Integration of Delaware Tax Ditch Drainage Organization Information into the Statewide Enterprise GIS
What is a Tax Ditch?

- It is a watershed-based drainage network (ditches) designed to remove water off lands.
- A tax ditch organization is a governmental subdivision of the state formed under Delaware Code under Title 7 Chapter 41.
- Comprised of and ran by the landowners that own land within that watershed (called taxables).

(Delaware Department of Natural Resources and Environmental Control, 2022)
## Tax Ditch Organization

### Quick Facts

<table>
<thead>
<tr>
<th>County</th>
<th>Number of Tax Ditches</th>
<th>Approx. Miles of Channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Castle</td>
<td>26</td>
<td>57</td>
</tr>
<tr>
<td>Kent</td>
<td>78*</td>
<td>769</td>
</tr>
<tr>
<td>Sussex</td>
<td>137*</td>
<td>1,193</td>
</tr>
<tr>
<td>Totals</td>
<td>234 (7 are dual county*)</td>
<td>2,019</td>
</tr>
</tbody>
</table>

(Delaware Department of Natural Resources and Environmental Control)
History

1793 – 1950
Ditch Companies & Corporations were formed

1940s
Updates to drainage outlets performed

1943 - 1944
Formation of 3 county Conservation Districts

1951
Tax Ditch Law established

1970
DNREC Division of Soil and Water Conservation Established
Peak Tax Ditch construction

1980’s
Clean Water Act

(Delaware Department of Natural Resources and Environmental Control)
Tax Ditches Impact:

• Drainage across the state
• Where structures can be built on a property
• A property’s taxes
• Access by the tax ditch on private property

Photo by Sonika Agarwal on Unsplash
Stakeholders

- Public (Taxables)
- Officers* (Taxables)
- DNREC*
- Conservation districts*
- Land use and stormwater permitting and planning agencies

- County tax collection agencies
- County courts
- Maintenance contractors
- Elected officials
- DelDOT

*Key Stakeholders
Evaluating Stakeholder Needs

2021 Tax Ditch Modernization Workgroup Report

A compilation of findings from the Workgroup related to improving the effective function, design and practices around Delaware’s tax ditches.

E&O.5 Tax ditch maintenance planning reference materials and resources

<table>
<thead>
<tr>
<th>E&amp;O.5.1</th>
<th>Develop a digital/GIS based tax ditch infrastructure and conditions inventory that can be easily shared, including reports provided to officers and maintenance contractors. Include clearly defined responsibilities for infrastructure in tax ditches.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Findings:</td>
<td>2.0, 3.1, 4.0, 4.3 Workgroup Recommendation: F.1 &amp; F.6</td>
</tr>
</tbody>
</table>
| | • Determine funding needed to complete this effort (DNREC/Partner)  
  • Secure funding (DNREC/Partner)  
  • Prepare and solicit Request for Proposals (RFP) (DNREC/Partner) |

F.6 Improve warrant rate recommendations to better reflect anticipated maintenance of the tax ditch system

<table>
<thead>
<tr>
<th>F.6.1</th>
<th>Develop a tool to estimate and project future routine expenses to determine appropriate annual warrant rates.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Findings:</td>
<td>1.1, 7.0, 7.3, 7.4, 8.1, 9.0 Workgroup Recommendation: E&amp;O.5.1</td>
</tr>
</tbody>
</table>
| | • Develop tool and document assumptions (DNREC/Partner)  
  • Share tool with tax ditch officers and county conservation districts for use (DNREC/Partner)  
  • Provide training as needed (DNREC/Partner)  
  • Evaluate and update tool based on expenses every other year (DNREC/county conservation districts) |

<table>
<thead>
<tr>
<th>F.6.2</th>
<th>Calculate and provide suggested warrant rates ahead of annual meetings for officer and taxable consideration.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Findings:</td>
<td>1.1, 7.0, 7.4, 8.0, 8.1, 9.0 Workgroup Recommendation: F.3 &amp; E&amp;O.5.1</td>
</tr>
</tbody>
</table>
| | • Fulfillment of F.6.1 (DNREC/county conservation districts)  
  • Calculate and provide warrant rate suggestion and associated paperwork for officers ahead of annual meeting (DNREC/county conservation districts)  
  • Consider whether collecting an appropriate warrant rate should be an eligibility criterion for tax ditch matching funds (county conservation districts) |

Areas for Improvement

Public Response

Administrative Assistance

Technical Assistance
Current Status

Data held in multiple formats and places

Where We Are

Where We’re Headed

One-stop-shop to address common tasks
DNREC Tax Ditch GIS Integration

- 2021 Tax Ditch Modernization Workgroup
- DNREC staff interviews
- Daily task review
- Geodatabase attribute table development

RFP (2022)
- RFP for implementing geodatabase design and application

Contractor Implements Pilot (2023)
- Pilot geodatabase and application, make revisions as necessary

Contractor Full Scale Implementation (2023-2024)
- Modify application and database based on pilot and implement for all 234 tax ditches

Future Integrations (2025)
- Drone
- Tax ditch watershed modeling
Capstone Project
Capstone Goal

To develop a request for proposals (RFP) that will allow the state of Delaware to select a vendor to implement solutions to the concerns identified in the needs assessment.
Capstone Deliverable: Request for Proposals (RFP)

- Introduction to the project’s organization
- A description of the need
- Scope and deliverables
- Timeline
- Submission requirements
- Selection criteria
- Contract terms

(Croswell, 2009, Khalimonchuk, 2021 and Reh, 2019)
## RFP Deliverable: GIS Geodatabases

<table>
<thead>
<tr>
<th>Deliverable Type</th>
<th>Category</th>
<th>Specific Items</th>
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<tbody>
<tr>
<td>Geodatabases</td>
<td>Tax Ditch Features</td>
<td>Channels (Layer)</td>
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<tr>
<td></td>
<td></td>
<td>Right-of-Way (Layer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stations (Layer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Watersheds (Layer)</td>
</tr>
<tr>
<td>Tax Ditch Deleted Features</td>
<td>Deleted Channels (Layer)</td>
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<td></td>
<td>Deleted Right-of-Way (Layer)</td>
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<td></td>
<td>Watershed Boundary Change (Layer)</td>
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<td>Assessment</td>
<td>2022 Assessment (Layer)</td>
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<td>Structures</td>
<td>Channel Structures (Layer)</td>
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<td></td>
<td>Gates (Layer)</td>
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<tr>
<td>Maintenance Concerns</td>
<td>Channel Erosion &amp; Sedimentation (Layer)</td>
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<tr>
<td></td>
<td>Channel Obstruction (Layer)</td>
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<tr>
<td></td>
<td>Right-of-Way Obstruction (Layer)</td>
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<tr>
<td>Technical Assistance</td>
<td>Land Development Review (Layer)</td>
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<td>Stake Out Completed (Layer)</td>
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<td>Permit Assistance (Layer)</td>
<td></td>
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<tr>
<td></td>
<td>Court Order Changes (Layer)</td>
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</table>

Photo by [Campaign Creators](https://unsplash.com) on Unsplash
RFP Deliverable: Input of Data into Geodatabases

- Pilot data entry with 10 ditches from each county
- Full implementation for all 234 tax ditches
**RFP Deliverable:**
GIS Application

- Pilot an application where DNREC and Conservation District staff can retrieve and update information and create reports
- Full implementation

Photo by Balázs Kétyi on Unsplash
Example Uses
to pay the cost of and be responsible for future major and minor maintenance of Prong 2 (P2) from Sta 23+22 to Sta 28+50, Sub 2 of Prong 2 (S2P2) from Sta 0+00 to Sta 2+50, Sub 1 of Sub 2 of Prong 2 (S1S2P2) from Sta 0+00 to Sta 6+00, Prong 6 (P6) from Sta 0+00 to Sta 12+39, and Sub 1 of Prong 6 (S1P6) from Sta 0+00 to 14+90 to Department of Natural Resources and Environmental Control, Division of Watershed Stewardship, Conservation Programs Section, Drainage Program specifications; and

• to pay the cost of and be responsible for maintenance of any pipes located with Prong 2, Sub 2 of Prong 2, Sub 1 of Sub 2 of Prong 2, and Sub 1 of Prong 6; and
This map depicts Derrickson Canal Tax Ditch Organization maintenance responsibilities as of 2/1/22.

In general, if an area is:
- Brown, it is up to the landowner to maintain.
- Green, it is up to the MLA or landowner to maintain. Purple is a partial half tax ditch and half landowner responsibility. All purple in N/A will have a pattern on top of them. The white horizontal pattern denotes "spoil removal is on the landowner".
- The red horizontal pattern denotes "special disposal right-of-way". The black vertical stippled pattern denotes the area for spells that go...
Horse Pound Tax Ditch Inspection Report

Report prepared by Brittany Haywood of the DNREC Drainage Program on February 28, 2022.

Tax Ditch Summary:

<table>
<thead>
<tr>
<th>Tax Ditch Maintenance Concern or Feature</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel &amp; Bank Structures</td>
<td>35</td>
</tr>
<tr>
<td>Green Infrastructure</td>
<td>2</td>
</tr>
<tr>
<td>Channel Concerns</td>
<td>142</td>
</tr>
<tr>
<td>ROW Obstruction</td>
<td>53</td>
</tr>
<tr>
<td>Grand Total</td>
<td>232</td>
</tr>
</tbody>
</table>

Channel & Bank Structures Summary:
During the inspection that occurred March through June of 2021, a total of 25 channel structures were noted, the majority being pipes. The majority were noted to be in sound condition although some were blocked due to environmental conditions. Below is a table of the noted structures along with any comments and photos. Object ID denotes the location on the map.

Channel Concern Summary:
Overall, the most prevalent concern is regarding small to medium sized trees growing within the channel of the tax ditch. The invasive plant, common reed or Phragmites australis, issues are present near the outlet of the Main at the intersection of the wetlands and agriculture lands, along the agricultural lands west of Governor Stockley Road (Object IDs: 50-73), on the Main between Prong 2 and Prong 3, on the Main between Prong 3 and Prong 3a, and on the Main to the east of Shortly Road. Cattails present at Object ID 85, downstream of Prong 2. There is a large natural wetland complex at the downstream end of the main that is providing for water storage for upstream portions of the ditch.

- Prong 1A – Issues with muskrat holes in banks, animal crossings, and sedimentation in channel were noted in multiple instances along this Prong.
- Prong 2/ Sub 1 Prong 2 – Issues with sedimentation/ filling in.
- Prong 3 – Issues with trees growing in flow line of ditch, rills and gullies, and sedimentation filling in the end of the prong.
- Prong 3A – Issues with trees growing in the flow line of the ditch, cattail present, straw bales fallen into ditch.
- Prong 4 – Minor issues with trees growing in flow line, and small washouts.

Right of Way Obstruction Summary:
Overall, the most prevalent concern is regarding small to medium sized trees growing within the right-of-way preventing access to the ditch. In some location structures such as houses, chicken coops and fences prevent access to the ditch.

Prepared by Delaware Department of Natural Resources and Control (DNREC) Drainage Program
Overview

There are a total of 35 Tax Ditch Organizations located within Representative District 40. These Tax Ditch Organizations include approximately 357 miles of tax ditch channels—a longer distance in miles than a round trip from Wilmington to Delmar.

Each tax ditch has a minimum of 3 officer positions: Chairperson, Secretary-Treasurer, and Manager, with some electing to have a Fourth Manager. Of the 35 Tax Ditch Organizations, 24 currently have all 3 officers, 3 have no officers, and 4 have only 1 officer.

Tax Ditch Terms to Know

- **Assessment Base:** the amount of money spent to construct the tax ditch system at formation.
- **Assessment:** that parcel’s portion or share of the initial construction cost of the tax ditch system. Assessment assessments may be variable across the watershed and/or parameters enforced at formation of the system.
- **Warrant Rate:** the percentage of the tax ditch assessment base that a landowner will be charged by the county on yearly tax bills.

Tax Ditch Watersheds in Representative District 40

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Bacon and Kenney Tax Ditch

The Bacon and Kenney Tax Ditch system is generally situated west of Saint George Road and east of Honey Church Road, and tax ditch channels are found both north and south of Bacon Road in Laurel, DE. This Tax Ditch Organization was formed in 1988.

The Bacon and Kenney Tax Ditch system provides a benefit to 80 properties on 657 acres. This Tax Ditch Organization is responsible for maintaining nearly 7 miles of tax ditch channels.

**Tax Ditch Officers**

As of January 2021, this Tax Ditch Organization has a full complement of officers.

<table>
<thead>
<tr>
<th>Officer Position</th>
<th>Officer Elected</th>
<th>Phone Number</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chairperson</td>
<td>Clarke Hastings</td>
<td>(302) 873-5038</td>
<td><a href="mailto:joustwindfanno@gmail.com">joustwindfanno@gmail.com</a></td>
</tr>
<tr>
<td>Manager</td>
<td>Jay Hastings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secretary/Treasurer</td>
<td>Lisa Disney</td>
<td></td>
<td><a href="mailto:dosney@udel.edu">dosney@udel.edu</a></td>
</tr>
</tbody>
</table>

2020 Revenue Details

- **Tax Ditch Assessment Base:** $557,715.37
- **Warrant Rate:** 1.2%
- **Financial Report:** 2018

Financial report is based on year of financial records submitted to DNREC Drainage Program.

Tax Ditch Officer Bonding

Under § 4164 of the Tax Ditch Law, the Secretary-Treasurer of each tax ditch shall be bonded. This is an insurance type policy for which the officer will, in good faith, perform his/her duties in relation to tax ditch funds.

**Is the Secretary-Treasurer bonded?** → No
Expected Outcomes

• RFP will allow for:
  • Project to come to fruition while not depleting DNREC staffing resources
  • Outside input and expertise
    • See options for approaches and costs
2022 Capstone Timeline

- **Mar. 14**: 596A Presentation
- **Mar. - Oct.**: Development of RFP Materials
- **Oct. - Dec.**: 596B: Fall Semester 2
  - Development of RFP materials
- **TBD**: Final Presentation
  - Possible URISA GIS Pro in Oct.
- **Dec.**: RFP Posted
  - RFP submitted to the state of Delaware's contracting website.
References