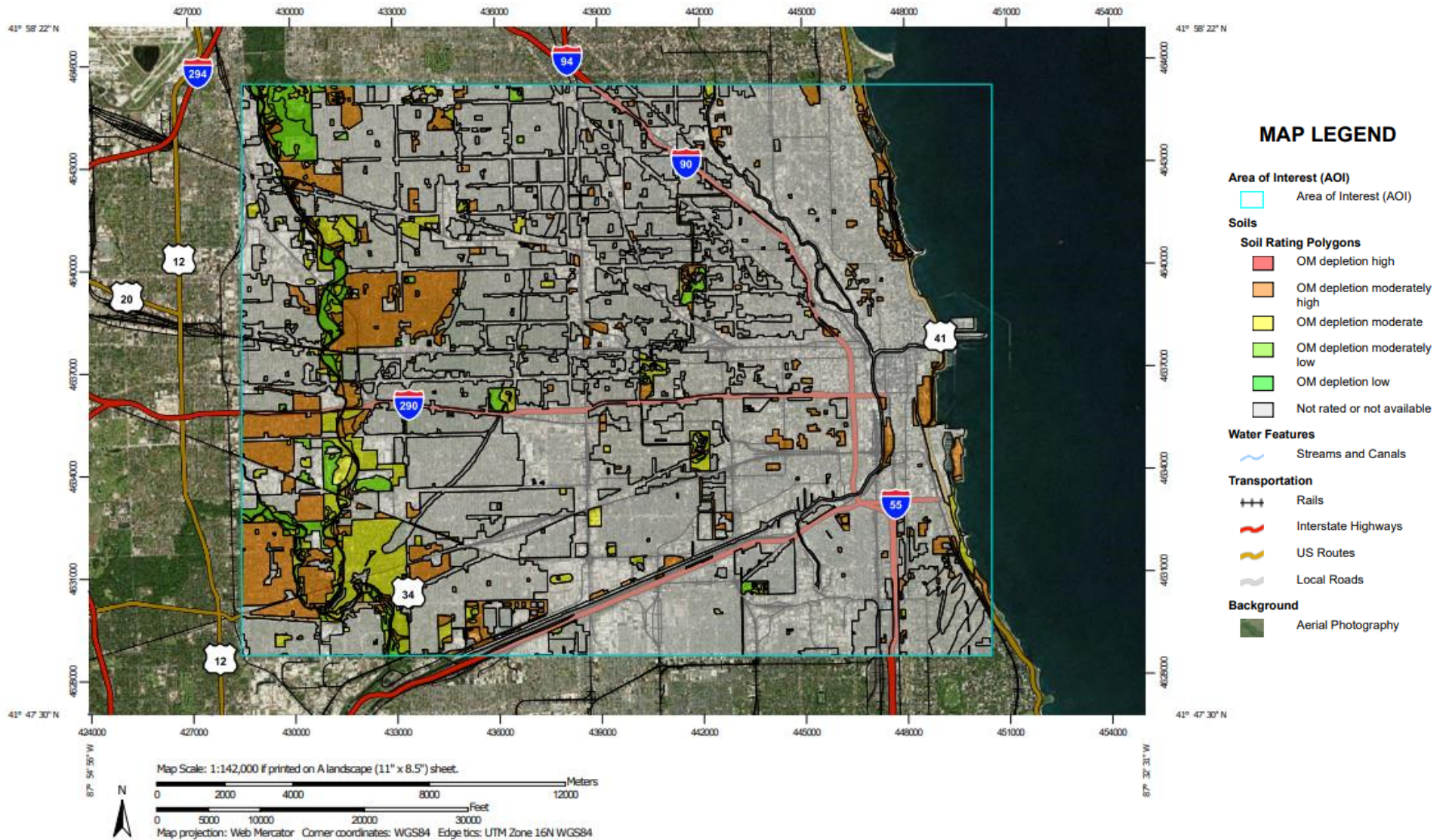
SYNTHESIS

Reflecting on the soil organic matter maps of Downtown Chicago, the western suburbs, and an area in northern Illinois, discuss how human population density and land use patterns might contribute to differences in soil organic matter content across these locations. Consider the impact of urbanization, agricultural practices, industrial activity, and natural landscapes on organic matter levels. How might these factors interact to influence soil health, carbon sequestration potential, and vulnerability to climate-related natural hazards in each area?

EXTENSION

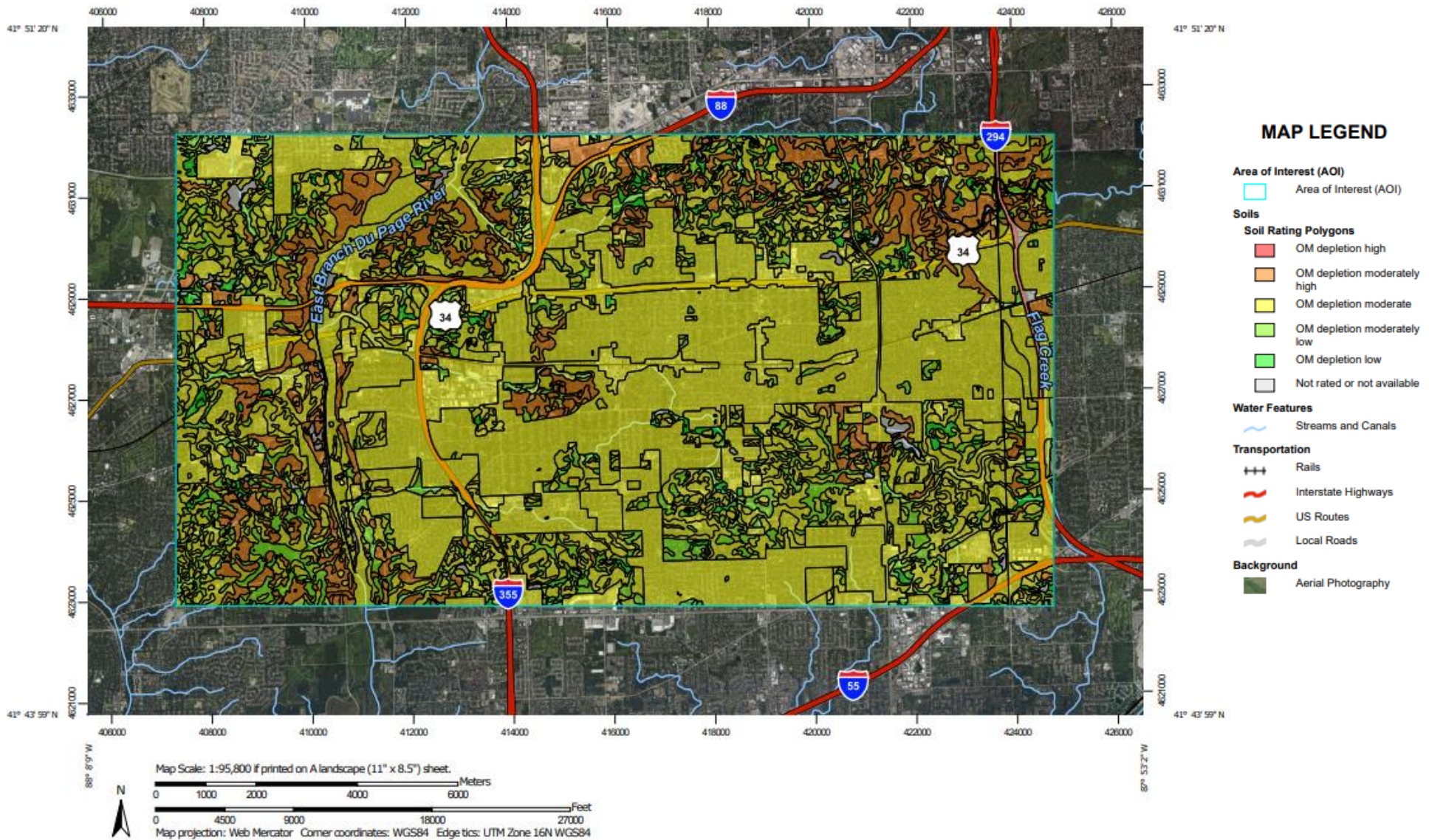
Learn about the soil organic matter in your community by examining a local soil map. How would you classify the organic matter amount near you? How does your local soil compare to the three maps you examined earlier? Write a paragraph to share your observations and comparisons.

Organic Matter Depletion – Chicago, IL



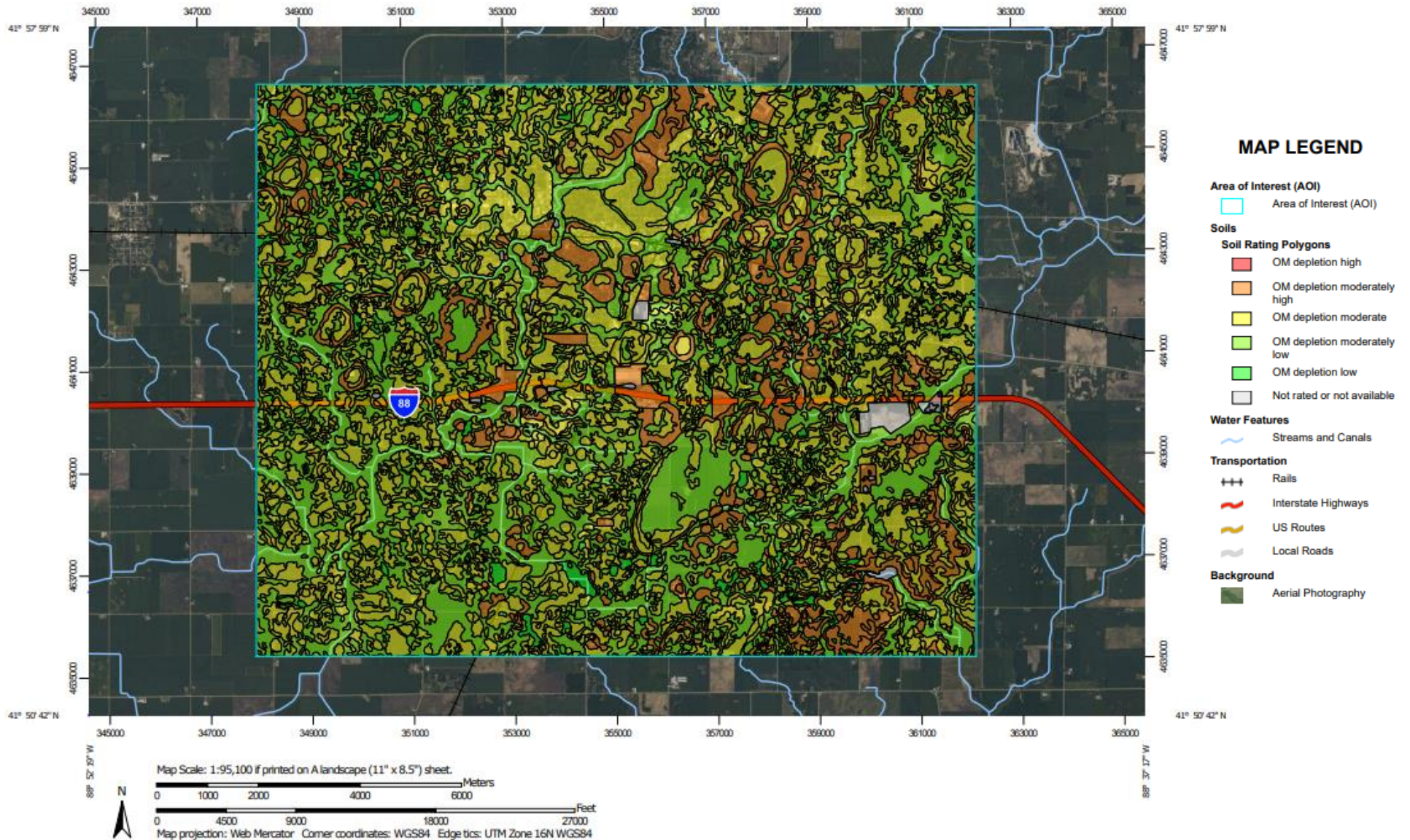
Credit: USDA NRCS Web Soil Survey

Organic Matter Depletion – Western Suburbs of Chicago, IL



Credit: USDA NRCS Web Soil Survey

Organic Matter Depletion – DeKalb, IL



Credit: USDA NRCS Web Soil Survey