# Grove Township in Stearns County Nitrogen Fertilizer Management Plan Summary

DEPARTMENT OF AGRICULTURE

## Groundwater, Nitrogen Fertilizer Management, and Nitrogen Loading Analysis

**September 2026**

## Township

## Introduction

This document summarizes the Minnesota Department of Agriculture's (MDA) current understanding of the nitrate-nitrogen levels in domestic (private) wells in Grove Township in Stearns County and its understanding of nitrogen management information. This summary presents information the MDA considered to determine whether the proposed list of nitrogen fertilizer best management practices (BMPs) and Alternative Management Tools (AMTs) will be protective of groundwater.

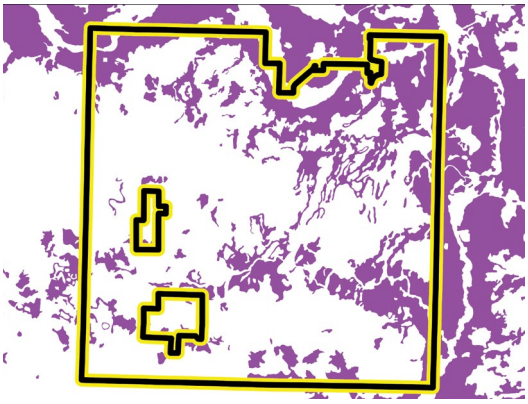


**Figure 1.** Grove Township in Stearns County, Minnesota is outlined in yellow and black. Coarse-textured soils are highlighted in purple.

## Project Area and Private Well Nitrate-Nitrogen Data

Groundwater protection is fundamental to the Nitrogen Fertilizer Management Plan (NFMP). The NFMP calls for an assessment of nitrate conditions on the township scale. Accordingly, the MDA offered nitrate tests to private well owners in fourteen townships in Stearns County in 2014 (Table 1). At least 10% of private wells in the township sampled over the Health Risk Limit of 10 mg/L nitrate-nitrogen, prompting the establishment of a local advisory team (LAT) made up of farmers, agronomists and other agricultural stakeholders within the township.

Grove Township includes over 16,500 acres of cropland. About 80% of this cropland is on fine-textured soil: 64% is loam, 7% clay loam, 7% mucky, and 1.3% silt clay loam. The remaining cropland soil is 11% sandy loam and 9% loamy sand.

**Table 1. Final Stearns County Township Testing Private Well Dataset**

| Township | Number of Wells | Wells > 10 mg/L Nitrate-N Count | Wells > 10 mg/L Nitrate-N Percentage |
|---|---|---|---|
| Brockway | 253 | 25 | 9.9% |
| Crow Lake | 34 | 2 | 5.9% |
| Crow River | 45 | 1 | 2.2% |
| Fair Haven | 146 | 10 | 6.8% |
| **Grove** | **44** | **5** | **11.4%** |
| Le Sauk | 156 | 10 | 6.4% |
| Lynden | 223 | 4 | 1.8% |
| Maine Prairie | 194 | 7 | 3.6% |

| Township | Number of Wells | Wells > 10 mg/L Nitrate-N Count | Wells > 10 mg/L Nitrate-N Percentage |
|---|---|---|---|
| Melrose | 61 | 2 | 3.3% |
| Millwood | 84 | 1 | 1.2% |
| Munson | 197 | 9 | 4.6% |
| North Fork | 19 | 0 | 0% |
| Oak | 51 | 0 | 0% |
| Wakefield | 281 | 23 | 8.2% |
| **Total** | **1788** | **124** | **5.5%** |

## Grove Township Land Use

The NFMP designates mitigation Level 2 for townships with at least 10% of samples submitted from private wells over the Health Risk Limit of 10 mg/L nitrate-nitrogen. Level 2 of the NFMP recommends the formation of an LAT for input on agricultural practices (BMPs and AMTs) that can reduce nitrate losses below cropland.

A review of the publicly available **USDA Cropland Data Layer** (croplandcros.scinet.usda.gov) in Grove Township shows that land use is predominately cropland. The data illustrated in Figure 2 is from the February 2025 data release. Additionally, the table below shows an estimate of the primary crops and average number of acres grown in the township from 2020 to 2024.

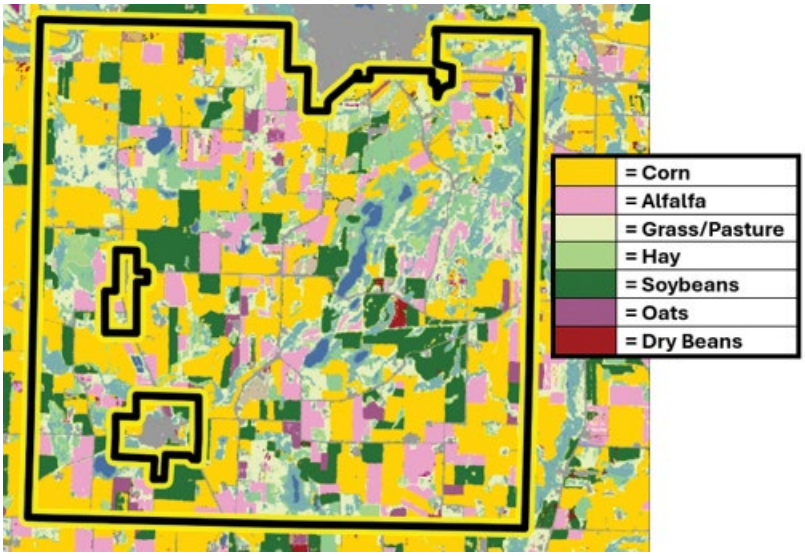



**Figure 2. 2025** Cropland in Grove Township based on the USDA Cropland Data Layer

The MDA defines cropland as land used primarily for the production or harvest of annual or perennial field, forage, food, fiber, or energy crops including pasture but excluding forestland. Within Grove Township, the most common annual crops are corn and soybeans. In 2020-2024, these crops accounted for 58% of the total cropland. Perennials—pasture, alfalfa, and grass hay—covered an average of 39% of the cropland over the five-year timeframe (Table 2).

**Table 2. Five-Year (2020-2024) Cropland Acres**

| Crop | Acres (5-yr Ave) | % Cropland |
|---|---|---|
| Corn | 6,835 | 40.9% |
| Alfalfa | 3,063 | 18.3% |
| Hay/Pasture | 3,481 | 20.9% |
| Soybeans | 2,895 | 17.3% |
| Small Grains | 368 | 2.2% |
| Other Crops | 73 | 0.4% |

The MDA surveyed agronomists and farmers to understand the nitrogen fertilizer management practices used in Grove Township. Having current and accurate nitrogen fertilizer management data is critical to the discussion of agricultural practices. The management information collected includes crop planting, harvest, and nitrogen fertilizer use information.

Nitrogen fertilizer BMPs are widely used within Grove Township. Surveys indicate that splitting nitrogen fertilizer applications on corn is a common practice. Additionally, that accounting for all nitrogen sources, crediting for manure applications and previous crops, and avoiding fall applications of nitrogen fertilizer are practices followed on most of the cropland.

In 2025, the MDA surveyed one fertilizer dealer about nitrogen fertilizer BMP use in the township. Nitrogen rates provided in the survey are shown in Table 3.

**Table 3. 2025 Corn Nitrogen Fertilizer Rates in Grove Township**

| Crop Rotation | Range of Nitrogen Rates Applied (lbs. N per acre) | Nitrogen Rate Most Commonly Applied (lbs. N per acre) | Percent of Acres Applying the Most Common Nitrogen Rate |
|---|---|---|---|
| Corn following corn—dryland | 165-185 | 175 or less | 80% |
| Corn following soybean—dryland | 135-150 | 140 or less | 80% |
| Corn following corn—irrigated | 190-235 | 210 or less | 90% |
| Corn following soybean—irrigated | 160-205 | 180 or less | 90% |

## Nitrate-Nitrogen Loss Below Cropland

Using a crop and soil computer simulation model called the **Environmental Policy Integrated Climate model (EPIC)** (epicapex.tamu.edu/epic/) the MDA has estimated the nitrogen loss below soils and weather conditions in Grove Township. Modeling indicates a reduction from current irrigated corn nitrogen rates to the University of Minnesota's 0.10 Maximum Return to Nitrogen (MRTN) (currently 210 lbs. N/ac for corn after corn and 180 lbs. N/ac for corn after soybeans) would reduce nitrate leaching under irrigated corn systems by 6%. Similarly, modeling results indicate that a reduction from current dryland corn nitrogen rates to the 0.125 MRTN (currently 175 lbs. N/ac for corn after corn and 140 lbs. N/ac for corn after soybeans), would reduce nitrate leaching under dryland corn systems by 4%.

The dealer survey indicated that cover crop planting in the fall is not common in this township. The EPIC model indicates that leaching is reduced by 6-10% per acre where cover crops are grown in corn-soybean rotations in the township. Perennials, including alfalfa in rotation with corn, can reduce leaching by 65% per acre or more when compared to corn-corn or corn-soybean rotations.

## MDA Recommended Nitrogen Fertilizer Best Management Practices for Grove Township

Nitrogen BMPs are based on University of Minnesota research and are considered economically and environmentally sustainable. Nitrogen rate is a BMP that could vary within the township depending on weather, soil and management. In-field data from nitrogen-rate trials or use of precision agriculture can identify the optimum nitrogen rate for a given field.

In consultation with the LAT. The MDA has developed the following list of BMPs to protect groundwater in the township.

- Apply nitrogen to irrigated corn in a corn-corn or corn-soybean rotation at or below the 0.10 MRTN in the University of Minnesota's nitrogen fertilizer application guidelines.
- Apply nitrogen to dryland corn in a corn-corn or corn-soybean rotation at or below the 0.125 MRTN in the University of Minnesota's nitrogen fertilizer application guidelines.
- Account for all nitrogen sources when calculating nitrogen rate.
- Take appropriate credits for previous legume crops and manure used in the crop rotation.
- Split applications of nitrogen fertilizer on coarse textured soils.

A complete list of the MDA recommended BMPs is available on the **Grove Township** webpage (mda.state.mn.us/grove-twp)

## AMTs and Additional Practices for Grove Township

In addition to BMPs, other practices, including AMTs, can be more protective of groundwater; the LAT recognizes the benefits of those listed below. While BMPs are applicable to most cropland acres, AMTs and additional practices tend to be less universal but very appropriate in select situations or fields. At a township scale, even small improvements in nitrogen management can reduce nitrogen loss below cropland and, over the long term, reduce nitrate levels in groundwater. Currently, the most applicable AMTs for this township include: Minnesota Ag Water Quality Certification Program, cover crops, on-farm nitrogen rate trials and precision nitrogen management.

## Approved AMTs

- Minnesota Ag Water Quality Certification Program
- Land Conservation Programs
- Increasing Continuous Cover: Perennial Vegetation
- Increasing Continuous Cover: Cover Crops
- On-Farm Nitrogen Rate Trials
- Precision Nitrogen Management
- Intermediate Wheatgrass (Kernza)

AMTs will be added to this approved list and posted on the **Approved AMTs** webpage (mda.state.mn.us/pesticide-fertilizer/approved-amts). Once posted online the new approved AMTs will be applicable in these townships.

## Additional practices

- Attend University of MN manure management educational events offered online or within the county.
- Calibrate manure spreading equipment to verify application rate.
- Test manure using a lab certified or approved by the MDA.

On irrigated acres within the township, promoting and supporting tools and information that improve irrigation scheduling and system upgrades to improve water use efficiency could further reduce the risk of saturated soil conditions that can lead to leaching. The irrigation technology Regional Conservations Partnership Program (RCPP) grant sponsored by the MDA is an example of the type of promotion and support to expand adoption of these tools. More information is available at the **Precision Irrigation Cost-Share** website (mda.state.mn.us/precision-irrigation-cost-share).

In addition to the items listed above, the MDA recognizes the use of manure on cropland within the township. Careful manure management is critical to make efficient use of this resource and avoid practices with inherently higher risk of nitrogen loss below the root zone. Careful crediting of nitrogen available from manure is fundamental. In addition to crediting, promoting manure testing, calibration of spreading equipment and storage upgrades can improve crop use of nitrogen available from manure and reduce nitrogen losses below the root zone.

## Conclusion

In Grove Township, the MDA reviewed the cropping history, surveyed nitrogen management practices, and discussed current practices with the LAT. A substantial amount of the township's cropland is in perennial cover, including grass hay, alfalfa, and pasture. Over a five-year period, perennials accounted for an average of 39% of cropland. Maintaining and increasing this type of perennial land use is important to minimizing nitrate leaching.

The current University of Minnesota nitrogen fertilizer timing, placement, and product BMPs already are widely used within the township, but adoption of these BMPs on all cropland acres would offer even greater water-quality benefits. MDA modeling suggests that fine-tuning nitrogen rates can be the most effective practice to reduce nitrate leaching from cropland. Limiting nitrogen rates on irrigated corn to at or below the University of Minnesota's 0.10 MRTN on irrigated corn and at or below the 0.125 MRTN on dryland corn would have positive water-quality impacts. Based on nitrogen rate distribution data gathered from area fertilizer dealers, computer modeling estimates an 6% reduction in losses below irrigated corn and 4% below dryland corn if nitrogen fertilizer is applied at or below these rates. Similarly, the use of precision nitrogen management or on-farm rate trials can help identify optimal nitrogen rate and further protect groundwater.

AMTs have great potential to reduce nitrate leaching losses. The LAT acknowledged the protective potential of these practices. Where possible, increasing the adoption of cover crops is encouraged. Funding to support the adoption of these practices would help increase adoption.

Based on the information provided above, the MDA believes that the recommended nitrogen management practices for Grove Township are appropriate, and that maximizing use of these practices over the long-term will prevent increases in nitrogen loss below cropland. These recommendations are available on the **Grove Township** website (mda.state.mn.us/grove-twp). Additionally, further reductions to nitrogen loss are possible with the increased use of AMTs where they are practicable and economical, recognizing that promotion and additional funding are needed to increase their adoption.

In accordance with the Americans with Disabilities Act, this information is available in alternative forms of communication upon request by calling 651-201-6000. TTY users can call the Minnesota Relay Service at 711. The MDA is an equal opportunity employer and provider.