American Farmland Trust
SAVING THE LAND THAT SUSTAINS US

Whatcom County Conservation Easement Program



Avoided Conversion in Whatcom County, Washington

Estimating the Benefits of Agricultural Land Protection

THE CARBEE FARM

Introduction

Residential development is a major driver of farmland loss in the United States (Hunter et al., 2022). Converting farmland into housing can lead to various adverse effects, including reduced food security and increased flood risk. This land-use change can also lead to increased emissions of greenhouse gas (GHG) and non-GHG air pollutants as a result of home construction, elevated traffic levels, and expanded energy consumption.

An effective way to protect farmland from development is through agricultural conservation easements. Agricultural conservation easements are voluntary legal agreements that protect farmland by removing development rights, thereby ensuring the land remains available for farming.

By permanently protecting farmland, agricultural conservation easements prevent potential GHG and non-GHG air pollutant emissions associated with residential development. Quantifying these avoided emissions offers a concrete method to measure the environmental benefits of protecting agricultural land.

Avoided conversion offers a practical framework for estimating agricultural land protection benefits by calculating emissions avoided by not converting farmland to residential development. In 2022, American Farmland Trust (AFT) determined via avoided conversion that a proposed agricultural conservation easement on Bishop Farm in Tazewell County, Illinois[1] would avoid an estimated 19,541 metric tons of carbon dioxide equivalent GHG emissions and 8 tons of non-GHG air pollutant emissions in the first 30 years.

In 2025, AFT collaborated with Whatcom County, Washington, to quantify the emissions avoided by the agricultural conservation easements protecting three adjoining farms in Whatcom County. The results provide a tangible estimate of the environmental benefits of protecting the Whatcom County farms and also demonstrate the potential for agricultural land protection projects in Washington to contribute towards the state's emission reduction goals.

The methods used in this study can be applied to other agricultural land protection projects and ultimately can help stakeholders make more informed decisions about the value of protecting versus developing farmland.

The Grubbs, Carbee And Vanderwerff Farms

The three adjoining farms in Whatcom County, referred to as the Grubbs, Carbee, and Vanderwerff farms, are located approximately 10 miles northeast of Bellingham, the county's largest city. Together, the farms cover 113 acres and are protected by separate agricultural conservation

easements through Whatcom County's Conservation Easement Program (CEP).

Established in 2002, the CEP compensates landowners who surrender their development rights to permanently preserve their property. Financed through Whatcom County's Conservation Futures Fund alongside federal, state, and local grants, the program has successfully protected 1,920 acres, including 1,686 acres of agricultural land, since its launch.

The first of three adjoining properties to be protected, the 20-acre Grubbs farm was permanently preserved in 2018. The Grubbs family run a seasonal U-pick operation featuring strawberries, raspberries, vegetables, and flowers. Backed by funding from Washington State's Recreation and Conservation Office and the USDA's Agricultural Conservation Easement Program (ACEP), preserving the farm has enabled the family to reinvest in farm infrastructure and purchase new equipment.

Preserved in 2020 shortly after the Grubbs property, the 73-acre Carbee farm features an active dairy and on-site feed production. The Carbee family had long envisioned passing the operation down to their son and wanted to safeguard the land from development. With funding from Whatcom County's Conservation Futures Fund and Washington State's Recreation and Conservation Office, the property is now permanently protected, ensuring it will remain available for the next generation.

Protected in 2023, the 20-acre Vanderwerff property was the final of the three adjoining farms to be permanently preserved. The project was funded by Washington State's Recreation and Conservation Office and the NRCS' Regional Conservation Partnership Program (RCPP). Currently used for beef cattle and hay production, preserving the farm has ensured the Vanderwerff's oldest son, who has long wanted to farm the land, can pursue his farming goal.

Development Risk

Whatcom County faces increasing development pressure in the years ahead, which could threaten the county's farmland. The county is expected to add almost 70,000 residents by 2045, with about 45% of that growth anticipated in Bellingham. This population growth will require an estimated 31,220–36,013 new housing units (Mittendorf, 2025).

Situated approximately 10 miles from Bellingham and less than one mile from State Route 542 (Mount Baker Highway), the Grubbs, Carbee and Vanderwerff farms offer convenient commuting access to Bellingham. State Route 542 also links Bellingham to Interstate 5, connecting the region to major metropolitan centers like Seattle and Vancouver, B.C.



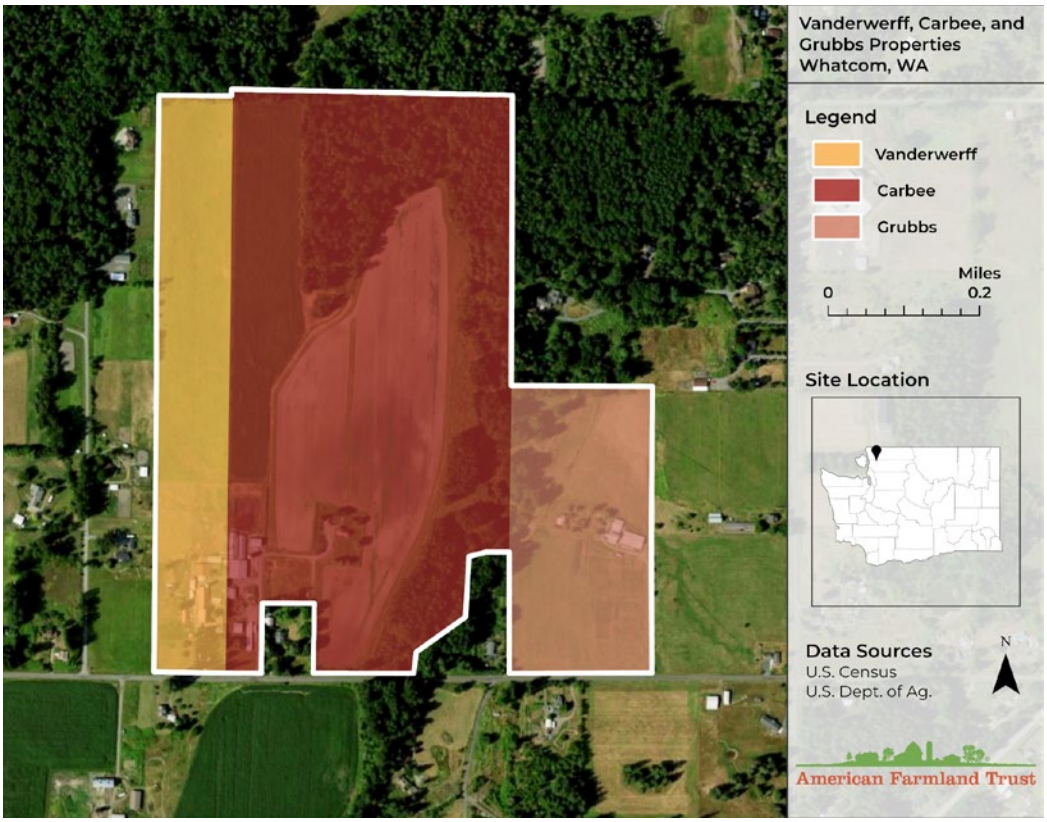
THE GRUBBS FARM



THE CARBEE FARM



THE VANDERWERFF FARM



CASE STUDY AREA

Considering the expected population growth in Whatcom County and the proximity of the farms to Bellingham, it is not inconceivable that the agricultural conservation easements on the Grubbs, Carbee, and Vanderwerff farms are protecting the farms from future development.

Estimatingthe Benefits of Agricultural Land Protection Through Avoided Conversion

Quantifying the emissions avoided by avoiding farmland conversion and instead shifting development to urban areas with more efficient energy use and transportation can provide a useful estimate of the environmental benefits of protecting agricultural land.

Avoided emission calculations are based on the number of development rights extinguished by an agricultural conservation easement. By extinguishing development rights, agricultural conservation easements limit the number of residential dwellings that can be constructed, thereby avoiding emissions associated with the construction and residential use of the land.

Avoided emissions are calculated as the difference between two scenarios:

a) Development of a number of residential dwellings on the agricultural land equal to the number of dwelling rights extinguished by the agricultural conservation easement.

b) Development of the same number of residential dwellings in an urban area with more efficient energy use and transportation.

Residential dwellings in rural agricultural areas tend to generate higher emissions per dwelling compared to dwellings in urban areas due to factors such as greater energy consumption by rural households and longer commuting distances to employment and other destinations in rural areas. The avoided emissions benefit of an agricultural conservation easement is therefore equal to the difference in emissions generated by the same number of dwellings constructed on agricultural land versus in an urban area.

Methods

AFT previously identified the California Air Resources Board (CARB)'s Agricultural Lands Conservation Easement Quantification Methodology (QM) as a suitable methodology to estimate the avoided GHG emissions associated with an agricultural conservation easement. The CARB developed the QM to estimate avoided GHG emissions and air pollutant emission co-benefits associated with agricultural conservation easements (California Air Resources Board, 2022). AFT applied the QM with minor modifications to estimate avoided emissions for the Bishop Farm case study (McGill et al., 2022).

For this study, AFT treated the separate conservation easements as a single unified easement. AFT also utilized Washington State data wherever possible and calculated avoided emissions over a different timeframe than specified in the QM. In most other respects, AFT followed the QM.

Per the QM, AFT estimated avoided GHG and non-GHG air pollutant emissions as a result of reduced vehicle miles traveled (VMT), reduced electricity use, reduced energy use for heating, and avoided loss of organic soil carbon from avoided house construction on the agricultural land.

To determine emission rates and key variables, AFT utilized data from the U.S. Environmental Protection Agency, the Washington State Department of

Transportation, and additional sources. A complete list of data sources is available upon request in the Whatcom County Avoided Conversion Calculator Tool.

The QM outlines procedures for calculating the development rights extinguished by agricultural conservation easements. However, this calculation was unnecessary because Whatcom County verified that the easements protecting the Grubbs, Carbee, and Vanderwerff farms extinguished a total of 19 development rights.

Per the QM, avoided emissions are calculated over a 30-year timeframe representing the "project life of an agricultural lands easement" (California Air Resources Board, 2022). However, because the agricultural conservation easements on the Grubbs, Carbee, and Vanderwerff farms are perpetual, they would likely generate avoided emissions benefits well beyond this 30-year period. For this study, AFT instead evaluated how emissions savings from the agricultural conservation easements on the Grubbs, Carbee, and Vanderwerff farms could contribute to Washington state's emission reduction goals.

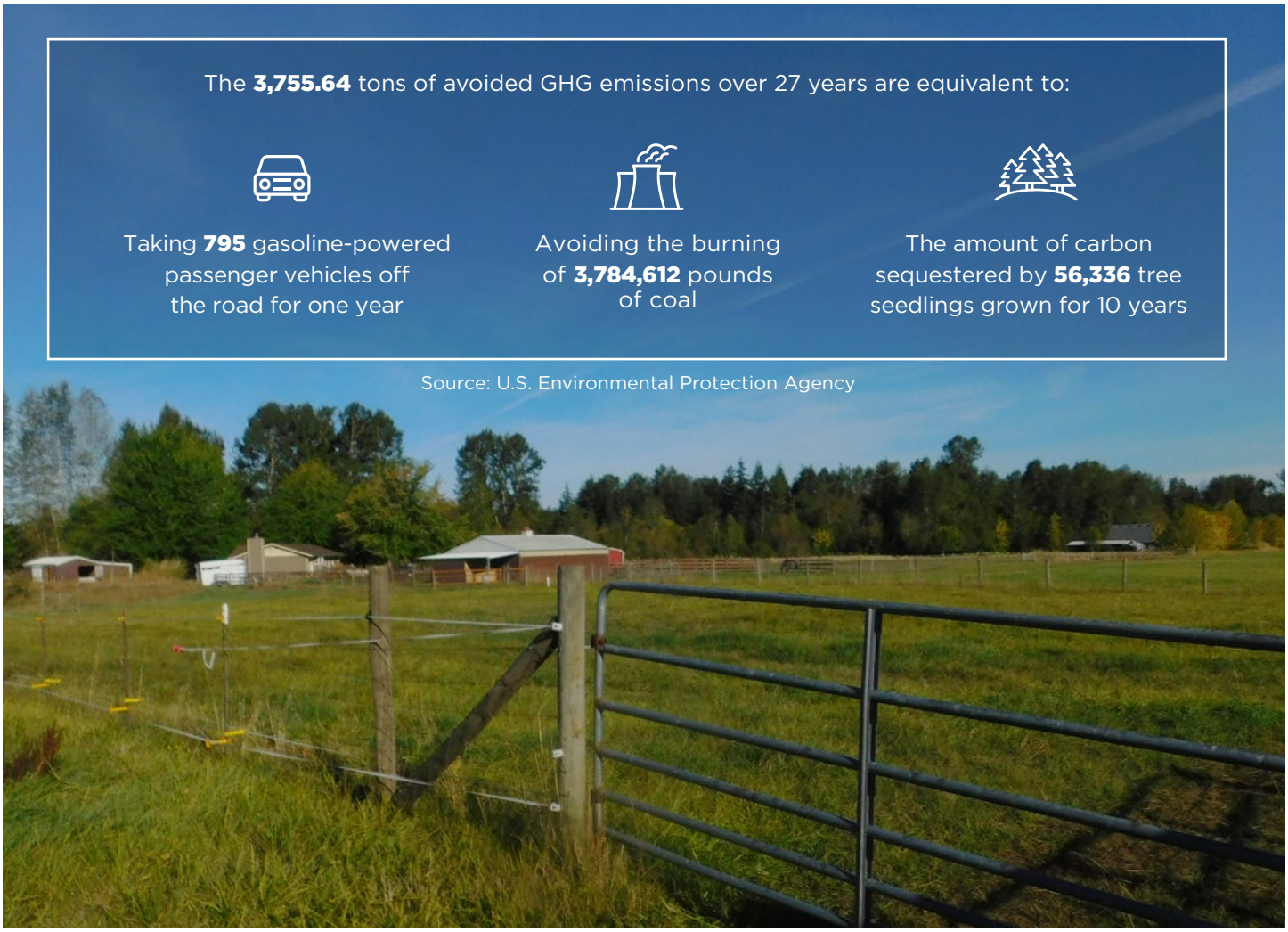
Washington has a legally mandated goal of achieving net-zero GHG emissions by 2050. This study illustrated the potential benefits of protecting the state's agricultural land toward achieving that goal. Consequently, AFT calculated the emissions avoided by these agricultural conservation easements over a 27-year timeframe, spanning from 2023, when the final of the three adjoining farms was protected, through 2050.

Results

Greenhouse Gas Emissions Avoided

The agricultural conservation easements protecting the Grubbs, Carbee, and Vanderwerff farms avoid an estimated **3,755.64 tons** of GHG emissions over 27 years, expressed in tons of carbon dioxide (tCO2).

Of the 3,755.64 tCO2 avoided, approximately 2,197.44 tCO2 is from avoided VMT, 589.53 tCO2 is from avoided electricity use, 194.0 tCO2 is from avoided propane use, and 774.67 tCO2 is from avoided soil organic carbon loss.



THE VANDERWERFF FARM

Non-GHG Air Pollutant Emissions Avoided

Over the 27-year timeframe, the agricultural conservation easements also avoid an estimated **2.44 tons** of non-greenhouse gas air pollutant emissions, including nitrogen oxides (NOx), particulate matter (PM2.5), and volatile organic compounds (VOCs).

Why This Is Important

According to AFT's Farms Under Threat 2040 initiative,[2] if current development trends continue, **192,300** acres of farmland and ranchland in Washington will be paved over, fragmented, or converted to uses that jeopardize agriculture by 2040 (American Farmland Trust, 2022). The agricultural conservation easements protecting the Grubbs, Carbee, and Vanderwerff farms have ensured that 113 acres of farmland in Whatcom County will never be developed and will remain available for farming.

Additionally, the agricultural conservation easements support Washington state's net-zero targets by avoiding an estimated 3,755.64 tons of greenhouse gas emissions over 27 years. These emission savings may lower the risks for Whatcom County farmers from events associated with higher GHG concentrations, such as severe weather and unpredictable rainfall.

Furthermore, by avoiding an estimated 2.44 tons of non-GHG air pollutant emissions over the next 27 years, the agricultural conservation easements may support long-term health. Certain air pollutants, including NOx and PM2.5, are classified as criteria air pollutants by the U.S. Environmental Protection Agency and are regulated under the Clean Air Act to protect public health and the environment (U.S. Environmental Protection Agency, 2026).

Applicability Across Washington State and the Pacific Northwest

The agricultural conservation easements protecting the Grubbs, Carbee, and Vanderwerff farms avoid approximately 139.1 tCO2 per year. With a combined area of 113 acres, this equates to a rate of 1.23 tCO2 avoided per acre per year. Applying this rate to Washington's 192,300 acres of farmland and ranchland threatened by development yields an estimated potential savings of 236,529 tCO2 annually. These emission savings match the impact of removing 50,051 gasoline-powered passenger vehicles from the road every year.

This study highlights the profound environmental benefits of safeguarding Washington State farmland from development. The methods used in this study can be applied elsewhere in the Pacific Northwest by using appropriate national, state, or local data.



THE GRUBBS FARM

Limitations

1) Average annual rural and urban VMT calculations are derived from historic Washington State highway VMT data for Whatcom County spanning the years 1994 to 2024, with the outlier years of 2020 and 2021 excluded. Because the underlying dataset is restricted to miles traveled on designated state highways—including Interstates, State Routes, and U.S. Routes—VMT estimates reflect travel solely on major roadways and do not include travel on other public roadways such as county routes and local municipal streets. While comprehensive VMT data for all public roadways in Whatcom County was unavailable for the 1994-2024 period, future studies could incorporate alternative datasets encompassing state, county, and local roads. Doing so would yield a more precise estimate of overall VMT and the resulting avoided emissions.

2) The calculations in this study exclude emissions produced or sequestered by the agricultural land itself or associated farming activities. While incorporating these emissions produced or sequestered would likely adjust the overall emissions avoided by the conservation easements, the QM does not provide a methodology for calculating them, and such an analysis remains beyond the scope of this study.

3) The GHG and non-GHG air pollutant emission estimates presented in this study are specific to the Grubbs, Carbee, and Vanderwerff farms. Consequently, applying these estimates to other farms and regions requires caution and appropriate caveats.

Endnotes

1. See McGill et al., 2022. *Climate change mitigation from an agricultural conservation easement: A case study of an Illinois farm.* https://farmlandinfo.org/publications/avoided-conversion-illinois

2. See the state summary for Washington State via American Farmland Trust's Farms Under Threat 2040 Web Mapping Tool at: https://development2040.farmland.org



THE GRUBBS FARM

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For more information, visit:
https://farmlandinfo.org/publications/avoided-conversion-whatcom-county

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