



**BOLTON
& MENK**

Real People. Real Solutions.

Report of

Annexation

Drainage District No. 14

Worth County, Iowa

2024

Submitted by:

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Report

of

Annexation

Drainage District No. 14

Worth County, Iowa

0A.1124363

2024

Annexation Report

Schedules

Background Information

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**ANNEXATION REPORT
DRAINAGE DISTRICT NO. 14
WORTH COUNTY, IOWA
2024**

Introduction

A. Scope of Work

The Board of Trustees, having examined the existing assessment schedule, had determined the assessment schedule was not equitable. The Drainage District No. 14 Trustees appointed Bolton & Menk, Inc. as engineer to investigate and recommend the annexation of benefited lands not now included in Drainage District No. 14. Jacob Hagan, a licensed Engineer in the State of Iowa with 8 years of experience working on drainage district annexations across the state, along with other licensed professional engineers within Bolton & Menk have prepared this report to follow Iowa Code 468.119 as stated below:

“To examine such additional lands, to make a survey and plat thereof showing their relation, elevation, and condition of drainage with reference to such established district, and to make and file with the auditor a report...said report to specify the character of benefit received”.

Pursuant to our appointment we have examined every parcel within the district and each $\frac{1}{4}$ - $\frac{1}{4}$ section or smaller tract of land in the district. This report will be on file with the Worth County Auditor’s Office and is available to the public. We encourage the landowners to read the report and enclosed appendices and schedules. We will answer any questions or concerns at the public hearing.

B. District Facilities

District No. 14 north of Keunnen’s Quarry consists of a main tile totaling approximately 10,000 LF of tile ranging in size from 24” to 10”, as well as five lateral tiles totaling approximately 15,000 LF ranging from 12” to 7”. South of 450th Street it originally consisted of a main totaling approximately 8,000 LF of 24” and 22” tile and 4 laterals totaling approximately 6,800 LF of 10” and 8” tile.

Currently the existing Drainage District No. 14 facilities include the North Main, the lower 2,500 LF of the South Main, as well as laterals 4, 4A, 5, 5A, 5B, and 6. A new Upper Main Tile, Lateral 4 and 5 will be constructed this year.

C. Landscape

This area has some of Iowa’s richest soil but is dotted with potholes and poorly drained lands. Worth County has 79 drainages districts covering approximately 50% of Worth County’s total land area. The installation of drainage systems in Worth County has likely done more for the development of Worth County than any other activity in the county. Today, this area is home to some of the nation’s highest yielding non-irrigated corn and highest land values.

The district’s landscape is atypical of drainage districts. The south half of the district’s landscape is dominated by a limestone quarry. Approximately 80 acres are residential, commercial, and industrial properties in Northwood. The remaining rural area is largely devoted to row crop corn and soybean production with a few acreages and about 9% of the watershed is CRP/grass.

There is a common misconception that all lands within a watershed of a drainage district should belong in the drainage district, Iowa Code does not define the benefitted area in that way.

However, it is typical that all the lands in the watershed are included as it is typical that all the lands in the watershed benefit from the district facilities provided. In this district, we do not recommend annexing all the lands in the watershed at this time. Those reasons will be discussed later in the report.

The primary soils in the watershed are Harcot, Lawler, Saude, and Marshan. These soils are characterized as mostly poorly drained over a gravel or sand layer. Overall, approximately 73% of this watershed is either very poorly drained, poorly drained, or somewhat poorly drained. This soil needs sub-surface drainage to achieve high production.

D. Weather Patterns

According to a report by the EPA, the average annual precipitation in most of the midwest has increased by 5 to 10 percent over the last 50 years, and rainfall during the four wettest days of the year has increased by 35 percent. Regardless of what has caused this increase, our current climate is different than the climate of 1912 when this district was constructed.

There is a popular and often accepted idea that an increase in subsurface drainage facilities adds to an increase in flooding. Published research from the University of Iowa’s IHR – Hydroscience and Engineering Center refutes that perception. This University of Iowa report was the result of a water model study of the Clear Creek Watershed in Iowa and Johnson Counties and found that an increase in field tile and subsurface drainage decreases peak flows for most storm events thereby lowering the risk of flooding. Most flooding is due to peak flows from surface runoff over land, not drainage tile.

E. History

The existing schedule was developed at the time of establishment in 1913. The existing schedule is on file at the Worth County Auditor’s office. The existing schedule includes all the facilities in one schedule and was created with the land use at that time considered.

The drainage district’s land use has changed since 1913 as shown on the chart below. One can see the increase in row crop production at the expense of small grains and hay land. Row crop production requires well drained soils for maximum production. The planting and harvesting windows for small grains is different than corn or soybeans.

Historical Crop Comparisons					
Crop	1925 Acres	1925 Percent of Land Use	2022 Acres	2022 Percent of Land Use	Percent Change in Land Use
Grain Corn	43,000	19%	110,000	53%	279%
Corn Silage & Pasture	27,000	12%	1,000	1%	(92%)
Small Grains	68,000	30%	1,000	1%	(97%)
Pasture	56,000	25%	5,000	2%	(92%)
Hay	34,000	15%	3,000	1%	(93%)
Soybeans	0	0%	86,000	42%	N/A

Modern Concept of Drainage

It's important to think of drainage within the time we are living in. The assessment schedule should reflect the needs and understanding of modern drainage and agriculture. When this district was established, their understanding of drainage was different than today, and their assessment schedule reflected their time. Our understanding of the facilities' benefit has changed; therefore, lands may not have been considered to benefit at the time of establishment but do benefit today even though the facilities may not have changed,

- The first drainage districts were founded in the 1900's after Iowa established its drainage laws in 1904. Much of the drainage district activity was constructed during World War I due the commodity price increases. Iowa now has 3,800 drainage districts. Most of the tiles installed at the time are still operating today.
- In 1920, the US Census of Agriculture completed a census of each state's drainage systems. It stated of the 255,360 acres in Worth County, 92,860 acres were operating in a drainage enterprise. This equates to 36% of the total county's farmland relying on agricultural drainage. The census also stated 7.3 million acres of Iowa was provided drainage and an additional 2 million acres needed drainage. Looking at the 2017 US Census of agriculture 15.8 million acres of Iowa relies on drainage. This is a 116% increase in the last 100 years and 6.5 million acres more than was estimated to be needed.
- The standard drainage coefficient, which is the measure of how much excess water should be removed from the landscape via drainage tile, was between 0.12"- 0.25" in 1920, but was updated in the 1950's to 0.5" to reflect the understanding that Iowa's agriculture needs more drainage. A 1983 study by Iowa State University concluded that 95% of tile drainage districts in the state are undersized.
- An engineer in 1912 would have thought about drainage during their time; laying clay tile by hand; they would not have imagined 1,000 horsepower tile plows laying 4" plastic tile every 60' through an entire farm.

Methodology

In accomplishing annexation, Iowa Code 468.119 does not explicitly state what is a benefit received by a drainage district, also referred to as a character of benefit or material benefit. Looking at the only two sections of Iowa Code 468 in which benefit is explicitly described, we can logically assume the benefit being referred to in Annexation would be the same benefit as described below:

Iowa Code 468.2 states the benefits of drainage districts:

*"The **drainage of surface waters from agricultural and all other lands**, including state-owned lakes and wetlands, or **the protection of such lands from overflow** shall be presumed to be a public benefit and conducive to the public health, convenience, and welfare."*

Iowa Code Iowa Code 468.40 lays out the Rules for Classification, estimating benefits received:

*"In estimating the benefits to the lands..... only the benefits which will be received by reason of the construction of the improvement in question **as it affords an outlet to the drainage of such lands or brings the outlet nearer to said lands or relieves the same from overflow and relieves and protects the same from damage by erosion.***

*When the land is a state-owned lake or state-owned wetland, the commissioners shall ascertain the benefits realized from **removing excess water** and shall not consider any benefit realized if the state-*

owned lake or state-owned wetland were drained or converted to another land use.”

In summary to recommend annexation, the engineer should examine the lands and determine if the drainage district aided the parcel by any of the following benefits: the drainage was improved, the parcel is less likely to pond, a drainage outlet was provided or brought closer, erosion was reduced, or the district removed excess water from the parcel.

Annexation requires the engineer to examine, survey and plat the additional lands showing the annexed parcels' relation, elevation, and condition of drainage. We will go through how each of those requirements are related to the benefits as outlined in 468.2 and 468.40.

1. Relation of Annexed Lands to Established Facilities

When determining the relationship of the proposed annexed lands to the established district facilities, the Iowa Drainage Code provides no specific means of establishing such a relationship leaving it to the discretion of the engineer. Typically, the relationship is described as how the annexed lands interact with the district facilities and how close they are to the district facilities. The benefit being described is how the drainage district provided or brought an outlet closer to the parcel.

For this report, we mapped the flow of water for every 1-acre area of the proposed annexation. Using these flow paths, we were able to calculate the distance between each parcel and their waters entry point to the district facilities. We have included a map showing these flow paths.

Drainage District No. 14 is a tile drainage district. It does not provide a drainage tile directly to the annexed parcels; however, it does bring a drainage tile closer to the parcels. Prior to the installation of Drainage District No. 14, the annexed parcels would have needed to construct a private tile system crossing through private landowners and be restricted in their drainage to as allowed by the law for private tiling. The installation of drainage district tile allows for the lands to connect private tiles into the drainage district tile, thereby allowing those annexed lands to change the flow of their water both in the matter of how is transported and in quantity. Drainage district tile typically is 2-5' under the ground surface allowing for better grade and lowering the water table below the surface.

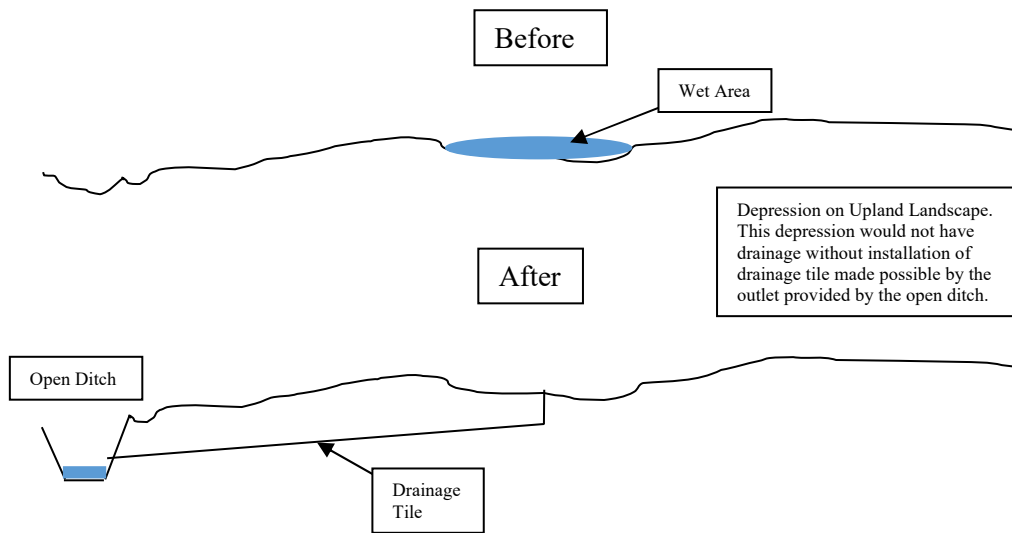
All landowners in a drainage district enjoy the benefits and rights of being in a drainage district. This includes the opportunity to object to any proposed improvements, to file claims for damages due to district construction, petition for repairs and improvements, and probably most importantly to ability to use the district facilities with no limitations or restrictions regarding how many or how large of private tiles are connected, surface intakes installed and having access to the district tile. Lands not in the district should not enjoy these rights.

2. Elevation

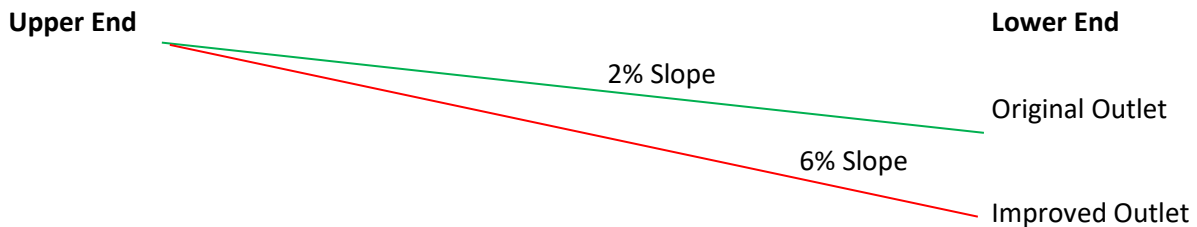
We have studied contour maps and used LIDAR to determine the elevation of every acre of the proposed annexed area as shown on the enclosed map. Again, the Iowa Drainage Code provides no specific way in which the elevations should be used when preparing an annexation report, leaving it to the discretion of the engineer. It is well understood that water flows downstream, and all parcels both currently in any drainage district or being proposed for any annexation have elevations above the bottom of any open ditch or drainage tile that they drain. Considering that, it has been the understanding of drainage engineers in the state that lands being simply higher in elevation than the district facilities that they drain to are not exempt from annexation on those grounds alone.

Elevation alone doesn't dictate a parcel's need for drainage. Drainage districts exist to improve drainage on poorly drained lands. There are often poorly drained areas or areas in need of drainage higher on the landscape in localized depressions. The simple drawing below illustrates this point. Note the elevation of the depression is not the lowest land in the landscape but without the outlet provided by the open ditch,

the depression won't be able to tile drain as needed to achieve maximum productivity.



Another example that elevation alone doesn't dictate a parcel's need of drainage is when the slope is insufficient to quickly remove excess water from the surface. Slope is the change of elevation over a distance. Drainage districts allow for the slope to be steepened to remove excess water more quickly. Increasing the slope can be accomplished by lowering the outlet. For example, if you have a 2' of elevation change over 100', you have a slope of 2%. Now, if you lower the outlet by 4', you will have the opportunity to have 6' of elevation change over 100' resulting in a slope of 6%. See illustration below, the green line shows the slope before, and the red line shows the slope after. Water will flow faster down the red line than the green line.



This increase in slope availability allows landowners to install smaller tile at a steeper grade to achieve the same drainage capacity. This is a direct cost savings to the landowners as smaller tile is less expensive than larger tile. For example, laying a 15" drainage tile at 6% slope has more drainage capacity than an 18" drainage tile at 2% slope.

3. Condition of Drainage

The condition to drainage is describing how the land drains and water flows into the facility. Condition of drainage is directly related to the benefits of relieving the lands from overflow, protecting from erosion, and removing excess water. Has the lands outlet been improved, is the land able to flow as runoff or subsurface flow, is there natural barriers limiting the flow or has the landowner constructed a system to avoid using the district facility are examples of questions the engineer asks himself when studying the condition of drainage.

We have included a soil drainage class map with this report. The soil drainage classes show a parcel's need for drainage and their response to taking advantage of an outlet provided. In 1983, Iowa State

University completed a study of drainage districts in Iowa. It estimated corn yields in very poorly and poorly drained soils to be zero without tile drainage. We have included the study as an appendix with this report.

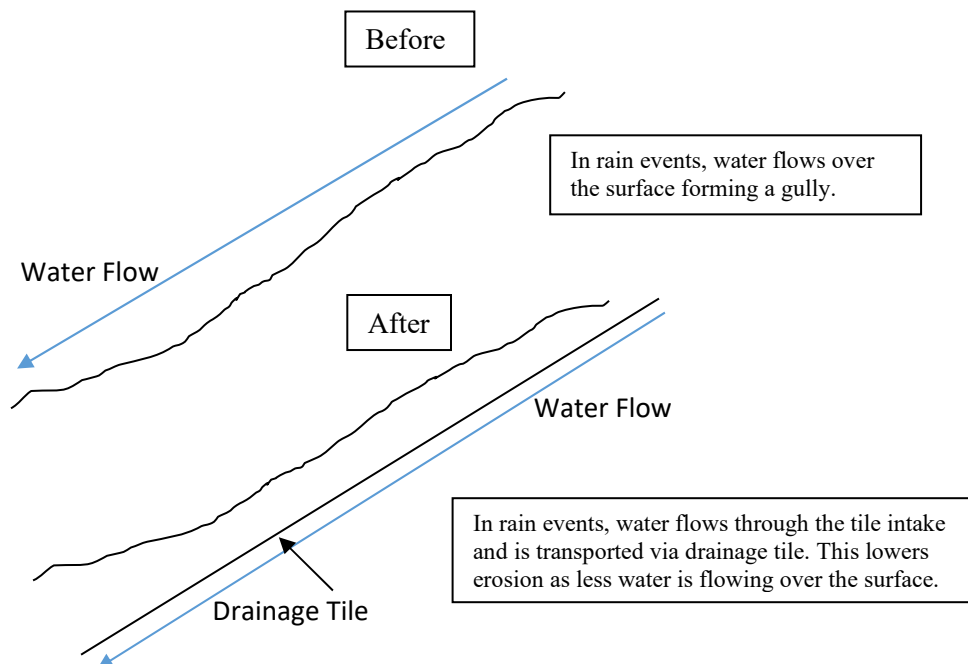
Land needing drainage is not alone a reason for annexation, the district must show a benefit was provided by the drainage district improvements. Did the drainage district improvements provide an opportunity for the lands to be better adapted for crop production or to convert the unusable marsh lands into farm or pastureland? To better understand this, we look at historical maps, soil maps, and historical photos to come up with a picture of the landscape before the drainage districts.

Another condition of drainage to consider is the opportunity provided by the district to change the condition of drainage from surface to subsurface (tile) drainage. Iowa Code Section 468.621 states:

“Owners of land may drain the land in the general course of natural drainage by constructing or reconstructing open or covered drains, discharging the drains in any natural watercourse or depression so the water will be carried into some other natural watercourse, and if the drainage is wholly upon the owner’s land the owner is not liable in damages for the drainage unless it increases the quantity of water or changes the manner of discharge on the land of another.”

According to 468.621, the upstream landowner may not increase the quantity of water or change the manner of discharge on the land of another. Therefore, without a drainage district tile or open ditch providing an outlet for a drainage tile, the upstream landowner would be unable to channel the natural surface flows into tile drainage without the consent of the downstream landowner. Being within a drainage district all landowners have the right to use the district facilities.

Iowa Code also states protecting lands from erosion as a benefit of a drainage district. Drainage tile can be beneficial to the environment and protect the land from erosion. Did the district facilities change the condition of drainage to limit erosion and control the flow of water on the annexed lands? This benefit is more common on lands with steeper slopes that are in less need of drainage. The installation of drainage tile or open ditches with controlled points of entrance can reduce runoff erosion as the runoff is channeled into the drainage facilities. Below is a simple drawing of a drainage tile preventing erosion of a gully.



Benefits of Drainage

The primary benefit of drainage is increased agricultural productivity. We have included some of the agricultural benefits of Drainage District No. 14 as described by Ohio State Professor Mel Palmer. Below are listed the benefits as described by Professor Palmer.

- Better Soil Aeration results from good drainage (surface water and free water in the root zone removed within 24 hours after heavy rainfall). This permits extensive root development and a more favorable environment for beneficial soil micro-organisms and earthworms. When soil aeration is reduced, the severity of soil-borne root is increased.
- Better soil moisture conditions with good drainage permit more efficient operation of tillage, planting, and harvesting equipment.
- Better soil structure can be developed and maintained with good drainage by reducing compaction when working soil that is too wet.
- Soils warm up quickly in the spring when free water is removed by a drainage system. This results in better seed germination and an increased rate of plant growth.
- An increased supply of nitrogen can be obtained from the soil when drainage lowers the water table in the root zone. Denitrification often occurs in soils with poor drainage.
- Longer growing seasons can be achieved with good drainage due to earlier possible planting dates. This also permits the use of higher-yielding crop varieties or extended grazing periods for livestock.
- Certain toxic substances and disease organisms are removed from the soil due to better drainage and soil aeration. In wet soil, roots can be injured by toxic substances produced in the reduction of iron and manganese salts and the reduction of nitrates to nitrites.
- Winds are less liable to uproot plants growing in soils that have been properly drained since root systems are deeper.
- Soil erosion and sediment loss can be reduced by subsurface drainage since drained soils have a greater capacity to absorb rainfall and the soil filters out suspended sediment.
- Good drainage saves fuel that would be used in working around wet areas in fields that are not properly drained. Also, since drained land is easier to work, there is less need for dual wheels or four-wheel drive tractors.
- Good drainage reduces winter crop damage such as frost heaving of alfalfa and smothering of wheat and cover crops under patches of ice.
- Good drainage promotes earlier crop maturity and earlier fall harvests when climatic conditions are better for natural drying of grain in the field, thereby saving artificial drying costs.
- A greater variety of crops can be grown on a farm that has good drainage. Alfalfa and sweet corn are examples of those that a farmer may choose.
- Weed control is easier with good drainage since shallow-rooted weeds and undesirable grasses often thrive in wet soil moisture and nutrients.
- Well-drained grazing land supports more livestock with less compaction damage to vegetation and soil from animal traffic.
- Good drainage reduces diseases that thrive on wet land. These include foot rot and liver fluke that infect livestock, and diseases carried by mosquitoes to both livestock and people.

- Valuable livestock water supplies can be obtained by draining hillside seeps and piping the water to stock water tanks.
- Plants are better able to withstand summer droughts with good drainage since lower water tables in the spring permit deeper root development for extraction of soil moisture and nutrients.
- Drainage is essential for salinity control in drier regions where irrigation is needed for permanent agricultural production.

Acreages and non-agricultural properties benefit from drainage district facilities. These properties rely on drainage district tiles and the outlets they provide to lower the water table and keep their basements drier. They are provided storm sewer relief, and their yards, gardens, and trees benefit from the increased soil productivity. Much like residents in town pay for storm sewers, the acreages should help pay for drainage districts providing the same benefit.

Roads can be assessed for benefits from a drainage district as outlined in Iowa Code 468.43. Iowa's early roads were muddy. The roads being drier makes maintenance easier. The roads also have higher runoff due to the hard surfaces. This runoff doesn't soak into the soil but instead quickly goes to the district tiles typically via intakes in the road ditches.

All landowners within the district benefit from the decrease in mosquitoes and the diseases associated with mosquitoes. Today, we don't think about how before drainage districts and other public health measures, malaria was a common disease in Iowa's wetlands. Iowa Code 468.2 even goes as far as stating one of the reasons to construct drainage districts as being conducive to public health, convenience, and welfare.

Overall, good drainage results in higher crop yields, improved public health, and higher land values. Most of these benefits may not be easily recognized as the system has been in place for 100 years now, and no one alive today remembers how this area drained prior to the district establishment. Therefore, when assessing benefits, we must review the historical information and use scientific and mathematical modeling to estimate the benefits.

Investigation

During the investigation the engineer surveyed and examined each parcel under consideration for the benefit received. Extensive drainage district records on file in the County Auditor's office, publicly available aerial photographs, land surface elevations and soils information were reviewed and utilized to determine the elevation and condition of drainage with relation to the several facilities of Drainage District No. 14.

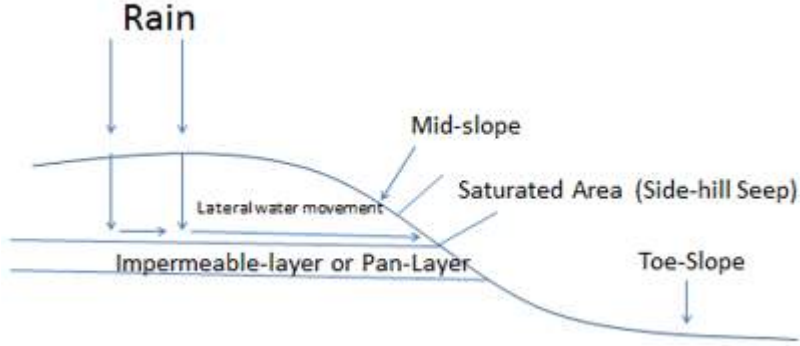
To estimate the drainage prior to the installation of the Drainage District, we have compiled maps from the USDA soil maps to estimate the landscape and drainage prior to any drainage in the area. This was compared to the aerial photos from the 1930's to present. We also analyzed the elevation maps to determine if any natural outlets or alternative drainage outside the drainage district facilities could have existed.

To calculate these factors and determine the benefits for each parcel, we employed a grid system using hexagons. Each hexagon covers an area of approximately one acre, which provides a comprehensive and precise assessment of the benefitted area. Within each hexagon, three key variables were documented: elevation, soil composition, and land usage. By establishing connectivity between these hexagons, the natural flow paths of water towards district facilities were outlined. The distance of the flow path from each hexagon to its associated district facility was then calculated. All this data was compiled and compared with our estimation of how the land would have drained prior to the district establishment to determine a benefit for the annexed lands.

The annexation schedule assumes that all landowners take advantage of the drainage provided by the drainage district. Iowa Code does not have a method to assign benefits based on the number of private tiles each individual landowner has. It would also be difficult to administrate such a method; it would require landowners to inform the district of any work being done on their lands and every time someone completed any work, the district would need to be reclassified.

In 1977, the district was effectively split into two watersheds, a north and south watershed via the construction of new 24" tile on the south side of Kensett Township Section 4. This provided relief to the downstream landowners as it removed approximately 1,341 acres from the main tile south of this point. However, this improvement provided little relief to the severely undersized tile upstream. In 2024, the Board approved an improvement project to provide a ½" Drainage Coefficient to the lands relying on the 1977 Main Tile. Completion of the construction of this system is expected to be completed by the end of 2024. This new system is designed to provide drainage to all the lands in the district including those being annexed.

This district's landscape has a sizable area of side-hill seep. The lands to the north have a layer of sand underneath and their water seeps out on the hillside directly south of them. An illustration of a side-hill seep provided by Iowa State is included below. The lands within Northwood or directly east of Northwood range from somewhat poorly drained to well-drained due the sand beneath them, however, this sand allows the water to move laterally through the soil seeping out in the hillside below them. This has created a very poorly drained environment downstream.



We are recommending three areas for annexation.

The largest of these areas, we are recommending annexation consisting of lands draining into the Upper Main Tile. Some of this land consists of very poorly drained areas downhill of the side-hill seep and some of the acres are on the top of the hill immediately close to the hill side. All these parcels include land of both drainage and landscape types. This land is provided a more reliable outlet sized to drain these acres. The classification will show a marked difference in assessment for the land on the bottom of the hill and the land on top of the hill.

We are also recommending lands served by the 1977 Main Tile be annexed. In 1977, when this new main was installed, the schedule was not updated to reflect the changes from this installation. Many of the lands that were being served by the 1977 Main Tile will be using the 2024 Main Tile. Since these acres were removed from the 1977 Main Tile, the lands still using the 1977 Main Tile now have greater capacity.

The other area being recommended to be annexed is served by the new Lateral No. 4. The new Lateral No. 4 is designed to handle these acres and will provide an outlet to each of these farm fields directly.

Approximately 550 acres of Drainage District No. 14 watershed are within the corporate city limits of Northwood. The north main tile also drains part of the city of Northwood. Urban areas have more hard surface areas designed to drain the water off more quickly than agricultural lands. There is no city storm sewer in the area of Northwood which is served by Drainage District No. 14. The city has installed intakes to drain the water from the surface to the sand layer underneath.

If annexation of these residential and commercial parcels is completed, this district would become a majority urban owned drainage district. One must consider the costs and benefits of each parcel being annexed to the drainage district. Whenever a parcel is annexed into a drainage district, that parcel receives full rights to drainage within the district. This includes the right to attend hearings, petition for improvements and repairs, a right to tile/drain their land to the district tile, and a right to object to any decision of the district.

This district is designed to serve agricultural land and is owned by the landowners of the district it serves. A change of the demographics of the district could result in more expense, and unnecessary misalignment of priorities not in the best interests of the existing landowners within the district.

It is our understanding that the city has no storm sewer in this part of Northwood. If annexed, the city would have the right to construct a storm sewer, or the urban landowners could improve their drainage and connect it to the drainage district facilities as an outlet. The proposed tile improvement is sized for agricultural land use, and any further improvements in town could put a strain on the system. If not annexed, the Board has the right to review and deny any request to connect to the district facilities.

This does not rule out annexation of these lands in the future, this report is limited to the current conditions and our current understanding of annexation and drainage.

Drainage District Procedure on Report

A. Notice and Hearing

Upon filing this report, the Board of Trustees will schedule a public hearing inviting all landowners in the district by regular mail and publishing the Notice of Hearing in the local newspaper per Iowa Code Sections 468.14 and 468.15. Landowners are encouraged to attend. At this hearing, we will present this report and answer any questions or concerns from the landowners and the Board of Trustees. No decision can be made outside a public hearing with all landowners invited. The hearing will be recorded and any information shared at the public hearing shall become a part of this report. The report may be amended after the hearing to reflect any information shared.

Our office and the Auditor's office will only mail letters and notices to the landowners of record. They do not have any official knowledge of any tenants. It is the landowner's responsibility to notify their tenants. Tenants have no official position, or the ability to file objections, or to file claims for damages.

B. Objections

Landowners have the right to object to annexation. The Board will consider these objections at the hearing. All objections should be in writing and filed prior to the close of the hearing.

Recommendations

It is this engineer's opinion that all the land areas shown in yellow hatching on the included map, totaling approximately 184.61 acres, are materially benefited by the facilities of Drainage District No. 14.

The benefits derived are material in that the lands recommended to be annexed drainage was improved, the parcel is less likely to pond, a drainage outlet was provided or brought closer, erosion

was reduced, or the district removed excess water from the parcel due to the construction and maintenance of the Drainage District No. 14 facilities.

Based on the information available to the engineer it is recommended that the board of supervisors pursue the annexation of the several benefiting parcels described herein following Iowa Code section 468.120. The Board shall consider this report and all other reports, plats, and profiles of the drainage district on file with the Auditor's Office.

Listed for each forty-acre or smaller parcel being recommended for annexation are the owner(s) of record, the legal description, elevation, relation, condition of drainage and the approximate number of benefited acres within the parcel. Actual benefited acres in each parcel will be established at the time the lands are classified. Benefiting county road rights-of-way which adjoin the annexed parcels, will also be made eligible for assessment by this action. A schedule of lands benefited by the existing DD 14 facilities and recommended for annexation is included with this report.

Annexation of the lands recommended herein is considered feasible, practicable and for the public good. It is therefore recommended that the Board of Supervisors take appropriate steps to accomplish the following:

1. Tentatively approve this report.
2. Subject to qualified legal guidance, schedule and give formal notice of and conduct the required public hearing or hearings as needed.
3. Annex to Drainage District No. 14 the lands ultimately determined to be benefited.

Respectfully submitted,


Jacob Hagan
Professional Engineer No. 25738

5/24/24
Date

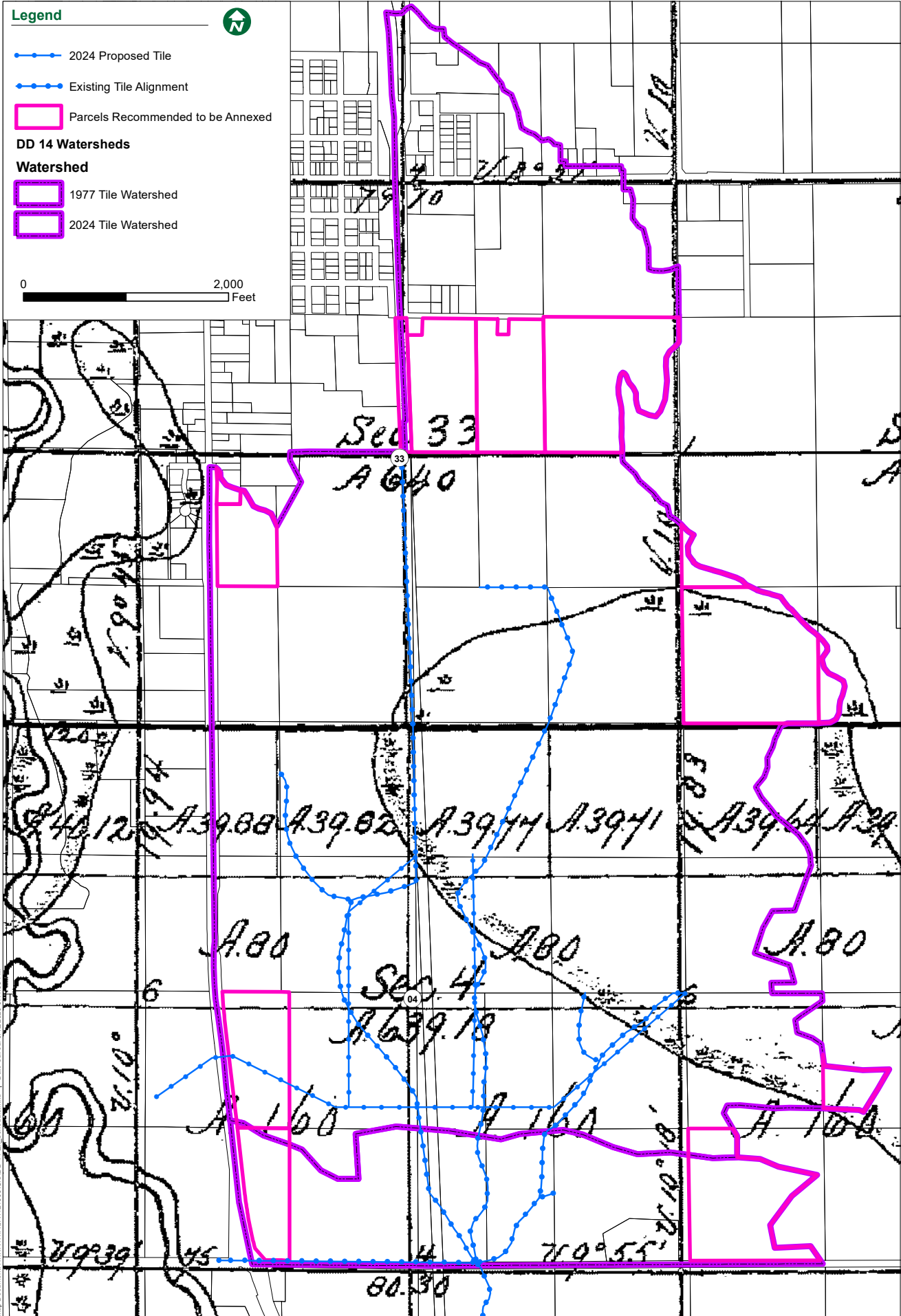


Background Information

Legend

- 2024 Proposed Tile
- Existing Tile Alignment
- Parcels Recommended to be Annexed
- DD 14 Watersheds
- Watershed
- 1977 Tile Watershed
- 2024 Tile Watershed

0 2,000 Feet



Legend

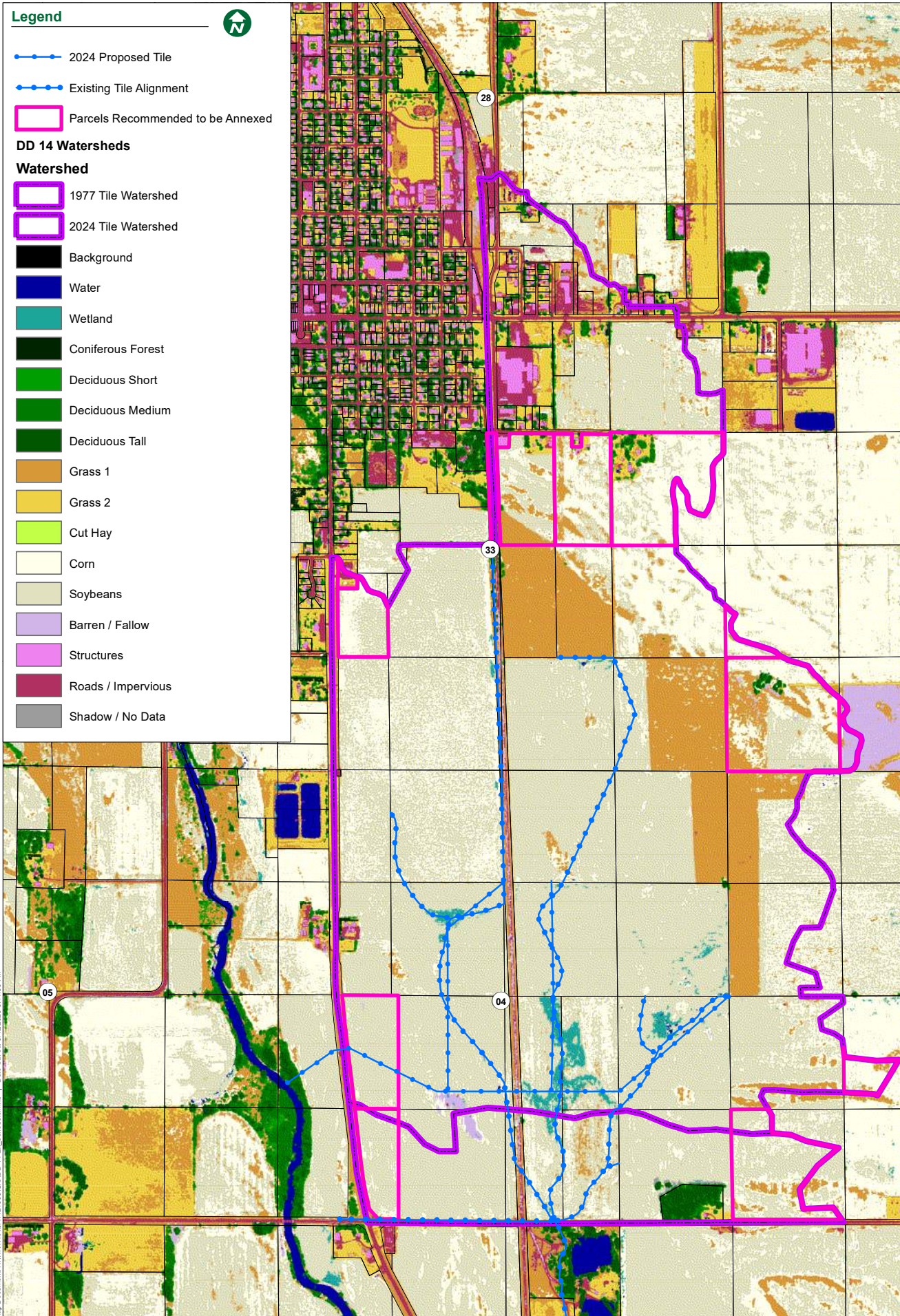


- 2024 Proposed Tile
- Existing Tile Alignment
- Parcels Recommended to be Annexed

DD 14 Watersheds






Watershed

- 1977 Tile Watershed
- 2024 Tile Watershed
- Background
- Water
- Wetland
- Coniferous Forest
- Deciduous Short
- Deciduous Medium
- Deciduous Tall
- Grass 1
- Grass 2
- Cut Hay
- Corn
- Soybeans
- Barren / Fallow
- Structures
- Roads / Impervious
- Shadow / No Data

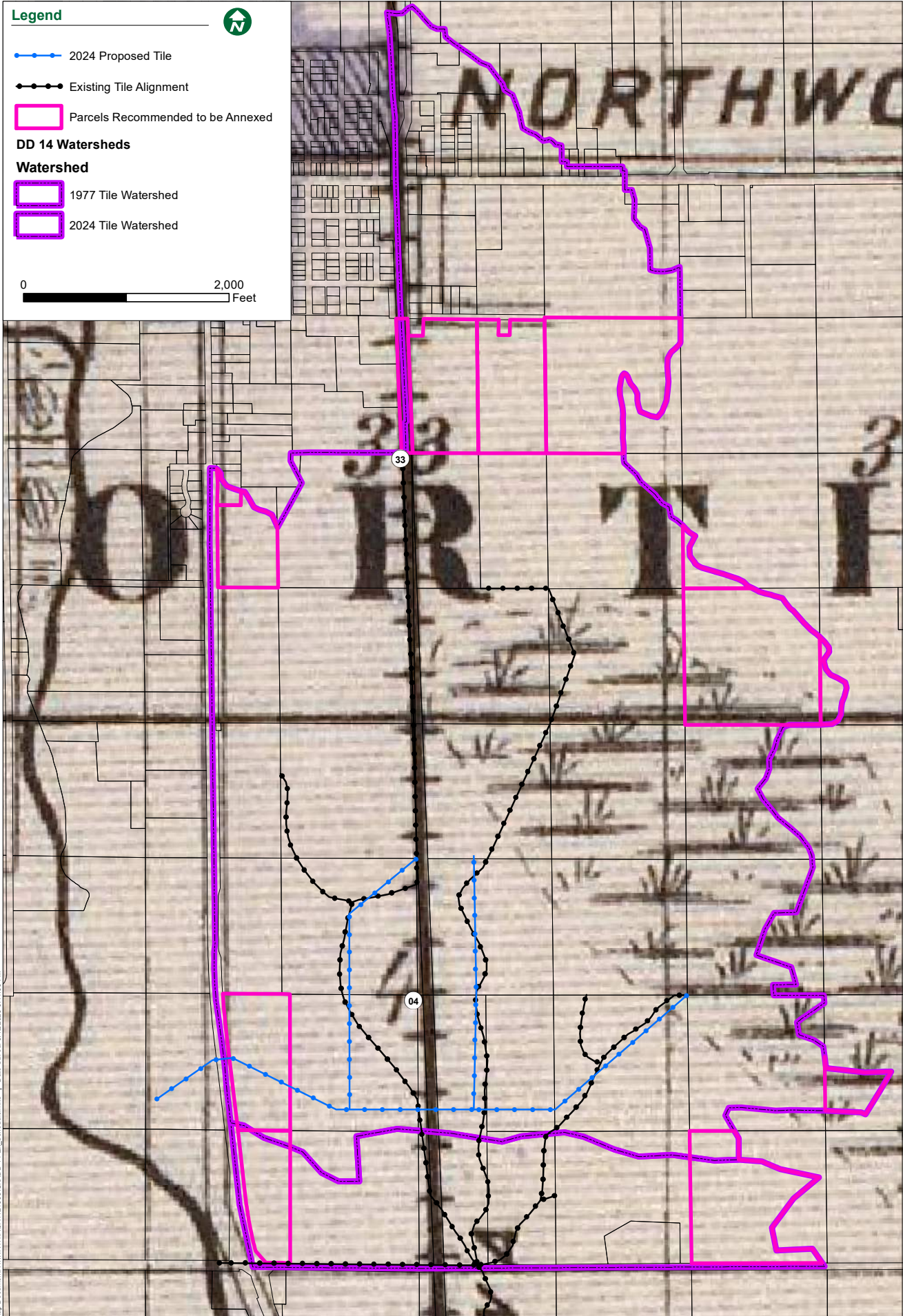


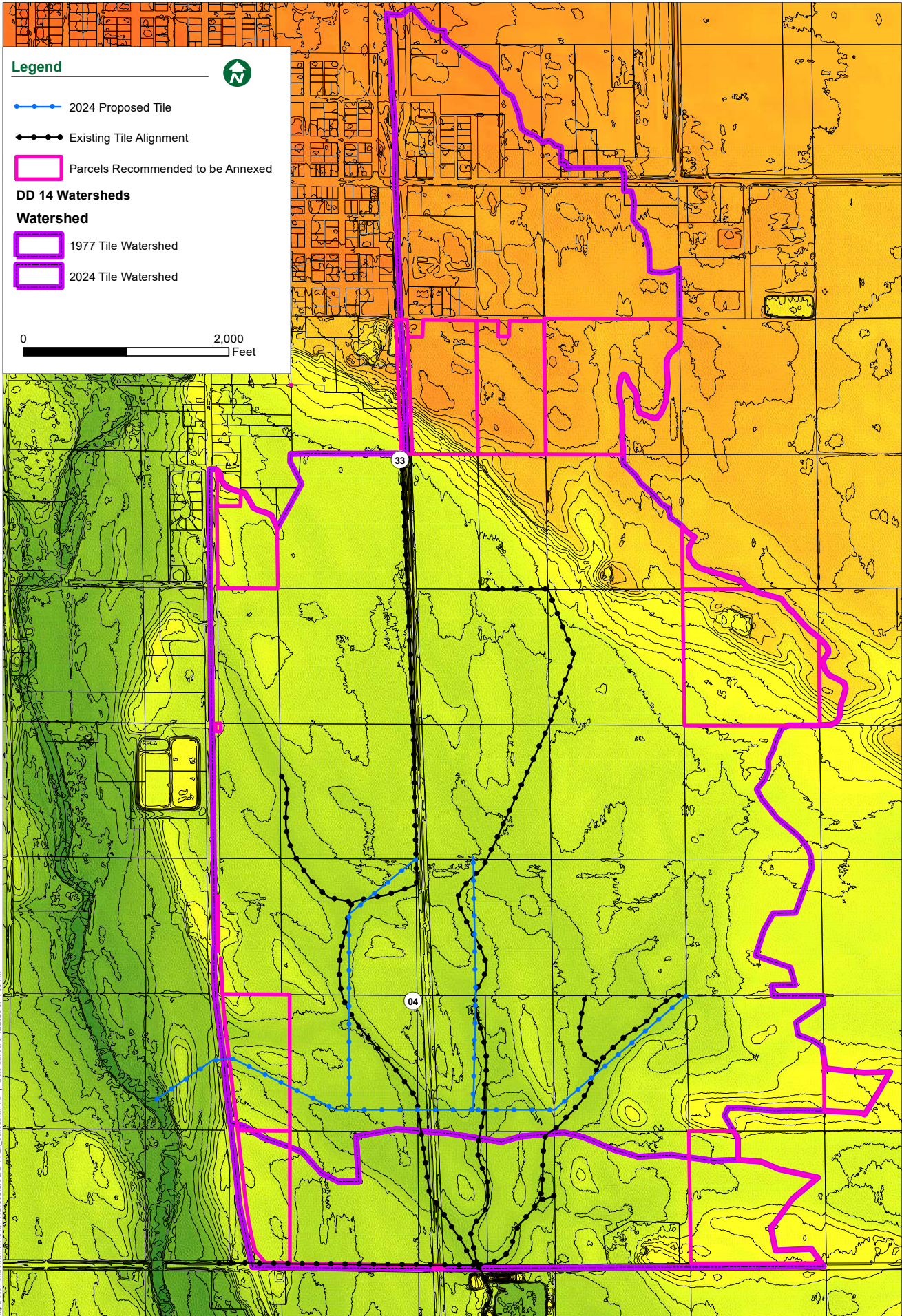
Legend



-  2024 Proposed Tile
 -  Existing Tile Alignment
 -  Parcels Recommended to be Annexed
- DD 14 Watersheds**
- Watershed**
-  1977 Tile Watershed
 -  2024 Tile Watershed





0 2,000 Feet







Legend



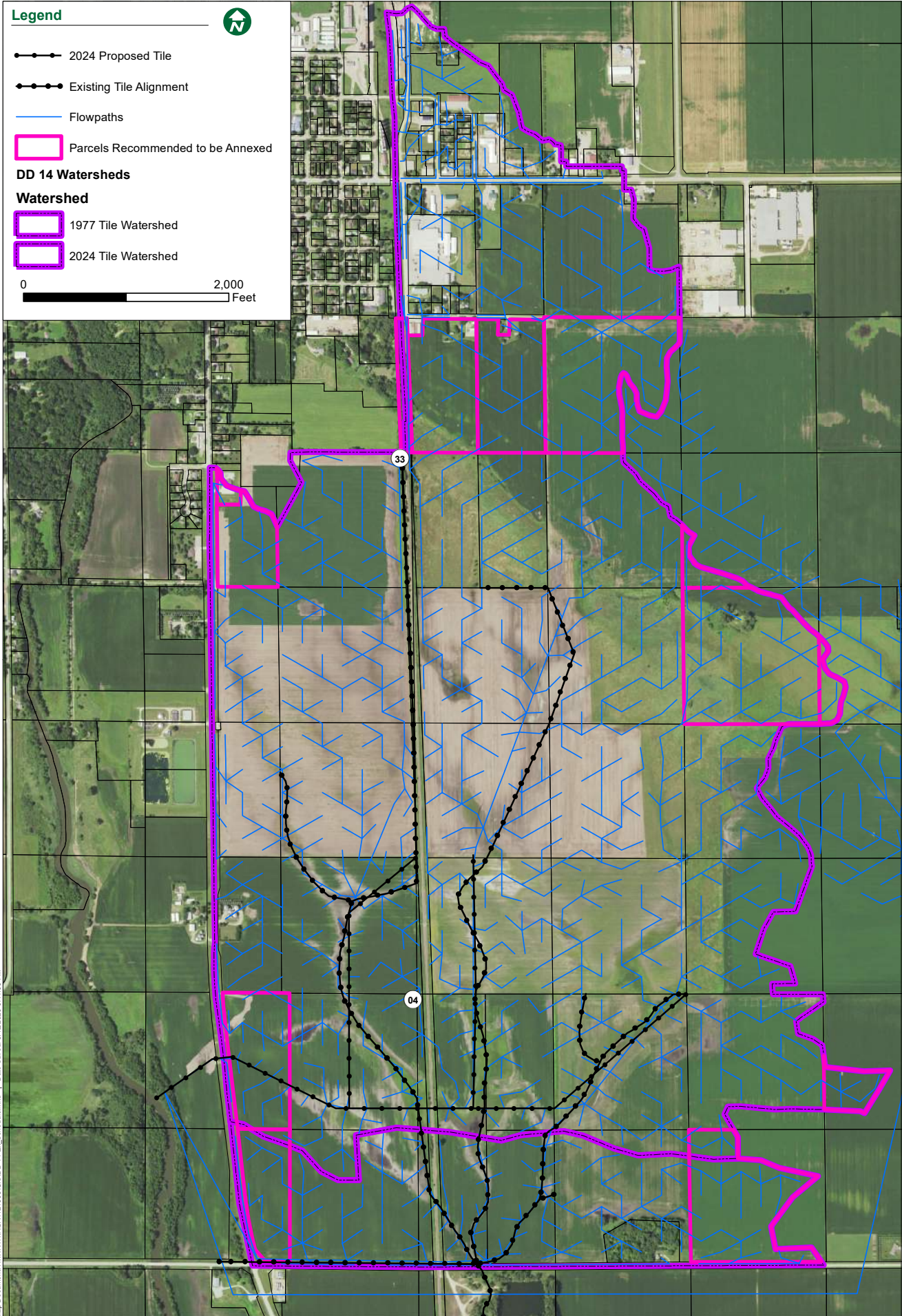
-  2024 Proposed Tile
-  Existing Tile Alignment
-  Flowpaths
-  Parcels Recommended to be Annexed

DD 14 Watersheds








Watershed

-  1977 Tile Watershed
-  2024 Tile Watershed

0 2,000 Feet



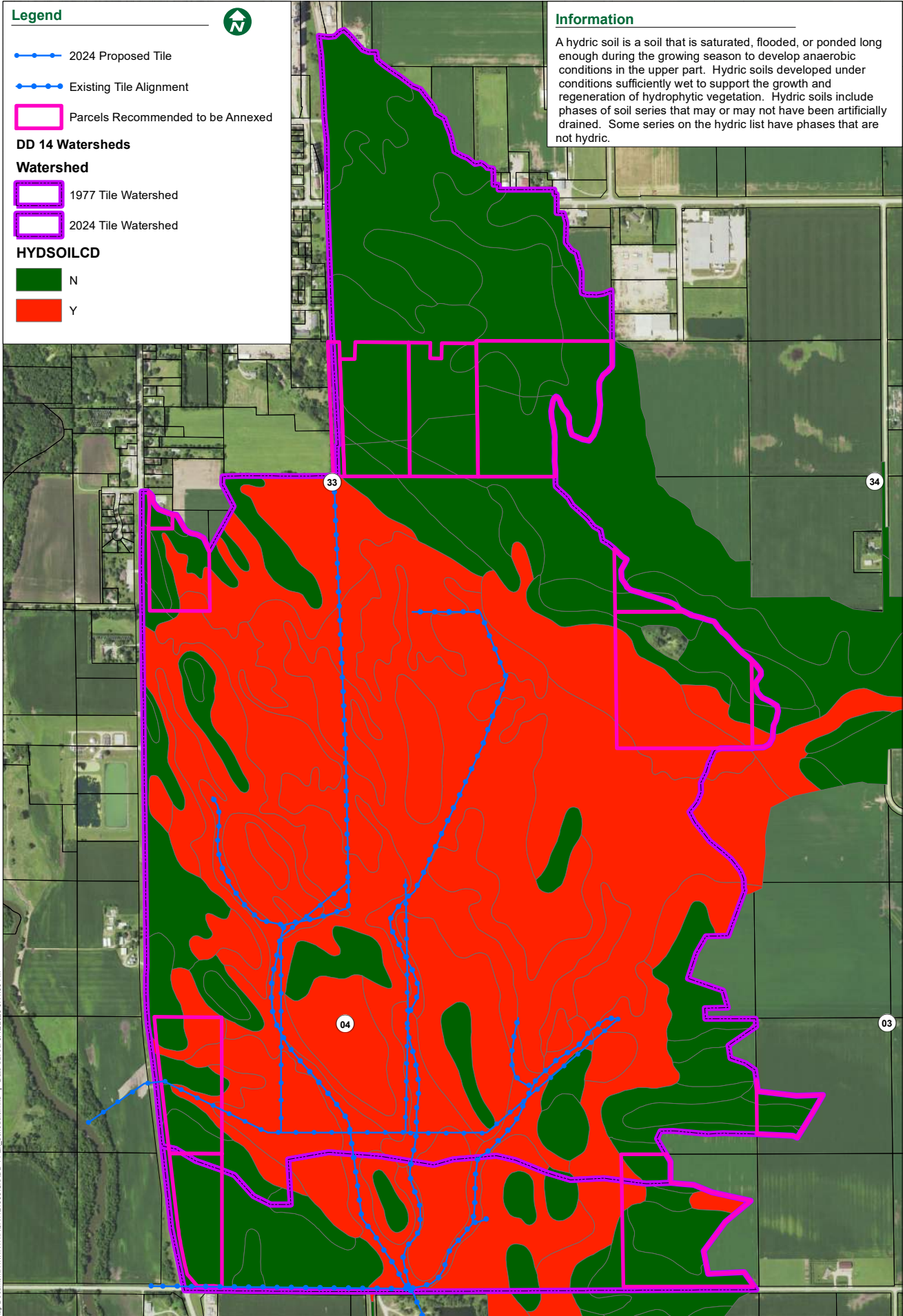
Legend

-  2024 Proposed Tile
 -  Existing Tile Alignment
 -  Parcels Recommended to be Annexed
- DD 14 Watersheds**
- Watershed**
-  1977 Tile Watershed
 -  2024 Tile Watershed
- HYDSOILCD**
-  N
 -  Y















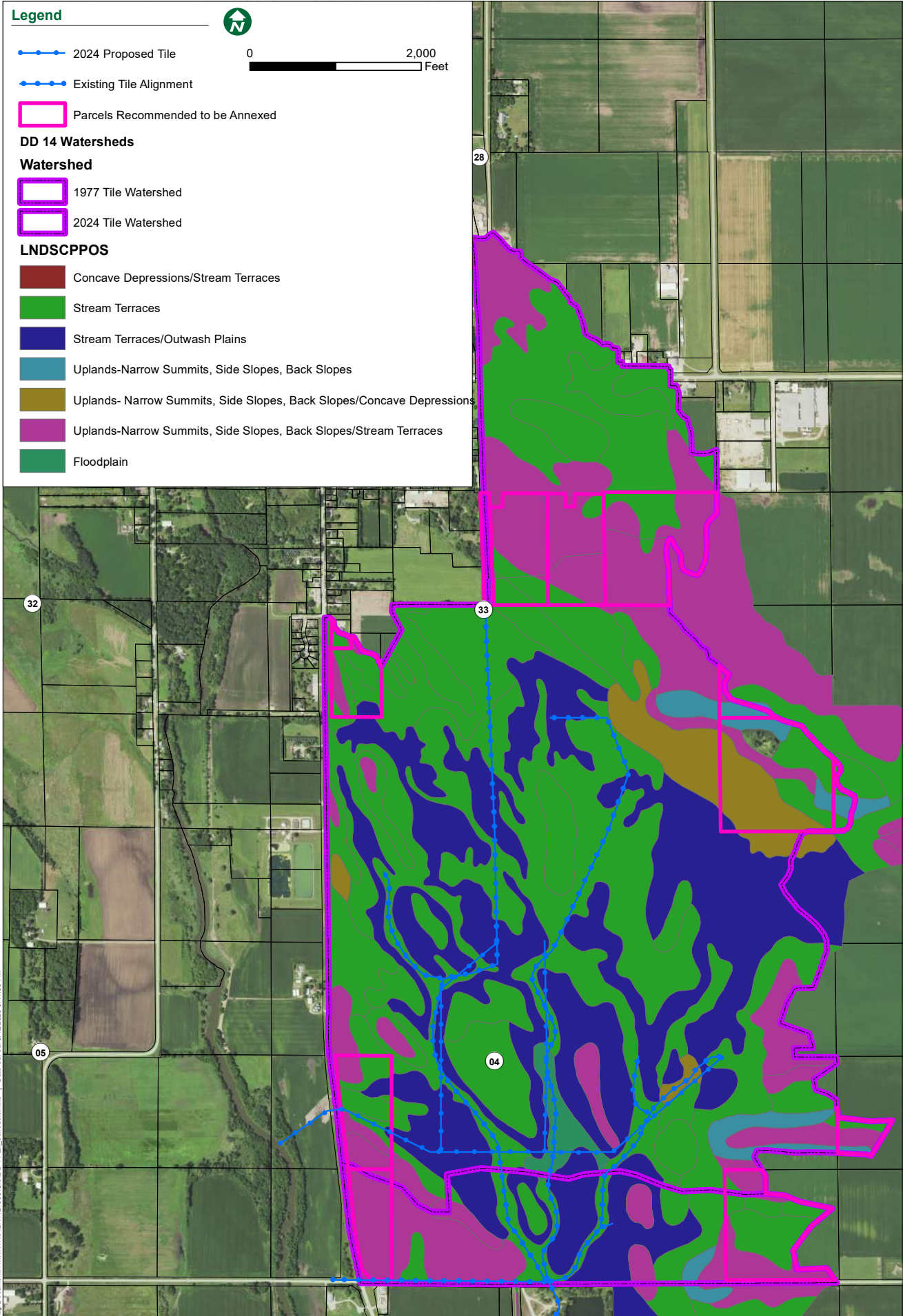
Information

A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. Hydric soils developed under conditions sufficiently wet to support the growth and regeneration of hydrophytic vegetation. Hydric soils include phases of soil series that may or may not have been artificially drained. Some series on the hydric list have phases that are not hydric.














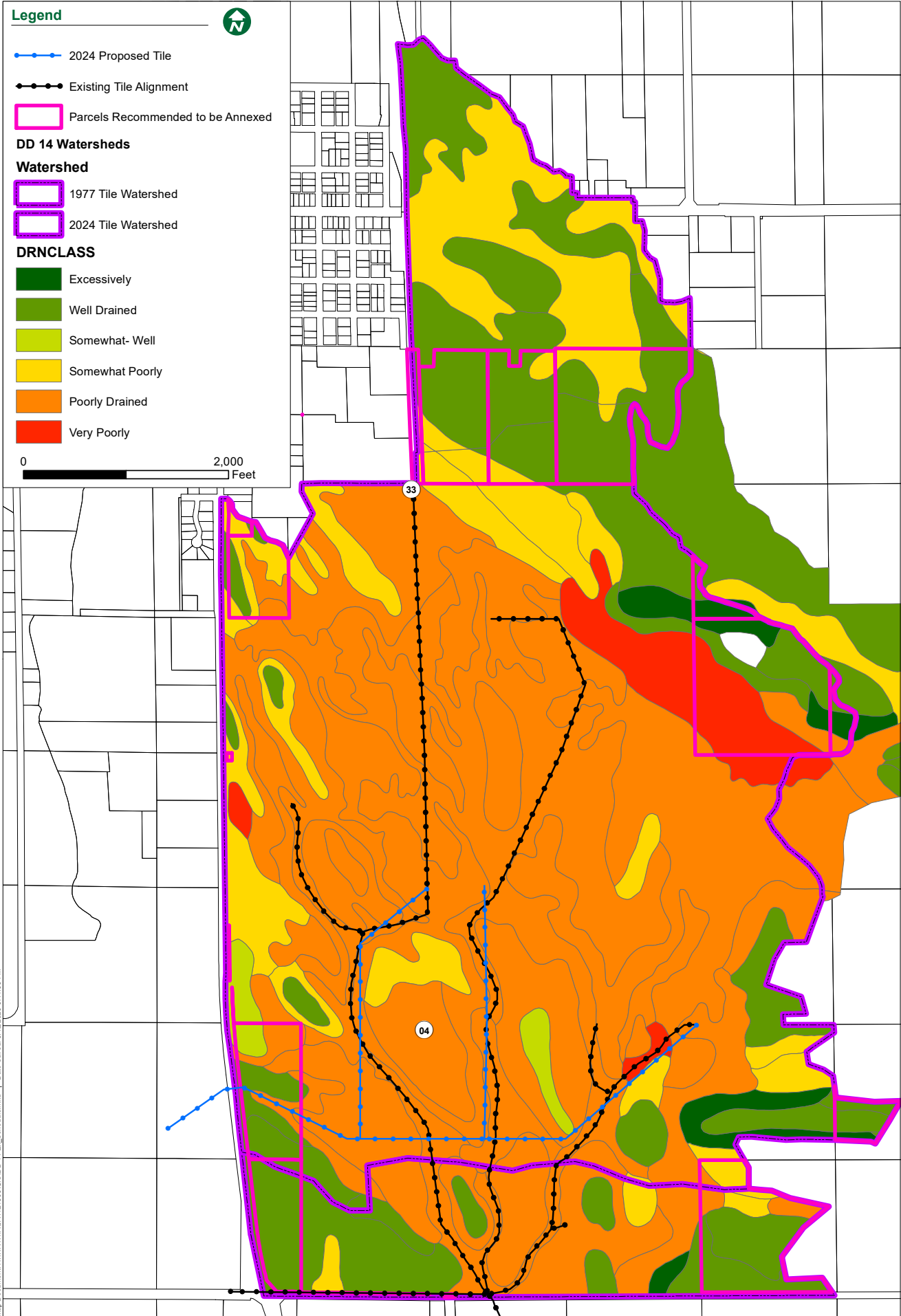
Legend

-  2024 Proposed Tile
 -  Existing Tile Alignment
 -  Parcels Recommended to be Annexed
- DD 14 Watersheds**
- Watershed**
-  1977 Tile Watershed
 -  2024 Tile Watershed
- LNDSCPPOS**
-  Concave Depressions/Stream Terraces
 -  Stream Terraces
 -  Stream Terraces/Outwash Plains
 -  Uplands-Narrow Summits, Side Slopes, Back Slopes
 -  Uplands- Narrow Summits, Side Slopes, Back Slopes/Concave Depressions
 -  Uplands-Narrow Summits, Side Slopes, Back Slopes/Stream Terraces
 -  Floodplain



Legend

-  2024 Proposed Tile
 -  Existing Tile Alignment
 -  Parcels Recommended to be Annexed
- DD 14 Watersheds**
- Watershed**
-  1977 Tile Watershed
 -  2024 Tile Watershed
- DRNCLASS**
-  Excessively
 -  Well Drained
 -  Somewhat- Well
 -  Somewhat Poorly
 -  Poorly Drained
 -  Very Poorly

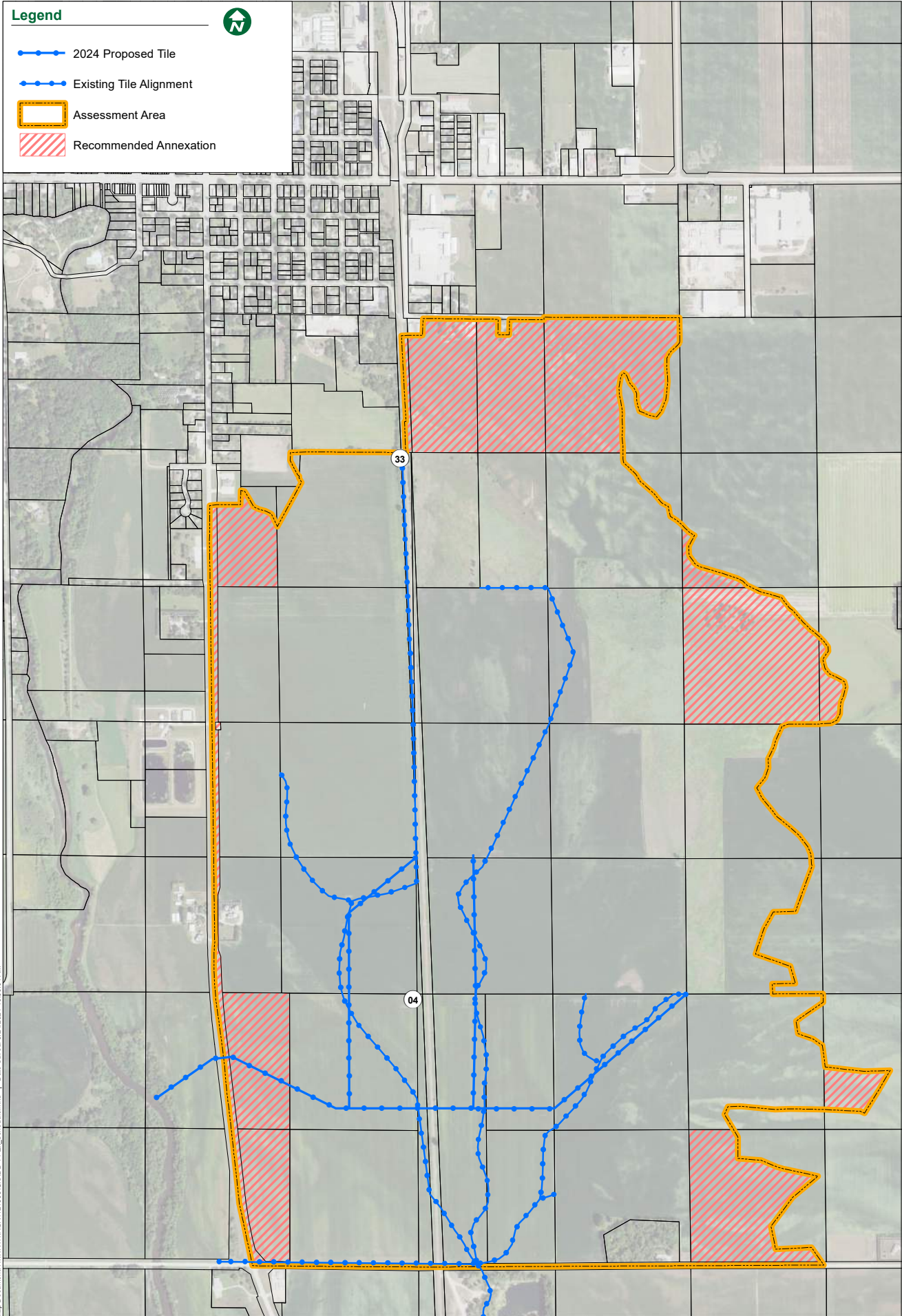


Annexation Schedule

Legend



- 2024 Proposed Tile
- Existing Tile Alignment
- Assessment Area
- Recommended Annexation



**ANNEXATION SCHEDULE
DRAINAGE DISTRICT NO. 14
WORTH COUNTY, IOWA**

Deedholder(s)	Parcel Number	Sec-Twp-Rng	Legal Description	Benefited Acres	Elevation (ft)	Relation (Percent of Outlet Provided)	Condition of Drainage
JOHNSON, RANDI & LAURIE	0334300001	34-100-20	NW SW	3.0	1217	85%	Subsurface and Surface Flows
BERGE, TIMOTHY	0703300002	3-99-20	NE SW	4.8	1204	75%	Subsurface and Surface Flows
D & R RENTALS LLC	0333276001	33-100-20	SE NE	31.8	1220	87%	Subsurface and Surface Flows
GORDON, DEAN R REVOCABLE TRUST	0333303007	33-100-20	E 1/2 NW SW EX 3 PARS & EX PAR A	10.6	1200	86%	Subsurface and Surface Flows
HELGELAND, KIRSTEN 1/8 INT & KEITH L/E	0704300005	4-99-20	NW SW EXC PAR & PA	17.9	1194	100%	Subsurface and Surface Flows
HELGELAND, KIRSTEN 1/8 INT & KEITH L/E	0704300007	4-99-20	SW SW EXC PAR & PA	12.5	1198	100%	Subsurface and Surface Flows
REEDER, KEVIN	0333251002	33-100-20	W 1/2 SW NE EX PAR	18.67	1202	86%	Subsurface and Surface Flows
REUVERS, DEBRA A L/E	0334300004	34-100-20	SW SW	37.5	1202	85%	Subsurface and Surface Flows
REUVERS, DEBRA A L/E	0334300007	34-100-20	SE SW EX PAR	2.8	1206	75%	Subsurface and Surface Flows
SCRIBBINS, ELAINE J REVOCABLE TRUST	0333251004	33-100-20	E 1/2	19.64	1218	87%	Subsurface and Surface Flows
TRENHAILE & SONS INC.	0703300003	3-99-20	SW SW	25.4	1200	71%	Subsurface and Surface Flows
Total				184.61			

Elevation- The lowest elevation on the annexed parcel per Contour maps.

Percent of Outlet Provided- Calculated by taking the length of the improved district facilities divided by the total length from the parcel to the outlet (The distance required if a drainage district didn't construct an outlet)

Condition of Drainage- How the drainage flows via the construction to the drainage district facility. In this case, drainage tile could now be installed where only surface drainage naturally existed.