

Delaware County Surveyor Embraces GIS Technology to Improve Drainage Management



Spring 2025
Delaware County, Indiana

The Delaware County Surveyor's Office plays a vital role in maintaining the county's drainage infrastructure. These drainage systems, known as "Legal Drains" or "Regulated Drains," are essential for managing water flow across rural farmland and urban areas. Indiana State law requires the office to collect taxes and use the funds to ensure these drains remain functional and effective, supporting the needs of both agricultural and residential communities within the watersheds they drain.

Historically, detailed records of these drainage systems were incomplete or inadequate for modern mapping standards. Over the years, the introduction of Geographic Information Systems (GIS) technology and local efforts have improved the accuracy of these maps.

Recently, Surveyor Tom Borchers, along with newly elected and appointed drainage board members, sought to enhance the use of GIS technology to improve the efficiency of their work and streamline the approval process for drainage projects. Their goal was to create tools that not only simplified operations but also provided greater transparency and accessibility for drainage board members and the public.


Leveraging GIS for Better Drainage Oversight

To meet these goals, the Surveyor's Office developed a dual approach utilizing ESRI ArcGIS technology. This approach enables precise tracking and visualization of drainage projects, both for internal use and public accessibility.

The first step was creating an **ArcGIS Online Survey123 form** (left), which streamlines the input of work order details. This simple form collects essential information, such as the work order number, project hearing date, contractor, township, drain or ditch name, and watershed. It also includes the capability for uploading photos of the project area as well as documents. This form can be utilized on either smartphones or desktop computers. A map input on the form allows the Surveyor's staff to easily add the work order location. When using a smartphone, the device's GPS location can be used. Once submitted, the form automatically records the project's location and stores the data in ArcGIS Online, making it accessible for further use in the maps and online applications that are detailed in the next sections.

A simple Survey123 form (left) allows the Surveyor's staff to quickly enter drainage work orders which are then automatically displayed on maps and dashboards. The Surveyor's web-based map (below) provides a wealth of mapping data related to drainage, topography and historic documents.

Legal Drain Maintenance Work



This form is for logging Legal Drain Maintenance Work Orders by the Delaware County Surveyor's Office. The submitted work orders are added to maps for project tracking and for use by Drainage Board Members.

Date of Drainage Board Review of this Work Order*

Work Order Number*

Date of WORK ORDER

Watershed Number*

Township

Drain Name

Contractor

Notes

Photo Attachments
(not required)

Select Project Location*

County Surveyor's Drainage Map

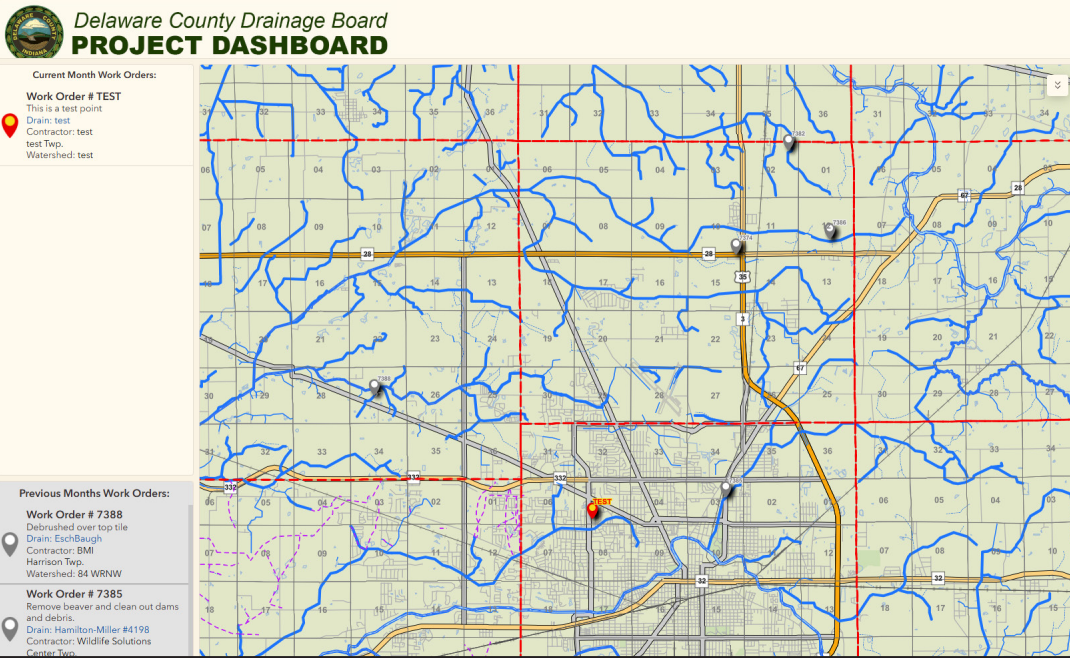
Legend

- Legal Drain Maintenance Work Orders (prior months)
 - Survey Point
- Underground_Legal_Drains_unverified_location
- Underground Drain Locate Survey VIEW
 - Survey Point
- Land Sections
- CountyDrainageMap - Rivers & Lakes
- Legal Drains - Named
 - INTERMITTANT_PLBORDER
 - INTERMITTANT_WATER_PLBORDER
 - NATURAL_WATERWAYS
 - NATURAL_WATERWAYS_PLDLOT
 - NATURAL_WATERWAYS_2_PLDLOT
 - OPEN_DRAINS
 - OPEN_DRAINS_PLDLOT
 - Not Verified Under Ground
 - Not Verified Underground
 - fill
- Creeks, Ditches and Drains

Legal Drain Maintenance Work 3 VIEW: EschBaugh

Contractor	BMI
Date of Drainage Board Review of this Work Order	1/21/2025, 12:00 PM
Date of WORK ORDER	12/12/2024, 12:00 PM
Drain Name	EschBaugh
Notes	Debrushed over top tile
Township	Harrison
Watershed Number	84 WRNW
Work Order Number	7388

Last edited on 1/24/2025, 2:20 PM.



The Drainage Dashboard provides quick and easy access to the locations of various drainage projects, both current and completed.

Enhanced Efficiency and Accountability

By embracing GIS technology, the Delaware County Surveyor's Office has significantly improved its ability to manage and oversee drainage projects. These tools have streamlined internal workflows, reduced the complexity of preparing documentation for drainage board meetings, and enhanced transparency for the public.

The adoption of these innovative applications ensures that funds collected through ditch taxes are used responsibly and effectively, addressing drainage issues across the county. With these advancements, the Surveyor's Office is better equipped to maintain critical drainage infrastructure, supporting both the environment and the communities that depend on it.

Applications for Efficiency and Transparency

Two primary GIS-based tools were developed to utilize the submitted data effectively:

Surveyor's Drainage Map

This comprehensive map serves as a cornerstone for the Surveyor's Office. It incorporates numerous map layers showing drain locations, watershed boundaries, surface drainage flow directions, and more. Newly submitted work orders are automatically integrated into this map and visually distinguished using filters to color-code the map pins. Upcoming drainage projects are highlighted for immediate attention, while completed projects are displayed in subdued colors for historical reference.

The map also allows for the generation of individual PDF layouts tailored to specific work orders, enabling detailed maps for drainage board meetings. This capability ensures that board members have the precise information they need to make informed decisions.

Drainage Board Project Dashboard

To foster transparency and accessibility, an ArcGIS Dashboard was developed for use by the drainage board and the general public. This dashboard offers an intuitive interface for viewing both current and historical projects. Users can browse a list of work orders, separated into current and completed projects, with basic details displayed for each entry. Selecting a project automatically zooms the map to its location, and any accompanying photos or documents submitted through the Survey 123 form appear in a pop-up box.

Underground Drainage

One of the major issues with old maps with questionable accuracy is the difficulty in translating them into a high-accuracy GIS dataset. While the ditches and creeks are easy to see on aerial imagery, the numerous underground tiles that are the responsibility of the Surveyor to maintain are another story. The difficulty of field locating drains has been a problem for decades. Efforts to use special infrared imagery to locate areas of drier soil above the tiles back in the early 2000s was mostly unsuccessful. Unfortunately, to employ other methods of location similar to typical underground utility locates would be prohibitively expensive on a county-wide scale. A longer-term and cost-effective solution is to collect the GPS locations of any failures. A separate Survey 123 Form was created for the Surveyor's staff and contractors to use on their mobile devices when working on a damaged underground legal drain/tile. These collected locations would provide updated reference points that will help re-align or create the underground tile features in the GIS. The form automatically uses the device's GPS location to locate the pin and when submitted the location and info are added to the system.

Section Corner Documentation

An additional map application that has been available for use is the Section Corners Map. This map provides quick access to the Section Corner Tie Sheet Documents through a simple map interface as a PDF download. Primarily used by Land Surveyors, these tie sheets provide information on the location of the section corner monumentation that is used as a reference point for the start of land surveys.

Access the applications in this article with the following links:

Surveyor's Drainage Map:
bit.ly/DCdrainageMap



Drainage Board Project Dashboard:
bit.ly/DCdrainageDashboard



Section Corner Map:
bit.ly/DCsectionCorners



For more information on the Delaware County Surveyor's Office, visit: www.co.delaware.in.us/department/index.php?structureid=35



DELAWARE COUNTY INDIANA
OFFICE OF INFORMATION
 & GIS SERVICES

Kyle Johnson is the Chief Information Officer and Director of the Delaware County Office of Information & GIS Services. This department provides professional geospatial, design, and related services to Delaware County offices and agencies, as well as other cities and towns in Delaware County, Indiana. To learn more about the services the Office of Information provides, visit: www.dcingis.org