# GIS Lab (Due Thursday, February 26th, 2015)

# Determination of Storage Volume in a Farm Pond

Mr. Oswald, Leopold Dermot (O.L.D.) McDonald has a farm, Eastern Illinois Enterprises in Oakwood (E.I.E.I.O), and on this farm he grows corn and soybeans He is interested in constructing a farm pond, in the section of the field at the western edge below the 716.5 ft contour line, that is to be used as the outlet/water source for a combined drainage/ subirrigation system. You have been provided with a satellite map of the field (lab06.bmp), a digital elevation model of the field in UTM coordinates (field\_data.asc), and a directory with soil shape files. The coordinates of the three points shown on the satellite map, and the origin of the local coordinate system, are given below.

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| --- |
| Long/Lat Coordinates |
| 1 | -88.645173 | 39.448332 |
| 2 | -88.645168 | 39.441019 |
| 3 | -88.631013 | 39.444904 |
|  |
| Local Origin | -88.64516305 | 39.44106809 |

1. Convert the soil map and the field boundary map to UTM and load it into MapWindow
2. Georeference the satellite map in UTM coordinates and add it as a base layer

|  |
| --- |
| UTM Coordinates |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
|  |
| Local Origin |  |  |

1. Load the DEM and create a contour map of the field, using 0.5 ft contour intervals.
2. Clip the contour map, blanking out the points that are outside of the field boundary
3. Calculate the area of the field.
4. The section of the field at the western edge below the 716.5 ft contour is to be made into a pond. Determine the area of the field that will be taken out of production to create the pond.
5. Determine the maximum volume of water that can be stored in the pond without excavation. If this volume were to be applied uniformly over the field, what would be the applied depth of water?
6. How deep would the pond have to be to store enough water to apply a) 1.75 inches and b) 3.5 inches of water to the entire field? What volume of soil would need to be excavated in each case?
7. Use the Illinois Drainage Guide to determine the recommended drain depth and spacing for the soils in the field. (<http://wq.illinois.edu/DG/>). Show the soil names and the recommended depth and spacing on the

Write a report to Mr. McDonald that describes what you have done and that provides the results of your analysis. Includes maps and graphs such as site maps, soil maps, contour maps, pond location, etc., and overlays of these maps. The report should give not be overly technical, and should give the farmer information that will help in his decision making.