Community Flood Risk, Vulnerability, Mitigation, and Adaptation Report for the HUD Most Impacted and Distressed Areas for Nebraska DR-4420

University of Nebraska-Lincoln
Nebraska Department of Economic Development
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Acknowledgement

This project would not have been possible without the historic devastation experienced by the residents of Nebraska as brought on by the effects of severe weather conditions and subsequent flooding spanning the time between March and July of 2019. The damages left in wake of Winter Storm Ulmer, straight-line winds, and subsequent flooding are still tangible five years later. We know Nebraskans are still struggling to recover from those four long months of uncertainty; which was compounded by the world-wide COVID-19 pandemic that followed on its heels. We understand some Nebraskans will never be made whole. We hope this document will support Nebraska's resilience against future disasters.

Furthermore, this project would not have been possible without Presidential designation (Public Law 116-20), congressional allocations, and federal agencies, particularly those operating under the Federal disaster assistance requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act Public Law 93-288, as amended, 42 U.S.C. 5121, et seq. (Stafford Act), especially, Federal Emergency Management Agency, and U.S. Department of Housing and Urban Development. Federal agencies, Nebraska Emergency Management Agency and Nebraska Department of Economic Development have facilitated community-based disaster recovery by funding initiatives and programs administered through state agencies.

The 2019 disaster (DR-4420) created an opportunity for the state, its communities, and residents to re-examine and reflect. This project team thanks everyone that contributed to this report. We understand and appreciate Nebraska's recovery process is ongoing, and so too is the relationship building necessary for sustaining success and working towards resilience at the local, regional, and state level. We would also like to thank the residents and staff of the City of Fremont, Dodge County, and Karl Dietrich at JEO Consulting Group, Inc. for their participation in the April 1, 2024, Fremont Flood Risk Open House at Keene Memorial Library.

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Cover Image Credit: Nebraska National Guard. https://www.axios.com/2019/03/16/historic-midwest-storm-flooding-prompts-emergency-declarations

Abbreviations

ACS	American Community Survey
AIDS	Acquired Immunodeficiency Syndrome
BFE	Base Flood Elevation
CDBG-DR	Community Development Block Grant for Disaster Recovery
CDP	Census Designated Places
CFM	Certified Floodplain Managers
CRS	Community Rating System
FAQs	Frequently Asked Questions
FEMA	The Federal Emergency Management Agency
FIRMs	Flood Insurance Rate Maps
HUD	Housing and Urban Development
HVAC	Heating, Ventilation, and Air Conditioning
IISD	International Institute for Sustainable Development
MID	Most Impacted and Distressed
NCEI	National Center for Environmental Information
NeDNR	Nebraska Department of Natural Resources
NFHL	National Flood Hazard Layer
NFIP	The National Flood Insurance Program
NRD	Natural Resources District
PALs	Provisionally Protected Levee
P-MRNRD	Papio Missouri River Natural Resources District
SFHA	Special Flood Hazard Area
SFHMP	State Flood Hazard Mitigation Plan
UNA	Unmet Need Assessment
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey

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Overview

Purpose

The purpose of this report is to establish a robust baseline of disaster impacts in the context of socio-economic conditions and flood risk, promoting awareness of risk to loss of life and property. The team carried out an assessment of communities in the counties of Dodge, Douglas, and Sarpy with special review and consideration given to vulnerable populations and the intersection of flood vulnerabilities.

Our goal is to facilitate and promote comprehensive community resilience, resulting in more resilient built environments. We aim to inform the public, policymakers, and elected officials to support their sound decision-making. In a time when federally declared disasters are becoming more common and damages are widespread, conversations around community resilience are critical. Careful consideration of natural disasters and an examination of their impact on historically disadvantaged neighborhoods is key to equitable and fiscally responsible recovery and rebuilding.

Scope

Understanding the damages following the federally-declared disaster in 2019 (DR-4420) were felt across the state, the team focused on the counties of Dodge, Douglas, and Sarpy. This decision was due to the State of Nebraska's $108.9M federal allocation of funding via HUD's Community Development Block Grant for Disaster Recovery (CDBG-DR). These three counties were identified by HUD as "most impacted and distressed" following the federal agency's internal analysis of reported damages data.

For this Report, the team collected and reviewed publicly available data from the U.S. Census, FEMA, HUD, 2021 Nebraska Hazard Mitigation Plan, 2022 Nebraska State Flood Hazard Mitigation Plan (State FHMP), and Nebraska's CDBG-DR Action Plan for DR-4420. The team was also able to access geospatial data through state and federal agencies.

Source: https://www.nytimes.com/interactive/2019/09/11/us/midwest-flooding.html

Findings

More work is necessary to increase Nebraska's resiliency and preparedness for future flood-related disasters. The scale and scope of recorded damages from the 2019 disaster firmly brought into focus the need for enhanced mitigation efforts across the state. In addition to supporting the need for improvements to stormwater drainage and emergency management alert tools, this Report echoes the findings of the SFHMP to expand nonstructural mitigation alternatives, including retrofits, land preservation, and acquisitions; updates to local building, design, and zoning codes or ordinances; and expanding participation in the National Flood Insurance Program, including incentivizing the Community Rating System at the state or county level. Critical to implementing these mitigation efforts at the state, regional, and local level is increasing awareness and understanding of flood risk and vulnerability across all ages and populations, so communities integrate flood risk mitigation planning into their long-term vision and comprehensive planning processes before disaster strikes.

Additional review of specific conditions within jurisdictions, coordination between natural resource districts and local governments, and community engagement is necessary to determine an implementation approach that considers risk and capacity, to right-size mitigation measures, and ties them to other community and economic development initiatives. For example, a community's flood risk may be reduced by expanding greenspace near waterways while also enhancing its available recreation areas, which can spur economic development – resulting in an increased tax base and funding to support other community needs. In all cases, it will be important for community members to be informed and engaged in the process. Given the proximity of many Nebraska communities to rivers and streams, flood risk and vulnerabilities should be accessed in all comprehensive and community planning processes as a matter of best practice, if not regulation.

Key Recommendations

- Floodplain & Stormwater Management – Up to date mapping, regulation, zoning changes, etc.
- Building Codes – Base flood elevation (BFE) levels, retrofitting, Flood zone designated areas, raised utility systems, etc.
- Community Education, Resilience & Awareness – Education campaigns, workshops, community meetings, local partnerships, and cultural and linguistic diversity of resources.
- Land Use Planning & Floodplain Restoration – Sustainable land use principles, constructed wetlands, expanded green spaces, etc.
- Community led initiatives (local, county, state) – Grants, and incentives, Centralized planning (local officials/state, police, fire, hospitals, etc.), Identification of key partners for designated areas, emergency planning exercises.

Introduction and Project Environment

FEMA has long been associated with disaster-response and recovery; however, with HUD's allocations of CDBG-DR occurring nearly annually since 1993, they've played an increasing role in the long-term recovery of affected communities. As of FY2023, Congress has allocated $99.8 Billion in CDBG-DR funding. Nebraska is the recipient of $108.9 Million in CDBG-DR to serve as a 'downpayment' towards its recovery from 2019's Winter Storm Ulmer, straight-line winds, and flooding. Classified as a Bomb Cyclone, the storm that set the stage for Nebraska's CDBG-DR program which aims to implement and fund activities addressing unmet needs not yet filled by other federal programs. The method of distribution is incorporated in the State's CDBG-DR Action Plan, as amended (Nebraska Department of Economic Development, 2024).

This Report is a function of the CDBG-DR Risk Awareness and Resilience Planning activities. The purpose of this Community Flood Risk, Mitigation, and Adaptation Report: the HUD Most Impacted and Distressed Areas for Nebraska DR-4420 ("Report") is to establish a robust baseline of disaster impacts in the context of socio-economic conditions and flood risk. The team carried out an assessment of communities in the counties of Dodge, Douglas, and Sarpy with special review and consideration given to vulnerable populations and the intersection of flood vulnerabilities.

The goal of this Report is to facilitate and promote comprehensive community resilience, resulting in built environments that are more resilient to the impacts of natural disasters. We aim to inform the public, policymakers, and elected officials to support decision-making. In a time when federally declared disasters are becoming more common and damages are widespread, conversations around community resilience are critical and special considerations can and should be extended to be responsive to the needs and risks uniquely experienced by the most vulnerable populations. Before any meaningful analysis can be done to determine how best to support vulnerable populations, the socio-economic conditions must be documented.

> "*Flooding is not new to Nebraska. Notable storms have impacted the state in 1993, 2000, 2010, and 2011, resulting in numerous presidential disaster declarations and hundreds of millions of dollars spent on recovery, funded by FEMA's PA Program. Despite this history of flooding, the impacts of the 2019 disasters were unprecedented and created devastating results.*
>
> *During the 2018-2019 winter season, Nebraska experienced record low temperatures that created frost depths approximately two feet deep and ice cover on rivers and creeks that eventually caused ice jams in several locations. February 2019 was also the coldest month in 18 years in Nebraska. Recorded temperatures were 12 to 15 degrees lower than normal across most of the state during this period. These factors contributed to the unprecedented damage Nebraska experienced in the months that followed*." – Section 1.2 Summary of Storm Impact, State of Nebraska Disaster Recovery Action Plan: Severe Winter Storm, Straight-line Winds, and Flooding (DR-4420), April 2021, APA3 (Substantial), Revised January 2024.

Following its worst disaster, the recovery process in Nebraska would be further complicated by the disaster brought on by an infectious disease (FEMA, n.d.). Completed July 2020 as part of the action planning process, the state's initial unmet needs assessment (UNA), part of the state's Initial Action Plan, established an estimated long-term recovery need of $249.9M. Exacerbating the matter, that assessment was completed less than six months into the world-wide COVID-19 pandemic. Thus, the costs of recovery have been further compounded by the socio-economic and fiscal stresses imposed by the unprecedented public health crisis.

On December 3, 2019, the U.S. Department of Housing and Urban Development (HUD) announced an unprecedented allocation of federal funding to support Nebraska's long-term recovery. In early 2019, the State of Nebraska suffered record-breaking damage due to severe winter weather (Winter Storm Ulmer), straight-line winds, and flooding, all of which contributed to a major disaster declaration (DR-4420) under the Stafford Act. Due to magnitude of damage and initial understanding of unmet needs, the State of Nebraska was granted $108,938,000 through HUD Community Development Block Grant for Disaster Recovery program to support long-term recovery efforts. The CDBG-DR program is intended to fund activities that specifically address unmet recovery needs in impacted communities. As the HUD-identified Most Impacted and Distressed (HUD-MID) areas, Sarpy, Dodge, and Douglas counties will be the target recipients of at least 80% of CDBG-DR funds.

Table 1: HUD Damage Categories, from the State of Nebraska CDBG-DR Action Plan, as Amended (Retrieved February 1, 2024)

Category		Real Property Damage	Personal Property Damage
Minor-Low		Less than $3,000	Less than $2,500
Minor-High		$3,000 to $7,999	$2,500 to $3,499
Serious Unmet Housing Needs	Major-Low	$8,000 to $14,999	$3,500 to $4,999
	Major-High	$15,000 to $28,800	$5,000 to $9,000
	Severe	Greater than $28,800, destroyed or 6+ feet of flooding	Greater than $9,000, destroyed or 6+ feet of flooding

Table 2: HUD Unmet Need Estimating Factors in Counties with Individual Assistance Declarations from the State of Nebraska CDBG-DR Action Plan, as Amended (Retrieved February 1, 2024)

County	Insurance Coverage		SBA Loans		HUD Category		
	Number of Claims		Number of Loans		Number of Claims		
	Homeowners	NFIP	Applied	Approved	Real Property	Personal Property	
						Owner	Renter
Dodge	676	319	441	189	832	86	77
Douglas	666	222	466	206	623	136	55
Sarpy	552	201	609	283	398	264	172
Remaining Counties	2,374	290	1,119	559	2,561	184	67
Total	4,268	1,032	2,635	1,237	4,414	670	371

The FRN and supplemental memorandum tied to Nebraska's CDBG-DR allocation listed a total of over $25.9M or 710 housing units having "serious unmet need" in the HUD-MID, as originally defined; and a total of over $78.4M in infrastructure need directly related to CDBG-DR eligible infrastructure needs tied to FEMA Public Assistance (PA) projects across all 84 declared counties and four tribal areas. Making up over 90% of its counties, the disaster-declared areas following the 2019 event, extended across a good portion of the state and conspicuously align with the path of the state's rivers and water channels.

Table 3: HUD Total Serious Unmet Need Estimate (Initial Action Plan), from the State of Nebraska CDBG-DR Action Plan, as Amended (Retrieved February 1, 2024)

County		Zip Codes	Estimated Serious Unmet Housing Needs			
			Value ($)	Number of Housing Units		
				Owner	Renter	Total
HUD-Defined MID Area	Dodge	68025	$4,961,936	137	32	169
	Douglas	68064	$4,659,244	100	31	131
		68069	$2,287,482	58	5	63
	Sarpy	Entire County	$14,003,818	280	67	347
Total			$25,912,480	575	135	710

Table 4: Details of HUD Infrastructure Unmet Needs Calculation from the State of Nebraska CDBG-DR Action Plan, as Amended (Retrieved February 1, 2024)

Category	Value
HUD Permanent Facilities (FEMA Cat C-G) Estimate	$444,614,309.51
Federal Share	$400,152,878.56
Local Share (Unmet Need)	$44,461,430.95

Table 5: Summary of Unmet Needs (Initial Action Plan) from the State of Nebraska CDBG-DR Action Plan, as Amended (Retrieved February 1, 2024)

	Housing	Infrastructure	Economic Revitalization	Total
Unmet Needs	$36,576,270	$196,163,422	$17,242,691	$249,982,383
Percentage of Total Unmet Needs	14.60%	78.50%	6.90%	100%

Table 6. FEMA and HUD, Misson Statements for Federal Agencies involved in Disaster Recovery Efforts

Federal Agency	
FEMA	HUD
FEMA's mission is helping people before, during, and after disasters, and our core values and goals help us achieve it.	HUD's mission is to create strong, sustainable, inclusive communities and quality affordable homes for all. HUD is working to strengthen the housing market to bolster the economy and protect consumers; meet the need for quality affordable rental homes; utilize housing as a platform for improving quality of life; build inclusive and sustainable communities free from discrimination and transform the way HUD does business.

Addressing the Gap: Flood Vulnerability and Vulnerable Populations

Like the impacts of climate change, research shows that lower income and other disadvantaged populations are especially vulnerable to disasters and disproportionately affected by the associated damages; this includes the geographic location where they live and work. Vulnerable populations, as defined by HUD, include the working poor, minorities, Native Americans, people with disabilities, people with AIDS, the elderly, and the homeless.

Perhaps better known for its involvement in disasters and mitigation efforts, FEMA's mission has not historically been positioned to address the unique circumstances and experiences of vulnerable populations whereas HUD has been driven by equity since its inception. In more recent years, both federal agencies are more closely aligned in their respective roles in the disaster recovery process; however, more enhanced coordination between the agencies would result in more effective recovery and mitigation in the face of future disasters, including how entities gather and report data throughout the disaster itself, response, recovery, and mitigation.

Furthermore, in its CDBG-DR guidance, HUD also emphasizes the overall importance of resiliency and mitigation and implicates the federal funding's role in supporting those goals. CDBG-DR is intended to fill the gaps remaining from State and other federal resources to support the long-long-term recovery needs. Given HUD's mission, CDBG-DR rather than FEMA funding programs, thus, may be the federal resource best situated to address vulnerable populations in the face of the disaster recovery process. As acknowledged by FEMA and noted in NeDNR's 2022 State Flood Hazard Mitigation Plan (State FHMP), mitigation is the most cost-effective means to reducing or eliminating long-term risk to people and property (Nebraska Department of Natural Resources, 2022).

Using HUD's own analysis, the cost of Nebraska's disaster impacts following the 2019 disaster was higher for infrastructure than housing; and owner-occupied housing experienced more reported damages than renter-occupied housing. Given the scope of the PA projects as reported in the Nebraska's CDBG-DR Initial Action Plan, the largest costs for recovery were for roads and bridges – which can be very costly, particularly for those communities with a smaller tax base. Still, at the time of the initial UNA, and based on FEMA Database (as of March 16, 2020), 2,492 persons previously living in a damaged dwelling were reported as displaced. Jurisdictions having a concentration of vulnerable populations are more likely to have more renter-occupied housing, constrained housing stock, and less general funds to support the cost of repairs, improvements, and maintenance for its infrastructure.

Figure 1: Ice Accumulation after 2019 Disaster, Knox County

Source: Knox County Emergency Manager

Table 7. Owner and Renter Displacement Status from the State of Nebraska CDBG-DR Action Plan, as Amended (Retrieved February 1, 2024)

	Damaged Dwelling	New Rental Unit	Displaced	Total
Owner	3,298	289	1,869	5,456
Renter	481	229	623	1,333
Total	3,779	518	2,492	6,789
% of Total	56%	7%	37%	100%

In the State FHMP, NeDNR includes a detailed record of where flooding has historically occurred and presents recommendations for how to reduce those flood-related vulnerabilities. Not specifically addressed are the socio-economic conditions of those areas. This Report aims to incorporate that missing information to facilitate understanding towards an equitable recovery and mitigation efforts that are considerate of capacity constraints within communities – especially those having concentrations of vulnerable populations, which are likely to be disproportionately challenged by the cost of mitigation and recovery.

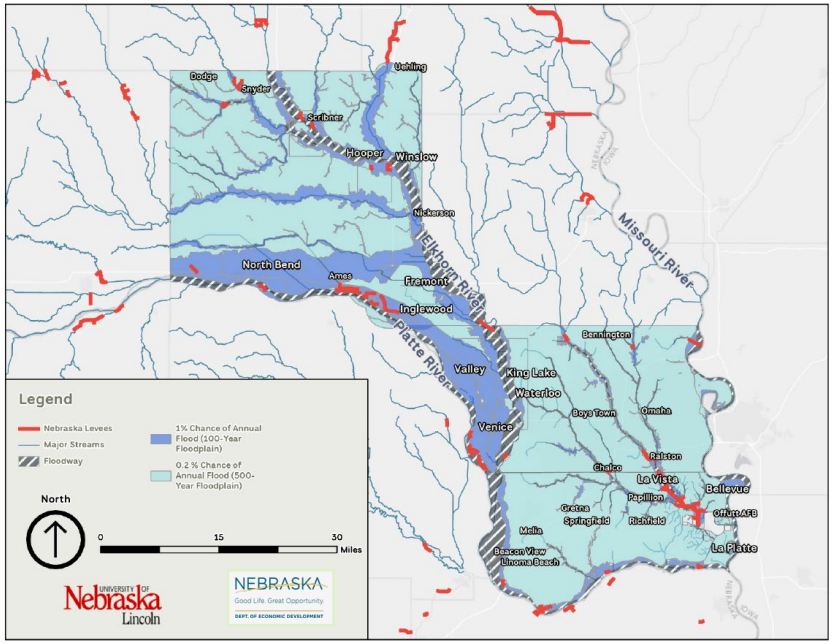
Chapter 1: Community Facts

Introduction

This chapter presents the community facts about three of the Nebraska flood-affected counties and their respective communities:

- **Dodge County**
  - City of Fremont
  - City of Hooper
  - Village of Inglewood
  - City of North Bend
  - Village of Winslow
- **Douglas County**
  - King Lake CDP
  - City of Valley
  - Venice CDP
  - Village of Waterloo
- **Sarpy County**
  - City of Bellevue
  - La Platte CDP
  - City of La Vista

Map 1.1: Nebraska Flood-Affected Counties and Communities



The community facts will focus on demographics (population information), economic characteristics (employment and household income), information on housing stock, and the critical facilities located in the communities. Data was collected from the US Census Bureau, the Nebraska Department of Environment and Energy, and through JEO Consulting Group.

Dodge County

Community Profile

Population

According to the 2022 American Community Survey (ACS) 5-year summary, the population for Dodge County has grown modestly over the years: from 36,576 in 2017 to 37,175 in 2022 (Figure 1.1). There are ten municipalities within the county, with Fremont being the largest and the county seat. Population for municipalities within the county fluctuated, with Ames seeing the highest population decline and Winslow and Inglewood with the highest population increase. Potential reasons for population growth in Winslow may be a result from a high margin of error when calculating the results. As for Inglewood, its proximity to Fremont may account to its large increase in population over the years.

Figure 1.1: Population in Municipalities, Dodge County, NE

Source: US Census Bureau 2010 Decennial Census, 2020 Decennial Census, and 2022 ACS 5-year summary

Age and Sex

The average age for Dodge County is 39.4 years (2022 ACS 5-year summary). About 19% of the population in Dodge County is over the age of 65 and 24.5% of the population is under the age of 18 according to the 2022 ACS 5-year summary. Figure 1.2 shows the age groups broken down between female and male residents in Dodge County. Overall, Dodge County's population is split evenly between males and females based on data from the 2022 ACS 5-year summary.

Race

The demographics in Dodge County is predominantly White, accounting for 88.5% of the total population. Figure 1.3 breaks down the county's race demographics using the 2022 ACS 5-year summary data.

Figure 1.2: Population by Age and Sex, Dodge County, NE

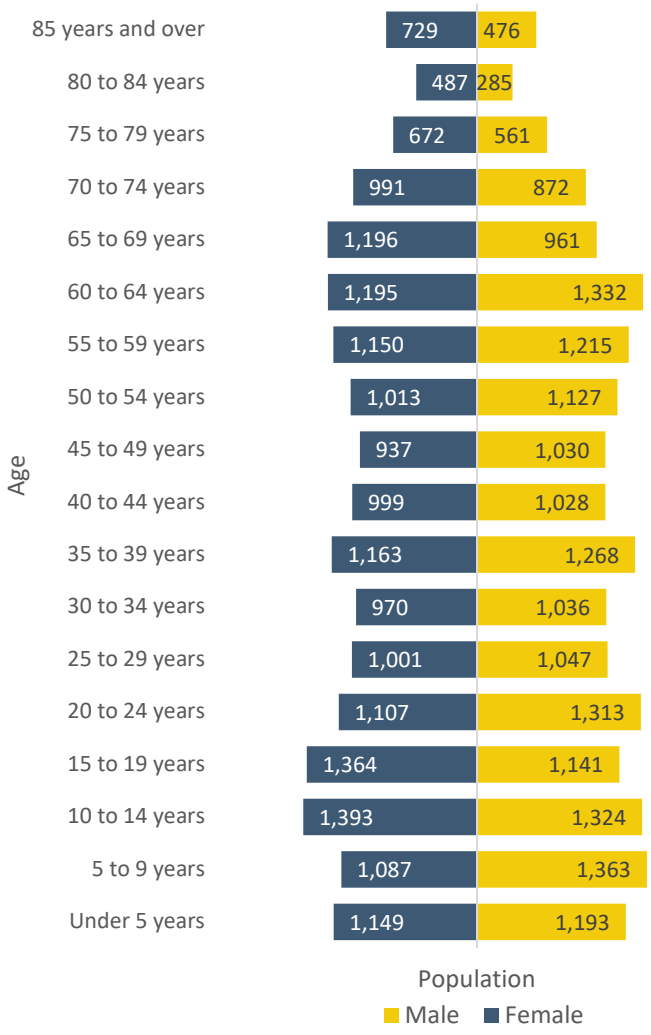
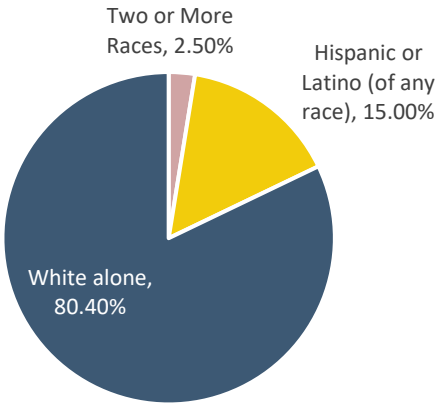
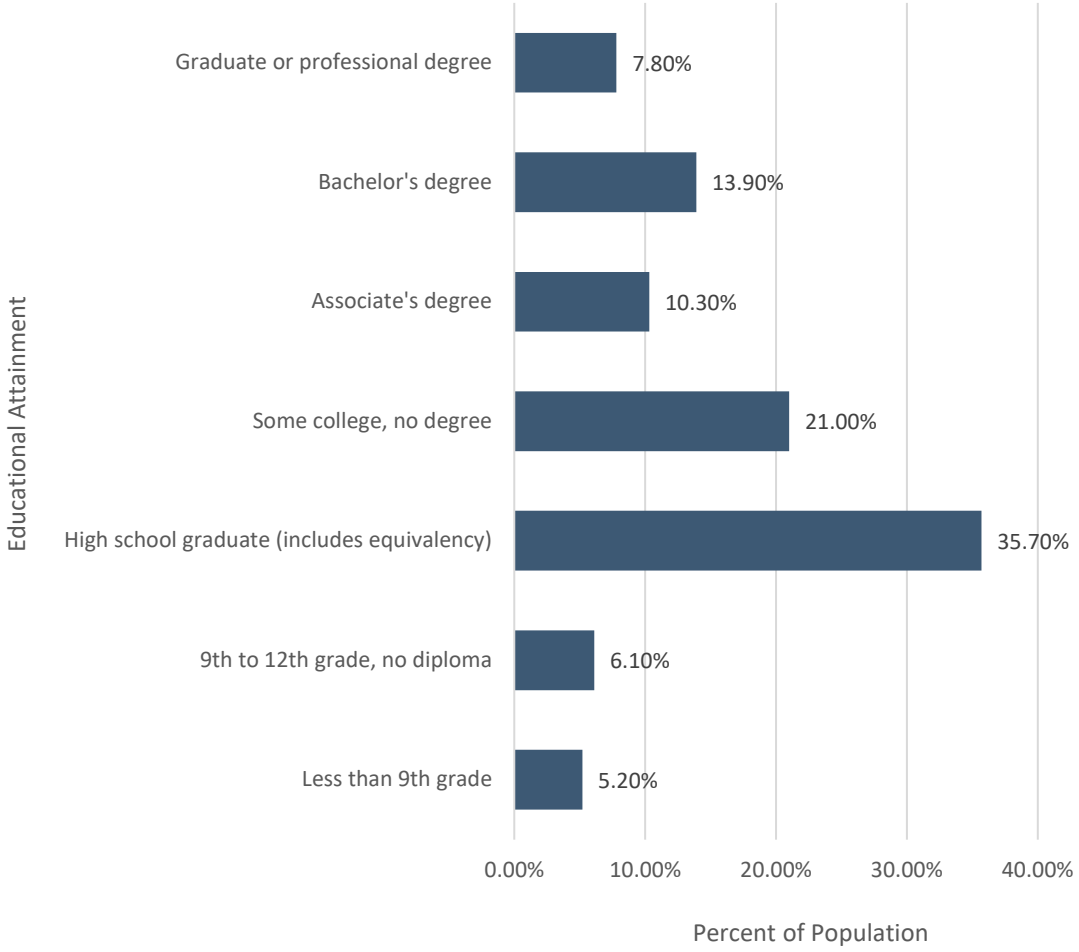


Figure 1.3: Population by Race, Dodge County, NE



Source: 2022 ACS 5-year summary

Figure 1.4: Educational Attainment, Dodge County, NE



Source: 2022 ACS 5-year summary

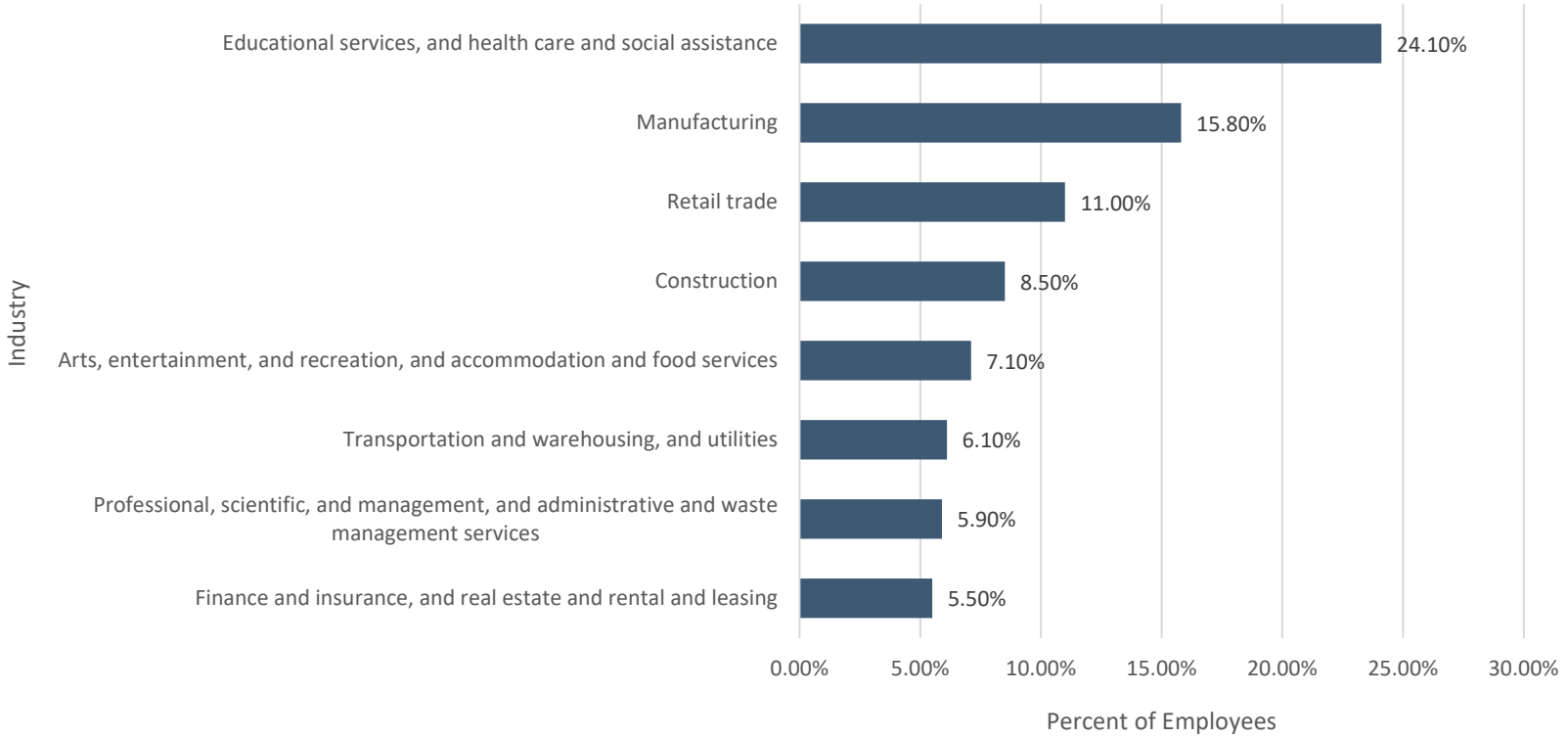
Educational Attainment

The educational attainment for residents 25 years old and older in Dodge County is shown in Figure 1.4. Almost 90% of the population has a high school degree or higher, and 32% of the population has received a higher education degree.

Economic Characteristics

A major economic industry in Dodge County is the educational services, healthcare, and social assistance sector, accounting for about 24% of the working-age population. When looking at Figure 1.5, the second-largest industry in terms of workers is manufacturing, followed by retail trade. Midland University is located in Fremont, and there are a handful of medical clinics and health facilities in Fremont, Dodge Village, and Hooper. There are also many agricultural and livestock factories in the county.

Figure 1.5: Employment by Industry, Dodge County, NE



Source: 2022 ACS 5-year summary

Household Income

The average household income for residents in Dodge County is $66,793; Figure 1.6 shows what percent of households earns for each income category (2022 ACS 5-year summary). For Nebraska, the average household income is $71,122 (Census Business Builder-2022 ACS 5-year summary).

Nearly 9% of Dodge County's population has an income below the poverty level (2022 ACS 5-year summary). Of that population, 9.7% are children under 18 years of age. The U.S. Census defines poverty threshold using household income and size. By comparison, the national poverty rate in 2022 is 11.5% according to the U.S. Census Bureau (Shrider & Creamer, 2023).

Figure 1.6: Household Income, Dodge County, NE

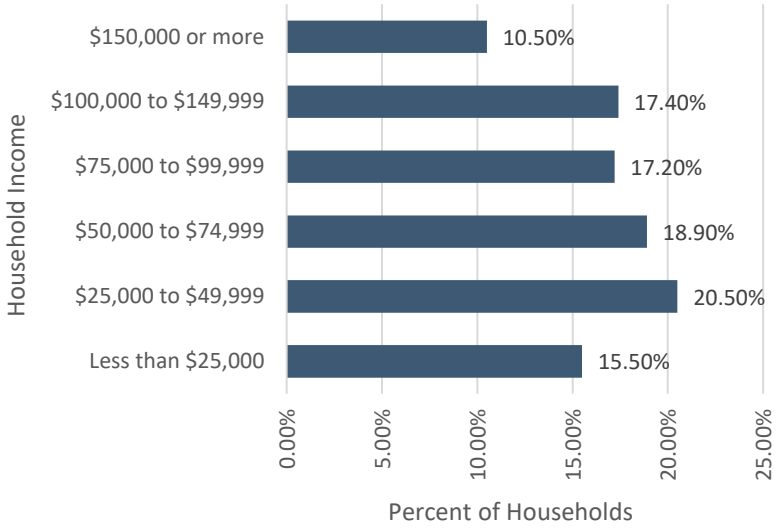
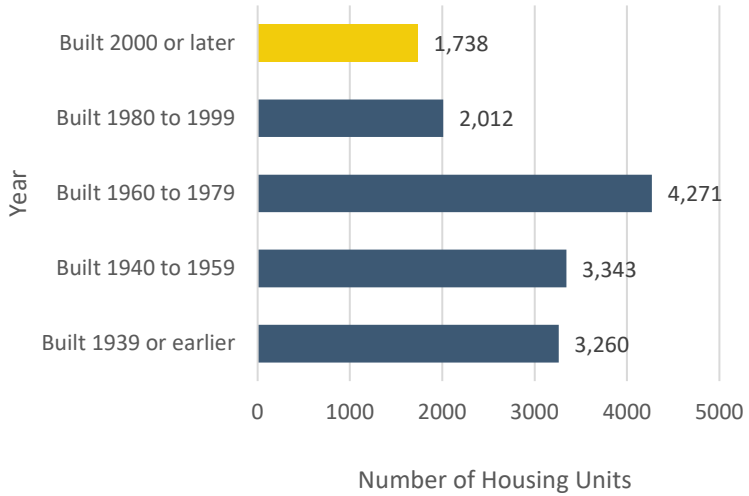


Figure 1.7: Age of Housing Units, Dodge County, NE



Source: 2022 ACS 5-year summary

Housing Conditions

Of the total 16,348 housing structures in Dodge County, most of the houses in Dodge County have been built before 2000, with 2,155 houses built before then. Figure 1.7 shows how many houses were built throughout the years. There are a total of 16,348 houses in Dodge County, with 9,613 being owner-occupied 5,011 being renter-occupied, and 1,724 vacated properties (2022 ACS 5-year summary). This has seen a decline based on the 2017 ACS 5-year summary that states the number of housing units being 16,699 (Census Business Builder 2017, ACS 5-year summary).

Approximately 11% of the housing stock is vacant, according to Figure 1.8. There is no information to indicate that these homes are seasonally vacant, meaning they are only occupied for a portion of the year or if they are permanently vacant. The number of vacant homes in an area can determine the housing supply available. Figure 1.9 shows that approximately 66% of occupied units are owner-occupied whereas 34% are renter-occupied, which is close to the national average of about 65% owner-occupied and 35% renter-occupied (2022 U.S. Census QuickFacts).

When looking at the 14,624 housing units that are occupied in Dodge County, almost 5% of them do not have a vehicle available, which equates to 708 households according to the 2022 ACS 5-year summary. Occupied units include both renter- and owner-occupied units. Figure 1.10 shows how many vehicles are available for occupied housing units in the county.

Figure 1.8: Occupied vs. Vacant Housing Units, Dodge County, NE

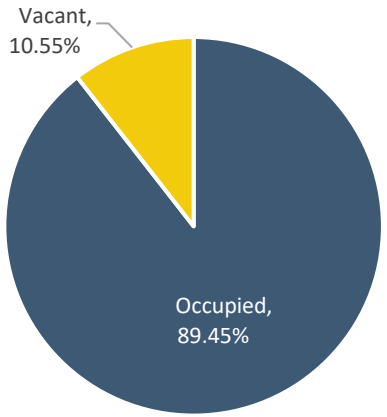


Figure 1.9: Owner- vs. Renter-Occupied Units, Dodge County, NE

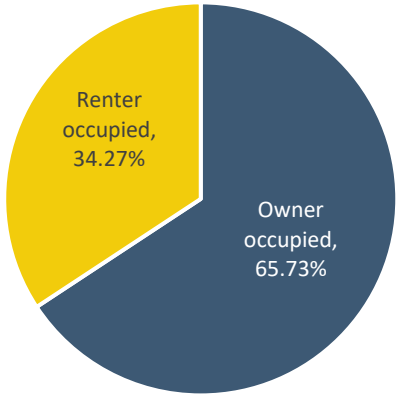
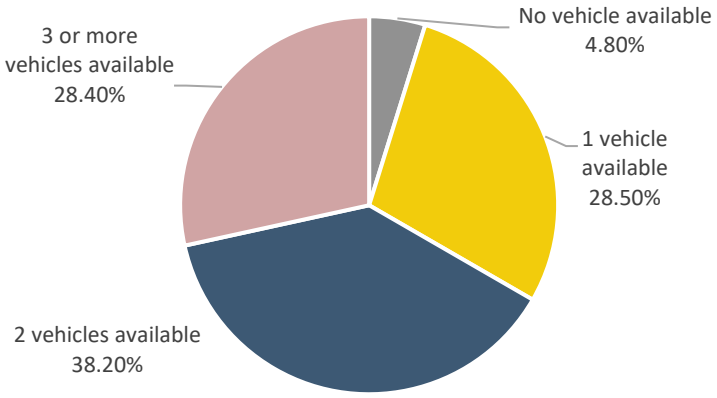


Figure 1.10: Vehicles per Household, Dodge County, NE



Source: 2022 ACS 5-year summary

Critical Infrastructure

Critical infrastructure are structures or areas that are essential for communities. Examples of critical infrastructure can include hospitals, fire and police stations, utility and transportation infrastructure, and storage locations. Locations that produce, use, or store hazardous materials are also considered critical facilities. These types of structures and areas should not be placed in a floodplain; in the case they are, then the facilities should be protected from flooding to a level that is safe and allows the facilities to function during and after a flood. Table 1.1 shows critical infrastructure in Dodge County. Map 1.2 further shows the locations of chemical facilities in the county.

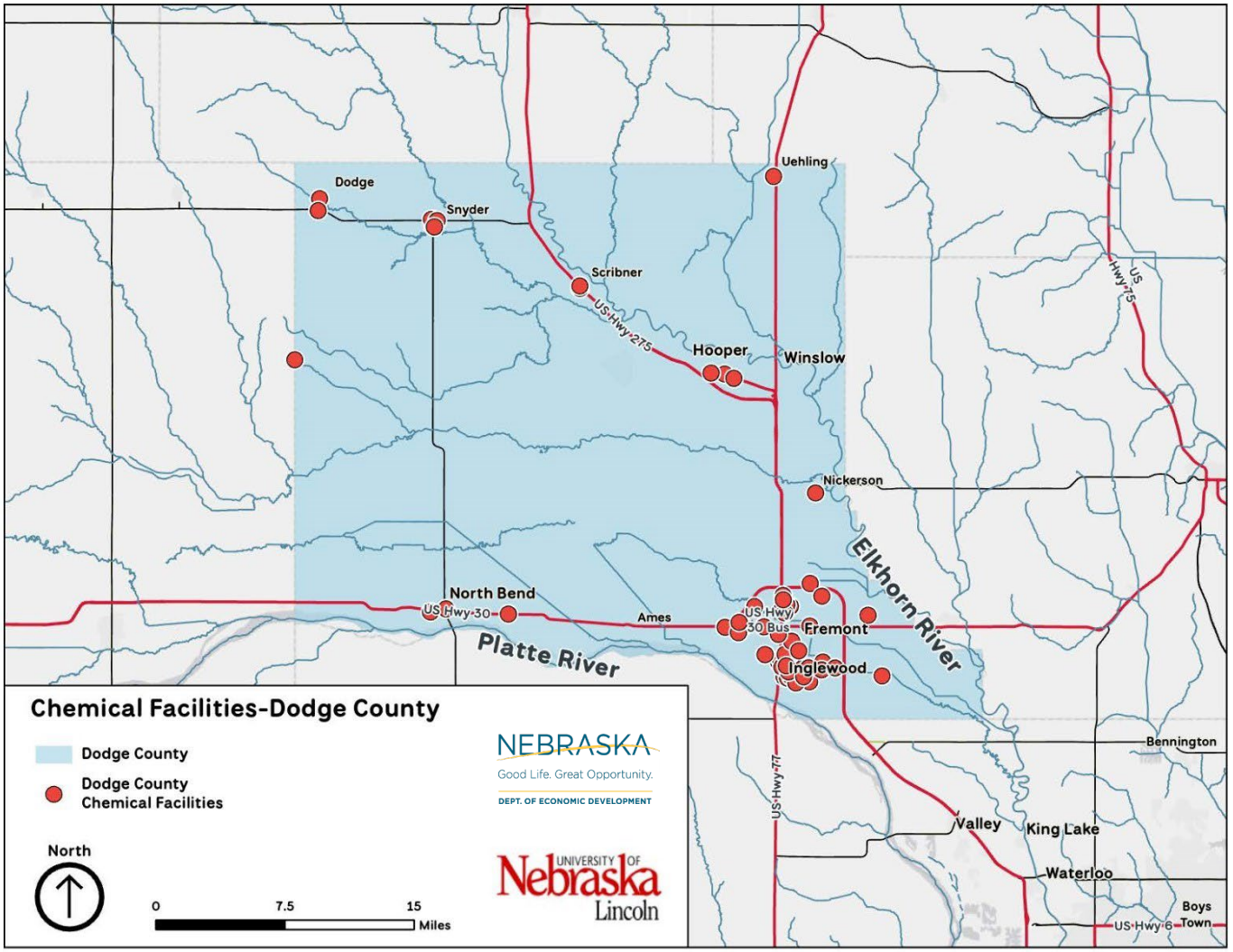
Table 1.1: Critical Infrastructure, Dodge County, NE

		Critical Facilities and Other Assets at Risk of Riverine Flooding	Critical Facilities and Other Assets in Levee Protected Areas	Critical Facilities and Other Assets at Risk of Dam Failure
Natural and Cultural Assets	Wetlands (acres)	15,637	232	9,374
	Threatened & Endangered Species Range (acres)	125,656	7,188	89,897
	Cultural Resources (count)	1	1	3
Population	Vulnerable Population (count)	5	7	21
Structures	State Owned (count)	0	-	-
	Local or Privately Owned (count)	5,137	1,333	14,482
Land Use	Agricultural Lands (acres)	88,052	4,253	59,672
Emergency	Emergency Management (count)	13	12	14
	Emergency Response (count)	4	6	8
Dams and Levees	Dams (count)	7	-	1
	Levees (miles)	39.1	23.3	39.4
Transportation	State (miles)	38.9	6.6	46.0
	Local (miles)	368.5	46.1	478.1
	State Bridges (count)	28	1	25
	State Culverts	15	-	9
	(count)			
	Local	202	2	75
	(count)			
	Railroad (miles)	52.9	18.1	87.8
Utilities	Electric Transmission Lines (miles)	34.6	1.2	55.1
Other	Other (count)	4	4	-
Total	Total Values of Improvements at Risk ($)	$282,926,061	$91,708,641	$1,188,029,248

Source: 2022 State of Nebraska Flood Hazard Mitigation Plan

Note: Facilities "at Risk of Riverine Flooding" are located in areas that can potentially flood when rivers and streams exceed their capacity and spill out into adjacent land areas. "Levee Protected Areas" are areas that are protected from flood risk by federal and local levees but in the case of levee failure, are at risk of flooding. Similarly, areas "at Risk of Dam Failure" are site-specific locations near dams that can be at risk of flooding if the dam fails (State of Nebraska Flood Hazard Mitigation Plan, 2022).

Map 1.2: Chemical Facilities, Dodge County, NE



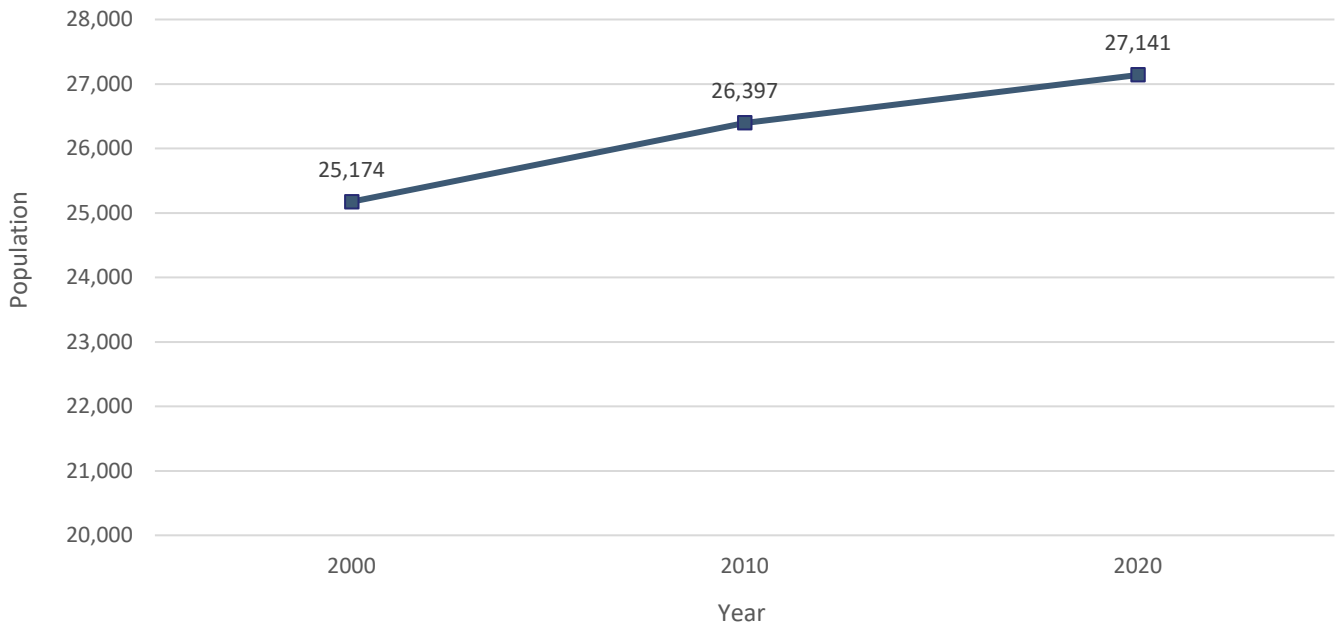
City of Fremont

Population

Fremont has seen a growth in population since 2000 (U.S. Decennial Censuses) as shown in Figure 1.11. Between 2000 and 2020, Fremont has grown by 7.81%, whereas Dodge County has grown by 2.78%. According to the 2022 ACS 5-Year Summary data, Fremont and Dodge County's most recent population estimates are 27,230 and 37,175, respectively. Based on this, Fremont accounts for 73.25% of Dodge County's population, making it the most populous municipality in the county.

Assuming Fremont's population will continue to grow, it is important to be aware of growth patterns to make sure residential areas are not built in areas that are at a high risk of flooding.

Figure 1.11: Population Change, Fremont, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

The median age for residents in Fremont is 37.9 years old, which is 1.5 years younger than Dodge County as a whole. Figure 1.12 breaks down Fremont's population by age cohorts. Almost a quarter of the population is under 18 years of age, and 18.5% of the population is 65 and over. Figure 1.12 shows Fremont's population for each age cohort for males and females. There are a total of 13,687 females and 13,543 males in Fremont, according to the 2022 ACS 5-year summary data.

Race

Racial demographics in Fremont is similar to Dodge County, with a majority white population. The second largest race in Fremont is Hispanic or Latino, with 4,422 of the total 27,230 residents. Figure 1.13 shows the percentage of each racial group in Fremont.

Figure 1.13: Population by Race, Fremont, NE

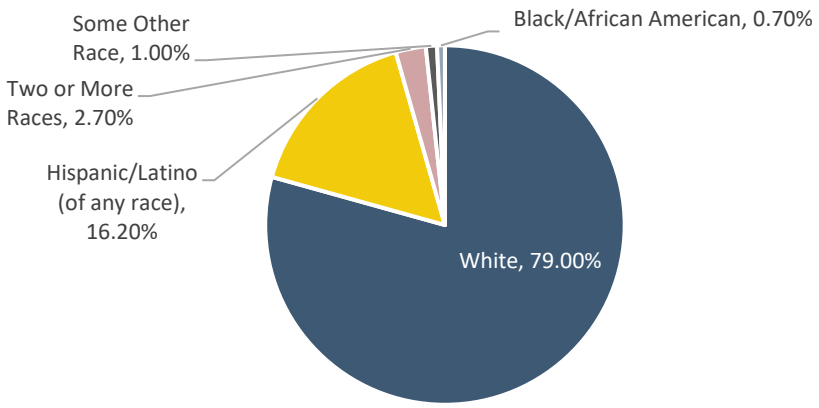
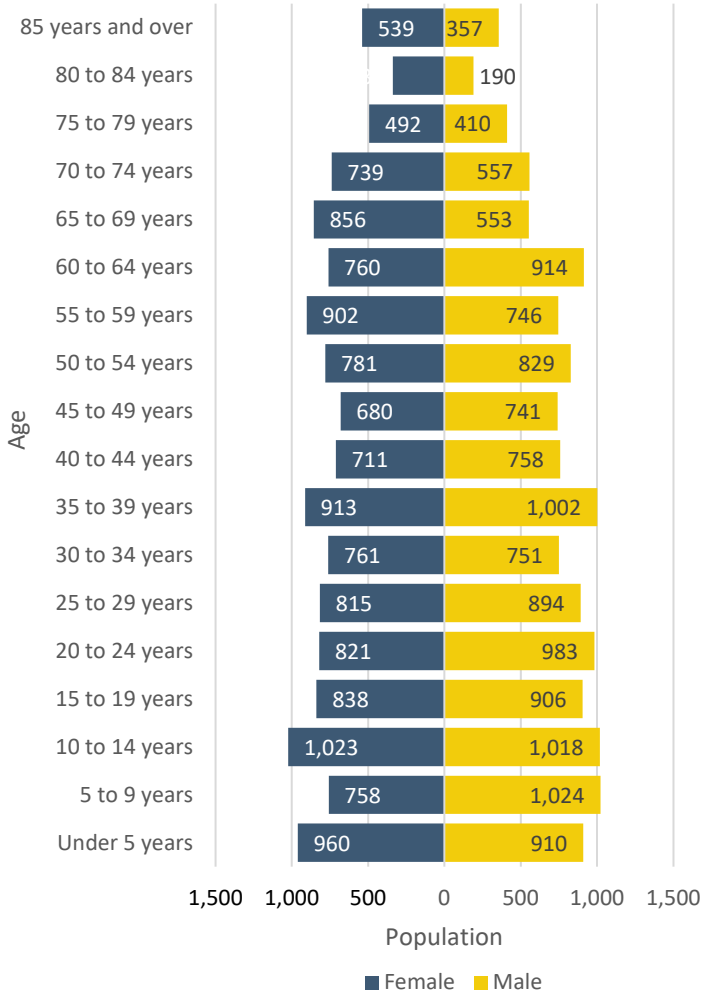
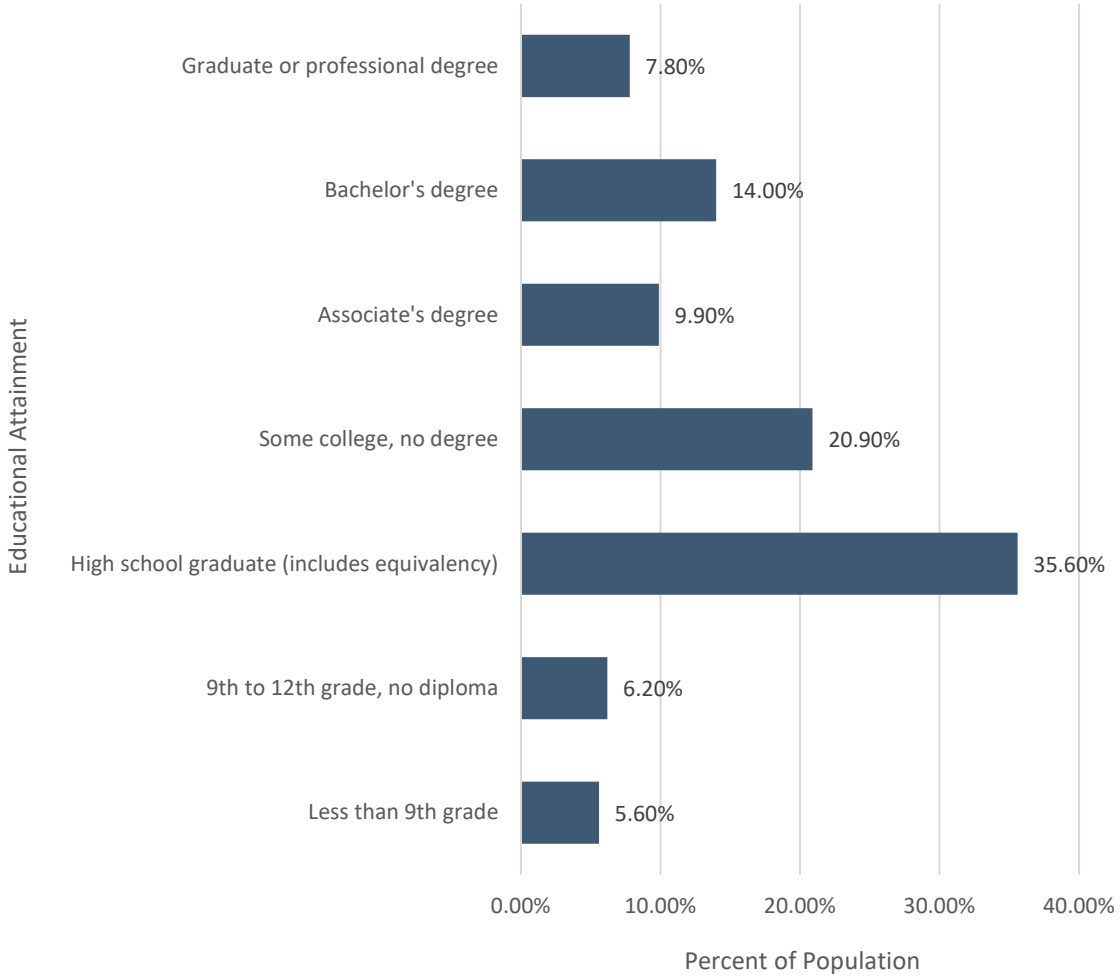


Figure 1.12: Population by Age and Sex, Fremont, NE



Source: 2022 ACS 5-year summary

Figure 1.14: Educational Attainment, Fremont, NE



Source: 2022 ACS 5-year summary

Educational Attainment

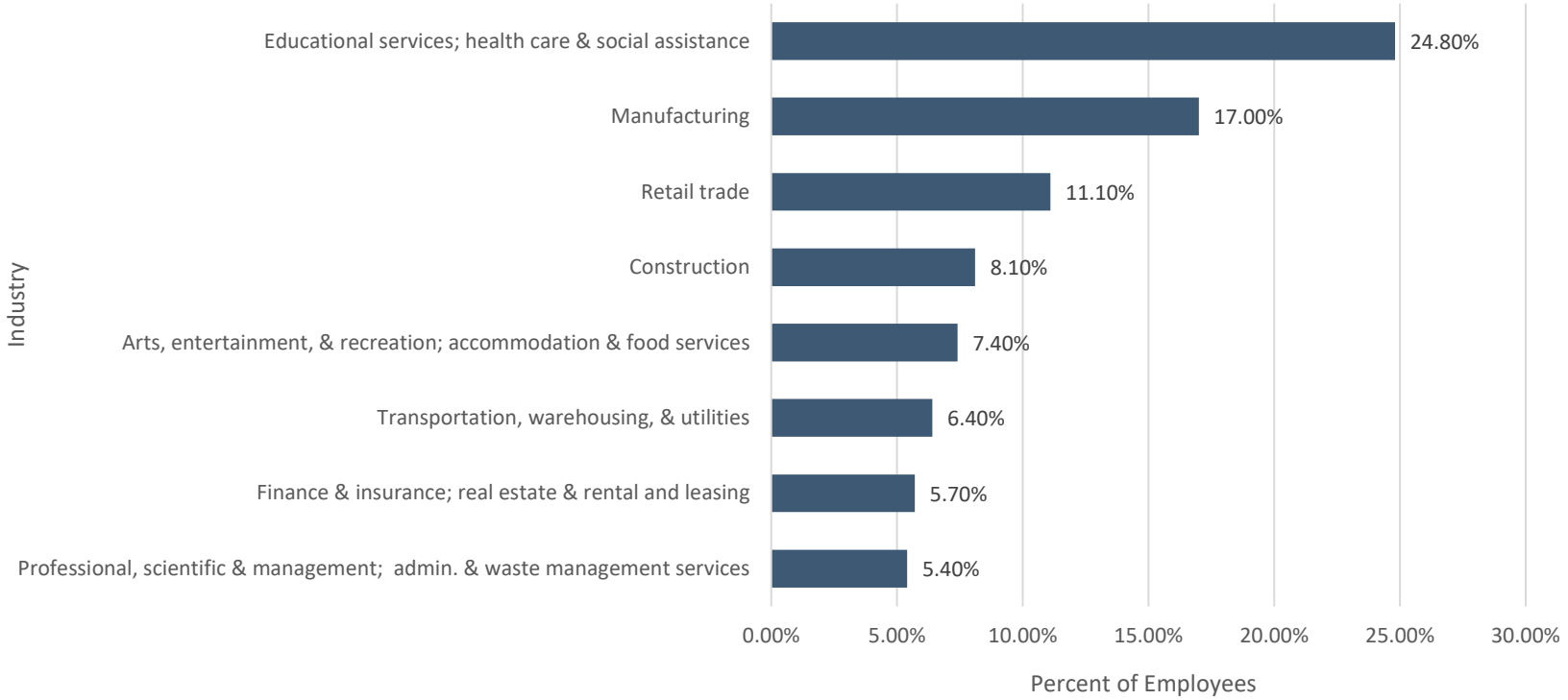
Nearly 90% of Fremont's population has received a high school degree or higher; within that, almost 8% has a graduate or professional degree according to the 2022 ACS 5-year summary. Figure 1.14 shows the percentage of the population within each educational attainment level. This data is similar to Dodge County's education attainment levels.

Economic Characteristics

Fremont has almost one quarter of its workforce ages 16 and older working in educational services, health care, and social assistance. Midland University, a private university, is located in Fremont. There are also numerous health care and social assistive care facilities in Fremont. Figure 1.15 summarizes the population's workforce in each major industry (2022 ACS 5-year summary).

The second-largest industry in Fremont is manufacturing. Fremont has multiple manufacturing facilities within agriculture and livestock, food production, and distribution.

Figure 1.15: Employment by Industry, Fremont, NE



Source: 2022 ACS 5-year summary

Household Income

Median household income in Fremont is $62,226, slightly lower than the $66,793 median household income for Dodge County (2022 ACS 5-year summary). Household incomes are broken down incrementally in Figure 1.16.

About 3,782 households included Social Security as a part of their income. Additionally, an estimated 1,116 households have included food stamps or SNAP benefits in their income within the past year. According to the 2022 ACS 5-year summary, 9.5% of families have an income that is below the poverty level. Of that population, 8.7% have children under the age of 18 living with them. The U.S. Census defines the poverty threshold using household income and size. Dodge County's poverty rate for all people is about 9% and the national poverty rate is 11.5% according to the U.S. Census Bureau (2023).

Figure 1.16: Household Income, Fremont, NE

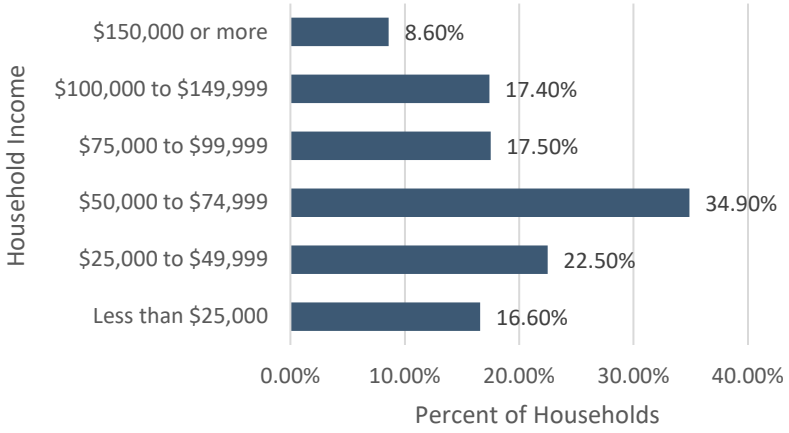
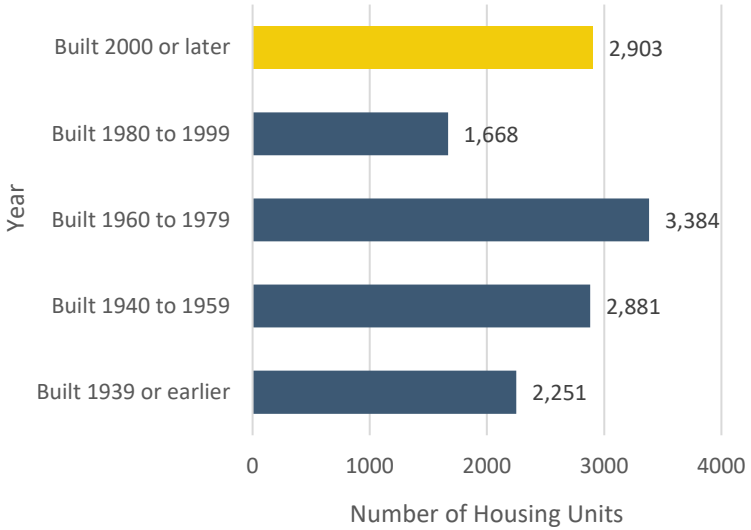


Figure 1.17: Age of Housing Units, Fremont, NE



Source: 2022 ACS 5-year summary

Housing Conditions

There are a total of 11,549 housing structures in Fremont; of those, 10,184 were built before the year 2000, approximately 88% of the housing stock. The amount of housing structures built over time is illustrated in Figure 1.17. From the total amount of units, 10,751 are occupied and 798 are vacant. The homeowner vacancy rate is 0%, indicating that the housing market is in high demand; the rental vacancy rate is at about 8%, which is slightly higher than the national average of about 6% (Figure 1.18).

Housing units have seen a slight rise in Fremont compared to the 11,466 housing units estimated in the 2017 ACS 5-year summary (CBB). The median value for owner-occupied units is $174,000 and $897 for renter-occupied units. Approximately 33% of renter-occupied units claim that rent counts for more than 35% of their household income. According to the Department of Housing and Urban Development, a household is considered "cost-burdened" when more than 30% of its income goes towards housing.

Fremont's almost 7% vacancy rate is lower than Dodge County, which has an 11% vacancy rate (2022 ACS 5-year summary). The owner- vs. renter-occupied rates are slightly different, with nearly 40% of units being renter-occupied, and 60% owner-occupied (Figure 1.19). Fremont appears to have higher renter-occupied units compared to Dodge County and the national average.

The number of households that have at least one vehicle in Fremont is estimated to be 10,111 (2022 ACS 5-year summary). Figure 1.20 breaks down how many vehicles are available for each occupied household in the city. There are 640 households that do not have an available vehicle, accounting for 6% of occupied housing units.

Figure 1.18: Occupied vs. Vacant Housing Units, Fremont, NE

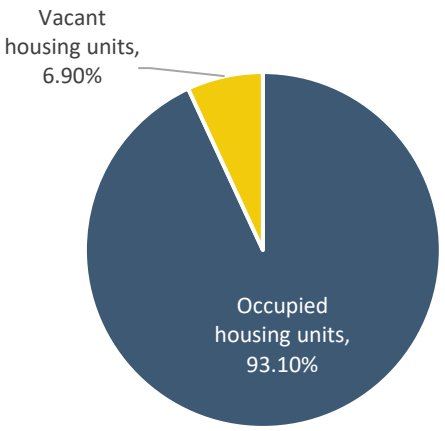


Figure 1.20: Vehicles per Household, Fremont, NE

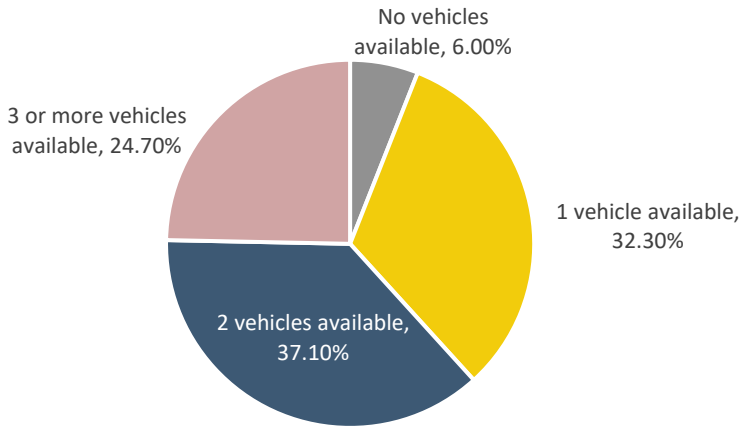
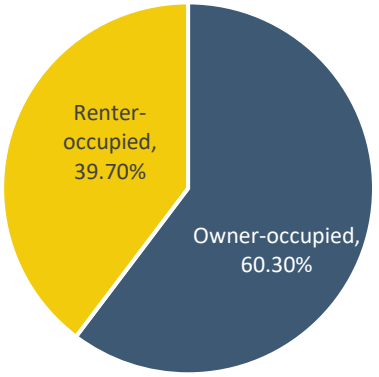


Figure 1.19: Owner- vs. Renter-Occupied Housing Units, Fremont, NE

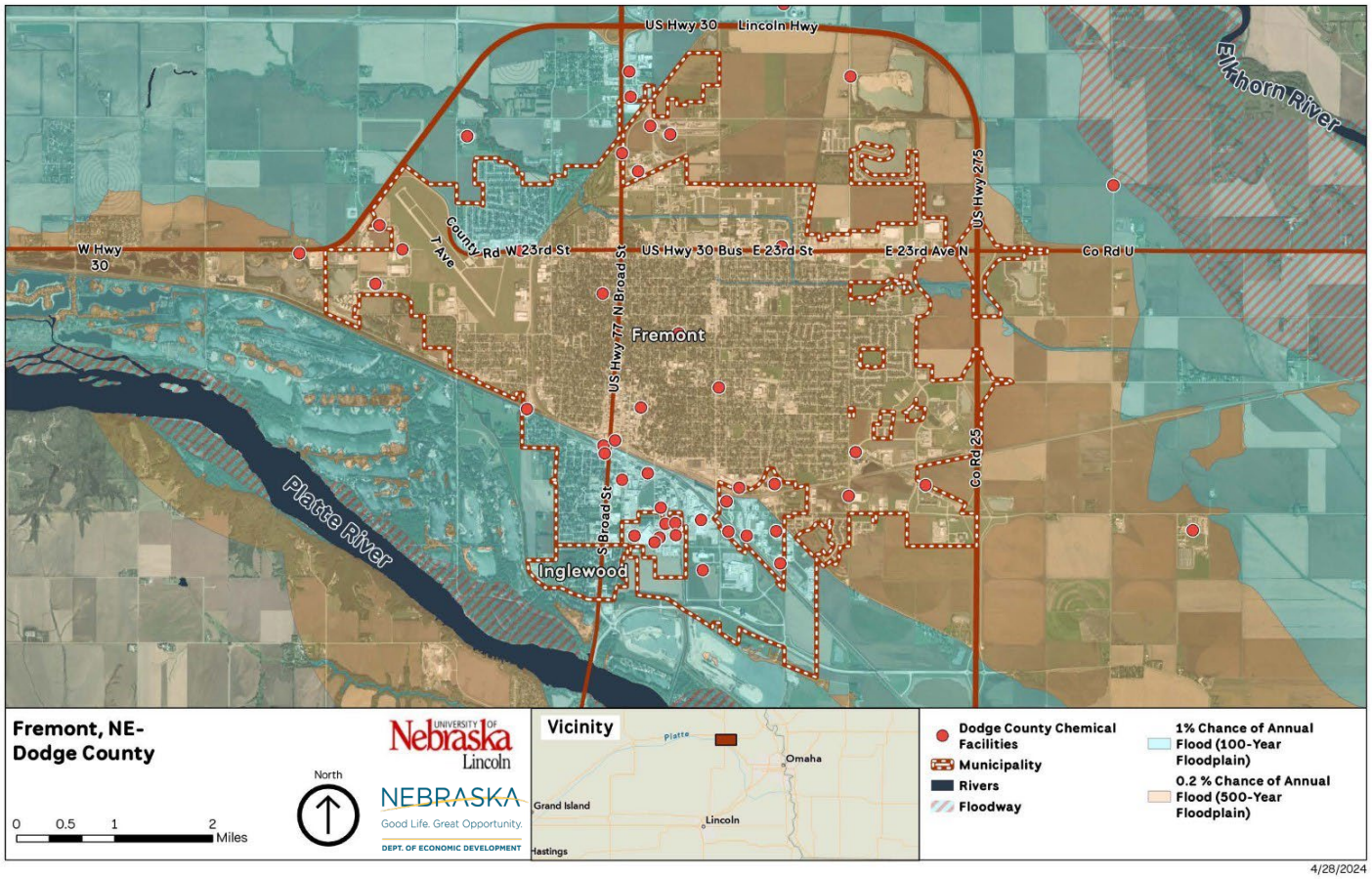


Source: 2022 ACS 5-year summary

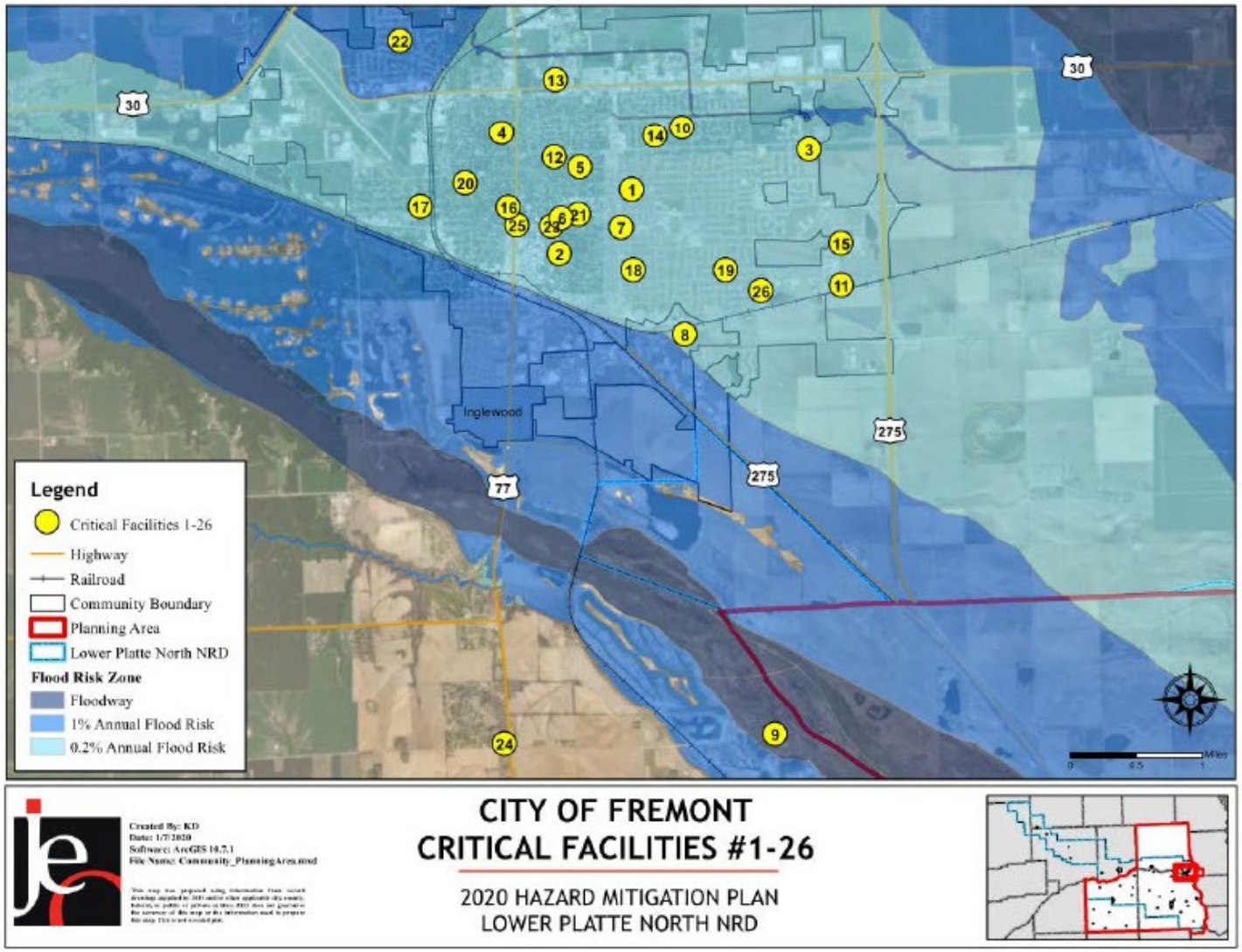
Critical Infrastructure

Fremont has several critical facilities, including hospitals, government buildings, and civic centers. These facilities play a crucial role in serving the community and ensuring its safety and well-being, especially during hazardous events. Additionally, Fremont is home to several factories, including those that produce pollutants, which can impact the environment and community health and should be regarded in the event of a flood or other hazard. The maps followed show chemical storage sites (Map 1.3) and critical facilities (Map 1.4 and Map 1.5) in Fremont.

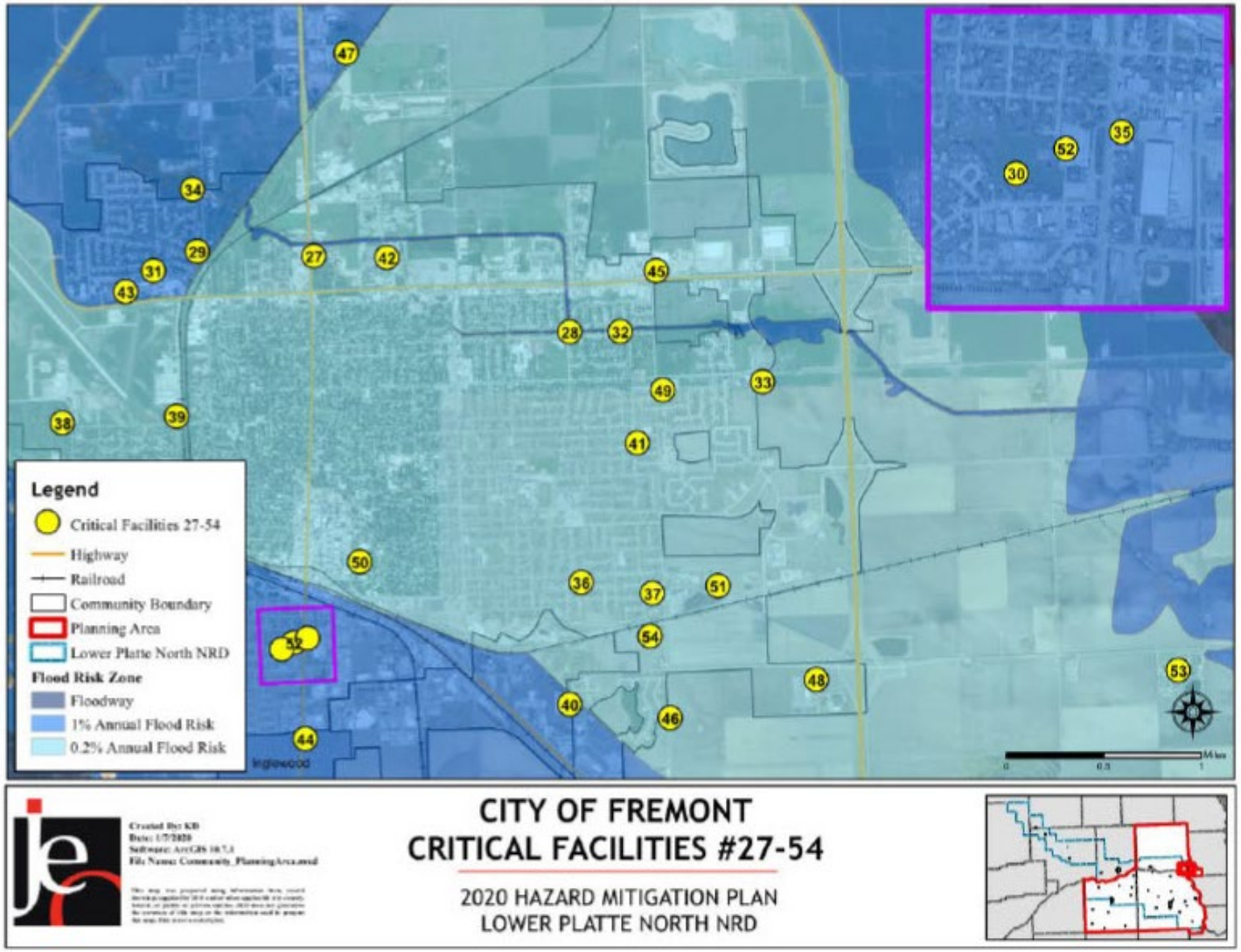
Map 1.3: Chemical Facilities, Fremont, NE



Map 1.4: Critical Facilities, Fremont, NE



Map 1.5: Critical Facilities, Fremont, NE

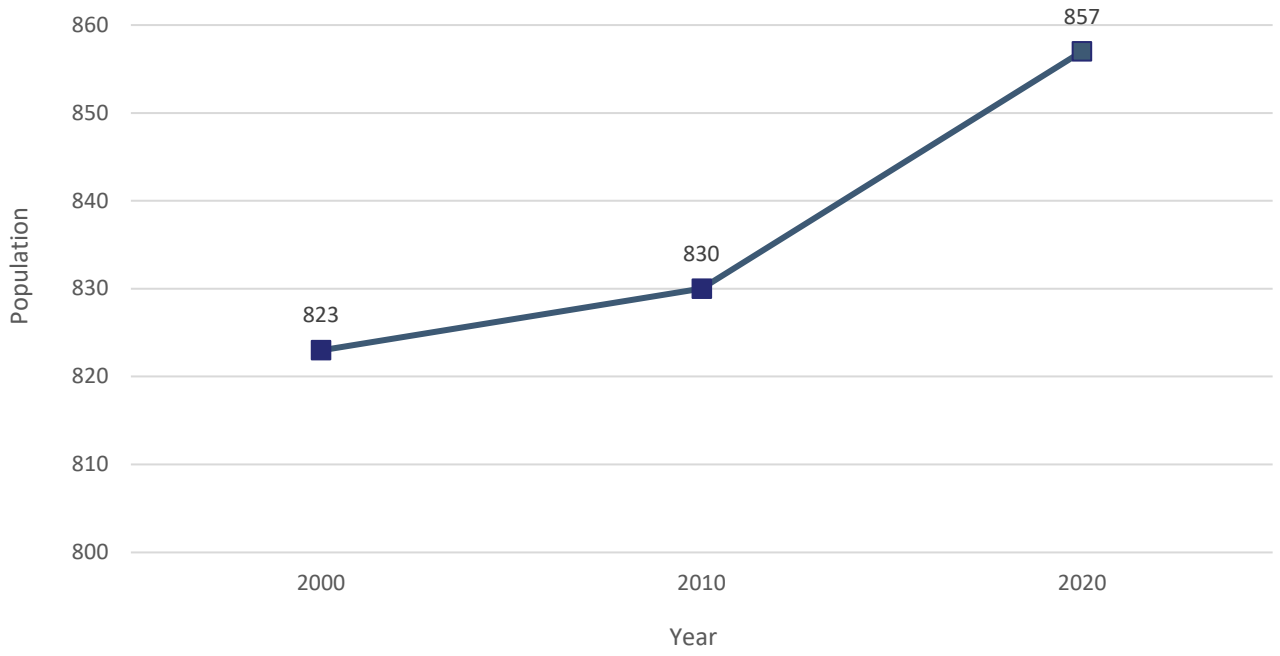


City of Hooper

Population

Hooper city has seen a slight increase in population over the past two decades (Figure 1.21). Between 2000 and 2020, the population in Hooper has grown by 4.13%. According to the 2022 ACS 5-year summary, the population of Hooper city is estimated to be 980 residents. This represents a 14.35% increase from the population of 830 recorded in the 2020 decennial census.

Figure 1.21: Population Change, Hooper, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

Hooper city has a higher percentage of male residents than females; based on the 2022 ACS 5-year summary, 57.7% of the population are male and 42.3% female. Figure 1.22 breaks down the ages within the City for each sex. About 38% of Hooper's population is under 18 years of age, which is higher than Dodge County and national levels. Additionally, the median age for Hooper city is 33.1 years old, more than six years younger than Dodge County's median age.

Race

The racial demographics of Hooper city in Dodge County, Nebraska are predominantly White, accounting for 87.3% of the total population (Figure 1.23). The remaining 12.7% of the population is divided among other races.

Figure 1.23: Population by Race, Hooper, NE

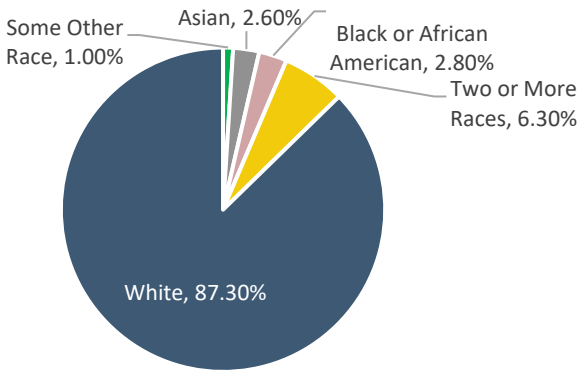
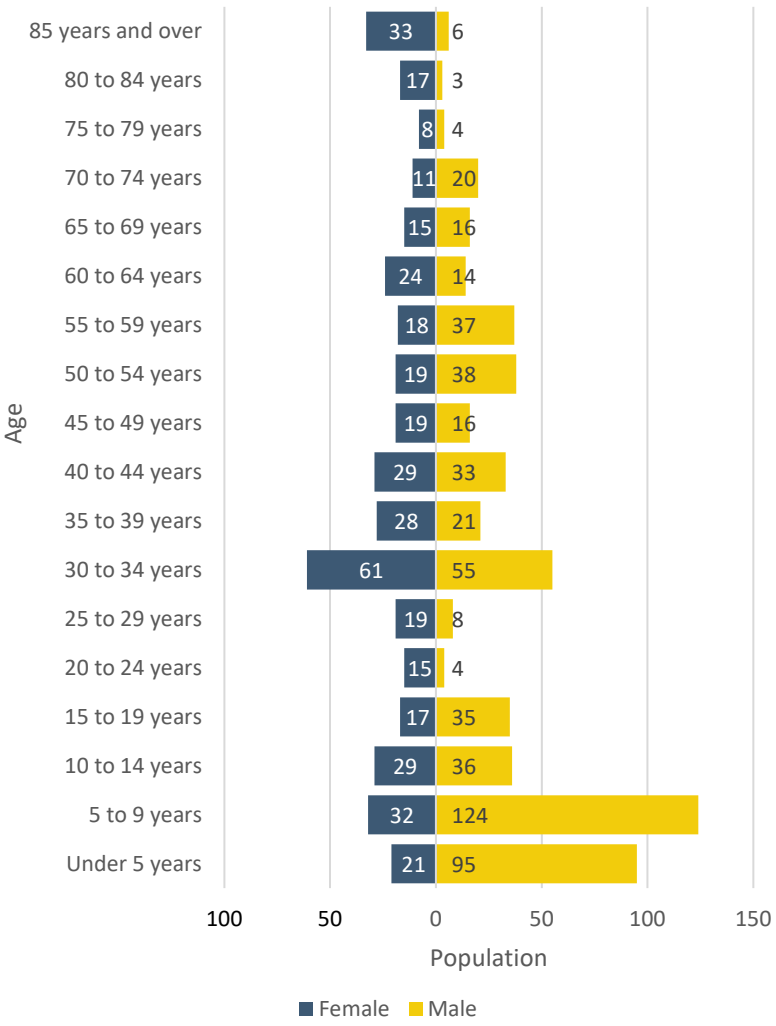
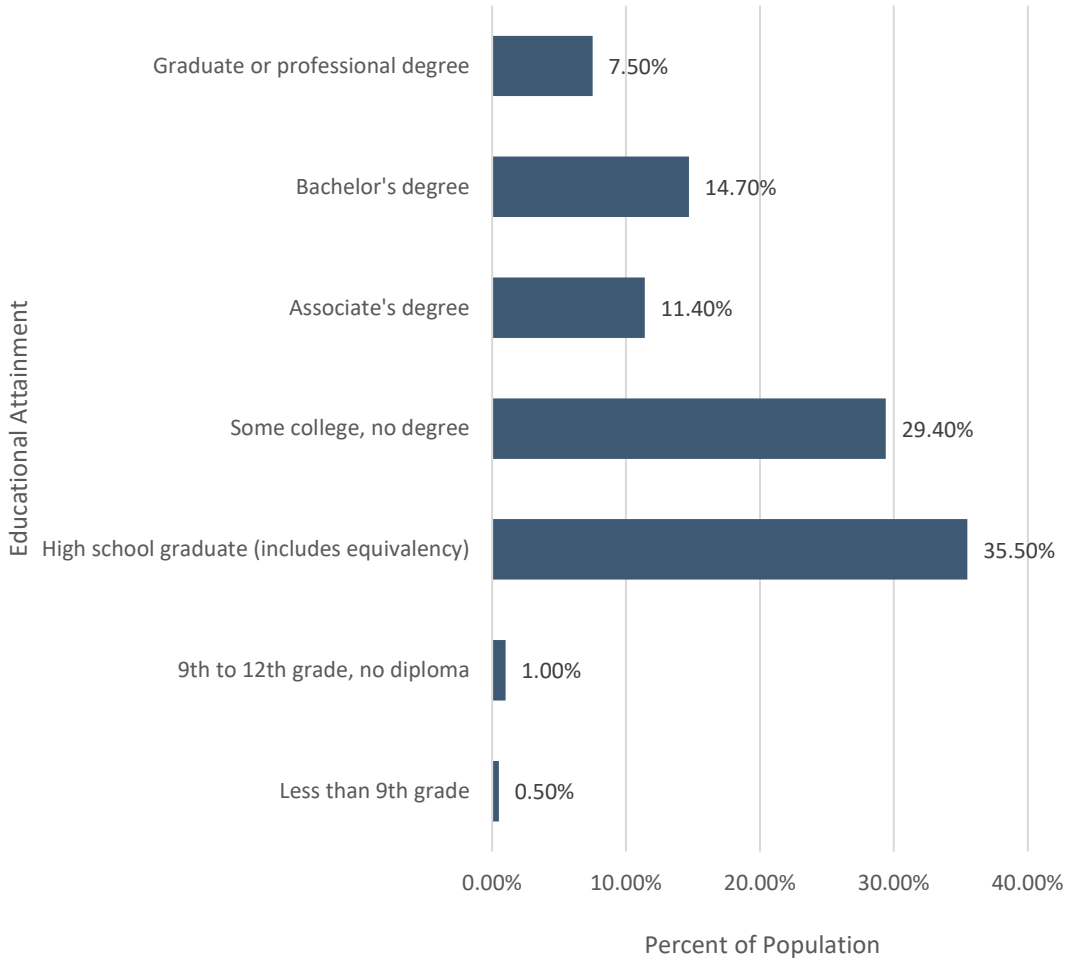


Figure 1.22: Population by Age and Sex , Hooper, NE



Source: 2022 ACS 5-year summary

Figure 1.24: Educational Attainment, Hooper, NE



Source: 2022 ACS 5-year summary

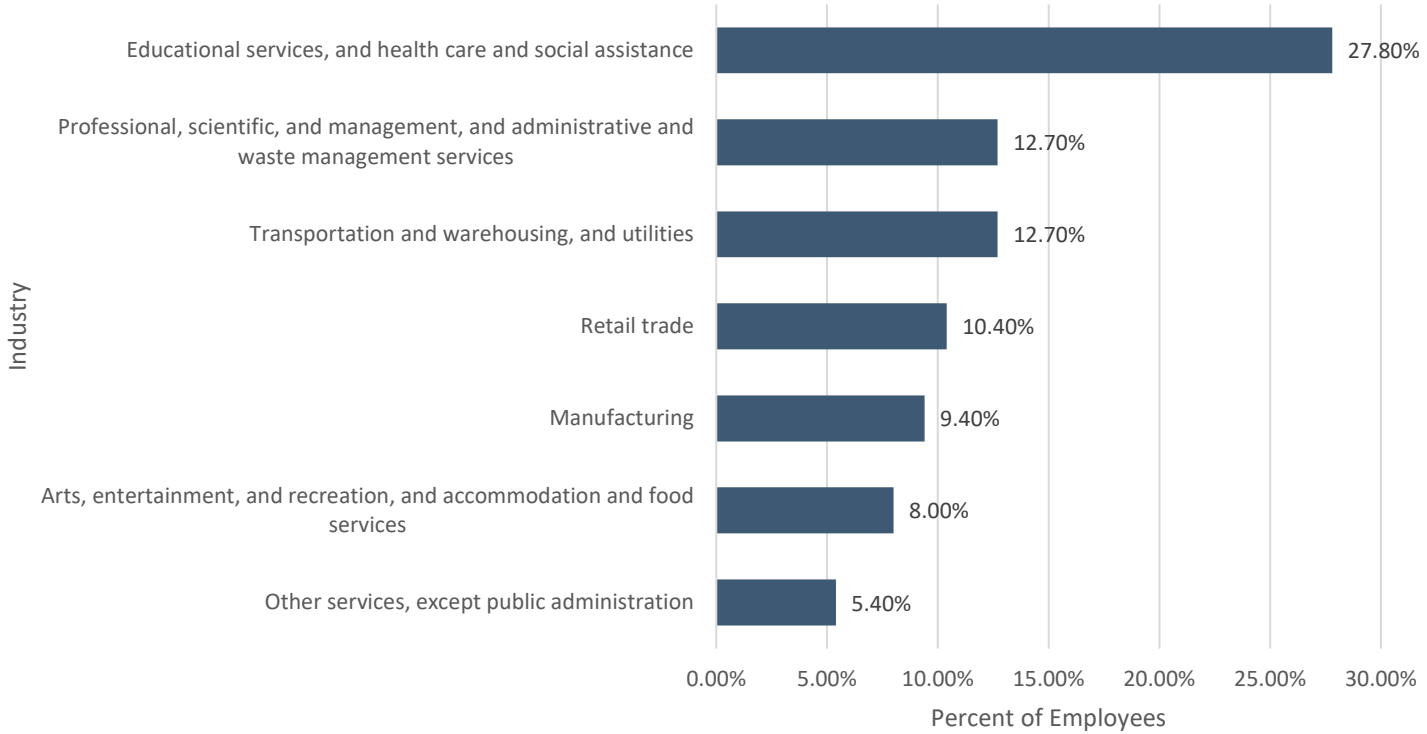
Educational Attainment

The education attainment levels for individuals 25 years and older in Hooper are comparable to Dodge County's, with slightly higher statistics for higher education degrees. About 98.5% of residents in Hooper have received a high school degree or higher (Figure 1.24).

Economic Characteristics

As of 2022, the largest sectors employees in Hooper work in are educational services, and health care and social assistance. Figure 1.25 shows each industry and the percentage of employees in them. According to the Census Bureau, roughly 85% of workers commute to work alone in either a car, truck, or van with the mean travel time to work 18.8 minutes (2022 ACS 5-year summary).

Figure 1.25: Employment by Industry, Hooper, NE



Note: Industries below 5.00%: Wholesale trade (0.90%); Information (1.20%); Public administration (2.40%); Construction (2.60%); Agriculture, forestry, fishing and hunting, and mining (2.80%); Finance and insurance, and real estate and rental and leasing (3.50%).

Source: 2022 ACS 5-year summary

Household Income

The median household income in Hooper is $73,958 according to the 2022 ACS 5-year summary. Adjusted income for all residents in Hooper is broken down in Figure 1.26.

From the 2022 ACS 5-year summary, 29 households received food stamp/SNAP benefits in the past year in 2022. Just under 2% of families and people earned an income below the poverty level within that same timeframe; 3% of those families and individuals had children under 18 years old within their household (2022 ACS 5-year summary).

Figure 1.26: Household Income, Hooper, NE

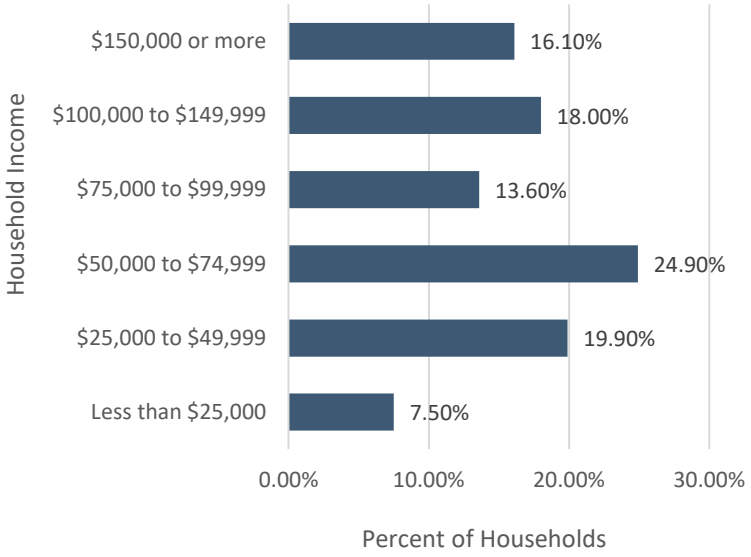
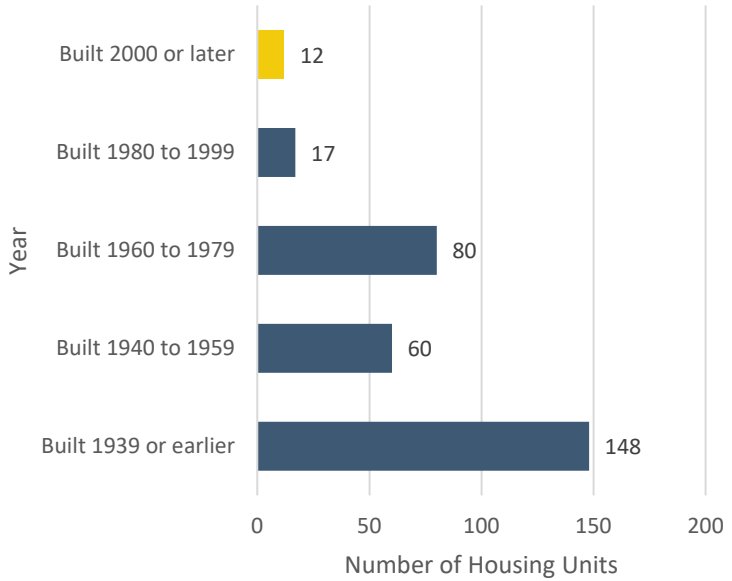


Figure 1.27: Age of Housing Units, Hooper, NE



Source: 2022 ACS 5-year summary

Housing Conditions

There are 362 housing units in Hooper, with 317 units occupied based on the 2022 ACS 5-year summary data. Most of the housing units in Hooper were built before 2000, accounting for about 96% of the city's housing stock (Figure 1.27).

Hooper has about 88% of its housing stock occupied, with about 12% vacant (Figure 1.28). Occupied and vacancy rates depend on the community, but it is generally healthy to have a vacancy rate that allows a reasonable number of choices for interested buyers and renters. Approximately 76% of the occupied units are owner-occupied and 23% are renter-occupied.

There are 11 households in Hooper that do not have access to a vehicle, based on data from the 2022 ACS 5-year summary. About 96.5% of Hooper's household units have access to at least one vehicle (Figure 1.30).

Figure 1.28: Occupied vs. Vacant Housing Units, Hooper, NE

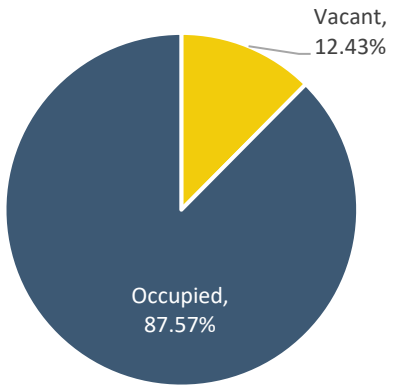


Figure 1.30: Vehicles per Household, Hooper, NE

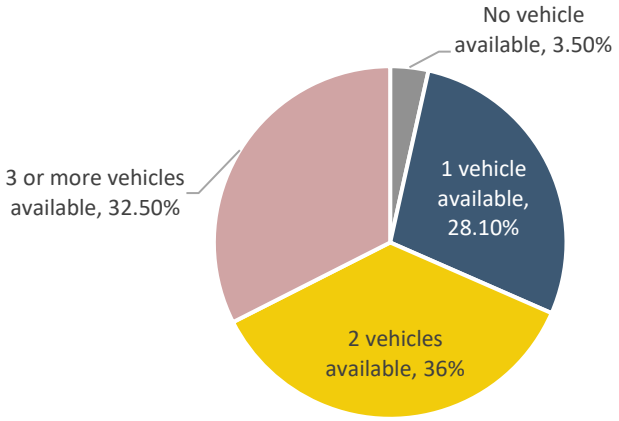
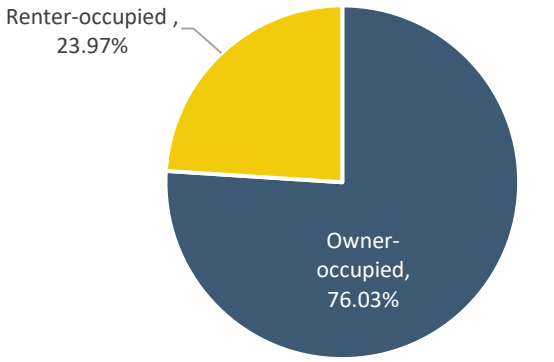


Figure 1.29: Owner- vs. Renter Occupied Housing Units, Hooper, NE

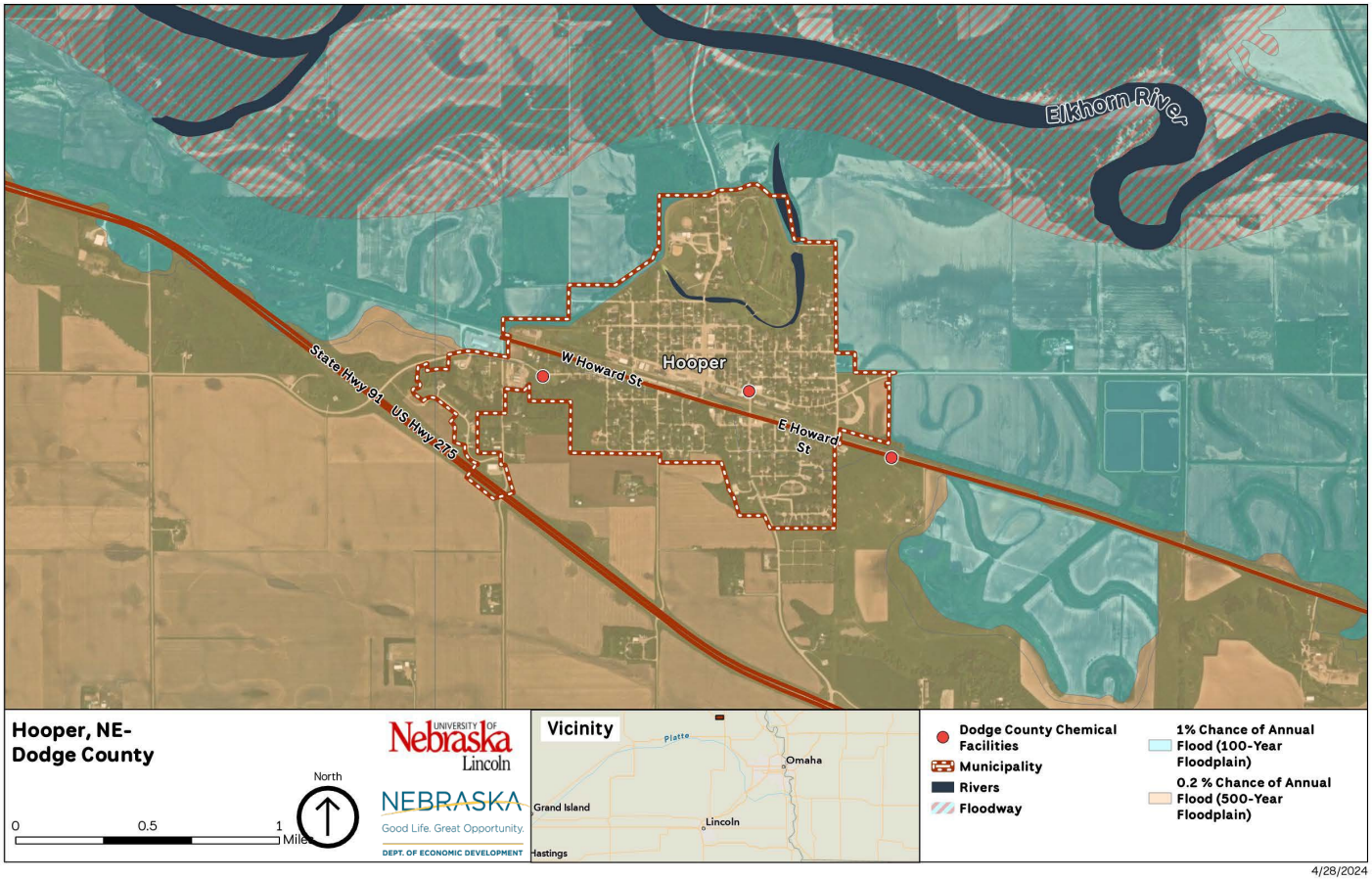


Source: 2022 ACS 5-year summary

Critical Infrastructure

There are three facilities that store or use hazardous chemicals in Hooper, also known as Tier II facilities. Map 1.6 shows the facilities and their addresses. Tier II facilities are required to report the type and amount of chemicals they have, to develop emergency response plans.

Map 1.6: Chemical Facilities, Hooper, NE

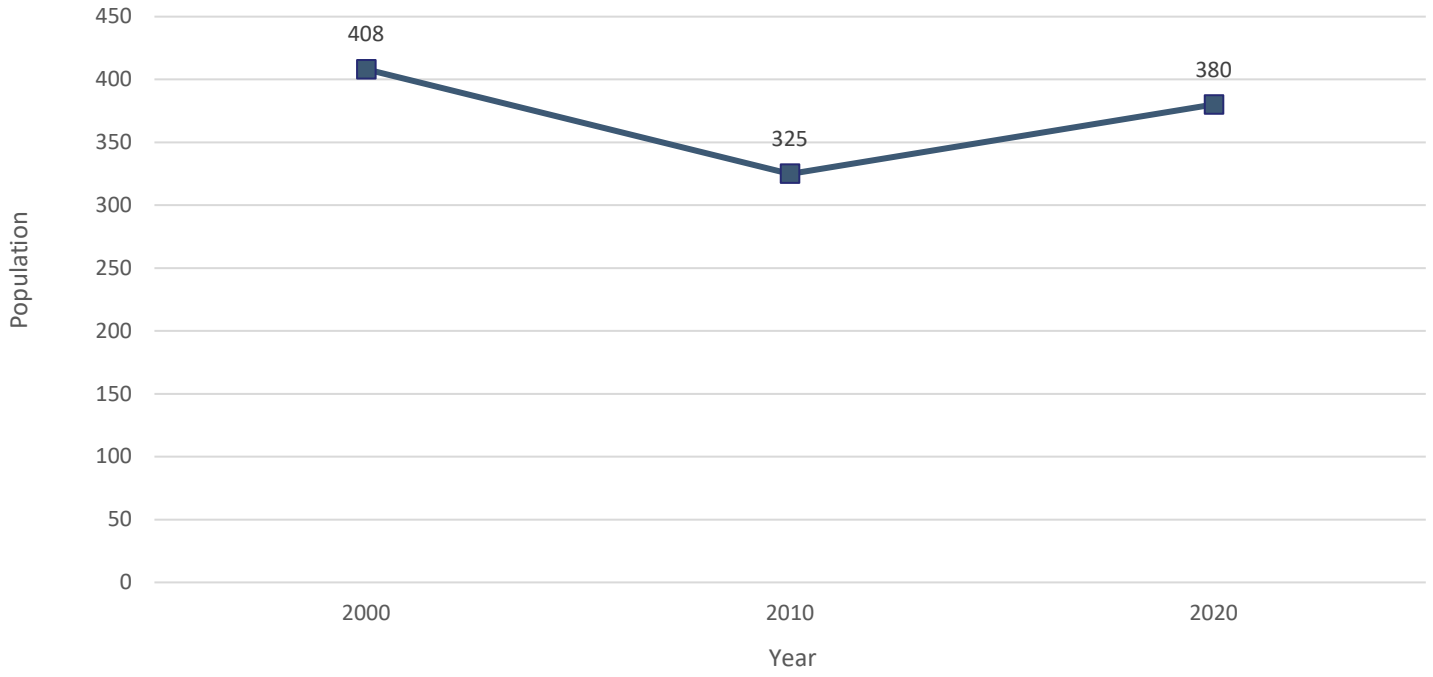


Village of Inglewood

Population

There has been considerable growth over the past decade in Inglewood (Figure 1.31). The most recent data states that the population in Inglewood is at 585 residents, almost a 54% increase from the 2020 Decennial Census (2022, ACS 5-year summary). Inglewood's population is approximately 66% female and 34% male.

Figure 1.31: Population Change, Inglewood, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

The median age in Inglewood is 24.6, over 15 years younger than Dodge County (Figure 1.32). The largest cohort age is 20-24 years old, which is relatively larger than other communities in Dodge County. In general, Inglewood has a much younger population than other municipalities in the three counties in this report.

Race

Over one-third of the population in Inglewood are Hispanic or Latino, Black or African American, or identify as having two or more races, based on the 2022 ACS 5-year summary data (Figure 1.33).

Figure 1.33: Population by Race, Inglewood, NE

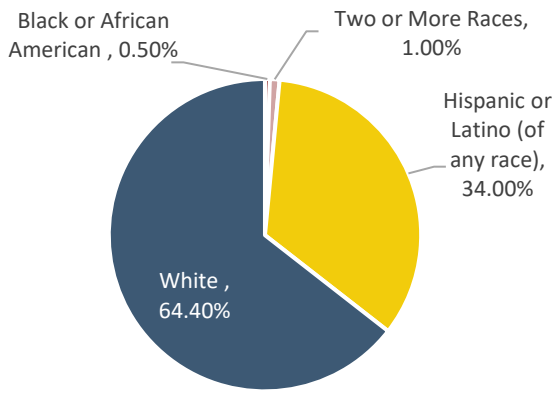
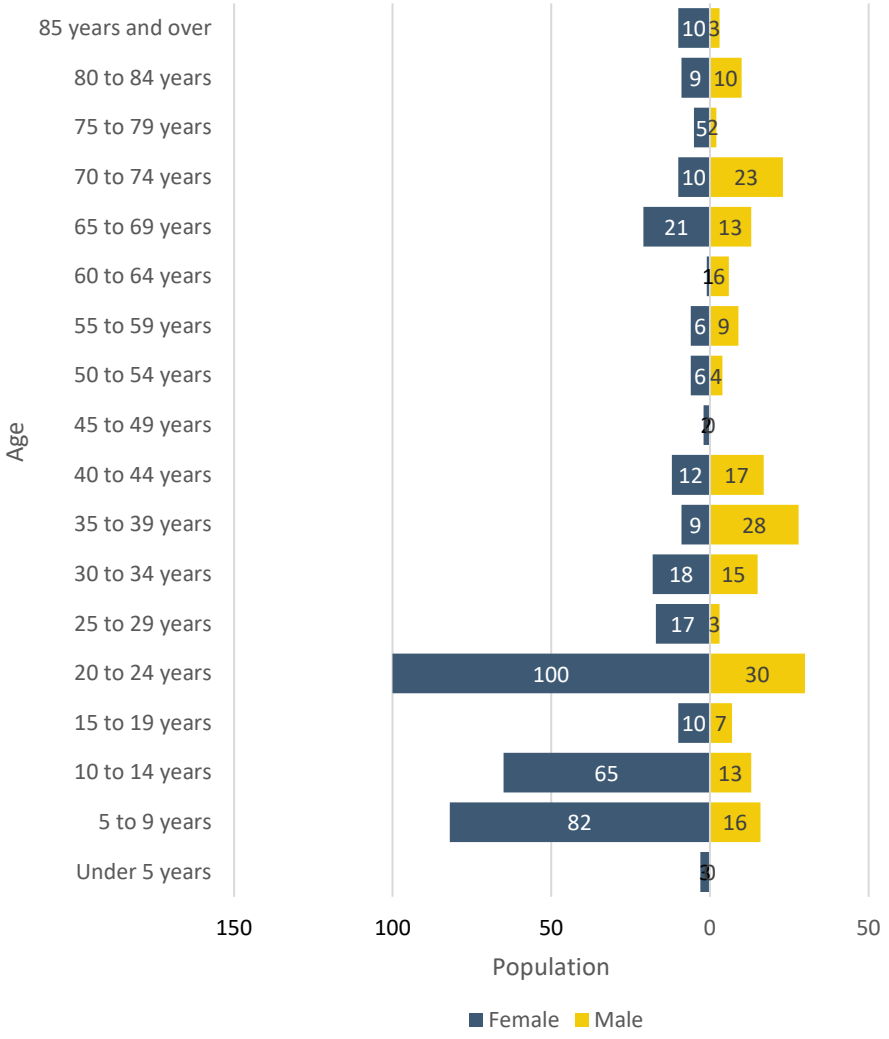
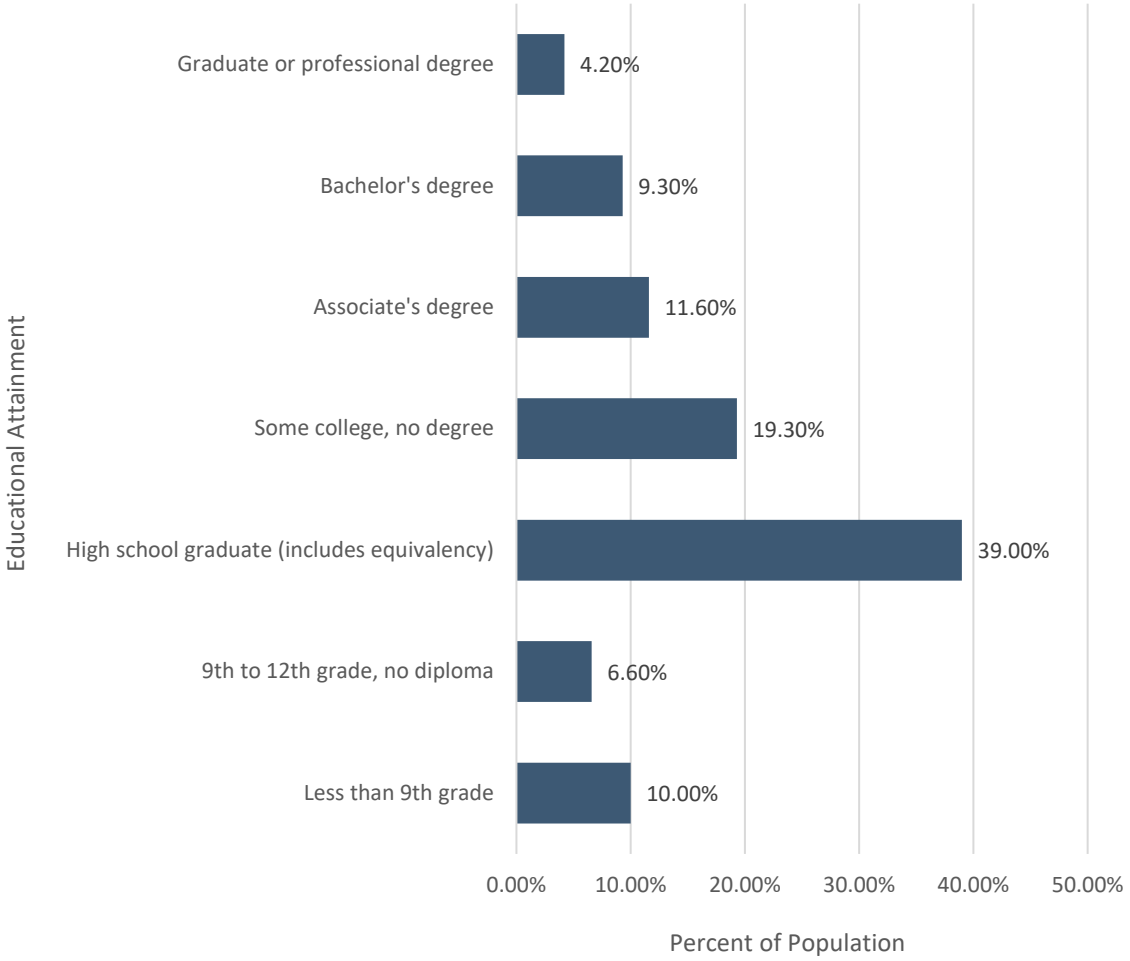


Figure 1.32: Population by Age and Sex , Inglewood, NE



Source: 2022 ACS 5-year summary

Figure 1.34: Educational Attainment, Inglewood, NE



Source: 2022 ACS 5-year summary

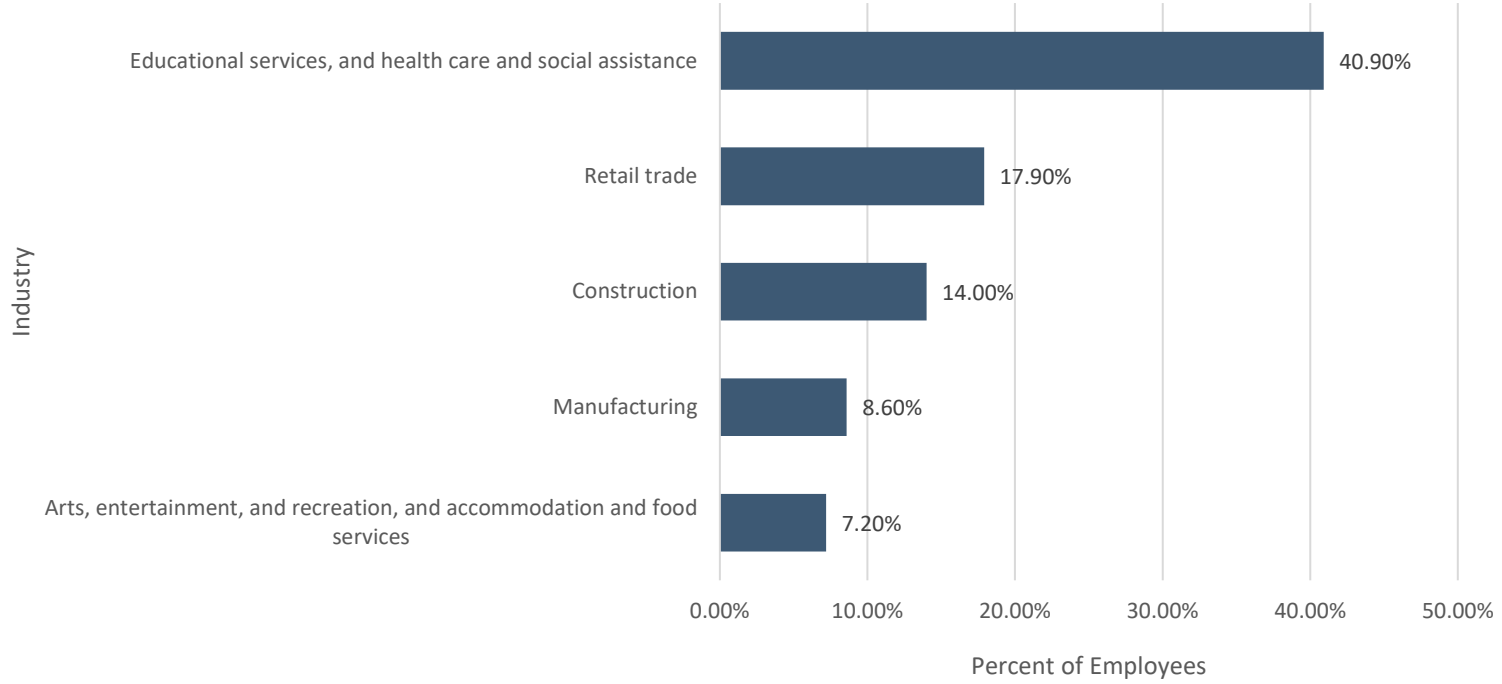
Educational Attainment

About 83% of Inglewood's population 25 years old and older is at least a high school graduate, slightly lower than Dodge County's and Nebraska's rates (Figure 1.34).

Economic Characteristics

Educational services, health care, and social services are the economic sector that employs the largest number of employees in Inglewood (Figure 1.35). This could be a result of Inglewood's proximity to Midland University in Fremont, Nebraska.

Figure 1.35: Employment by Industry, Inglewood, NE



Note: Industries with less than 5.00%: Information (0.00%); Agriculture, forestry, fishing and hunting, and mining (0.70%); Finance and insurance, and real estate and rental and leasing (1.10%); Wholesale trade (1.40%); Professional, scientific, and management, and administrative and waste management services (1.40%); Other services, except public administration (1.40%); Public administration (1.80%); Transportation and warehousing, and utilities (3.60%).

Source: 2022 ACS 5-year summary

Household Income

The median household income is $60,156 in Inglewood (Figure 1.36). According to the 2022 ACS 5-year summary, almost 11% of households received food stamp/SNAP assistance. Additionally, about 12% of individuals in Inglewood earn an income below the poverty level, slightly higher than the county and state statistics. Almost 18% of individuals under 18 years of age are also below the poverty line.

Figure 1.36: Household Income, Inglewood, NE

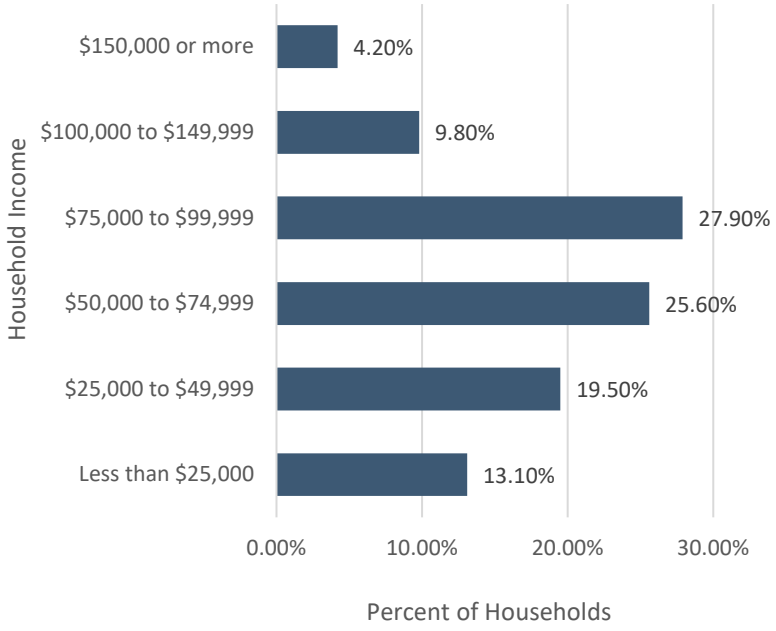
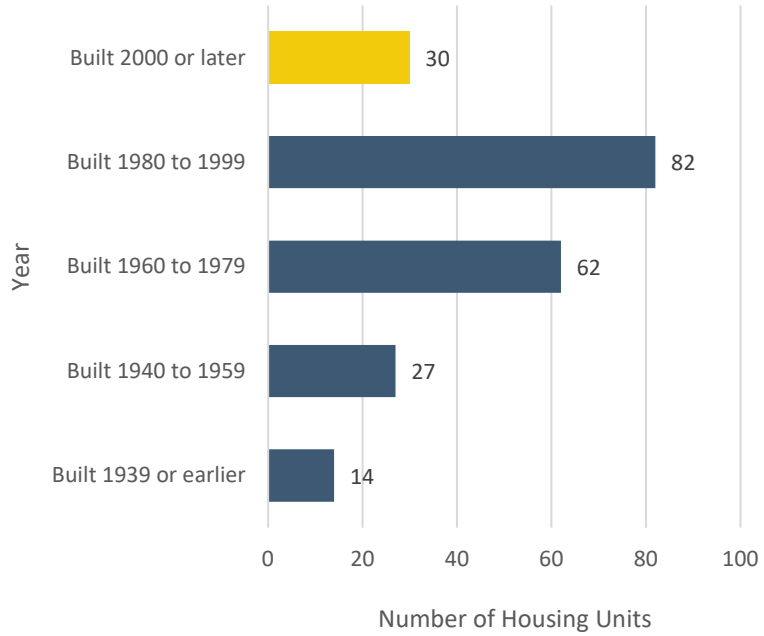


Figure 1.37: Age of Housing Units, Inglewood, NE



Source: 2022 ACS 5-year summary

Housing Conditions

Most of the housing stock in Inglewood was built before 2000; however, Inglewood has seen a rise in housing built within the last two decades. Figure 1.37 illustrates when housing structures were built in Inglewood, and there were 30 units built since 2000.

Inglewood has 219 housing units based on the 2022 ACS 5-year summary. Of those, about 98%, or 215 are occupied and 4 are vacant. This results in about a 2% vacancy rate (Figure 1.38). Further, 39% of the housing units are renter-occupied while nearly 61% are owner-occupied in Inglewood (Figure 1.39).

Most of the households in Inglewood have access to at least one vehicle. The 2022 ACS 5-year summary data states that 3 households in Inglewood do not have access to a personal vehicle (Figure 1.40).

Figure 1.38: Occupied vs. Vacant Housing Units, Inglewood, NE

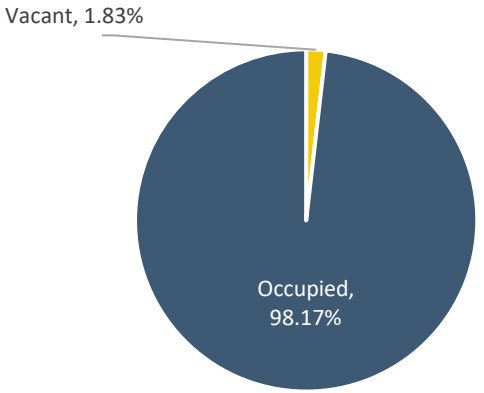


Figure 1.39: Owner- vs. Renter-Occupied Housing Units, Inglewood, NE

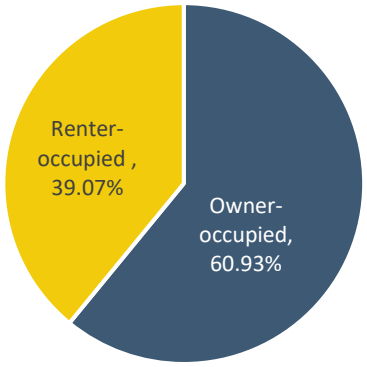
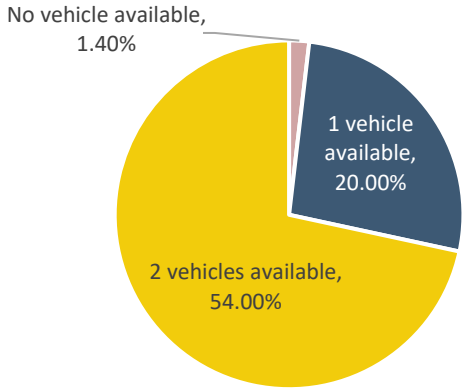


Figure 1.40: Vehicles per Household, Inglewood, NE



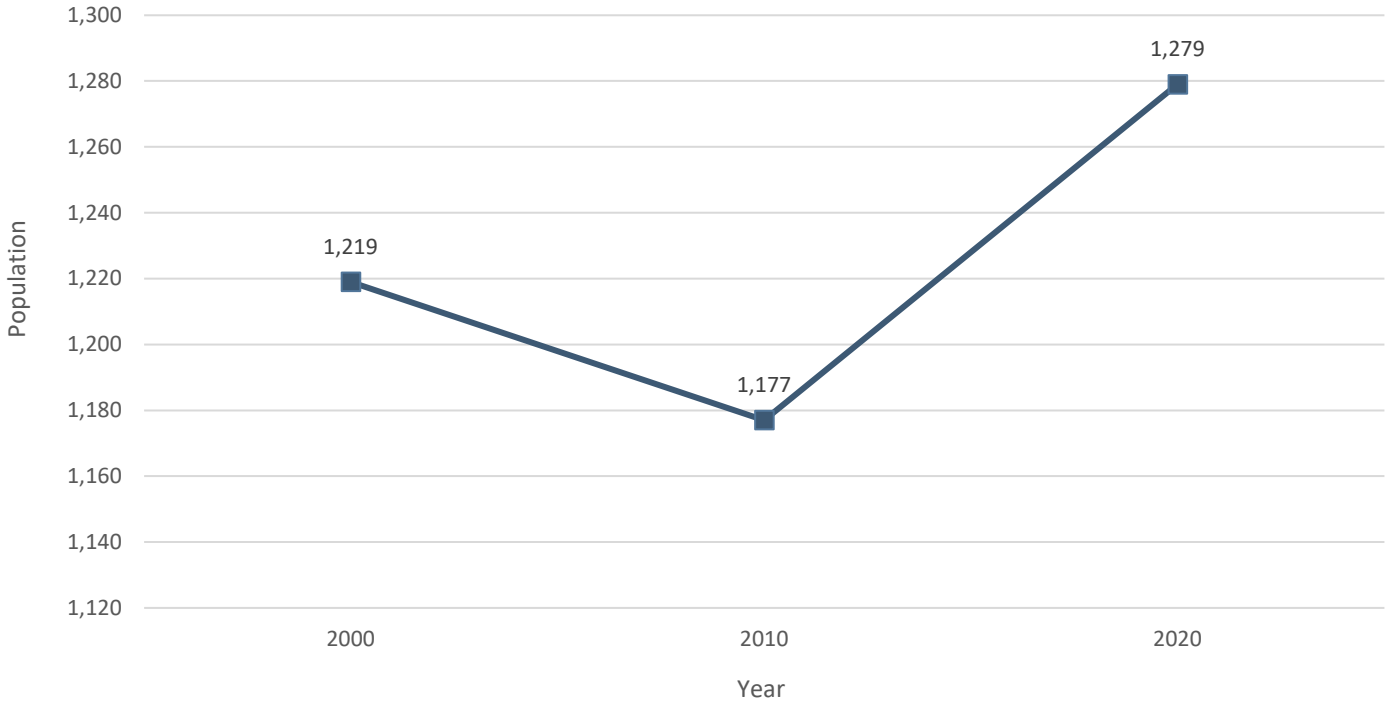
Source: 2022 ACS 5-year summary

City of North Bend

Population

Population in North Bend has fluctuated since 2000 (Figure 1.41). The 2022 ACS 5-year summary data states that the population in North Bend is at 1,250 residents, about a 2% decline since the 2020 Decennial Census, but saw a substantial increase between 2010 and 2020.

Figure 1.41: Population Change, North Bend, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

Approximately 56% of the population in North Bend is female, which is about a 10% increase compared to Dodge County. The median age in North Bend is 41, which is higher than Dodge County and the national average. There is a higher proportion of residents between the ages of 10-19, making up over one-fifth of the population overall (Figure 1.42).

Race

Majority of the population in North Bend identifies as White, about 92% or 1,155 residents (Figure 1.43). Hispanic or Latino, Asian, Two or more races, and American Indian and Alaskan Native account for the remaining population.

Figure 1.43: Population by Race, North Bend, NE

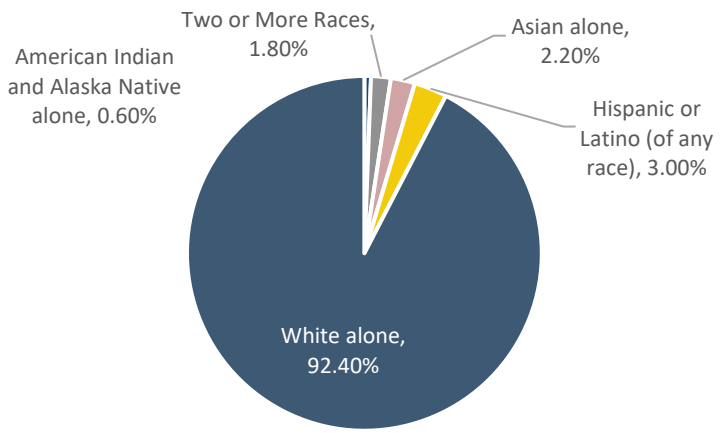
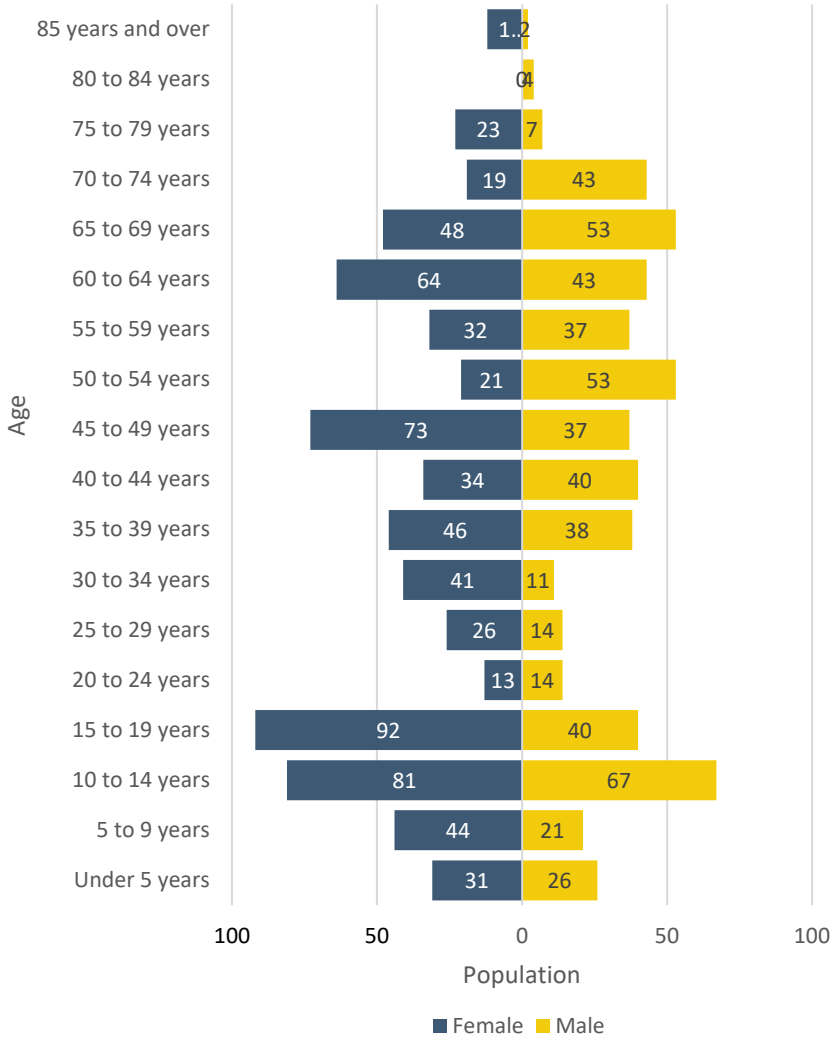
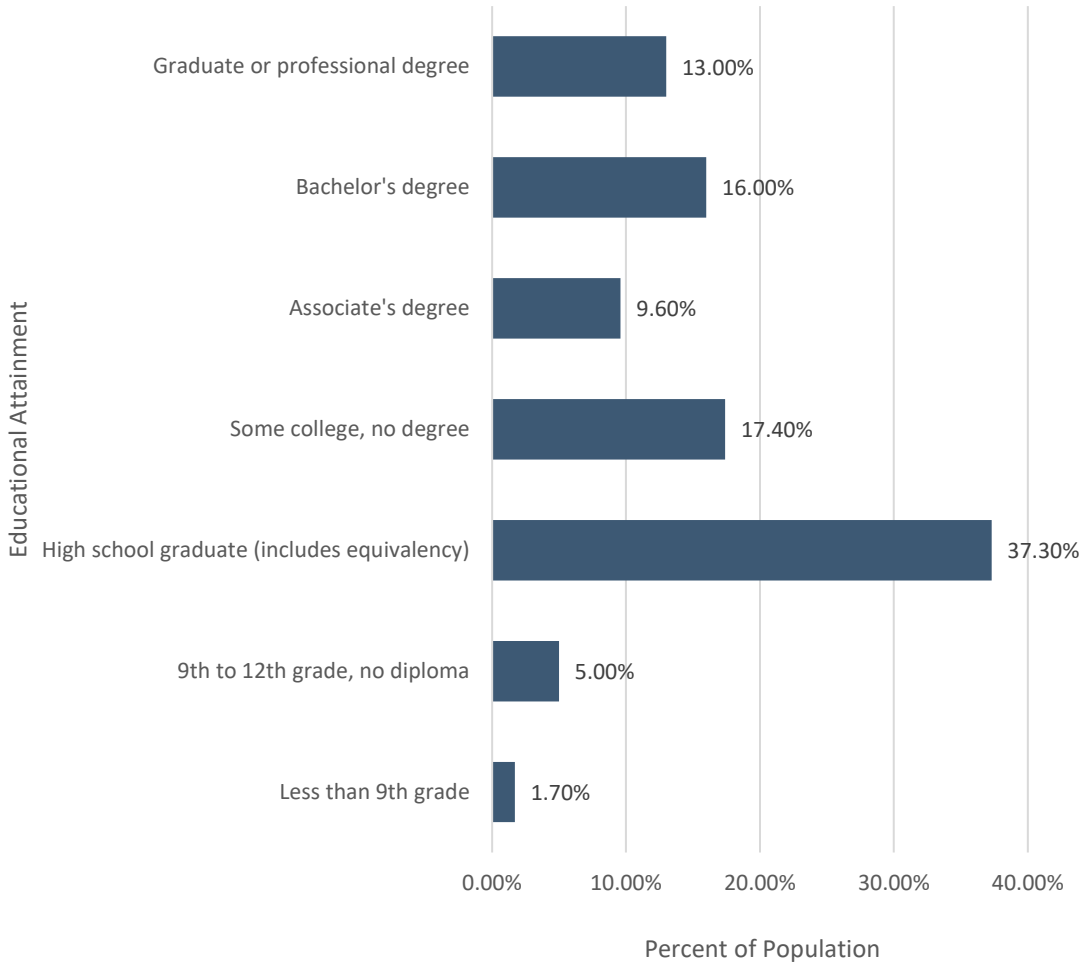


Figure 1.42: Population by Age and Sex, North Bend, NE



Source: 2022 ACS 5-year summary

Figure 1.44: Educational Attainment, North Bend, NE



Source: 2022 ACS 5-year summary

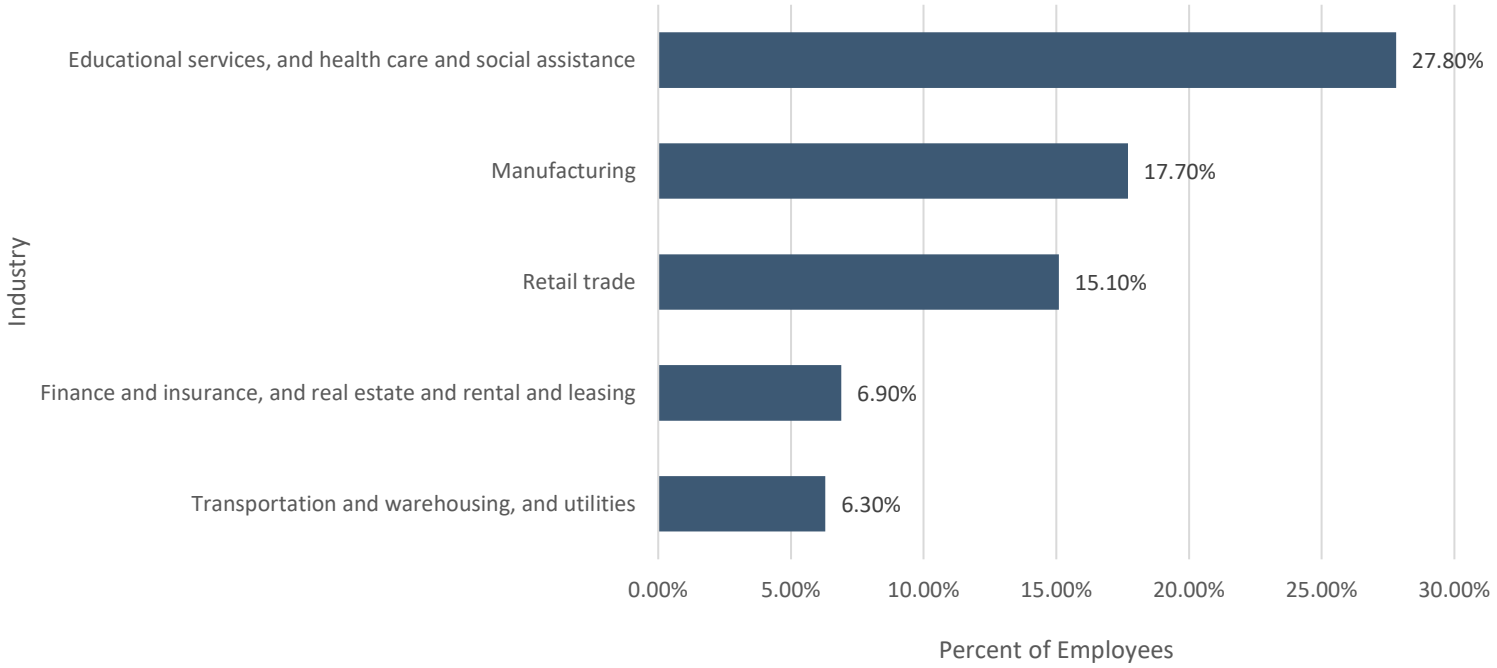
Educational Attainment

Over 90% of the population 25 years old and older in North Bend has a high school degree or higher, which is relatively higher than Dodge County. The 29% rate for individuals over the age of 25 with a Bachelor's degree or higher is also greater than in Dodge County (Figure 1.44).

Economic Characteristics

Majority of employees in North Bend work in educational services, health care, and social assistance, according to the 2022 ACS 5-year estimates. Manufacturing is the second-largest sector for employment for North Bend residents, with 113 employed in that field. Figure 1.45 shows what sectors individuals in North Bend are employed in.

Figure 1.45: Employment by Industry, North Bend, NE



Note: Industries with less than 5.00%: Information (1.40%); Wholesale trade (2.00%); Construction (2.70%); Arts, entertainment, and recreation, and accommodation and food services (3.00%); Other services, except public administration (3.60%); Professional, scientific, and management, and administrative and waste management services (4.20%); Public administration (4.40%); Agriculture, forestry, fishing and hunting, and mining (4.90%).

Source: 2022 ACS 5-year summary

Household Income

The median household income in North Bend is $81,923, higher than Dodge County and Nebraska. Figure 1.46 shows the percentage of households earning a certain income.

The poverty rate (5.1%) is lower in North Bend compared to Dodge County and national levels. Roughly 2% of households received food stamps/SNAP benefits within the past year, according to the 2022 ACS 5-year summary estimates.

Figure 1.46: Household Income, North Bend, NE

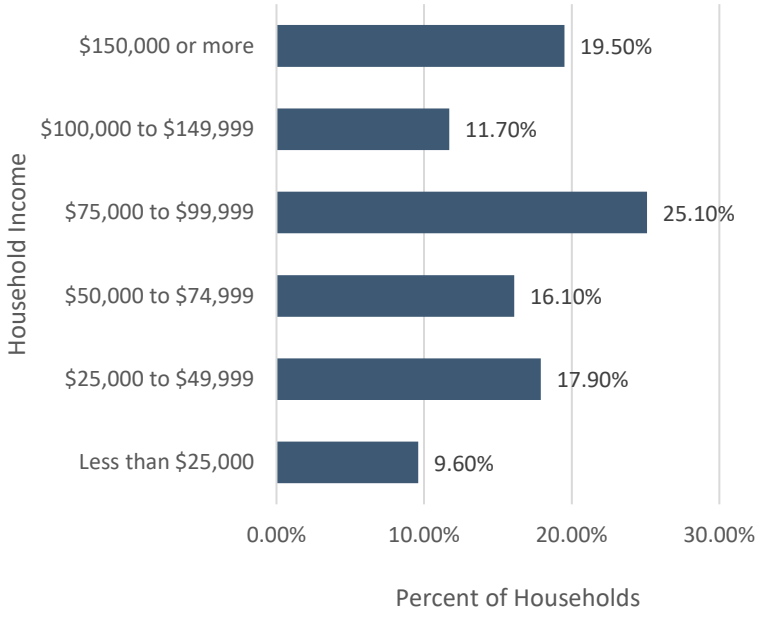
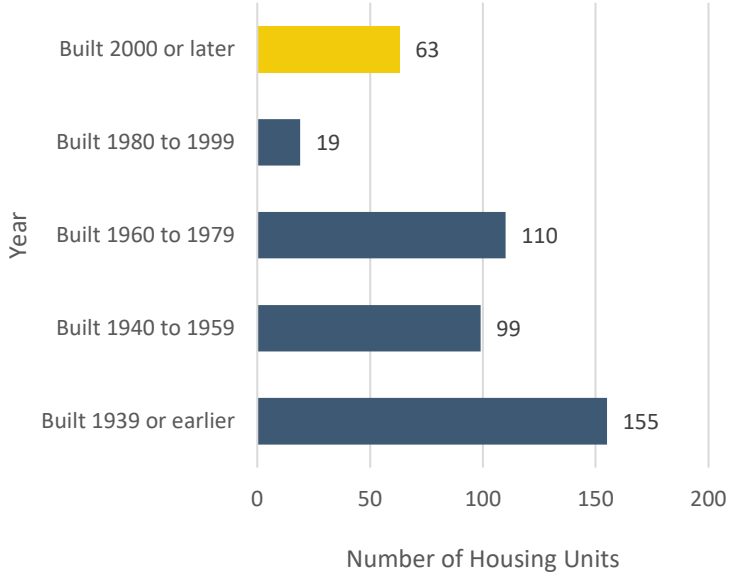


Figure 1.47: Age of Housing Units, North Bend, NE



Source: 2022 ACS 5-year summary

Housing Conditions

There are 487 housing units in North Bend; almost 13% of those units were built in 2000 or later. Figure 1.47 highlights the age of housing units in North Bend.

There are 446 occupied housing units from the 487 total units in North Bend. Of the 446 occupied units, 375 and 71 housing units are owner-occupied and renter-occupied, respectively. Figures 1.48 and 1.49 highlight percent of occupied housing units that are occupied vs. vacant and owner- vs. renter-occupied respectively.

All households in North Bend have access to at least one vehicle. Majority of households have at least two vehicles, based on the data from the 2022 ACS 5-year summary. Figure 1.50 breaks down the number of vehicles per household for North Bend.

Figure 1.48: Occupied vs. Vacant Housing Units, North Bend, NE

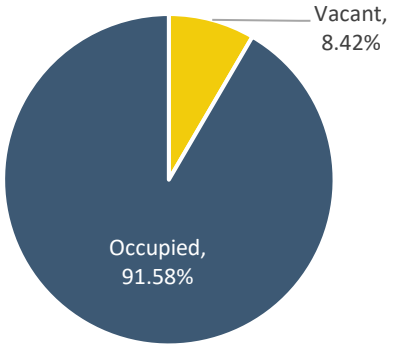


Figure 1.49: Owner- vs. Renter-Occupied Housing Units, North Bend, NE

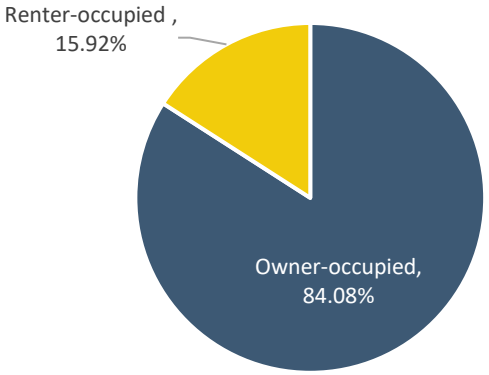
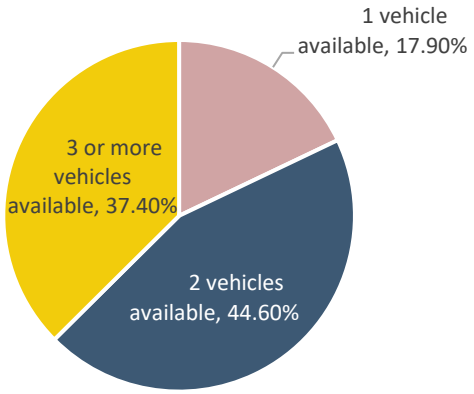


Figure 1.50: Vehicles per Household, North Bend, NE

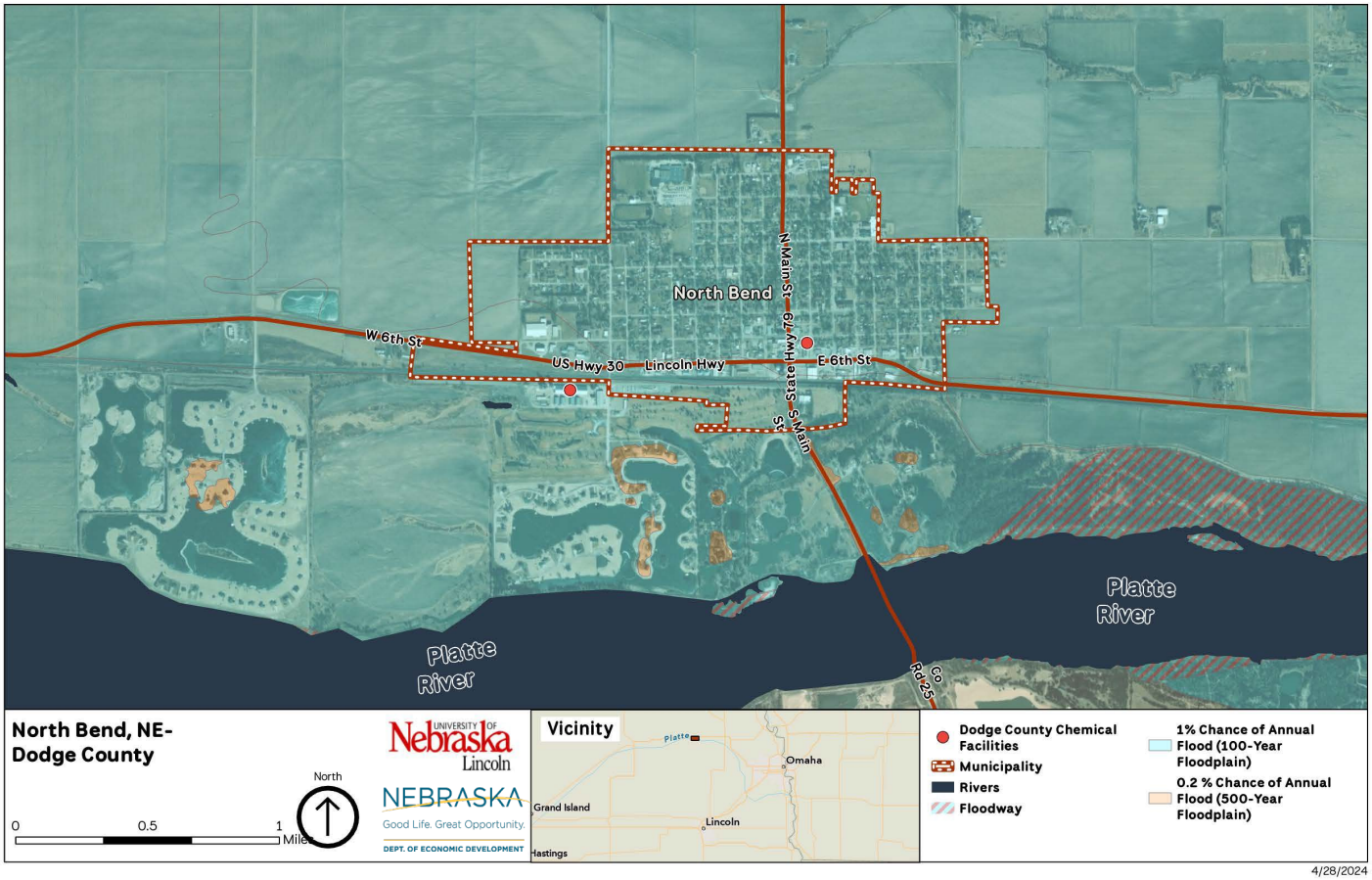


Source: 2022 ACS 5-year summary

Critical Infrastructure

North Bend has three Tier II facilities within its jurisdiction. Map 1.7 shows the three facilities and their addresses. It is important to know what facilities operate with or store hazardous chemicals to plan for the appropriate emergency services.

Map 1.7: Chemical Facilities, North Bend, NE

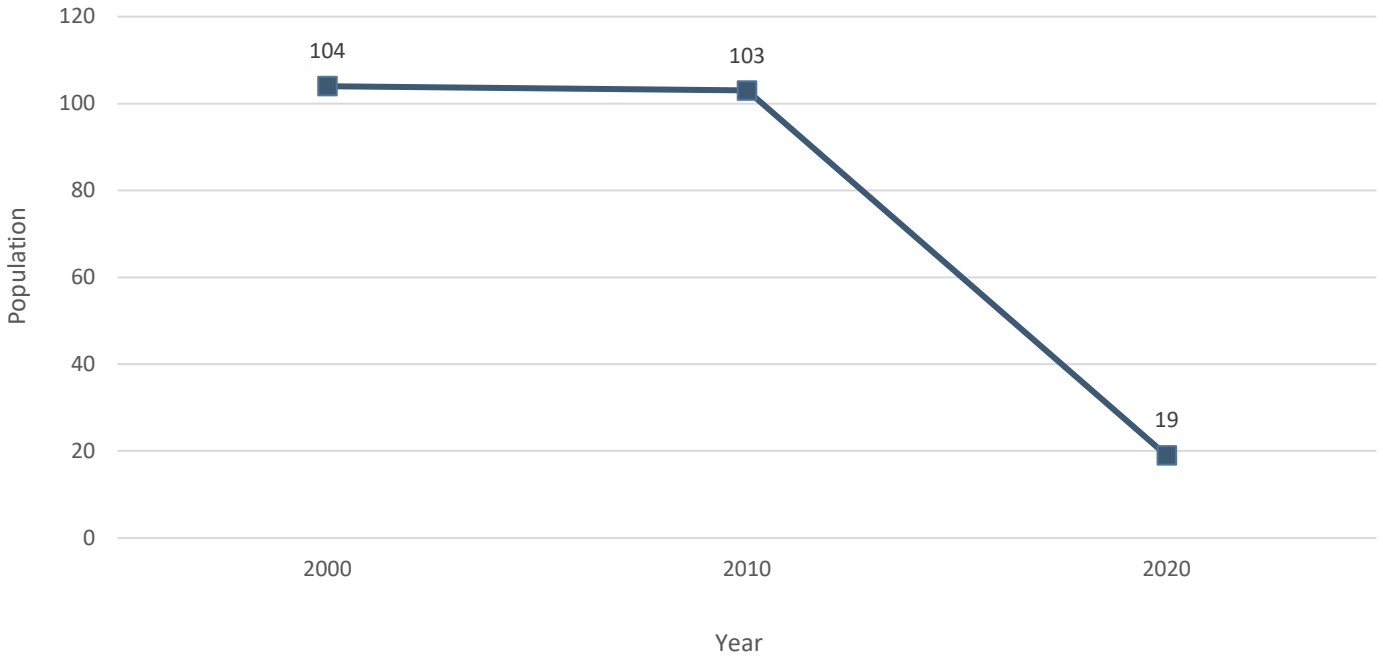


Village of Winslow

Population

Winslow has seen a decline in population over the past couple of decades (Figure 1.51). Between 2010 and 2020, there was about an 82% decline in population. One potential reason for this can be the significant impact of the 2019 floods in Nebraska. Based on the 2022 ACS 5-year summary, the most current population in Winslow is 109 residents. This number could be a result of the calculations based on data over a five-year period.

Figure 1.51: Population Change, Winslow, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

The median age in Winslow is 56.3 years, which is higher than in Dodge County and Nebraska. Most of the residents in Winslow are male at 79 residents and 30 female residents (Figure 1.52). It is important to note that the 2022 ACS 5-year summary data are estimates using data from previous years.

Race

The three races in Winslow are White with 100 residents, four residents identifying as Hispanic or Latino of any race, and five residents identifying as two or more races, using the 2022 ACS 5-year summary data (Figure 1.53).

Figure 1.53: Population by Race, Winslow, NE

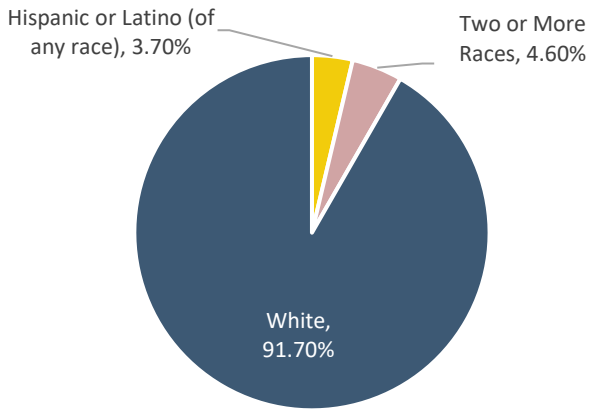
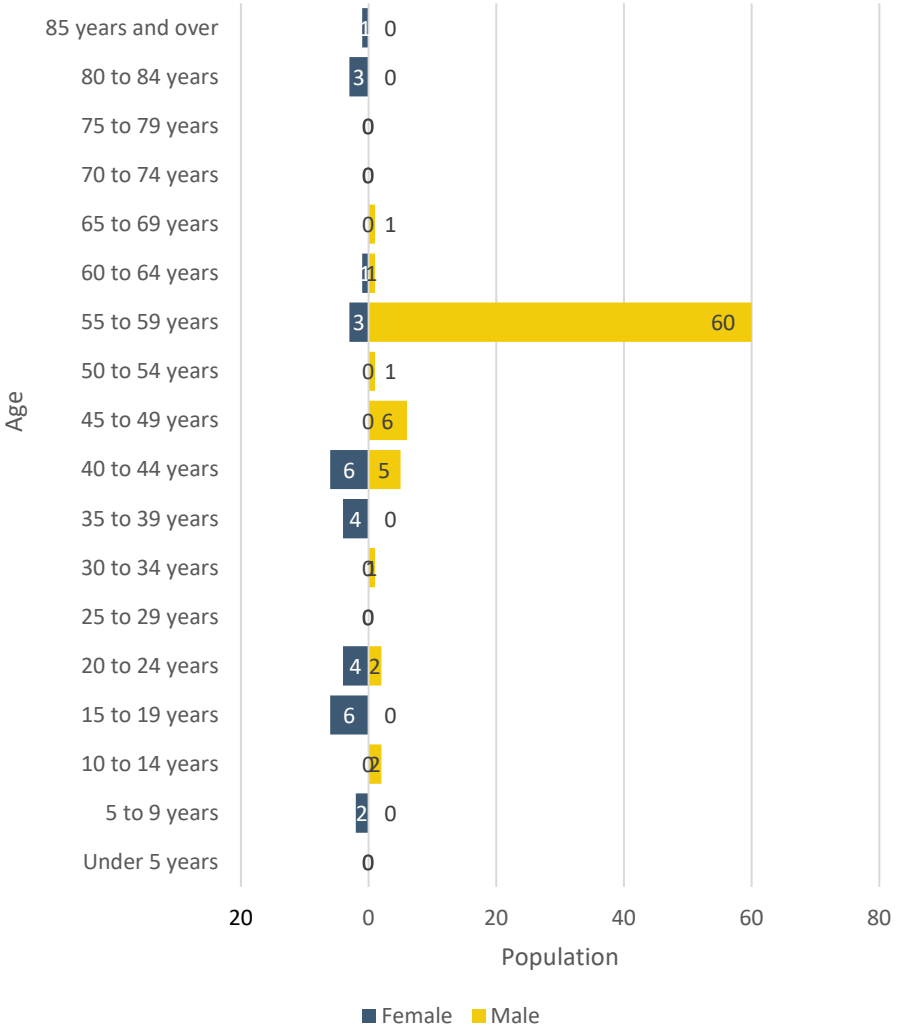
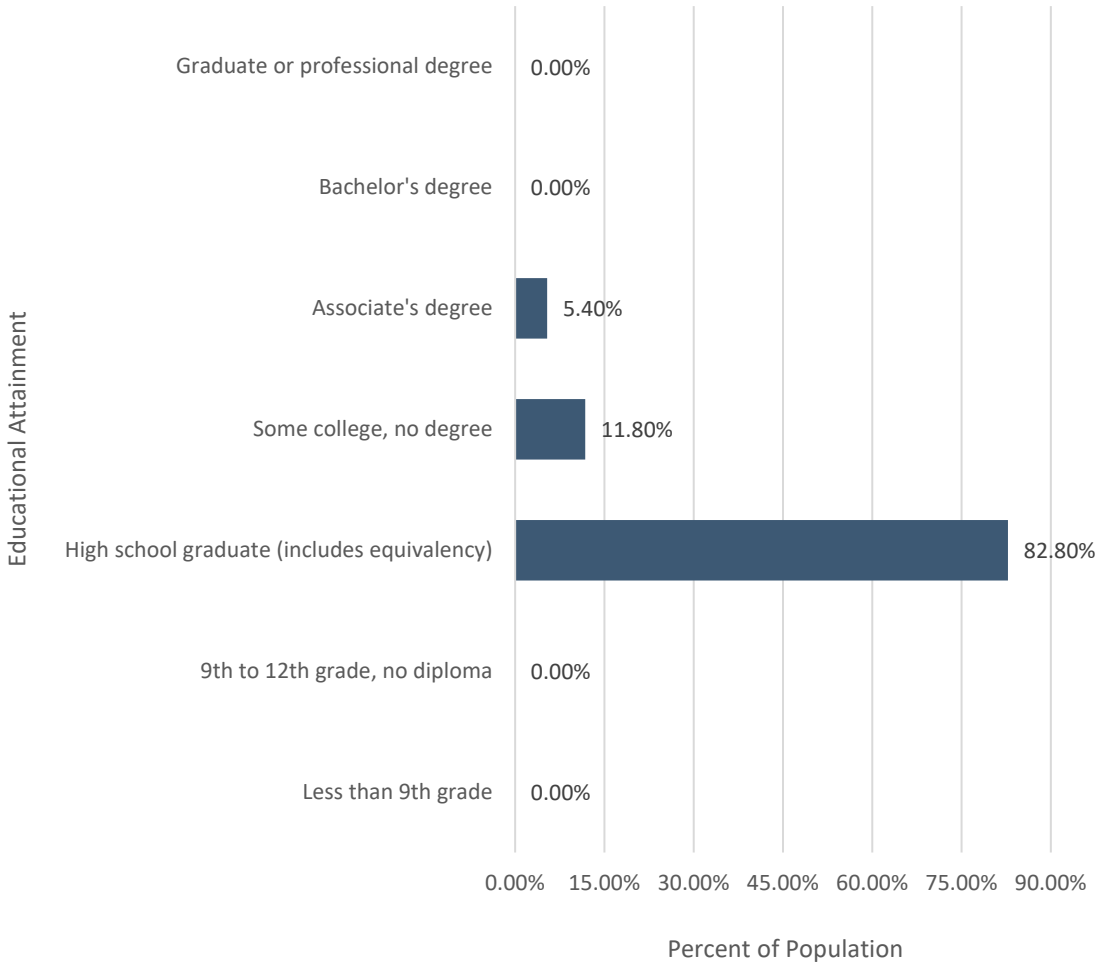


Figure 1.52: Population by Age and Sex, Winslow, NE



Source: 2022 ACS 5-year summary

Figure 1.54: Educational Attainment, Winslow, NE



Source: 2022 ACS 5-year summary

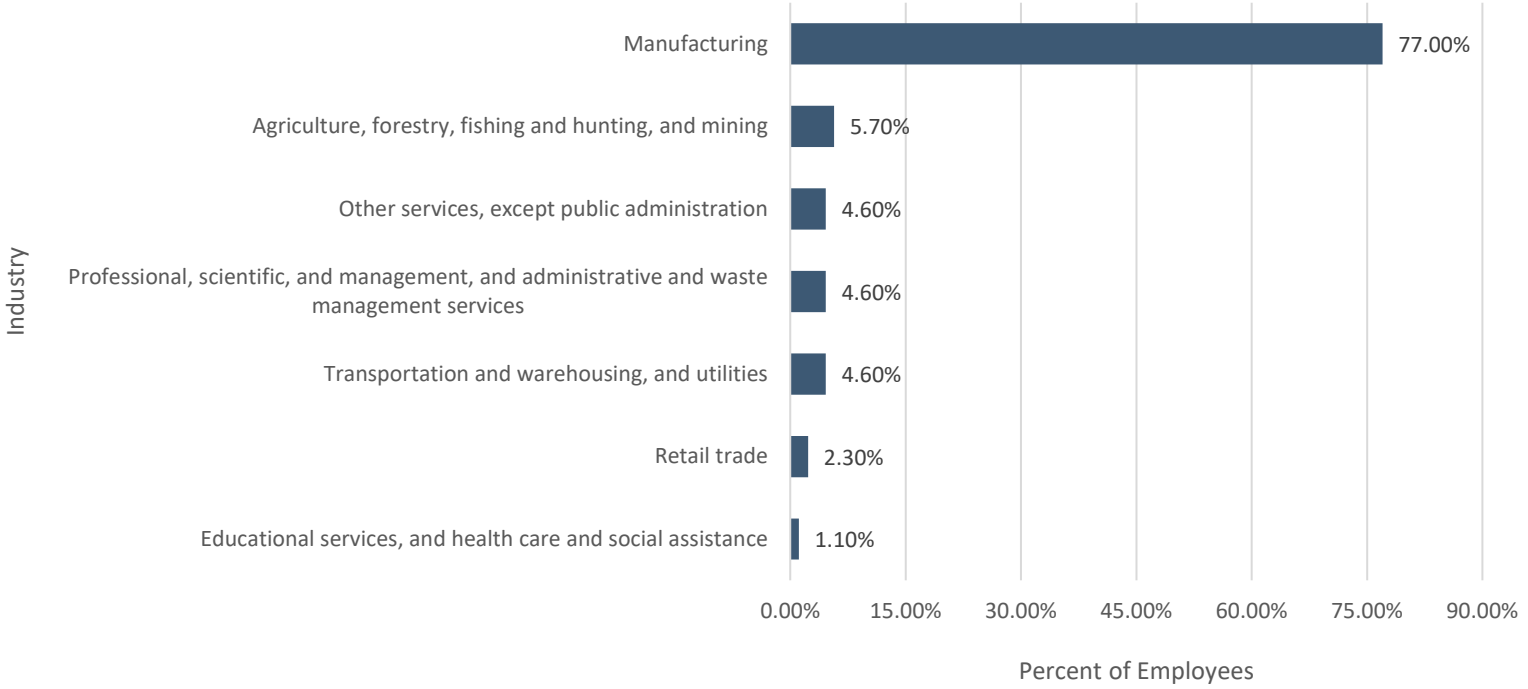
Educational Attainment

All residents 25 years or older in Winslow have earned at least a high school degree or higher. About 17% have earned some college education or degree. Figure 1.54 shows the percentages of educational attainment in Winslow.

Economic Characteristics

Manufacturing is the most common industry that employs residents in Winslow, employing 67 people (Figure 1.55). Other industries where other residents are employed are agriculture, public administration services, management services, transportation, rental trade and educational services.

Figure 1.55: Employment by Industry, Winslow, NE



Note: Industries with 0.00%: Construction; Wholesale trade; Information; Finance and insurance, and real estate and rental and leasing; Arts, entertainment, and recreation, and accommodation and food services; and Public administration.

Source: 2022 ACS 5-year summary

Household Income

Most of the households in Winslow earn between $50,000 and $74,999, with the median household income being $66,042 according to 2022 ACS 5-year summary data (Figure 1.56).

Approximately four households received food stamps/SNAP benefits over the past year in 2022. Additionally, about 1.8% of people live below the poverty line in Winslow, which is lower than county and national averages.

Figure 1.56: Household Income, Winslow, NE

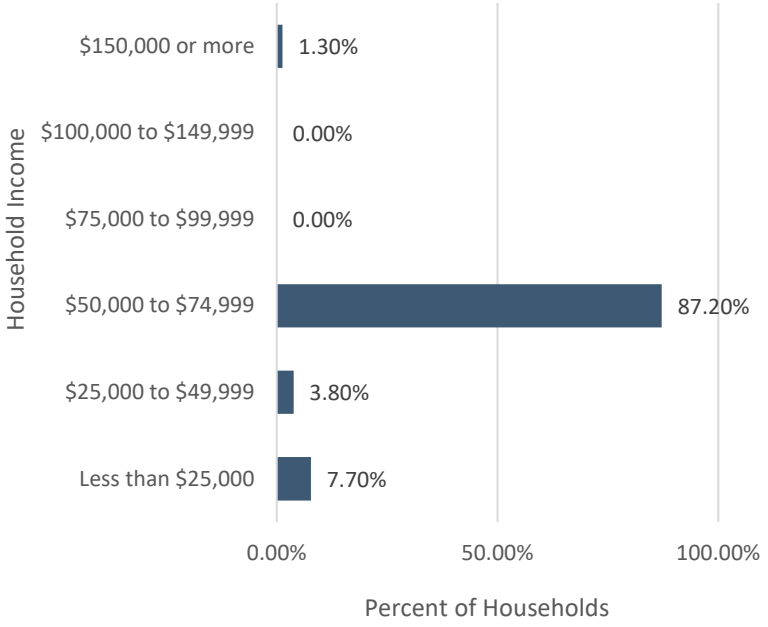
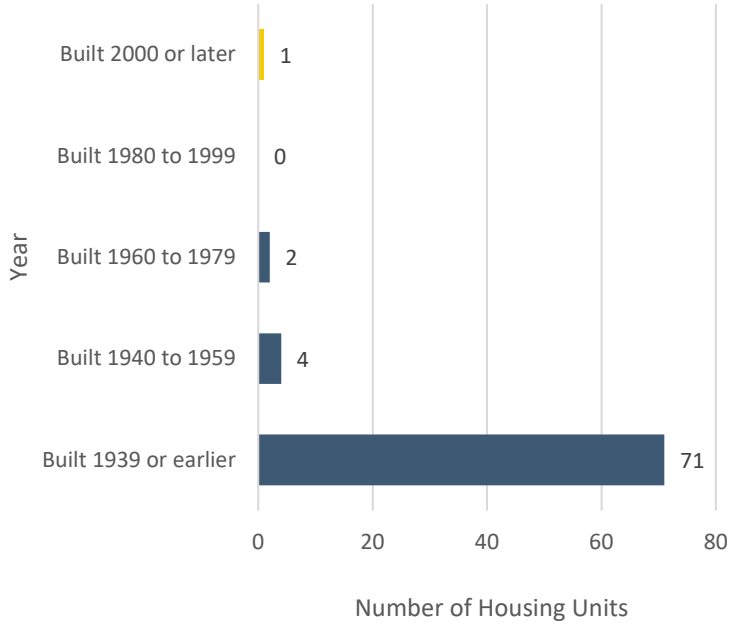


Figure 1.57: Age of Housing Units, Winslow, NE



Source: 2022 ACS 5-year summary

Housing Conditions

Over 80% of occupied housing in Winslow was built in 1939 or earlier (Figure 1.57). Older housing structures may be more susceptible to damage during flooding events and other environmental hazards.

There are 90 housing units located in Winslow, with 78 of them occupied and 12 vacant housing units (Figure 1.58). All of the occupied units are owner-occupied with no renter-occupied housing units (Figure 1.59).

Figure 1.60 shows how many households have access to a vehicle. According to the 2022 ACS 5-year summary estimates, all households have at least one vehicle available.

Figure 1.58: Occupied vs. Vacant Housing Units, Winslow, NE

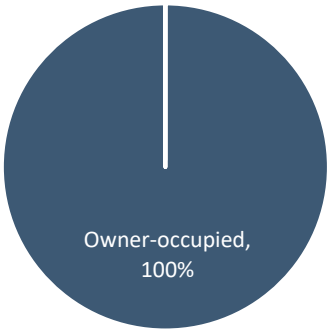


Figure 1.59: Owner- vs. Renter-Occupied Housing Units, Winslow, NE

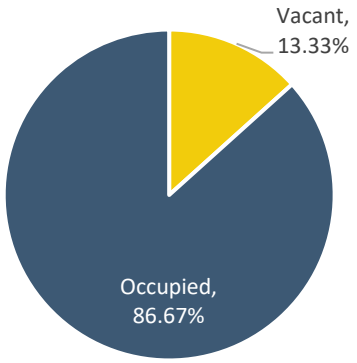
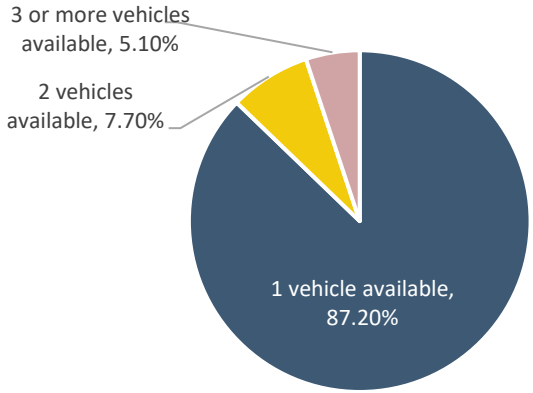


Figure 1.60: Vehicles per Household, Winslow, NE



Source: 2022 ACS 5-year summary

Douglas County

Community Profile

Population

Douglas County is in Eastern Nebraska and has 326.4 square miles of land area and is the 91st largest county in Nebraska by total area. According to the 2022 American Community Survey (ACS) 5-year summary, the population of Douglas County is at 584,526 residents (Table 1.2). There are eleven municipalities within the county, with Omaha being the most populous and the county seat. Located between two waterways—the Platte River to the South and the Missouri River to the East—communities bordering bodies of water are at higher risk for flooding.

Table 1.2: Population in Municipalities, Douglas County, NE

Municipality	Population (2010)	Population (2020)	Population estimate (2022)
Bennington city	1458	2026	N/A
Boys Town village	N/A	N/A	N/A
King Lake CDP	N/A	N/A	N/A
Omaha city	408,958	486,051	491,743
Ralston city	5,943	6,494	6,424
Valley city	N/A	N/A	N/A
Venice CDP	N/A	N/A	N/A
Waterloo village	N/A	N/A	N/A
Douglas County Total	517,110	584,526	586,106

Source: US Census Bureau 2010 Decennial Census, 2020 Decennial Census, and 2022 ACS 5-year summary

Age

The average age for Douglas County is 35.8 years (2022 ACS 5-year summary). About 13.5% of the population in Douglas County is over the age of 65 and about 28% of the population is under the age of 18 according to the 2022 ACS 5-year summary. Figure 1.61 breaks down the age population for the entire county into five-year age groups.

Race

The majority race in Douglas County is predominantly White, accounting for 80.5% of the total population. Figure 1.62 breaks down the county's race demographics using the 2022 ACS 5-year summary data.

Figure 1.62: Population by Race, Douglas County, NE

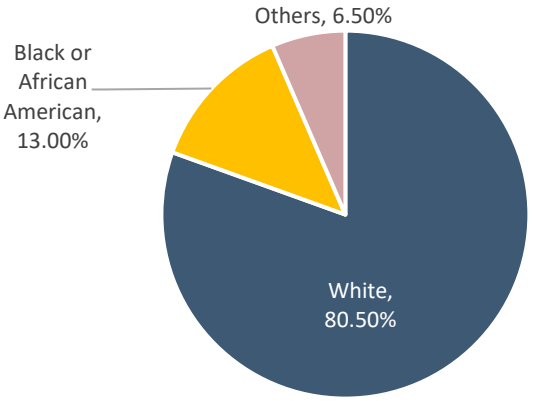
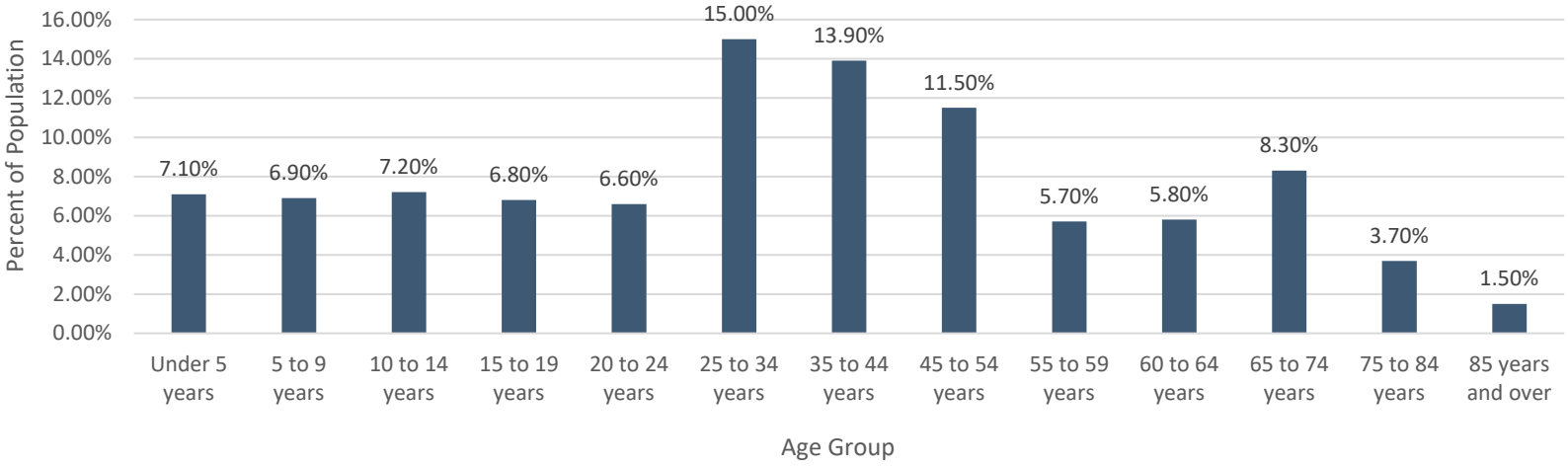
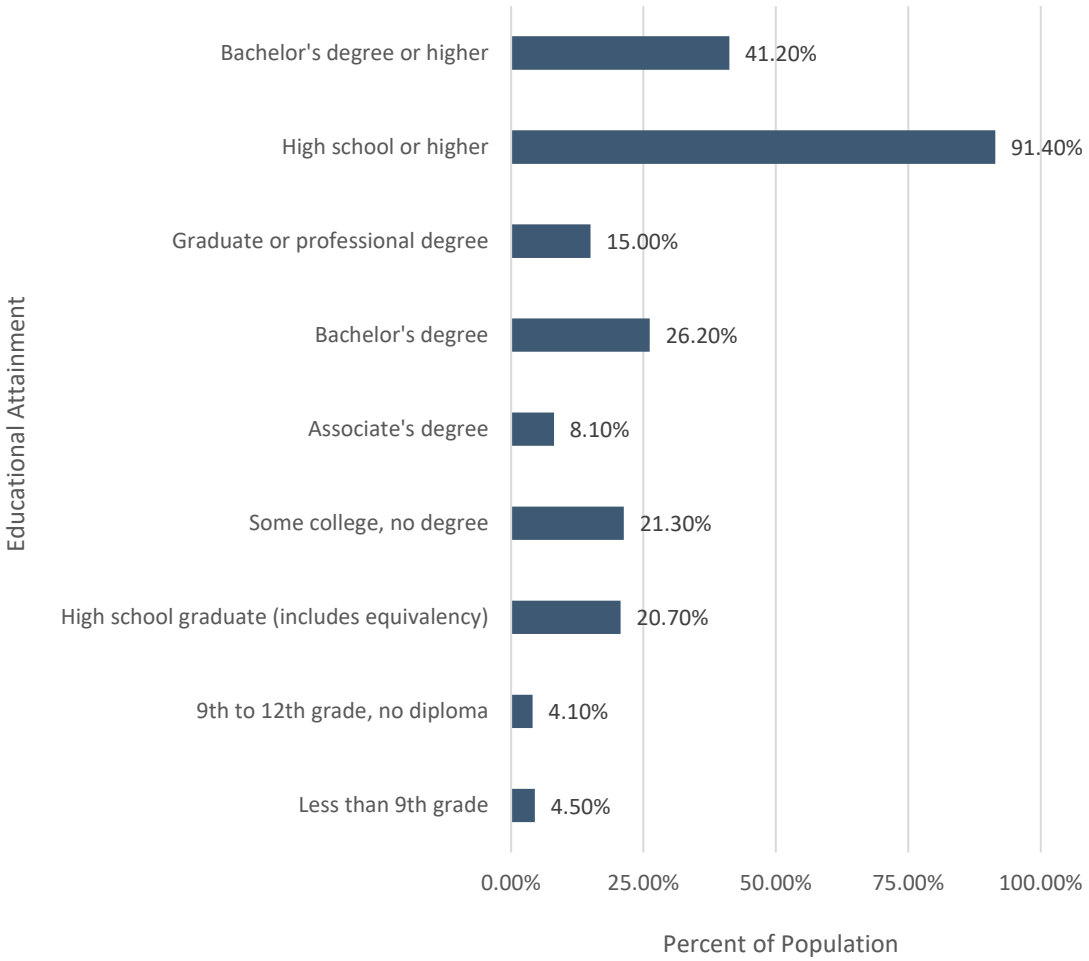


Figure 1.61: Population by Age, Douglas County, NE



Source: 2022 ACS 5-year summary

Figure 1.63: Educational Attainment, Douglas County, NE



Source: 2022 ACS 5-year summary

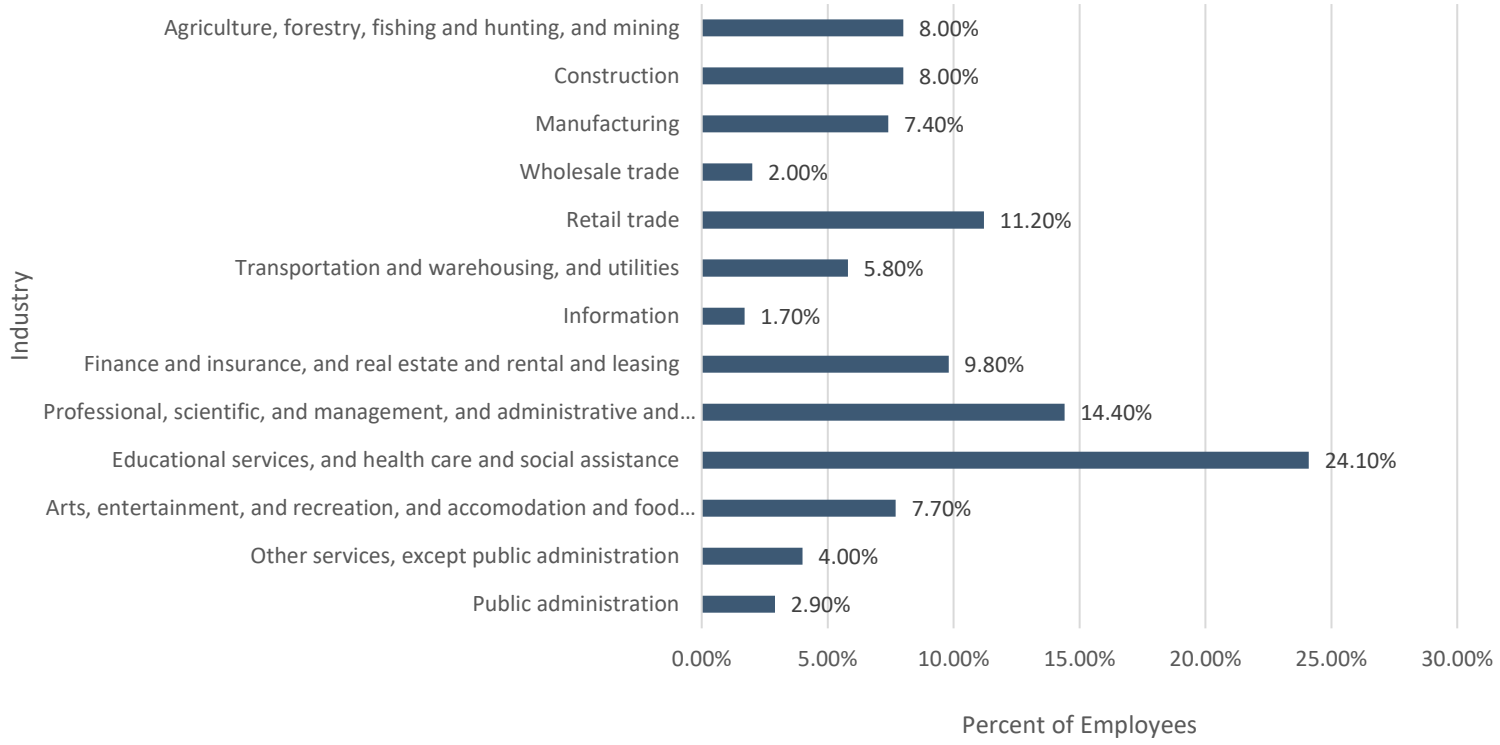
Educational Attainment

The educational attainment for residents 25 years old and older in Douglas County is shown in Figure 1.63. Over 90% of the population has a high school degree or higher, and 42% of the population has received a higher education degree.

Economic Characteristics

A major economic industry in Douglas County is the educational services, health care, and social assistance sector accounting for about 24% of the working-age population. When looking at Figure 1.64, the second-largest industry in terms of workers is professional, scientific, management, and administrative, followed by retail trade. Several healthcare networks from Douglas County have offices in Sarpy County, such as Methodist, Children's physicians, and CHI. Douglas County is also situated between rural and urban areas, making the location ideal for trade and transporting goods both within state and out of state.

Figure 1.64: Employment by Industry, Douglas County, NE



Source: 2022 ACS 5-year summary

Household Income

The median household income in Douglas County, NE is approximately $74,250 annually (Figure 1.65). Most of the population, about 47%, have incomes between $50,000 and $149,999 annually. For Nebraska, the average household income is $74,250 (Census Business Builder-2022 ACS 5-year summary).

Figure 1.65: Household Income, Douglas County, NE

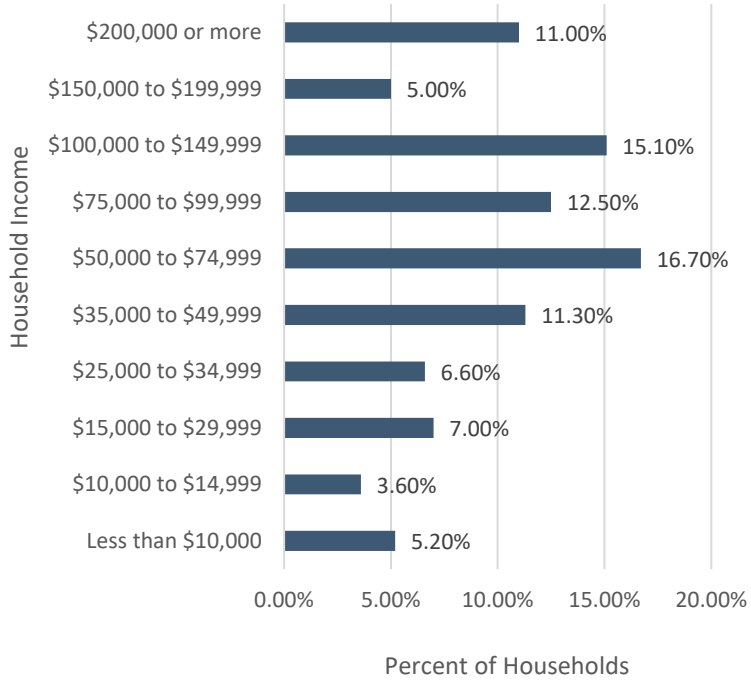
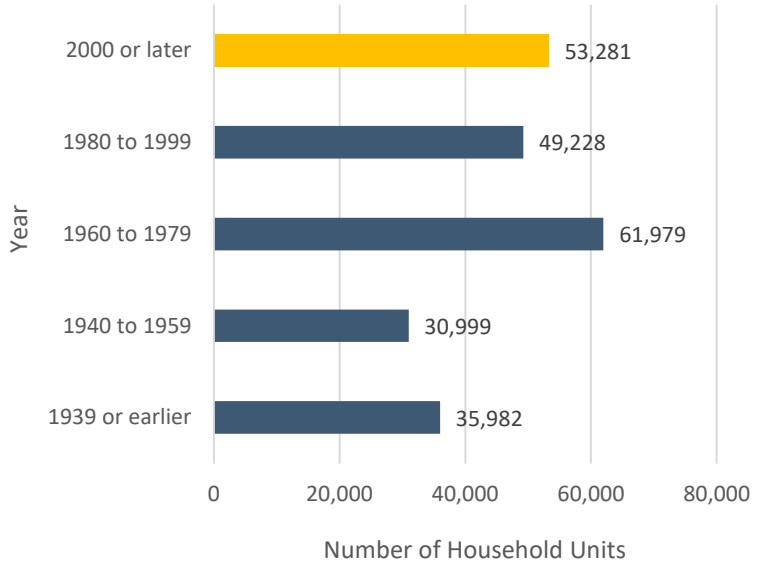


Figure 1.66: Age of Housing Units, Douglas County, NE



Source: 2022 ACS 5-year summary

Housing Conditions

Of the total 198,410 housing structures in Douglas County, most of the houses in Douglas County have been built before 2000, with 44,547 houses built before then. Figure 1.66 shows how many houses were built throughout the years. There are a total of 198,410 housing units in Douglas County, with 127,698 being owner-occupied, and 70,712 being renter-occupied (2022 ACS 5-year summary).

Approximately 6.38% of the housing stock is vacant, according to Figure 1.67. There is no information to indicate that these homes are seasonally vacant, meaning they are only occupied for a portion of the year or if they are permanently vacant. The number of vacant homes in an area can determine the housing supply available. Figure 1.68 shows that approximately 64.4% of occupied units are owner-occupied whereas 35.6% are renter-occupied, which is close to the national average of about 65% owner-occupied and 35% renter-occupied (2022 U.S. Census QuickFacts).

Figure 1.67: Occupied vs. Vacant Housing Units, Douglas County, NE

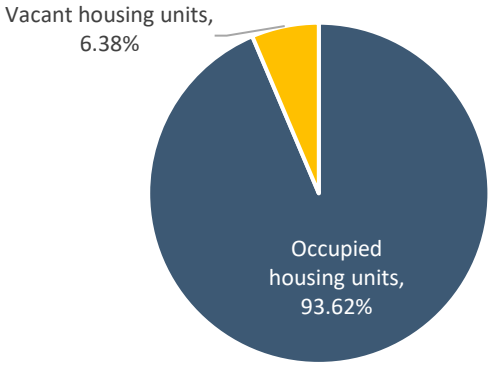
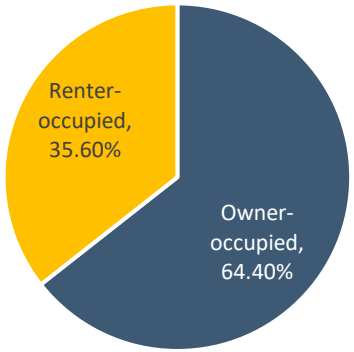


Figure 1.68: Owner- vs. Renter-Occupied Housing Units, Douglas County, NE

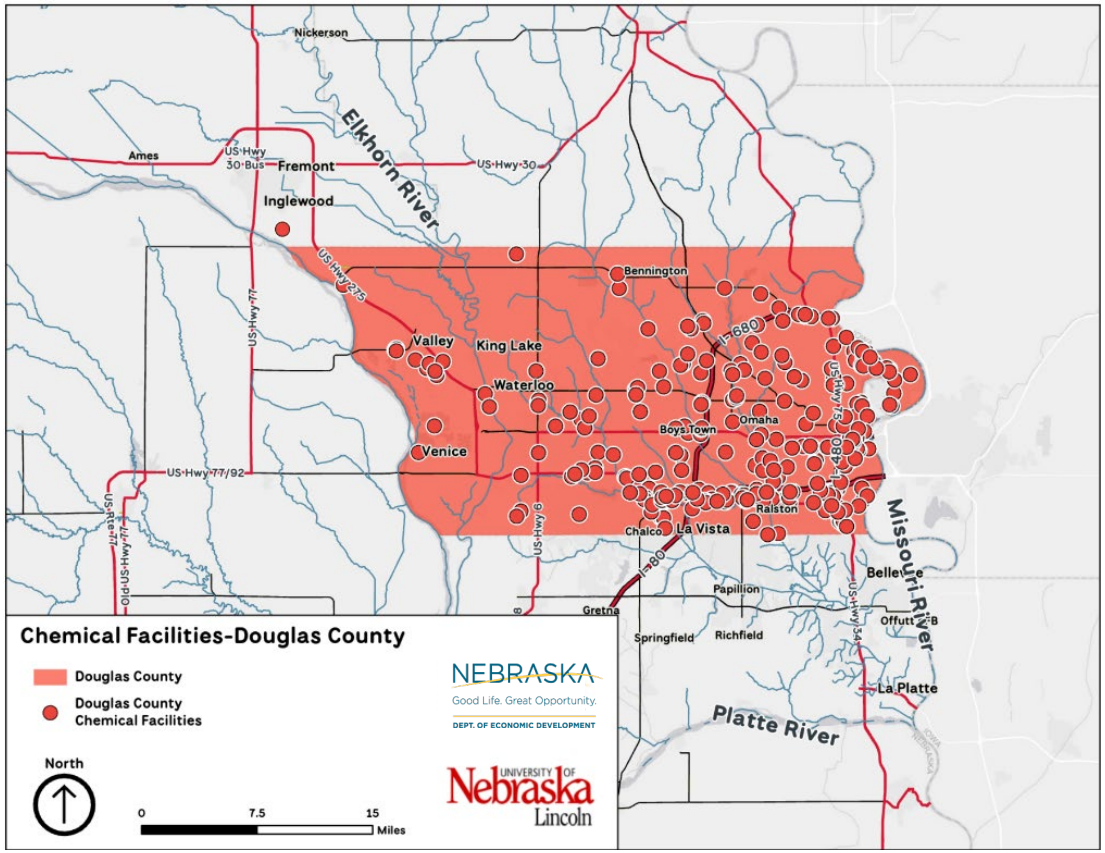


Source: 2022 ACS 5-year summary

Critical Infrastructure

Map 1.8 below shows different locations of chemical facilities within Douglas County. Scattered about, some appear near waterways while others are outside of floodplains.

Map 1.8: Chemical Facilities, Douglas County, NE

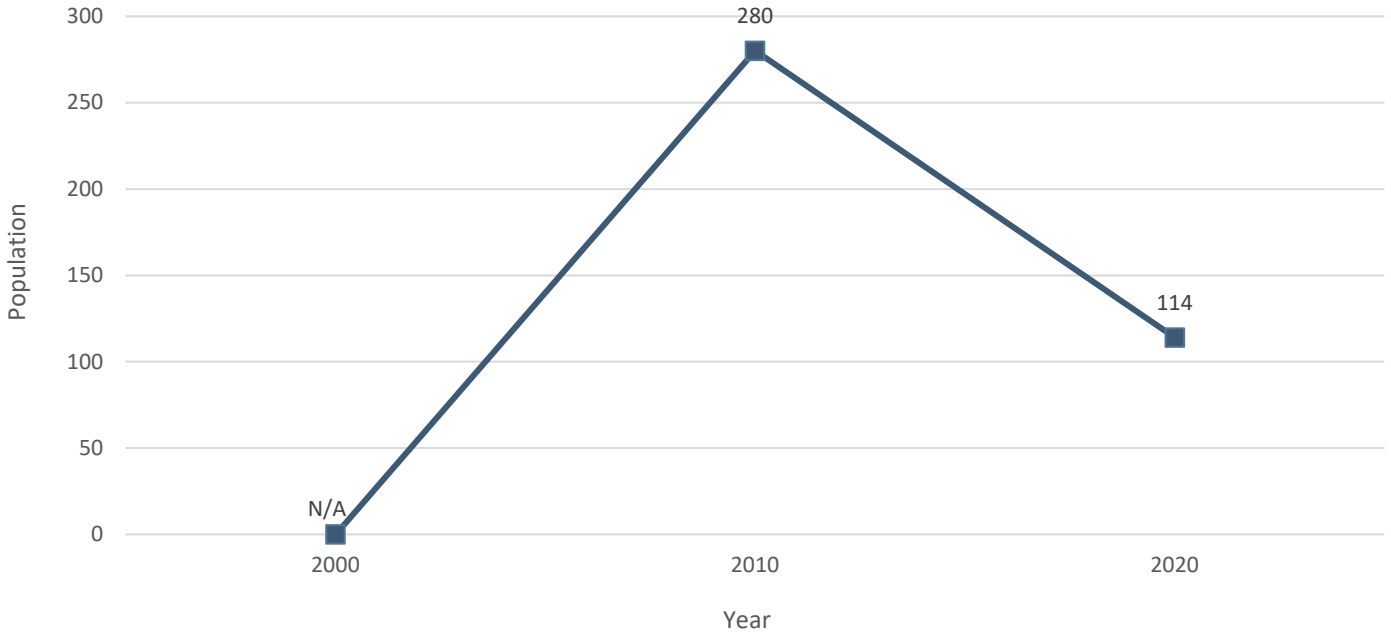


King Lake CDP

Population

The Census Bureau has acknowledged King Lake as a "census designated place," meaning it is a recognized community that does not have legally defined borders or an active governmental body. The census data may not accurately represent what is present in the area. Based on the available data from the Decennial Census, the population in King Lake CDP has declined between 2010 and 2020 (Figure 1.69). The 2022 ACS 5-year summary shows that the population in Venice CDP is at 71 residents.

Figure 1.69: Population Change, King Lake CDP, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

The population sex-wise in King Lake CDP is fairly evenly split. The median age is 66.1, significantly higher than regional and statewide averages (Figure 1.70). The 2020 Decennial Census does indicate a large portion of the population over the age close to that age range, with about 30% of residents being 62 years old and over.

Race

The 2022 ACS 5-yar summary state that the most recent population in King Lake CDP is 100% White (Figure 1.71). The 2020 Decennial Census recorded about 79% of the population as White, 1.8% as Asian, 1.8% as some other race, and less than 1% as Black or African American.

Figure 1.71: Population by Race, King Lake CDP, NE

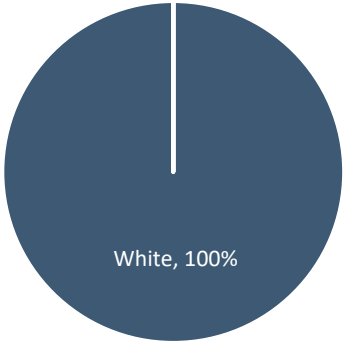
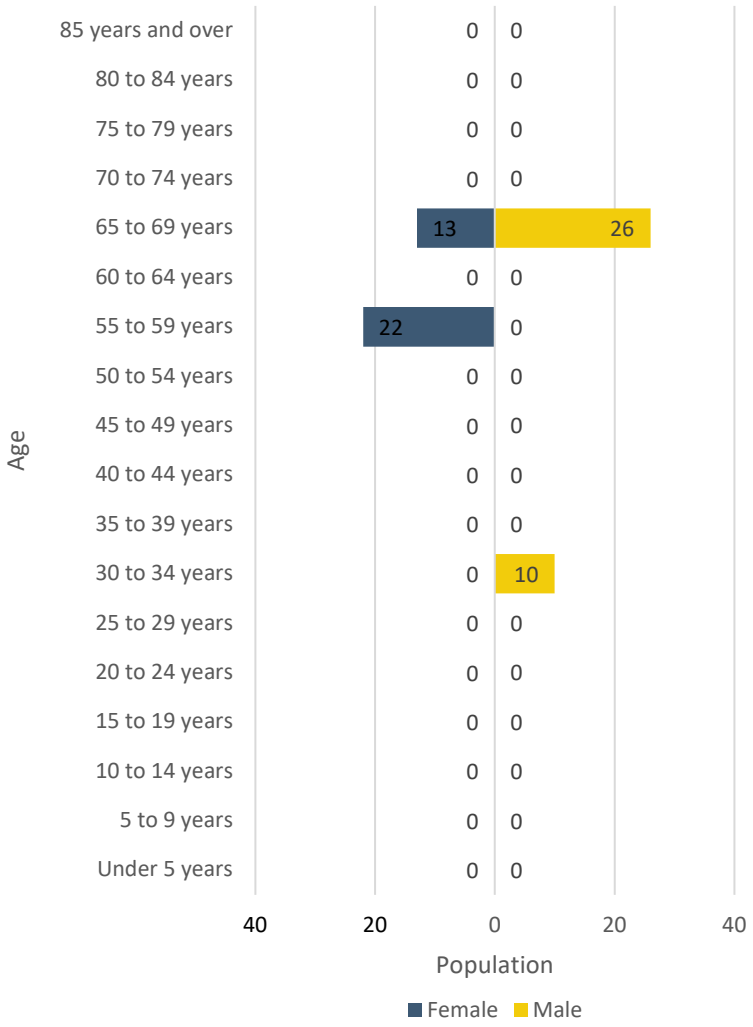
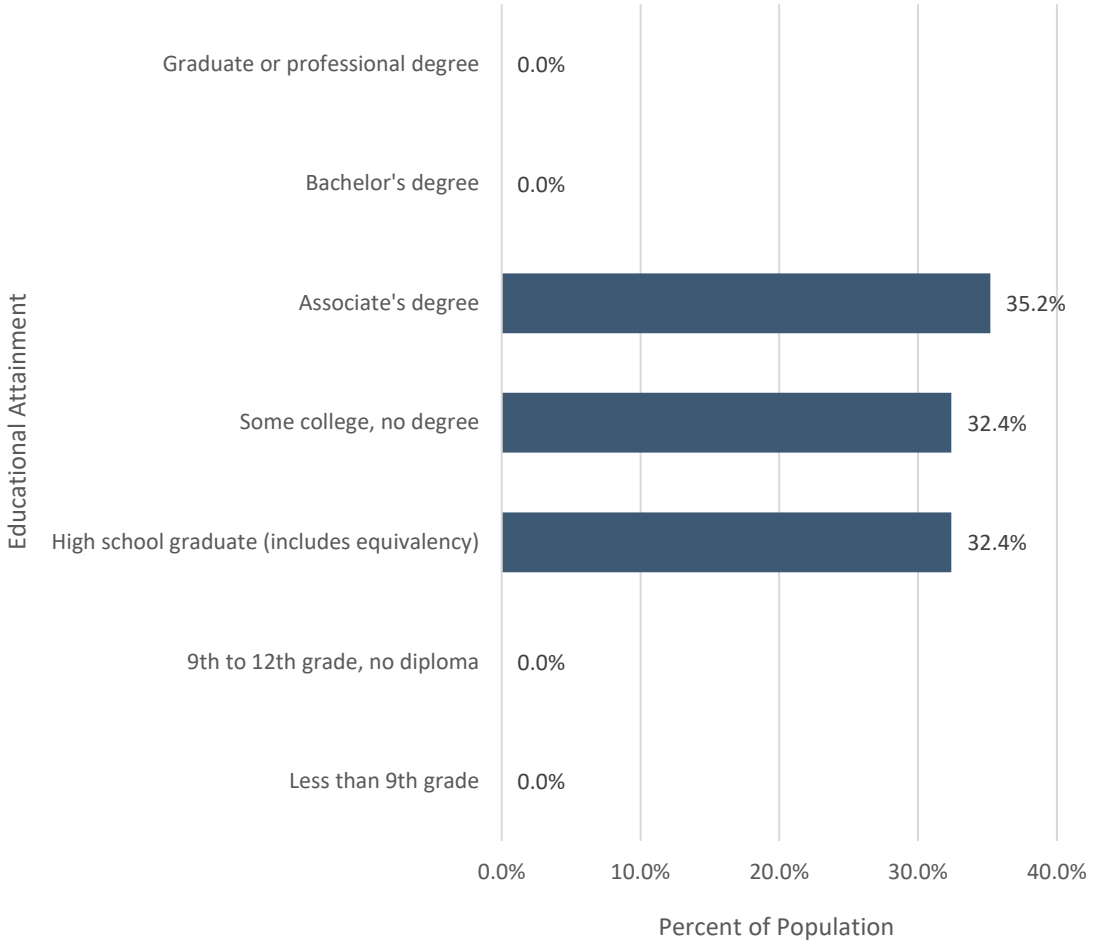


Figure 1.70: Population by Age and Sex, King Lake CDP, NE



Source: 2022 ACS 5-year summary

Figure 1.72: Educational Attainment, King Lake CDP, NE



Source: 2022 ACS 5-year summary

Educational Attainment

All the residents in King Lake CDP have graduated high school or received an equivalent high school diploma, based on the 2022 ACS 5-year summary data. Figure 1.72 breaks down the percent of the population 25 years and older and their education attainment levels.

Economic Characteristics

The ACS 5-year summary data state that the entire working age population in King Lake CDP work in the manufacturing sector.

Household Income

Figure 1.73 shows the income levels for the households in King Lake CDP. There are 25 households that earn less than $25,000 per year, according to the 2022 ACS 5-year summary data.

Figure 1.73: Household Income, King Lake CDP, NE

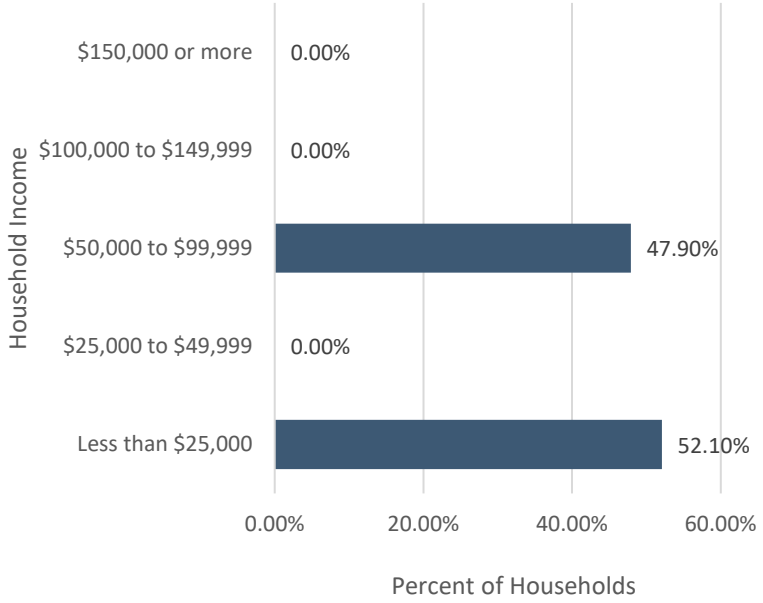
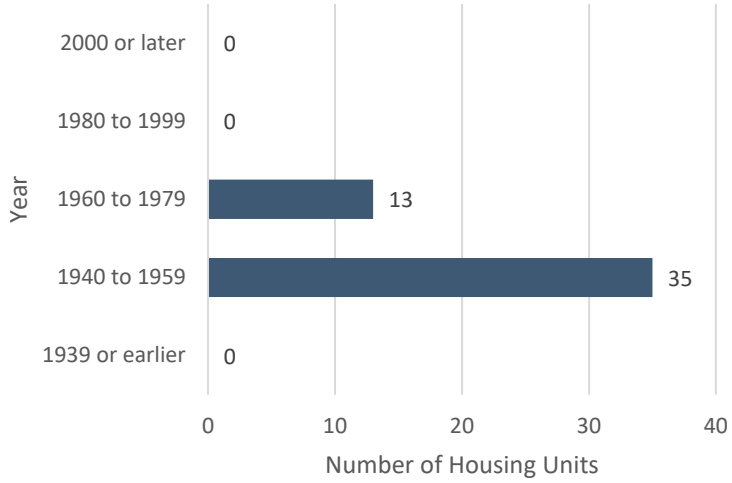


Figure 1.74: Age of Housing Units, King Lake CDP, NE



Source: 2022 ACS 5-year summary

Housing Conditions

There are a total of 87 housing units in King Lake CDP, with 48 of them currently occupied, based on 2022 ACS 5-year summary data. The data states that all housing structures were built before 1980, which is illustrated in Figure 1.74.

According to the 2020 Decennial Census, there were 109 housing units in King Lake CDP, with 64 of them occupied.

Of the total 87 housing units, 39 of them are vacant. The 2020 Decennial Census recorded similar ratios of occupied and vacant properties when looking at Figure 1.75, stating that 58.7% were occupied and 41.3% were vacant.

The 2022 ACS 5-year summary data states that all occupied housing units are owner-occupied (Figure 1.76). When compared to the 2020 Decennial Census, the occupied housing units in King Lake CDP were 84.4% owner-occupied and 15.6% renter-occupied.

The ACS 5-year summary data states that all households have access to at least one vehicle. Figure 1.77 breaks down the percentage of households have one or two vehicles available.

Figure 1.75: Occupied vs. Vacant Housing Units, King Lake CDP, NE

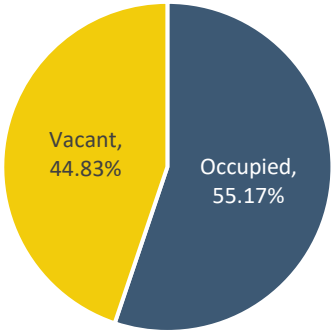


Figure 1.77: Vehicles per Household, King Lake CDP, NE

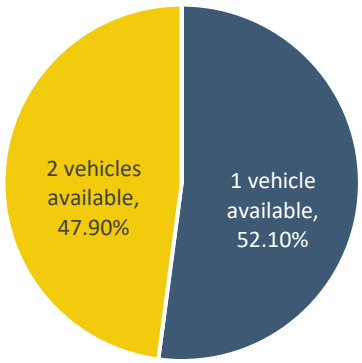
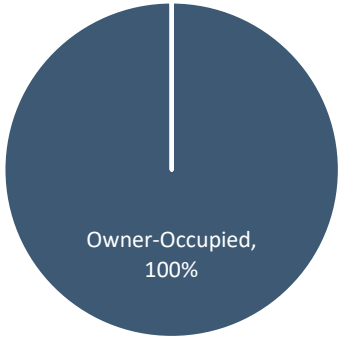


Figure 1.76: Owner- vs. Renter-Occupied Housing Units, King Lake CDP, NE

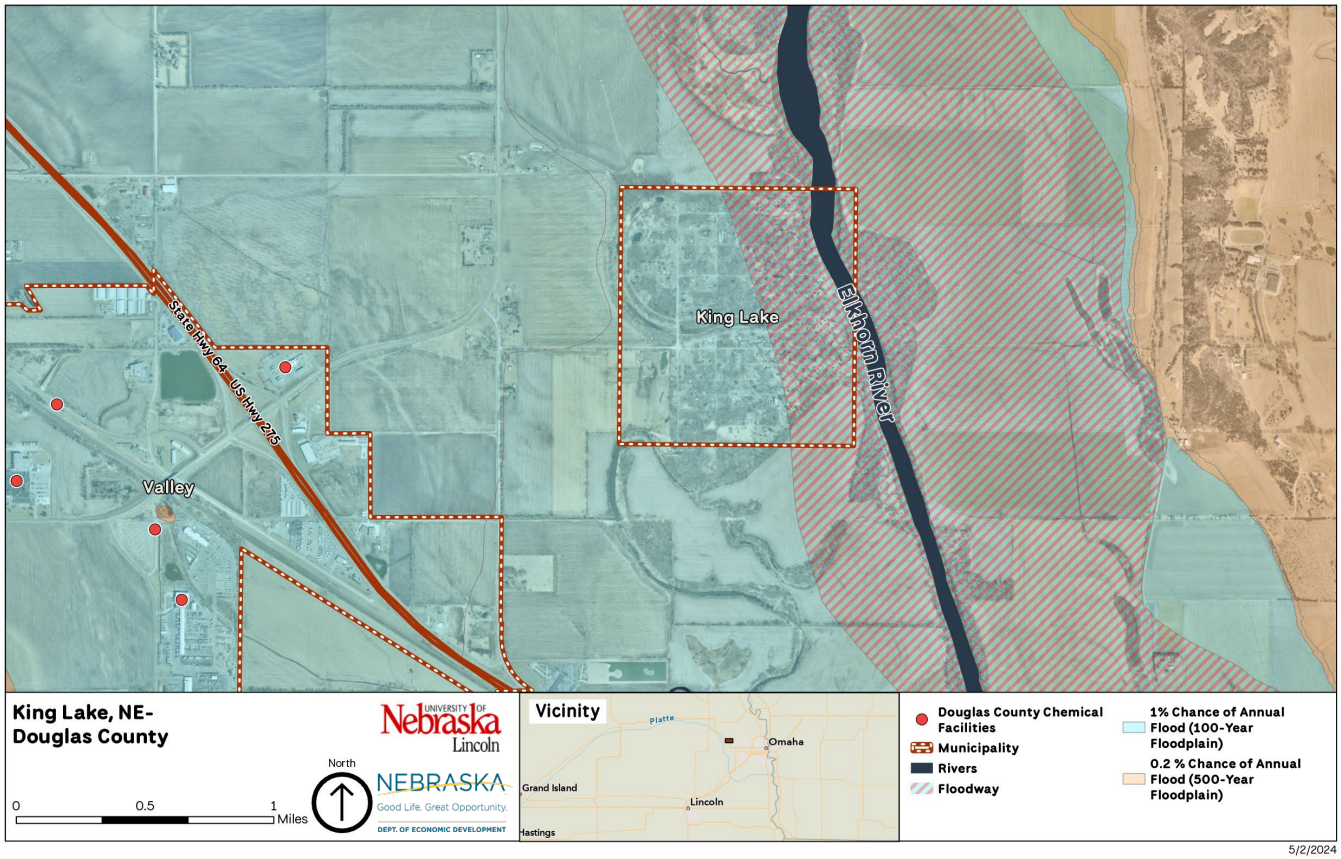


Source: 2022 ACS 5-year summary

Critical Infrastructure

Map 1.9 below shows different locations of chemical facilities within King Lake CDP.

Map 1.9: Chemical Facilities, King Lake CDP, NE

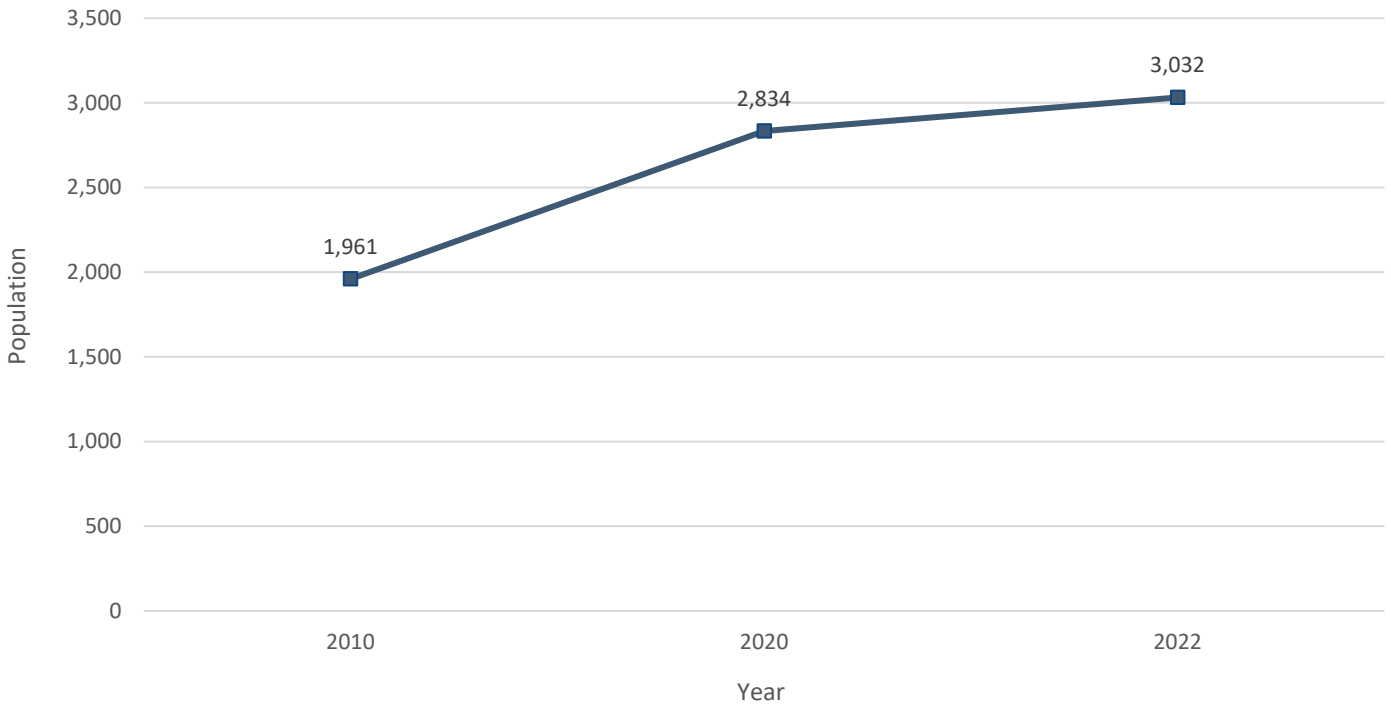


City of Valley

Population

Valley city has seen a significant increase in population over the past decade (Figure 1.78). Between 2010 and 2022, the population in Valley has grown by 54.6%. According to the 2022 ACS 5-year summary, the population of Valley city is estimated to be 3,032 residents. This represents a 6.99% increase from the population of 2,834 recorded in the 2020 decennial census.

Figure 1.78: Population Change, City of Valley, NE



Source: 2000, 2010, 2020 Decennial Census

Age

Valley city has a slightly higher percentage of male residents than females; based on the 2022 ACS 5-year summary, 50.4% of the population are male and 49.6% female. Figure 1.79 breaks down the age distribution. About 22% of Valley's population is under 19 years of age, which is lower than Douglas County. Additionally, the median age for Valley city is 48.5 years old.

Race

According to the 2022 ACS 5-year summary, the racial demographics of Valley city in Douglas County, Nebraska are predominantly White, accounting for 98.5% of the total population. The remaining 1.5% of the population is divided among other races (Figure 1.80).

Figure 1.80: Population by Race, City of Valley, NE

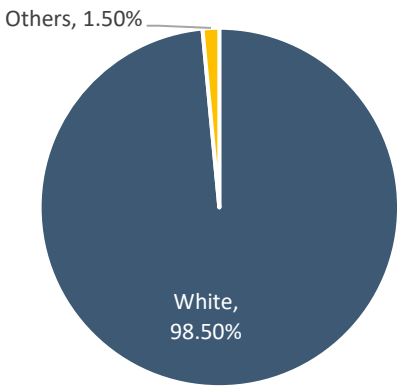
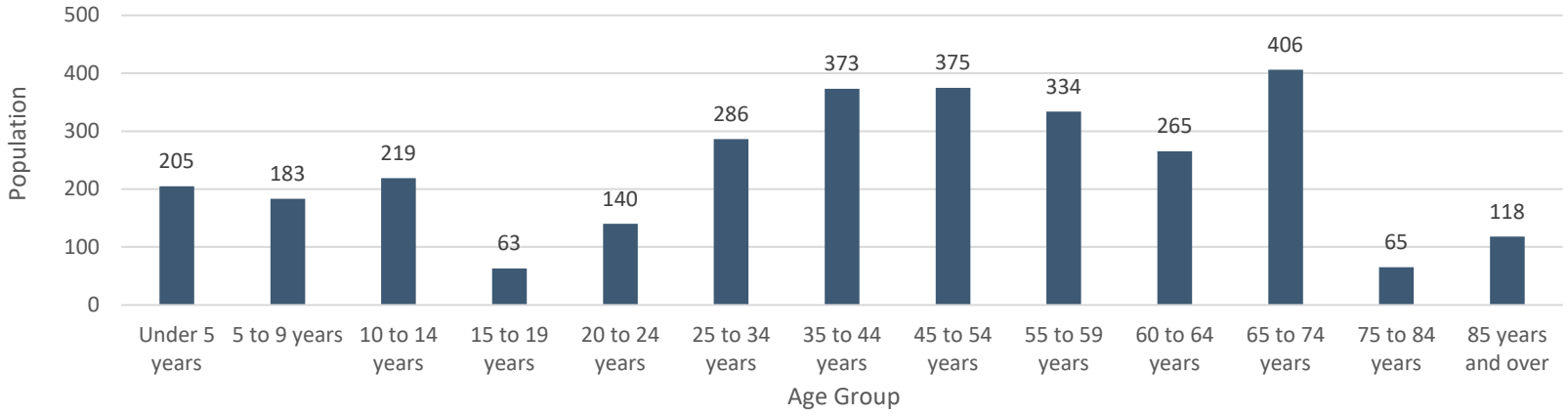
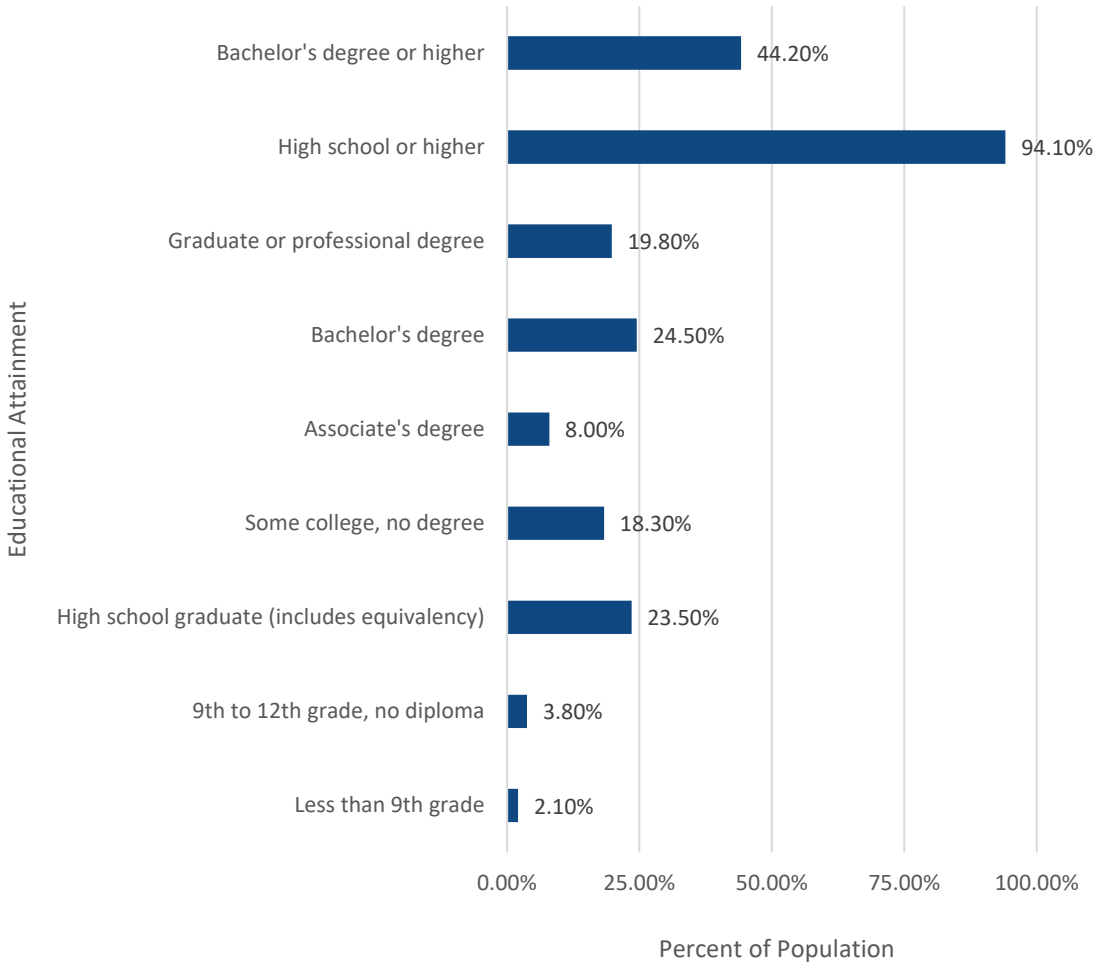


Figure 1.79: Population by Age, City of Valley, NE



Source: 2022 ACS 5-year summary

Figure 1.81: Educational Attainment, City of Valley, NE



Source: 2022 ACS 5-year summary

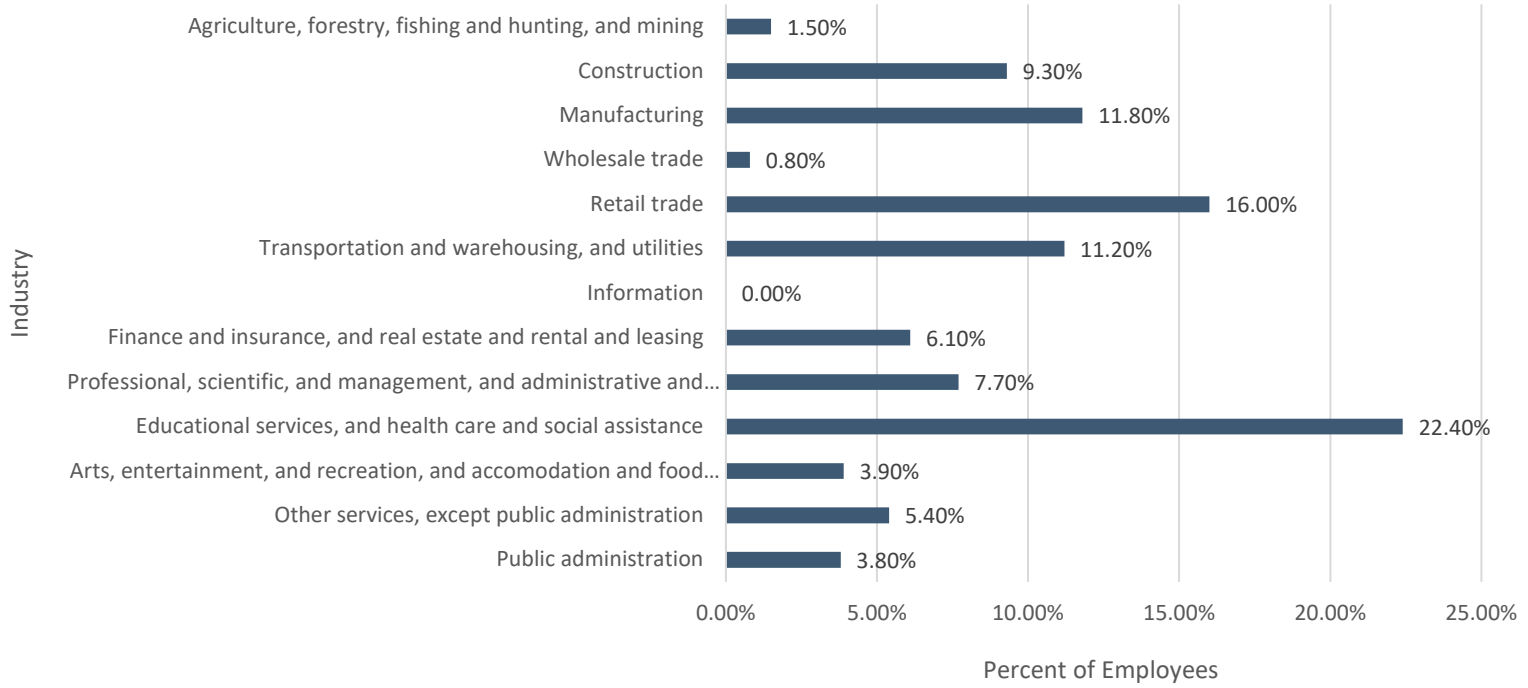
Educational Attainment

The education attainment levels in Valley are comparable to Douglas County's, with slightly higher statistics for higher education degrees (Figure 1.81). About 94.1% of residents in Valley have received a high school degree or higher.

Economic Characteristics

As of 2022, the largest sectors employees in Valley work in are educational services, and health care and social assistance. Figure1.82 shows each industry and the percentage of employees in them. According to the Census Bureau, roughly 72.4% of workers commute to work alone in either a car, truck, or van with the mean travel time to work 26 minutes (2022 ACS 5-year summary).

Figure 1.82: Employment by Industry, City of Valley, NE



Note: Industries with 0.00%: Construction; Wholesale trade; Information; Finance and insurance, and real estate and rental and leasing; Arts, entertainment, and recreation, and accommodation and food services; and Public administration.

Source: 2022 ACS 5-year summary

Household Income

The median household income in Valley is $124,583 according to the 2022 ACS 5-year summary. Adjusted income for all residents in Valley is broken down in Figure 1.83.

From the 2022 ACS 5-year summary, 63 households received food stamp/SNAP benefits in the past year in 2022. Full time working Females had a median income of $75,658 while males made $71,048.

Figure 1.83: Household Income, City of Valley, NE

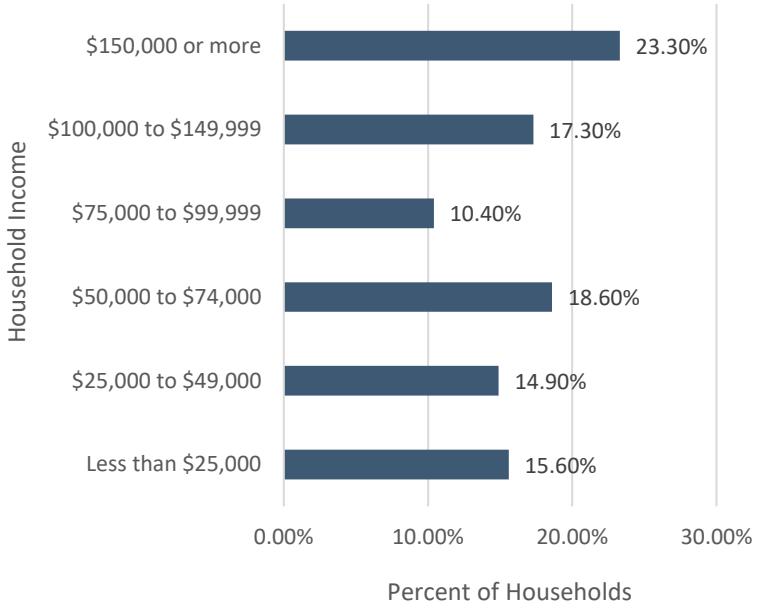
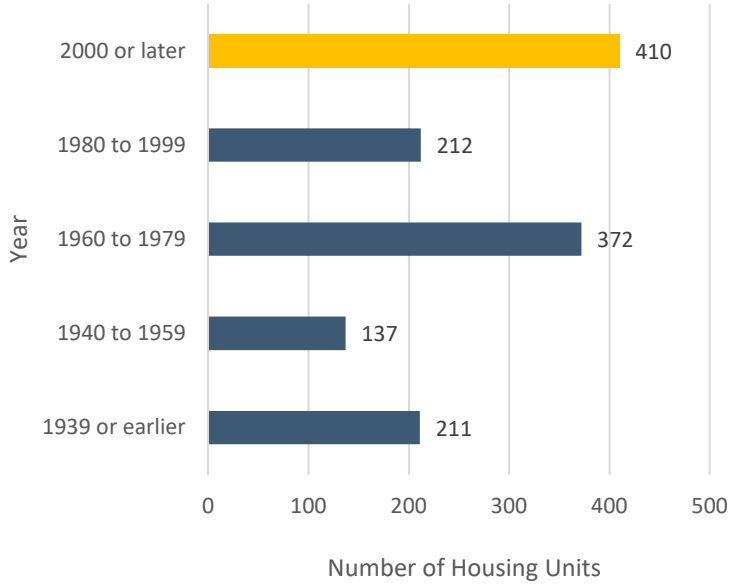


Figure 1.84: Age of Housing Units, City of Valley, NE



Source: 2022 ACS 5-year summary

Housing Conditions

There are 1342 housing units in Valley, with 100% of the units being occupied based on the 2022 ACS 5-year summary data. Most of the housing units in Valley were built before 2000, accounting for about 84.3% of the city's housing stock (Figure 1.84).

Valley has 100% of its housing stock occupied, with no recorded vacancies (Figure 1.85). Occupied and vacancy rates depend on the community, but it is generally healthy to have a vacancy rate that allows a reasonable number of choices for interested buyers and renters. Approximately 76% of the occupied units are owner-occupied and 23% are renter-occupied (Figure 1.86).

There are 46 households in Valley that do not have access to a vehicle, based on data from the 2022 ACS 5-year summary. About 96.6% of Hooper's household units have access to at least one vehicle (Figure 1.87).

Figure 1.85: Occupied vs. Vacant Housing Units, City of Valley, NE

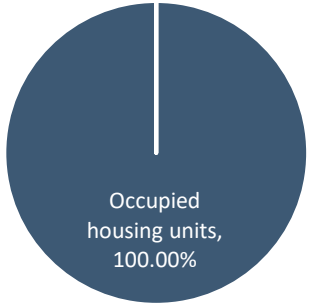


Figure 1.87: Vehicles per Household, City of Valley, NE

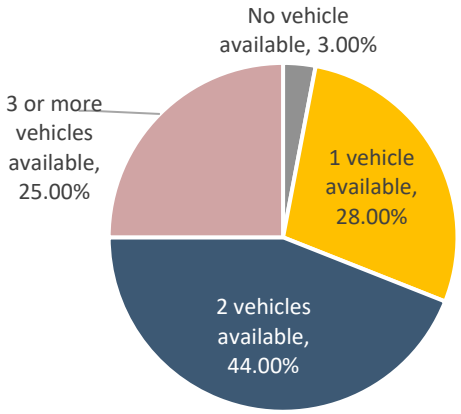
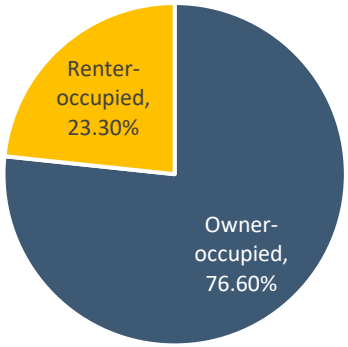


Figure 1.86: Owner- vs. Renter-Occupied Housing Units, City of Valley, NE

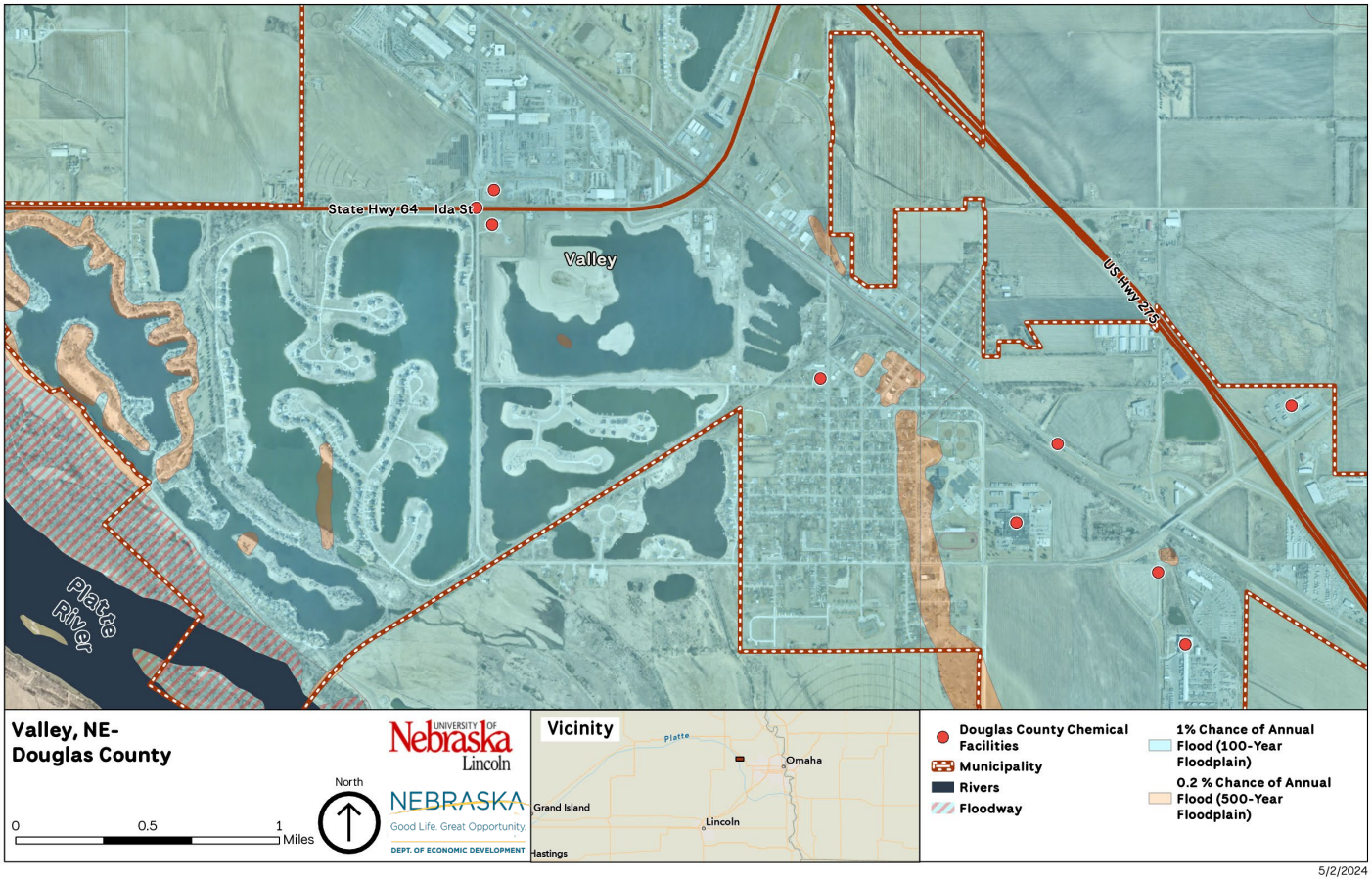


Source: 2022 ACS 5-year summary

Critical Infrastructure

Map 1.10 below shows different locations of chemical facilities within City of Valley.

Map 1.10: Chemical Facilities, City of Valley, NE

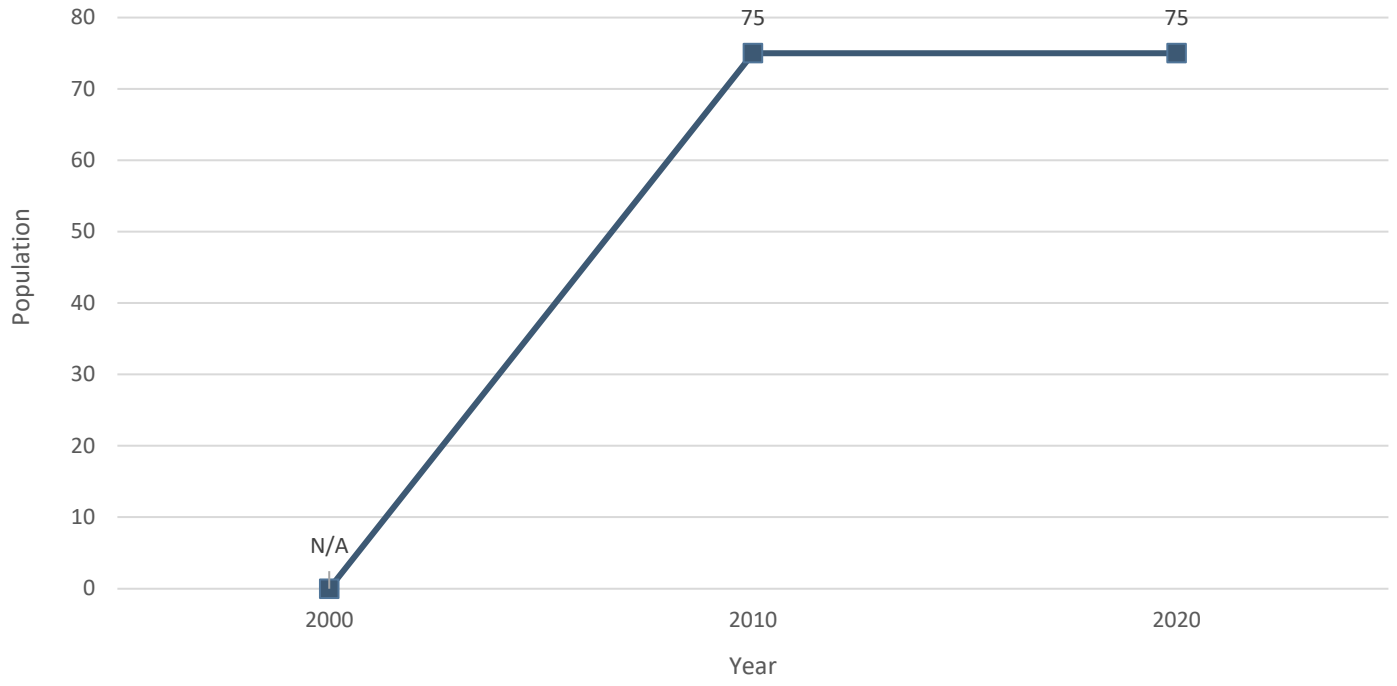


Venice CDP

Population

According to the Census Bureau, Venice is a "census designated place," meaning it is a recognized community that does not have legally defined borders or active governmental body. The census data may not accurately represent what is present in the area. Based on the available data from the Decennial Census, Venice CDP has had a consistent population between 2010 and 2020 (Figure 1.88). The 2022 ACS 5-year summary shows that the population in Venice CDP is at 26 residents.

Figure 1.88: Population Change, Venice CDP, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

The 2022 ACS 5-year summary states that there are 26 residents living in Venice CDP. The population is predominantly male, accounting for about 65% of the population. The median age in Venice CDP is 55.4 years, higher than regional and national averages. Figure 1.89 breaks down the age and sex in Venice CDP. The 2020 Decennial Census indicated that the age and sex population had a reversed ratio, with 35 male residents and 40 female residents.

Race

According to the 2022 ACS 5-year summary data, White is the only population present in Venice CDP. This is close to the percent from the 2020 Decennial Census that says that about 97.3% of the population was White and 2.7% identified as being two or more races (Figure 1.90).

Figure 1.90: Population by Race, Venice CDP, NE

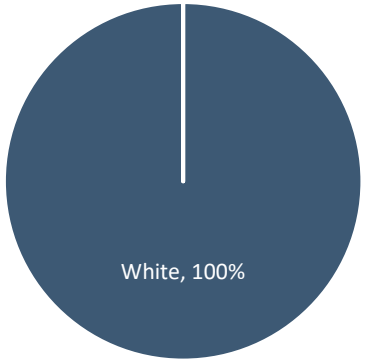
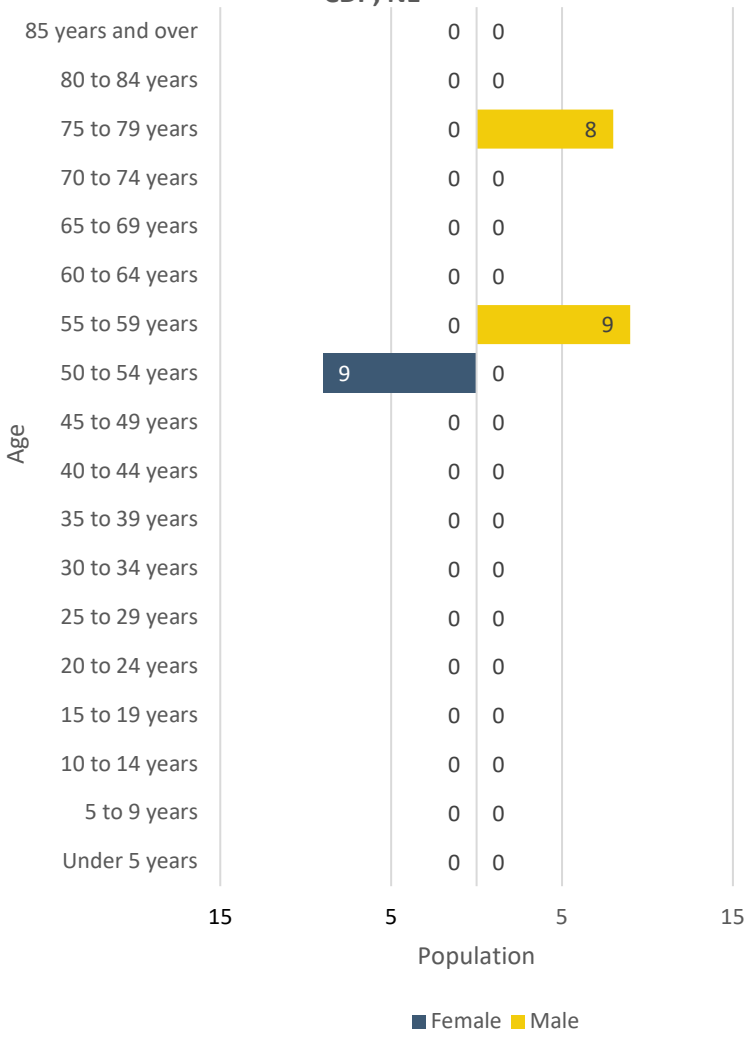
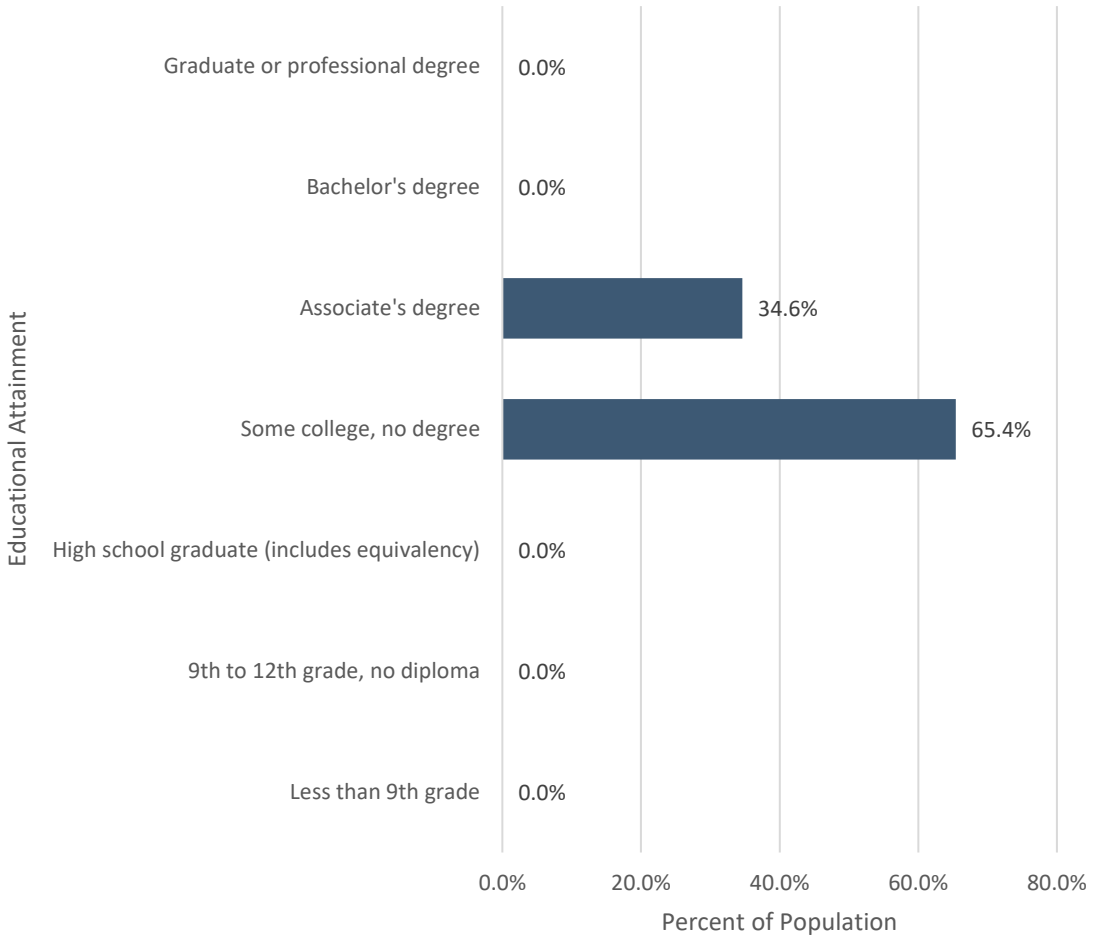


Figure 1.89: Population by Age and Sex , Venice CDP, NE



Source: 2022 ACS 5-year summary

Figure 1.91: Educational Attainment, Venice CDP, NE



Source: 2022 ACS 5-year summary

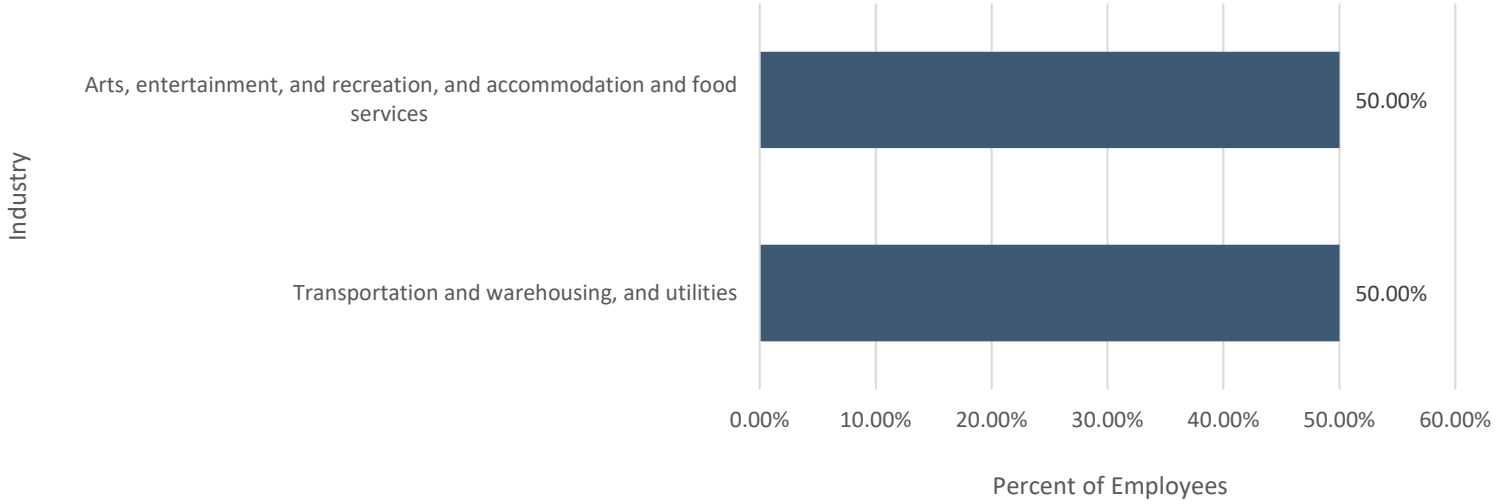
Educational Attainment

Figure 1.91 shows the education attainment levels in Venice CDP. All the residents in Venice CDP have earned at least a high school degree. Over a third of the population has received an Associate's degree.

Economic Characteristics

The two industries that working residents in Venice CDP are employed in are arts, entertainment, recreation, accommodation, food services, along with transportation and warehousing, and utilities. According to the 2022 ACS 5-year summary, there are 9 residents employed in each category found in Figure 1.92.

Figure 1.92: Employment by Industry, Venice CDP, NE



Source: 2022 ACS 5-year summary

Household Income

Figure 1.93 shows the household income of Venice CDP based on the 2022 ACS 5-year summary data. This data also states that no households or individuals received public assistance, or food stamps/SNAP benefits. There is also no indication that there are residents who have incomes that fall below the poverty level.

Figure 1.93: Household Income, Venice CDP, NE

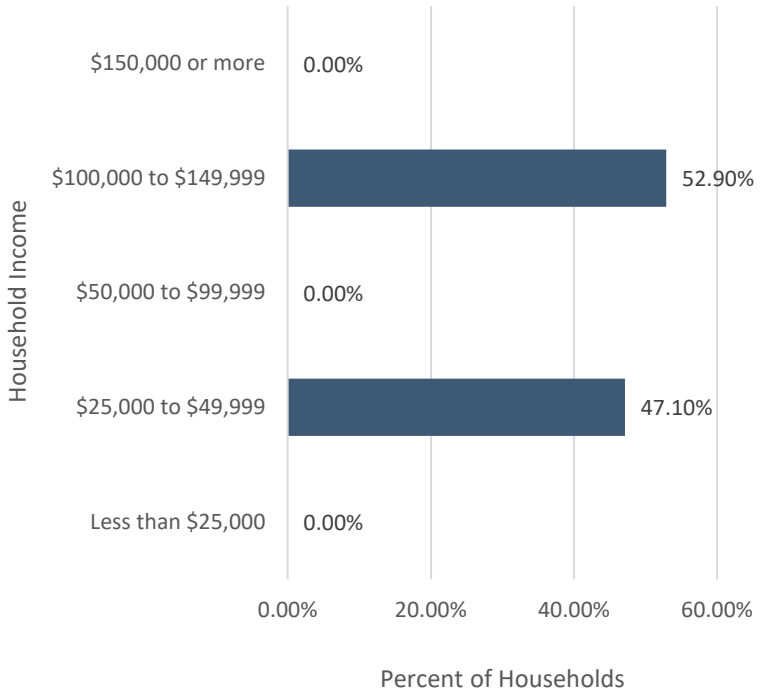
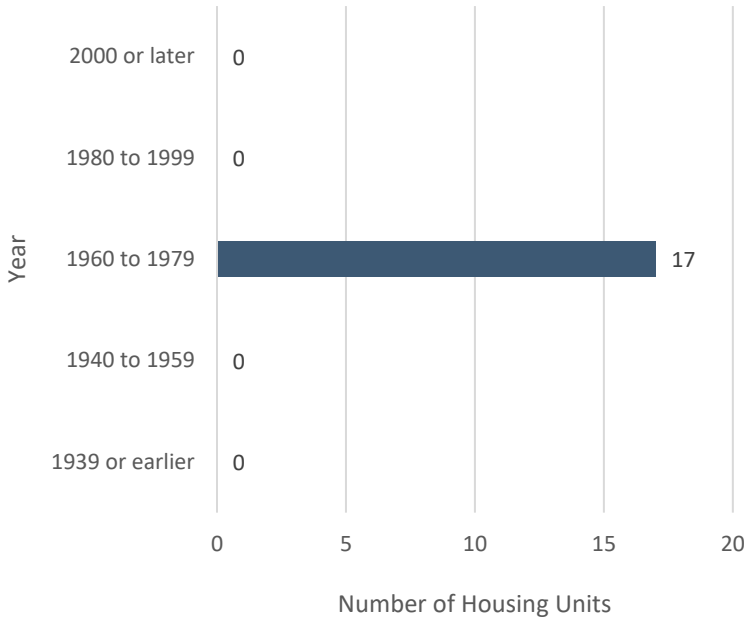


Figure 1.94: Age of Housing Units, Venice CDP, NE



Source: 2022 ACS 5-year summary

Housing Conditions

There are a total of 25 housing units in Venice CDP based on the 2022 ACS 5-year summary. Of the 25, 17 of them were built between 1960 and 1979, based on Figure 1.94.

The 2020 Decennial Census showed that there were 45 total housing units, with about 26.7% of the units vacant. The owner- and renter-occupancy ratio was 2:1.

Based on the 2022 ACS 5-year summary data, 32% or 8 housing units in Venice CDP are unoccupied (Figure 1.95). Figure 1.96 shows that all the occupied housing units are owner-occupied.

All households have access to two vehicles, according to the 2022 ACS 5-year summary (Figure 1.97).

Figure 1.95: Occupied vs. Vacant Housing Units, Venice CDP, NE

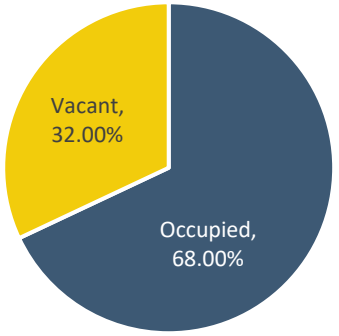


Figure 1.96: Owner- vs. Renter-Occupied Housing Units, Venice CDP, NE

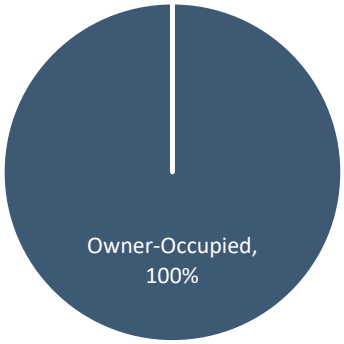
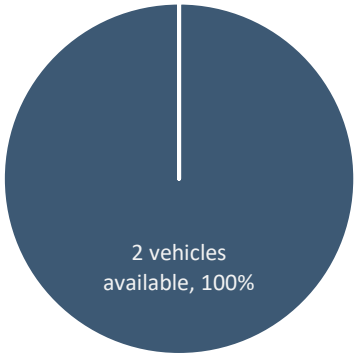


Figure 1.97: Vehicles per Household, Venice CDP, NE

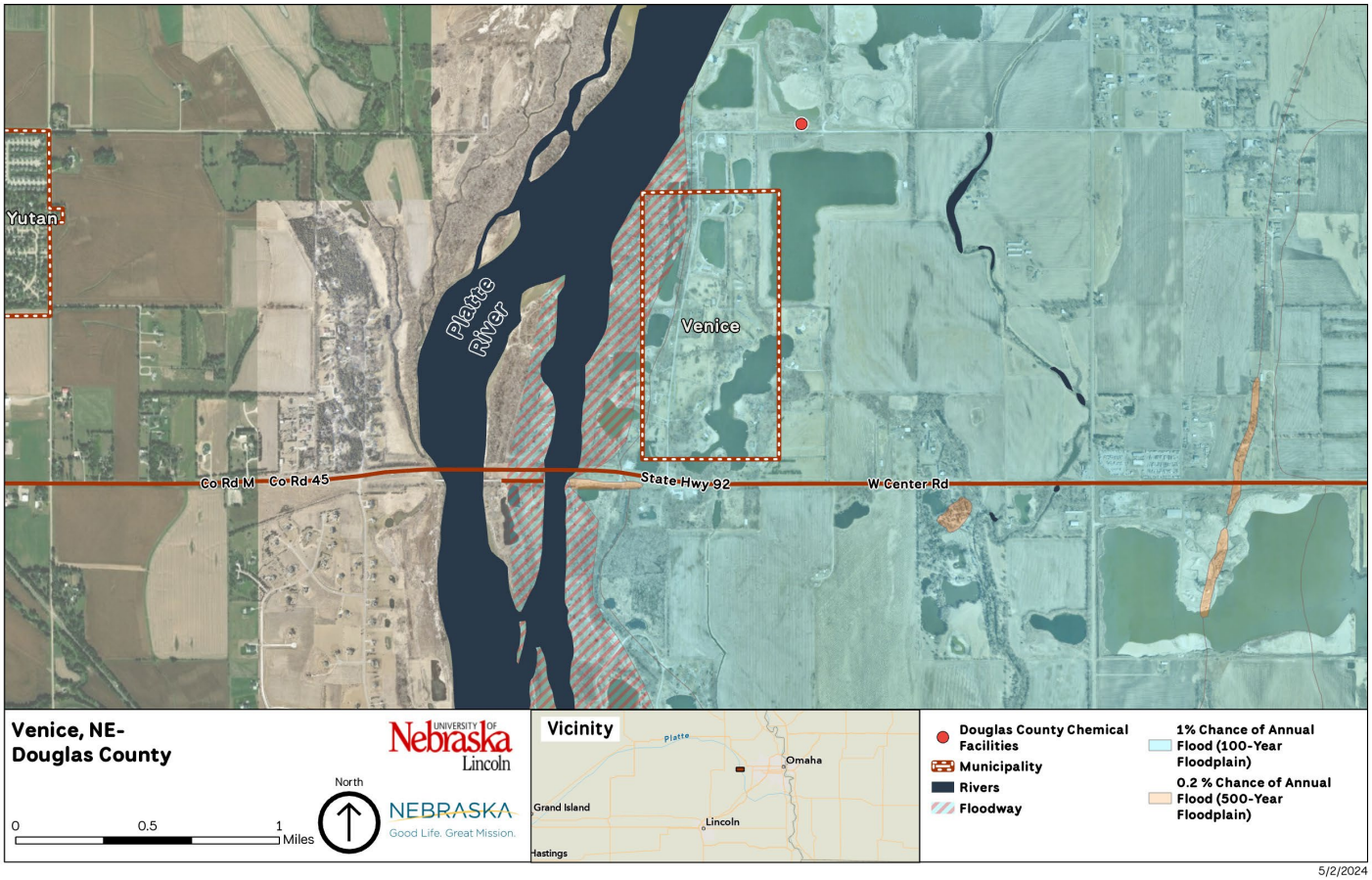


Source: 2022 ACS 5-year summary

Critical Infrastructure

Map 1.11 below shows different locations of chemical facilities within Venice CDP.

Map 1.11: Chemical Facilities, Venice CDP, NE

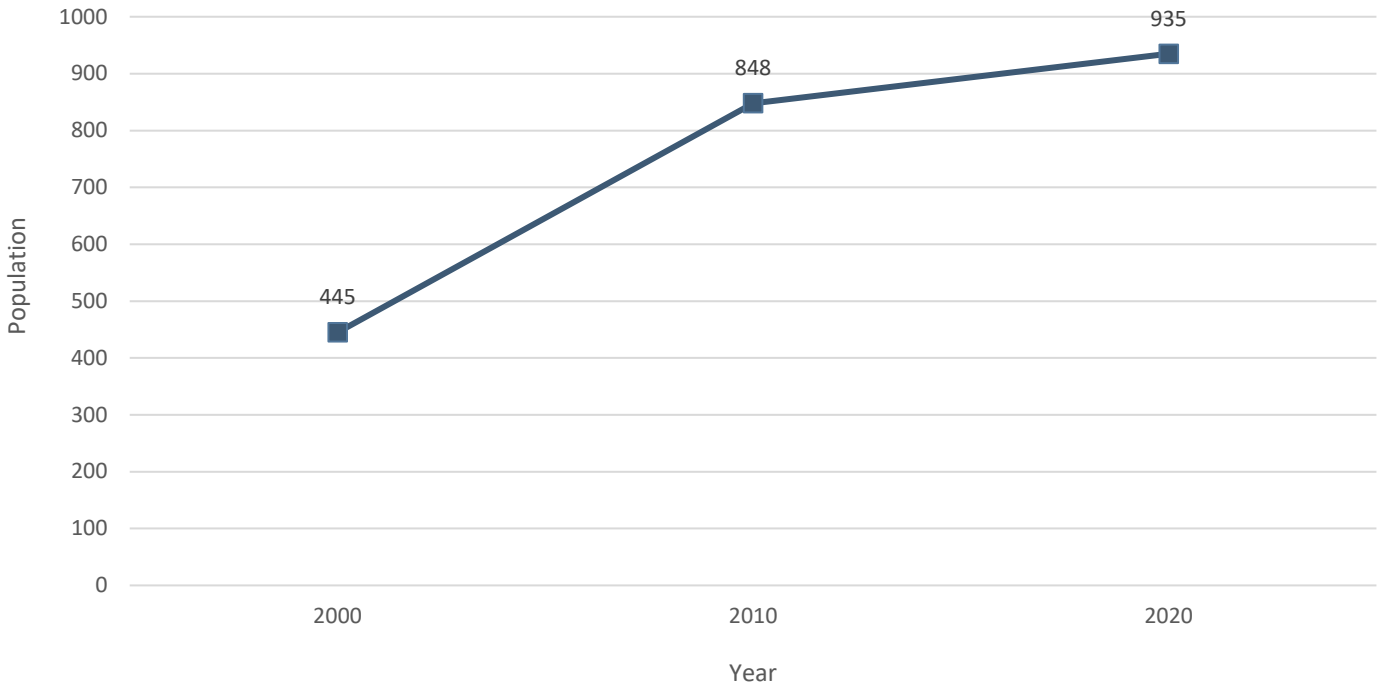


Village of Waterloo

Population

Based on the 2022 ACS 5-year summary, the population in Waterloo is at 931 residents. Since 2000, Waterloo has seen a steady rise in its population, growing a little more than 9% between the 2010 and 2020 decennial census. Figure 1.98 shows the change in population for the Village of Waterloo.

Figure 1.98: Population Change, Village of Waterloo, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

The Village of Waterloo has 520 female residents and 411 male residents. Figure 1.99 breaks down the population in Waterloo based on sex and age cohorts. The median age in the village is 37.6 years old, which is close to the state average of 36.9 years.

Race

Figure 1.100 illustrates the different races in the Village of Waterloo. The village is predominantly White with 874 residents, followed by 30 residents identifying as two or more races, and 27 residents identifying as Hispanic, based on the 2022 ACS 5-year summary data.

Figure 1.100: Population by Race, Village of Waterloo, NE

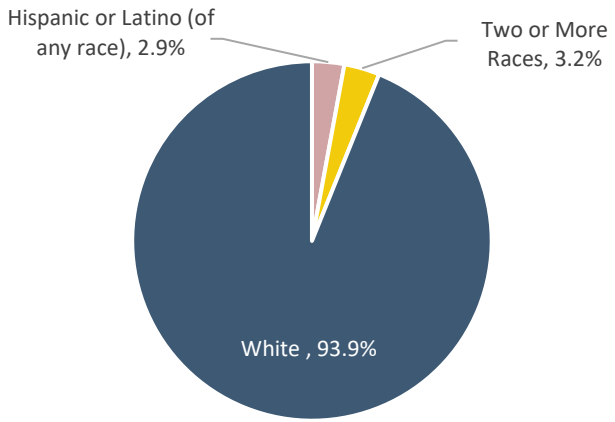
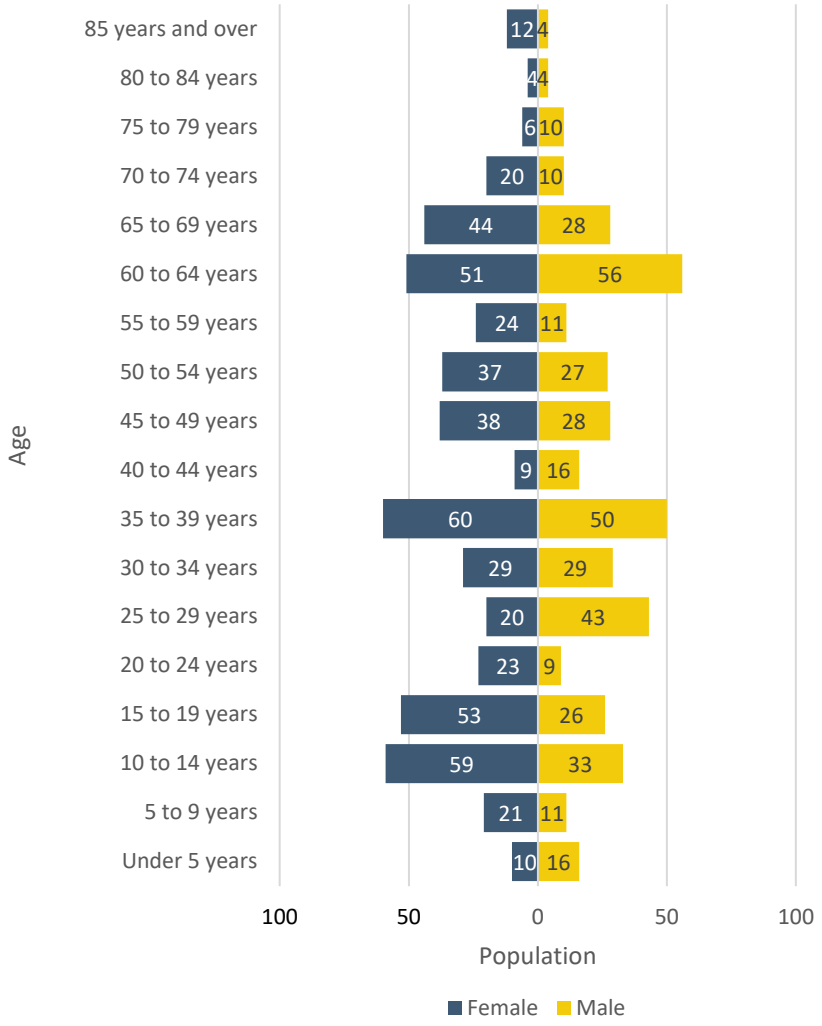
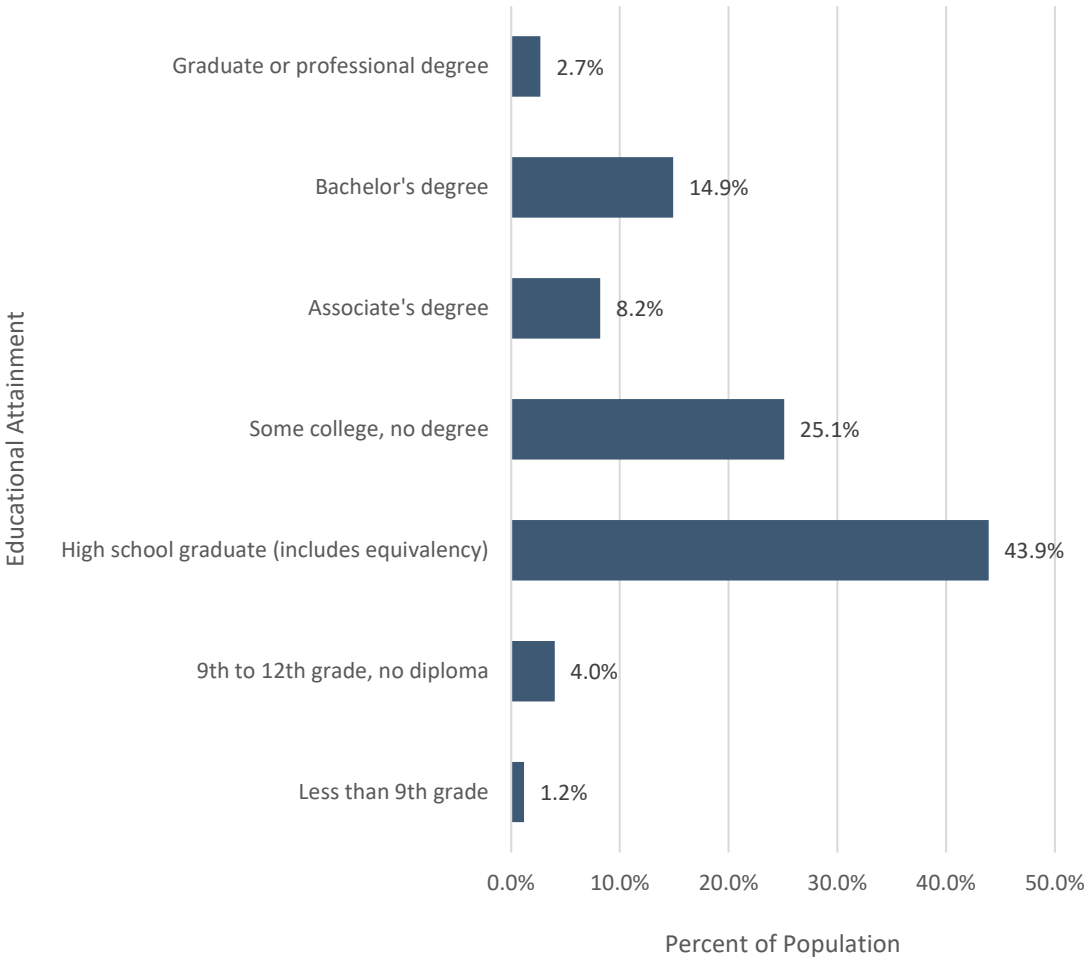


Figure 1.99: Population by Age and Sex, Village of Waterloo, NE



Source: 2022 ACS 5-year summary

Figure 1.101: Educational Attainment, Village of Waterloo, NE



Source: 2022 ACS 5-year summary

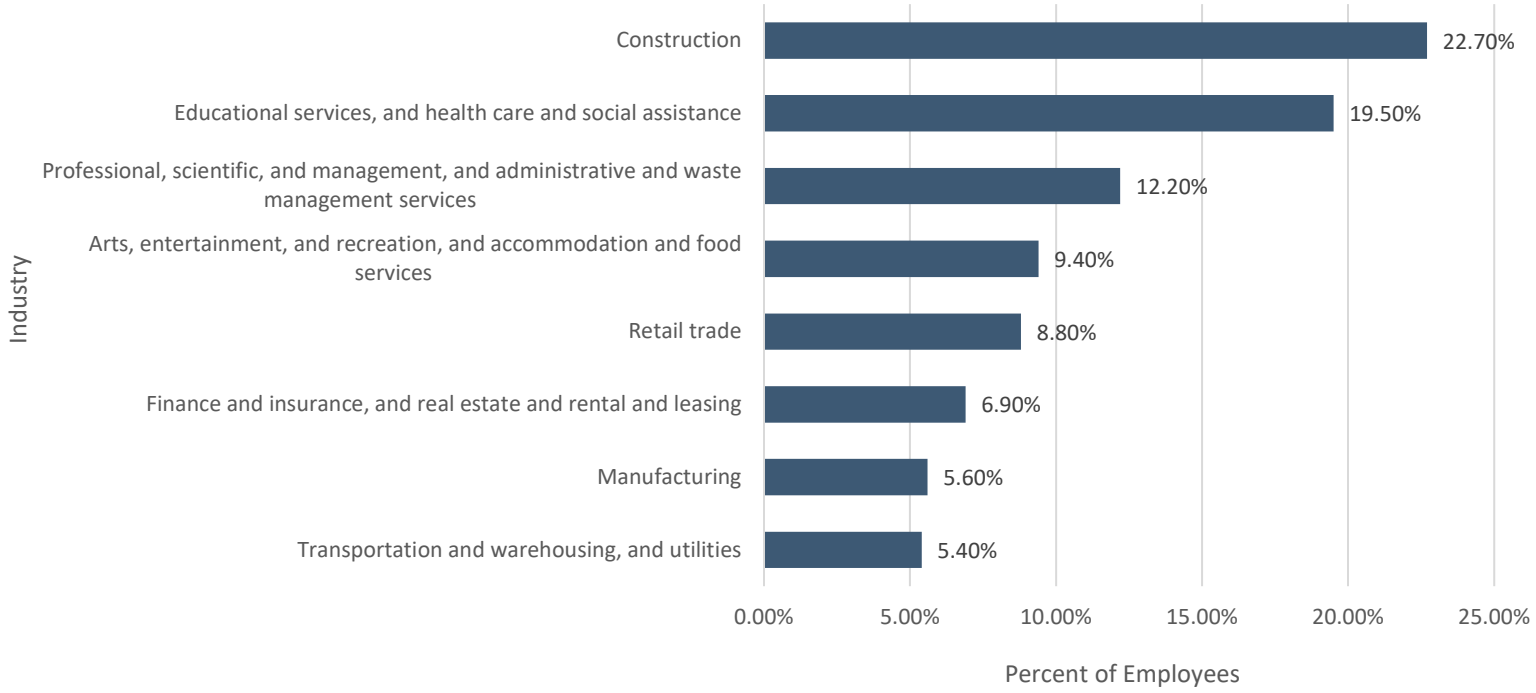
Educational Attainment

Over 94% of the population 25 years and older have received a high school degree or higher. Residents with a Bachelor's degree or higher, which is 17.6% of the focused population, is slightly lower than regional averages (Figure 1.101).

Economic Characteristics

A little over one-fifth of the working population of individuals 16 years old and older in the Village of Waterloo work in construction. The second-largest industry employers in Waterloo educational services, health care, and social assistance with 91 employees working in those sectors (Figure 1.102).

Figure 1.102: Employment by Industry, Village of Waterloo, NE



Note: Industries with less than 5.00%: Agriculture, forestry, fishing & hunting, & mining (0.00%); Information (1.30%); Wholesale trade (1.70%); Public administration (2.10%); Other services, except public administration (4.50%).

Source: 2022 ACS 5-year summary

Household Income

Of the 376 households in the Village of Waterloo, the median household income is $65,000. About 50% of the households earn between $50,000 and $ $99,000 in Waterloo (Figure 1.103).

Based on the 2022 ACS 5-yar summary data, households that received food stamps/SNAP benefits within the past year in the Village of Waterloo is 38, or about 10% of the households. Almost 9% of individuals earned an income below the poverty level. Of those individuals, 14.5% are under 18 years of age.

Figure 1.103: Household Income, Village of Waterloo, NE

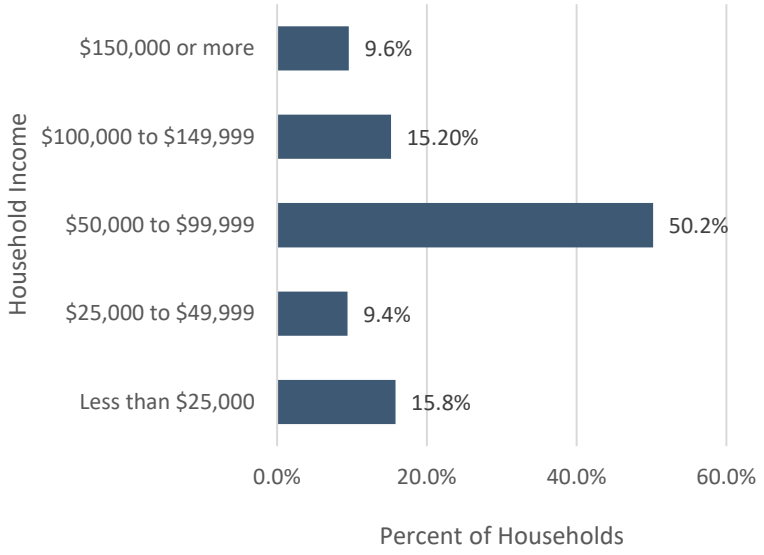
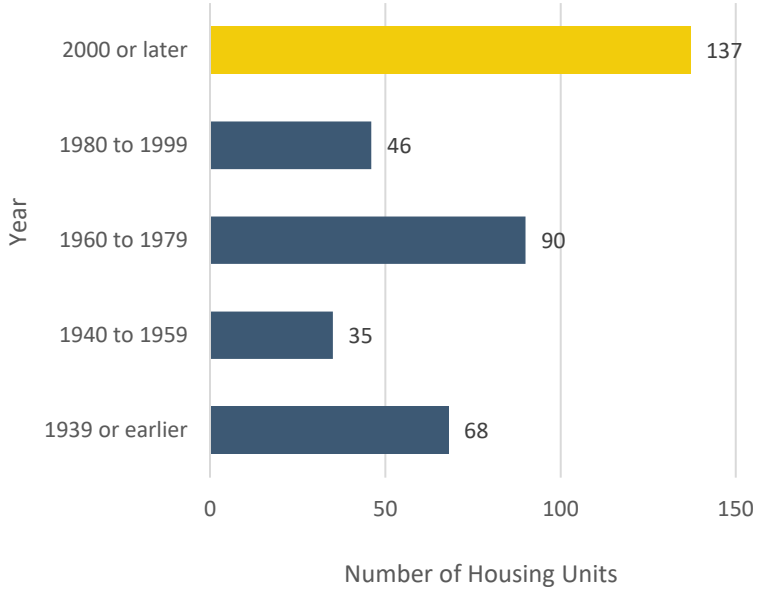


Figure 1.104: Age of Housing Units, Village of Waterloo, NE



Source: 2022 ACS 5-year summary

Housing Conditions

Over a third of housing units in the Village of Waterloo have been built since 2000 (Figure 1.104). This indicates that the housing market has been experiencing significant growth in the past 24 years.

There are a total of 378 housing units in Waterloo, with 376 of them occupied. The vacancy rate for the village is at 0.53%, which can indicate that there is a competitive housing market. Figure 1.105 highlights the difference between occupied and vacant housing units.

A little over three-quarters of the occupied units in the Village of Waterloo are owner-occupied (288), compared to the 74 or roughly 23% that are renter units. Figure 1.106 shows the percentage of occupied units that are owner- and renter-occupied.

Most of the households in the Village of Waterloo have access to at least one vehicle. Figure 1.107 breaks down how many vehicles each household has in Waterloo. There are two households in the village that do not have a vehicle.

Figure 1.105: Occupied vs. Vacant Housing Units, Village of Waterloo, NE

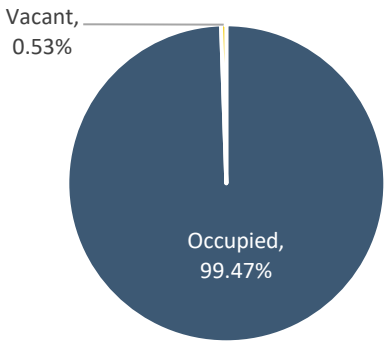


Figure 1.107: Vehicles per Household, Village of Waterloo, NE

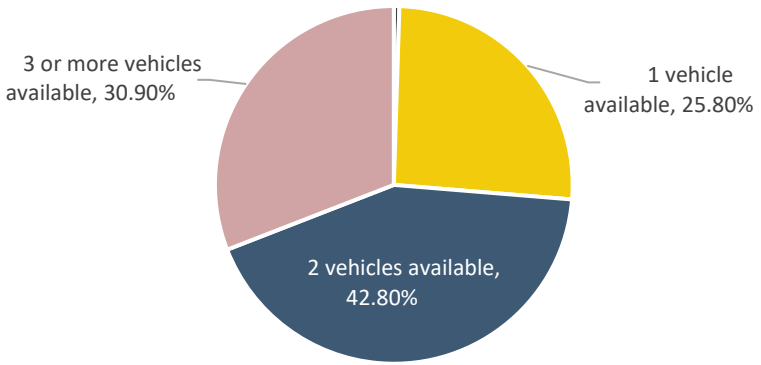
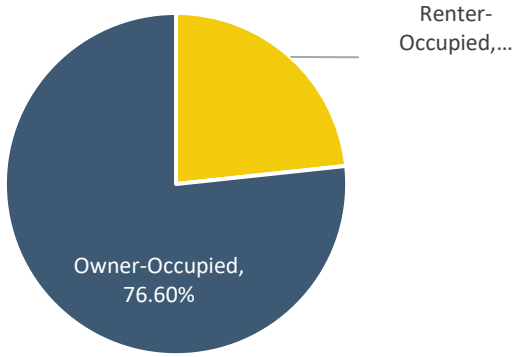


Figure 1.106: Owner- vs. Renter-Occupied Housing Units, Village of Waterloo, NE

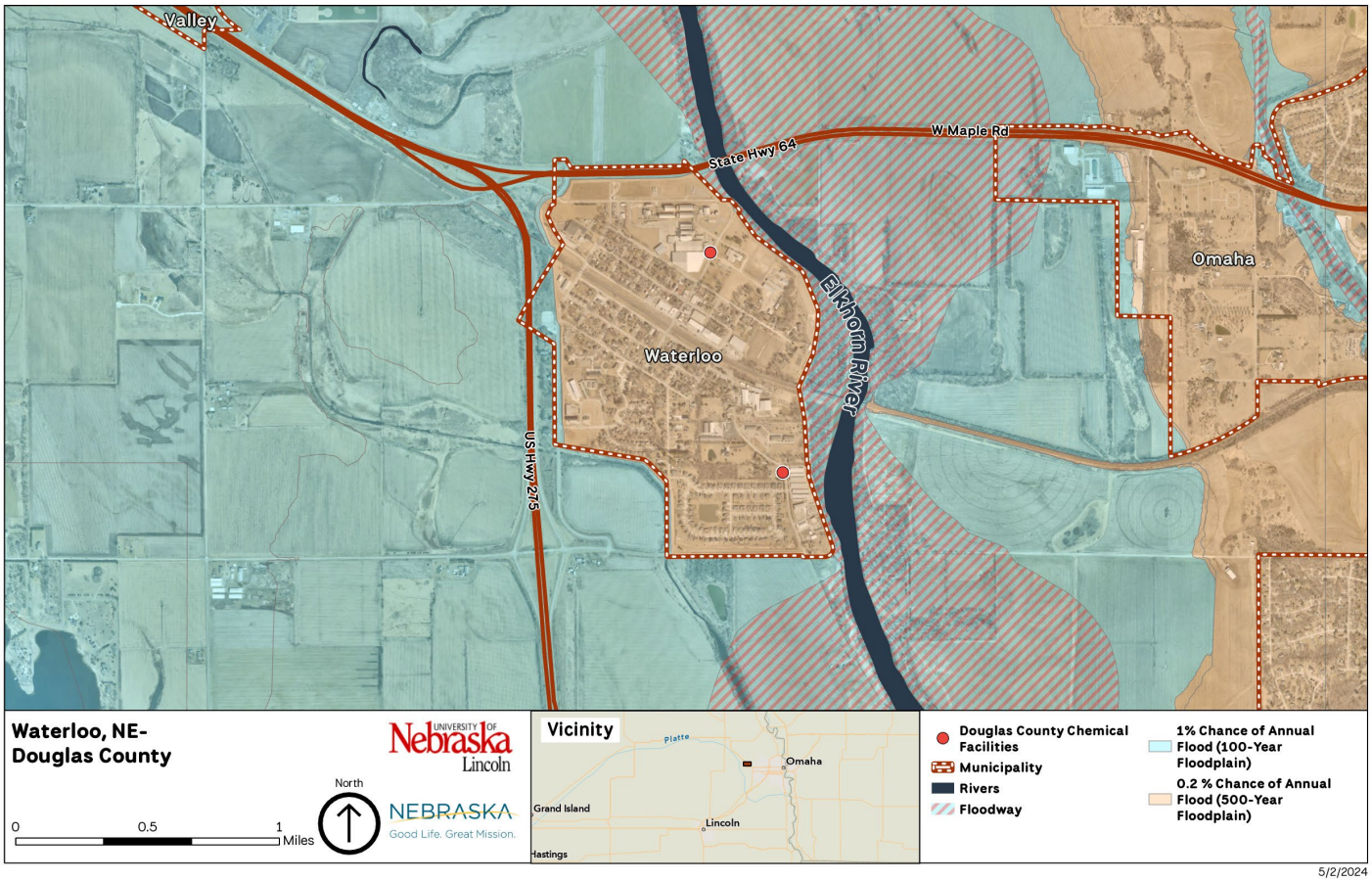


Source: 2022 ACS 5-year summary

Critical Infrastructure

Map 1.12 below shows different locations of chemical facilities within Village of Waterloo.

Map 1.12: Chemical Facilities, Village of Waterloo, NE



Sarpy County

Community Profile

Population

Sarpy County is in Eastern Nebraska, covering 238 square miles of land. According to the 2022 American Community Survey (ACS) 5-year summary, the population of Sarpy County is at 190,604 residents (Table 1.3). There are twelve municipalities within the county, with Bellevue being the most populous and Papillion being the county seat. Located between two waterways—the Platte and Elkhorn River to the South and West and the Missouri River to the East—communities bordering bodies of water are within floodplain zones.

Table 1.3: Population in Municipalities, Sarpy County, NE

Municipality	Population (2010)	Population (2020)	Population estimate (2022)
Beacon View CDP	N/A	26	30
Bellevue city	50,137	64,176	63,015
Chalco CDP	10,994	11,064	N/A
Gretna city	4,441	5,083	9,071
La Platte CDP	83	136	151
La Vista city	15,758	16,746	16,379
Linoma Beach CDP	N/A	19	24
Melia CDP	76	98	120
Offutt AFB CDP	4,644	5,363	5627
Papillion city	18,894	24,159	23,794
Richfield CDP	138	14	40
Springfield city	1343	1582	1555
Sarpy County Total	158,840	190,604	196,553

Source: US Census Bureau 2010 Decennial Census, 2020 Decennial Census, and 2022 ACS 5-year summary

Age

The average age for Sarpy County is 35.3 years (2022 ACS 5-year summary). About 17% of the population in Sarpy County is over the age of 65 and about 32.5% of the population is under the age of 18 according to the 2022 ACS 5-year summary. Figure 1.108 breaks down the age population for the entire county into five-year age groups.

Race

The demographics in Sarpy County is predominantly White, accounting for 88.2% of the total population. Figure 1.109 breaks down the county's race demographics using the 2022 ACS 5-year summary data.

Figure 1.109: Population by Race, Sarpy County, NE

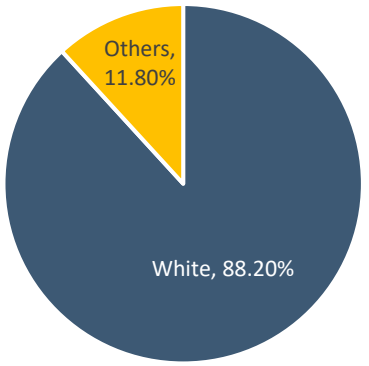
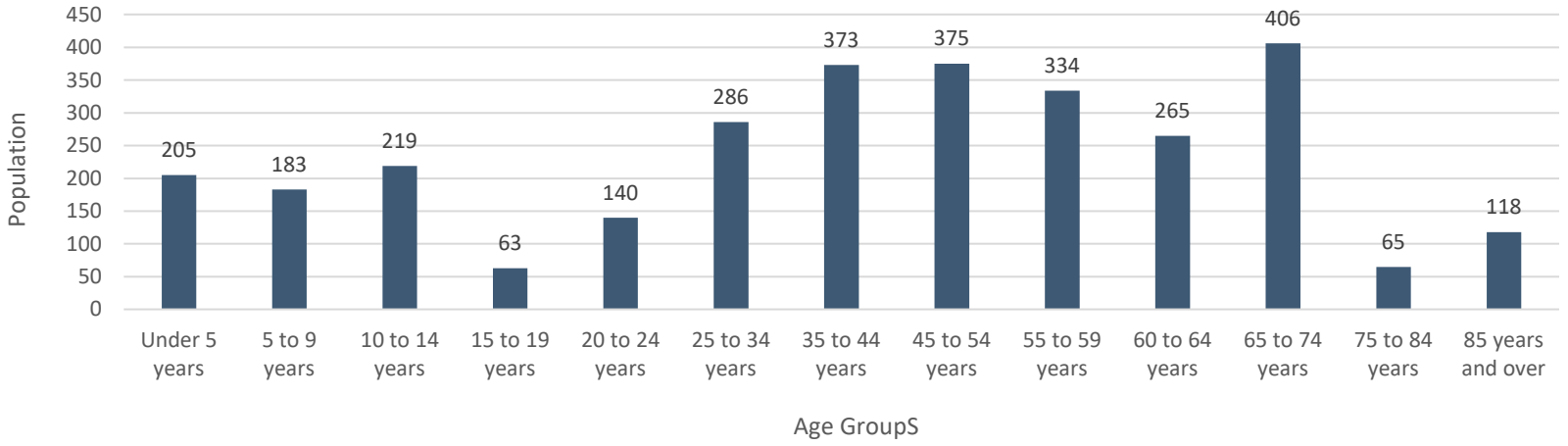
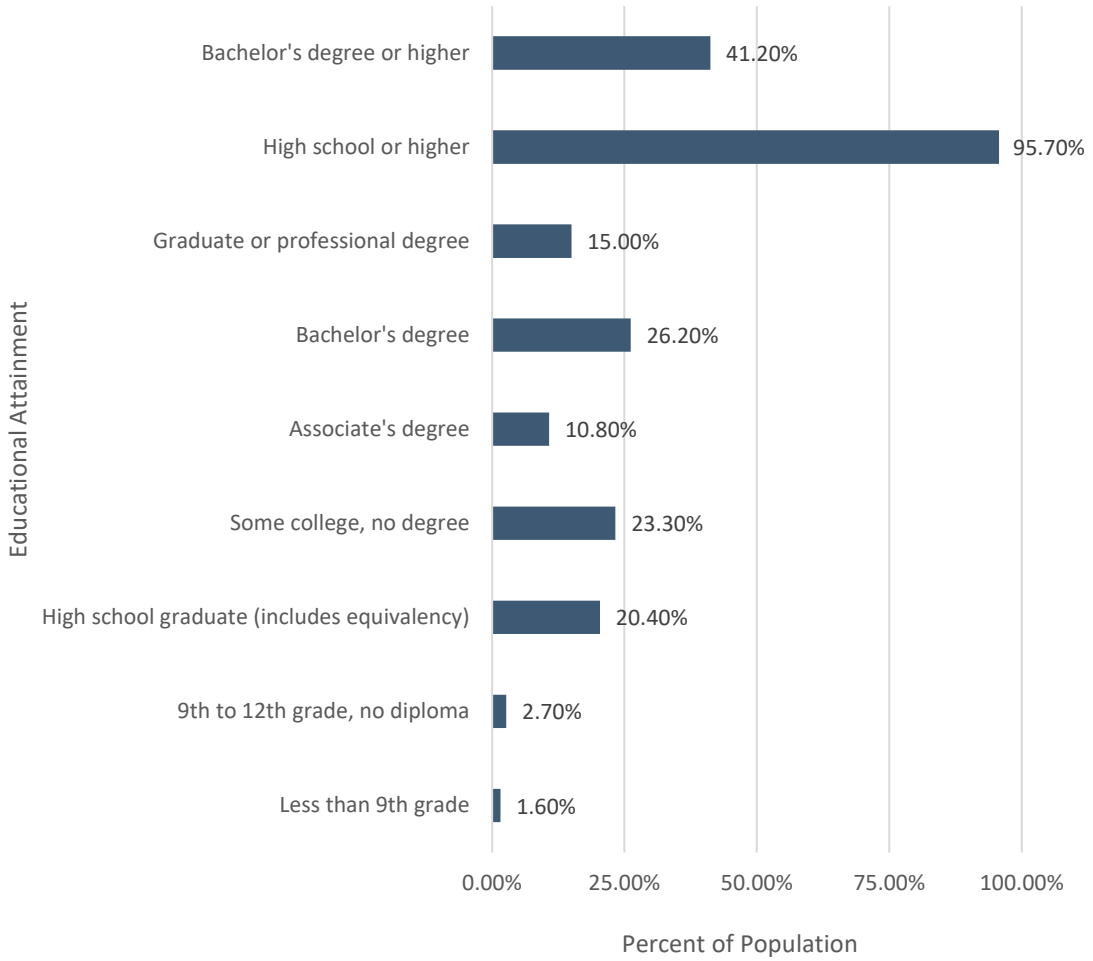


Figure 1.108: Population by Age, Sarpy County, NE



Source: 2022 ACS 5-year summary

Figure 1.110: Educational Attainment, Sarpy County, NE



Source: 2022 ACS 5-year summary

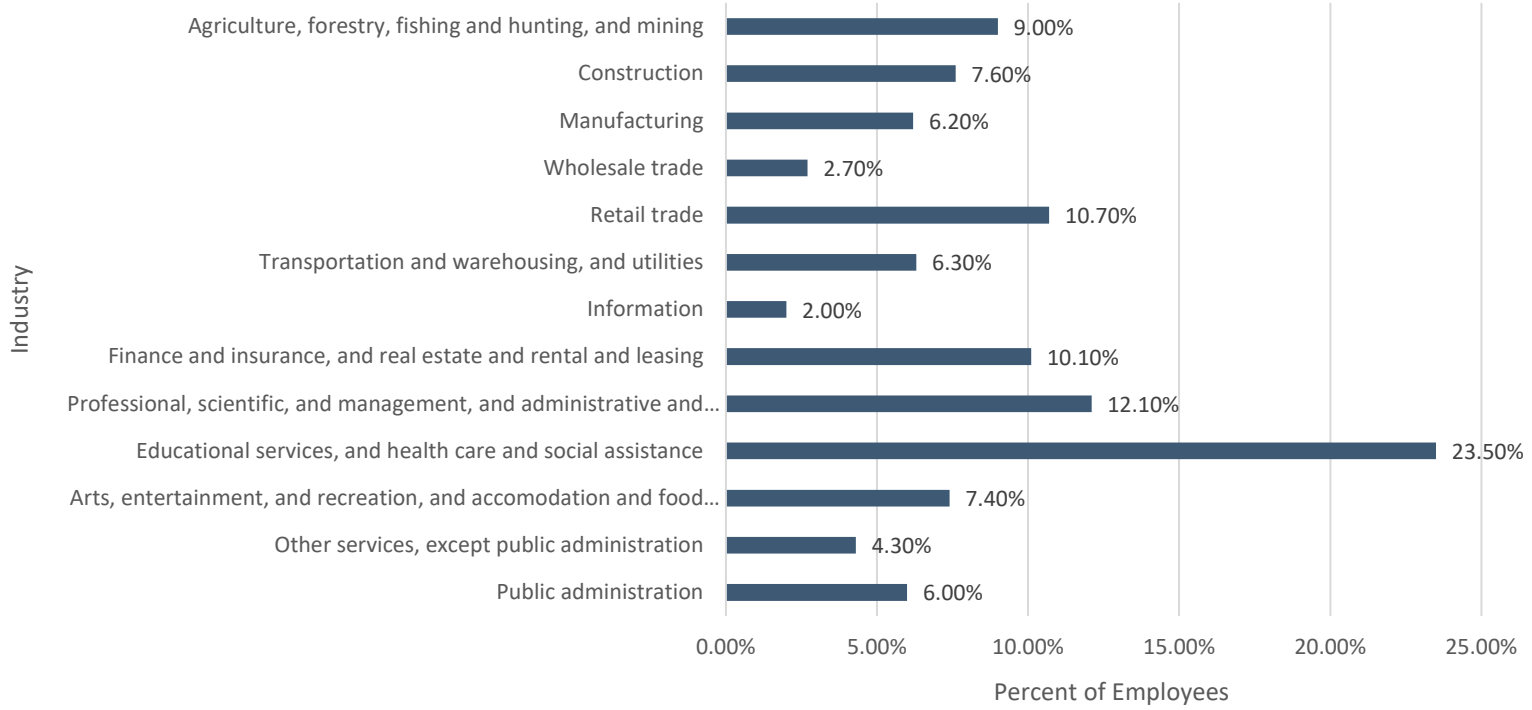
Educational Attainment

The educational attainment for residents 25 years old and older in Sarpy County is shown in Figure 1.110. Over 95% of the population has a high school degree or higher, and 52% of the population has received a higher education degree.

Economic Characteristics

A major economic industry in Sarpy County is the educational services, health care, and social assistance sector accounting for about 23.5% of the working-age population. When looking at Figure 1.111, the second-largest industry in terms of workers is professional, scientific, management, and administrative, followed by retail trade. Several healthcare networks from Douglas County have offices in Sarpy County, such as Methodist, Children's physicians, and CHI. Sarpy County is also situated between rural and urban areas, making the location ideal for trade and transporting goods.

Figure 1.111: Employment by Industry, Sarpy County, NE



Source: 2022 ACS 5-year summary

Household Income

The median household income in Sarpy County, NE is approximately $87,500 annually (Figure 1.112). Most of the population, about 52%, have incomes between $50,000 and $149,999 annually. For Nebraska, the average household income is $71,122 (Census Business Builder-2022 ACS 5-year summary).

Figure 1.112: Household Income, Sarpy County, NE

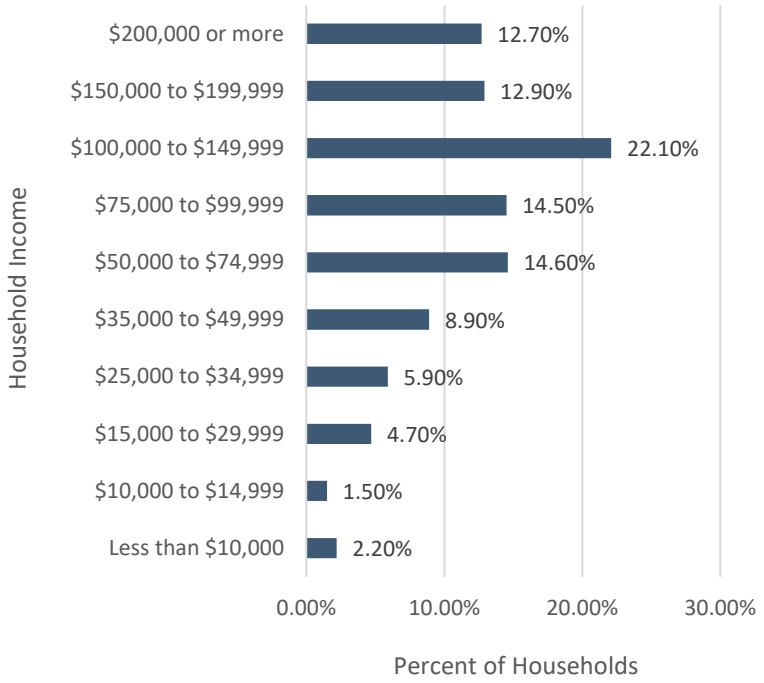
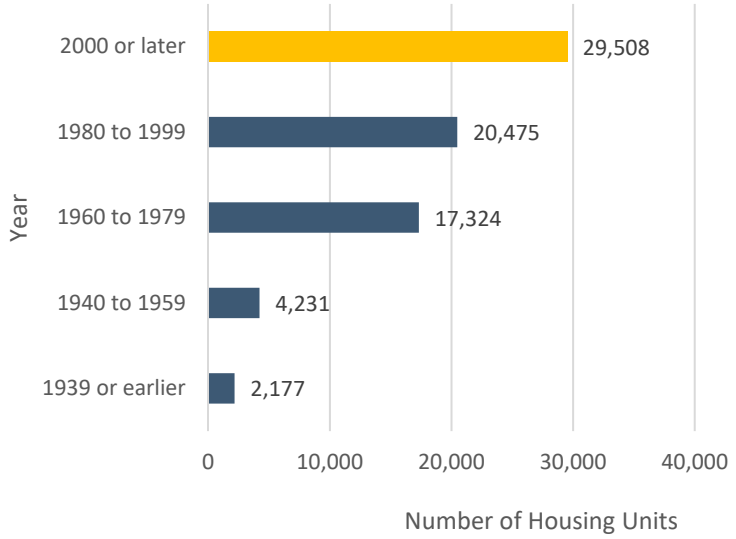


Figure 1.113: Age of Housing Units, Sarpy County, NE



Source: 2022 ACS 5-year summary

Housing Conditions

Of the total 73,715 housing structures in Sarpy County, most of the houses in Sarpy County have been built before 2000, with 44,207 houses built before then. Figure 1.113 shows how many houses were built throughout the years. There are a total of 73,715 housing units in Sarpy County, with 49,735 being owner-occupied 21,407 being renter-occupied, and 2,573 vacated properties (2022 ACS 5-year summary).

Approximately 3.5% of the housing stock is vacant, according to Figure 1.114. There is no information to indicate that these homes are seasonally vacant, meaning they are only occupied for a portion of the year or if they are permanently vacant. The number of vacant homes in an area can determine the housing supply available.

Figure 1.115 shows that approximately 69.9% of occupied units are owner-occupied whereas 30.1% are renter-occupied, which is close to the national average of about 65% owner-occupied and 35% renter-occupied (2022 U.S. Census QuickFacts).

Figure 1.114: Occupied vs. Vacant Housing Units, Sarpy County, NE

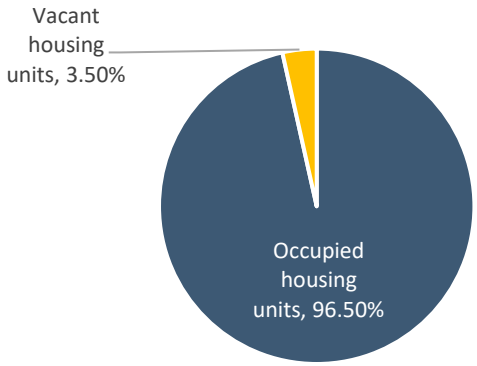
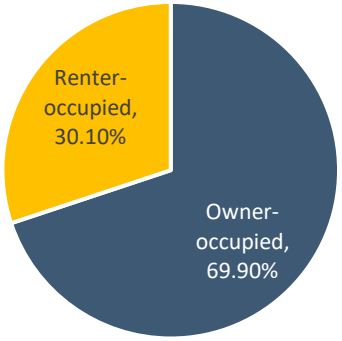


Figure 1.115: Owner- vs. Renter-Occupied Housing Units, Sarpy County, NE

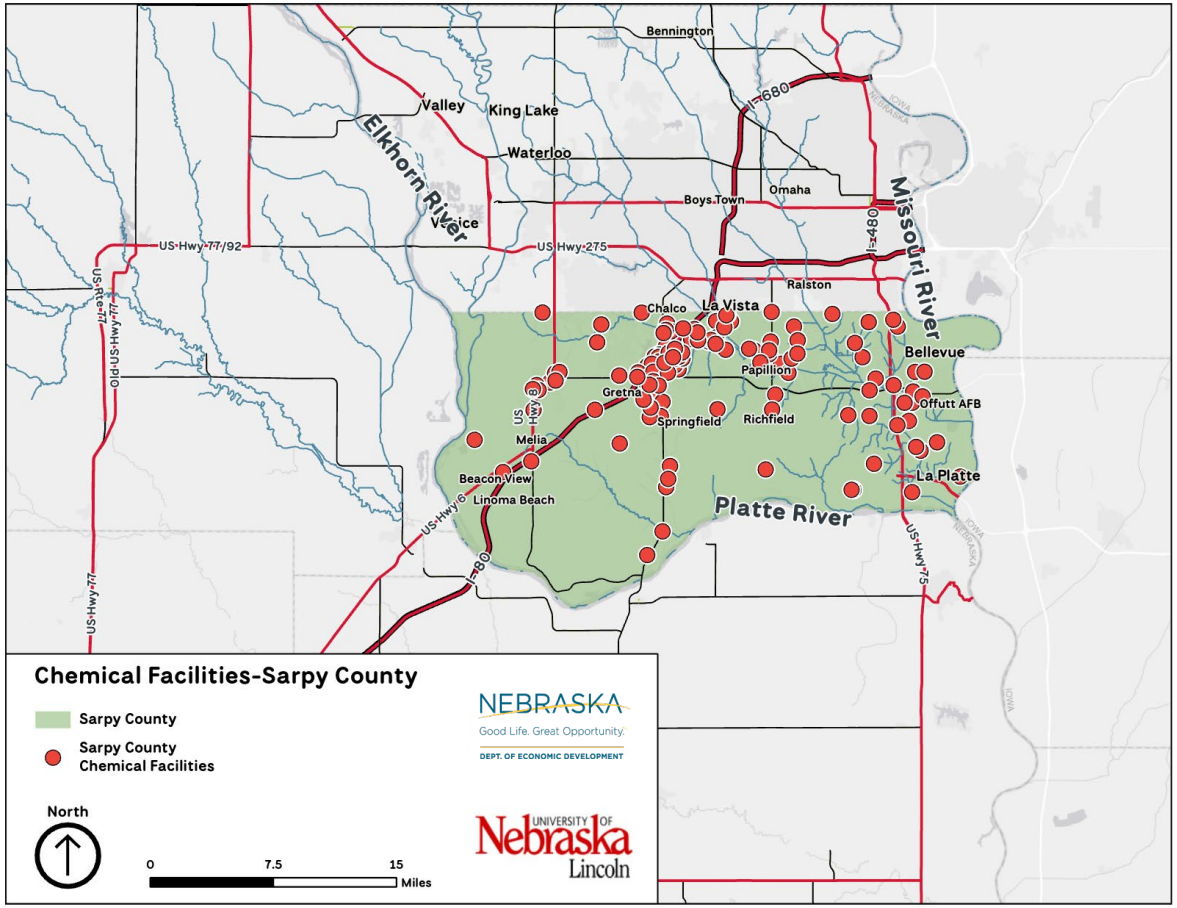


Source: 2022 ACS 5-year summary

Critical Infrastructure

Map 1.13 below shows different locations of chemical facilities within Sarpy County.

Map 1.13: Chemical Facilities, Sarpy County, NE

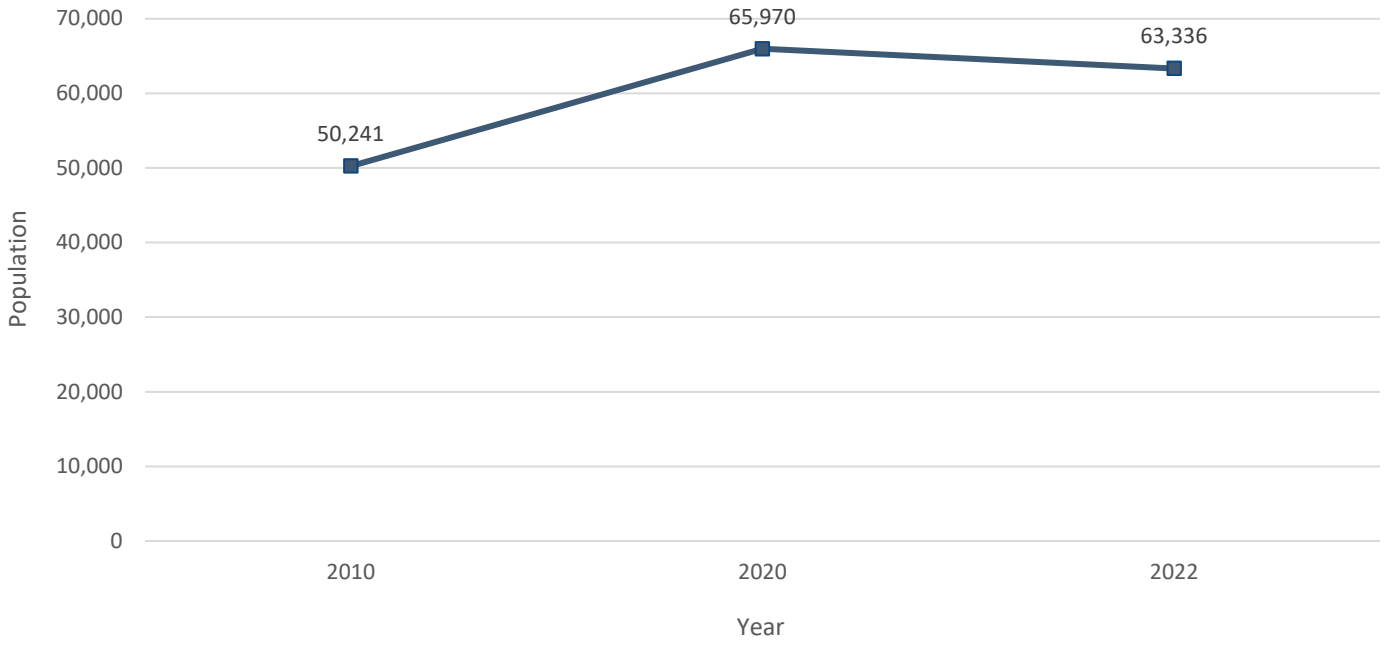


City of Bellevue

Population

Bellevue city has seen an increase in population over the past decade with a slight decline recently (Figure 1.116). Between 2010 and 2022, the population in Bellevue has grown by 27.33%. According to the 2022 ACS 5-year summary, the population of Bellevue city is estimated to be 63,336 residents. This represents a less than 1% decrease from the population of 63,970 recorded in the 2020 decennial census.

Figure 1.116: Population Change, City of Bellevue, NE



Source: 2000, 2010, 2020 Decennial Census

Age

Bellevue city has a slightly higher percentage of male residents than females; based on the 2022 ACS 5-year summary, 51.8% of the population are male and 48.2% female. Figure 1.118 breaks down the age distribution. About 27% of Bellevue's population is under 19 years of age, which is higher than Sarpy County. Additionally, the median age for Bellevue city is 35.5 years old.

Race

According to the 2022 ACS 5-year summary, the racial demographics of Bellevue city in Sarpy County, Nebraska are predominantly White, accounting for 82.8% of the total population (Figure 1.117). The remaining 17.5% of the population is divided among other races.

Figure 1.117: Population by Race, City of Bellevue, NE

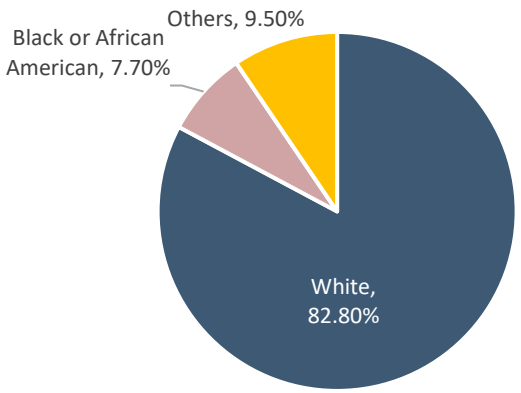
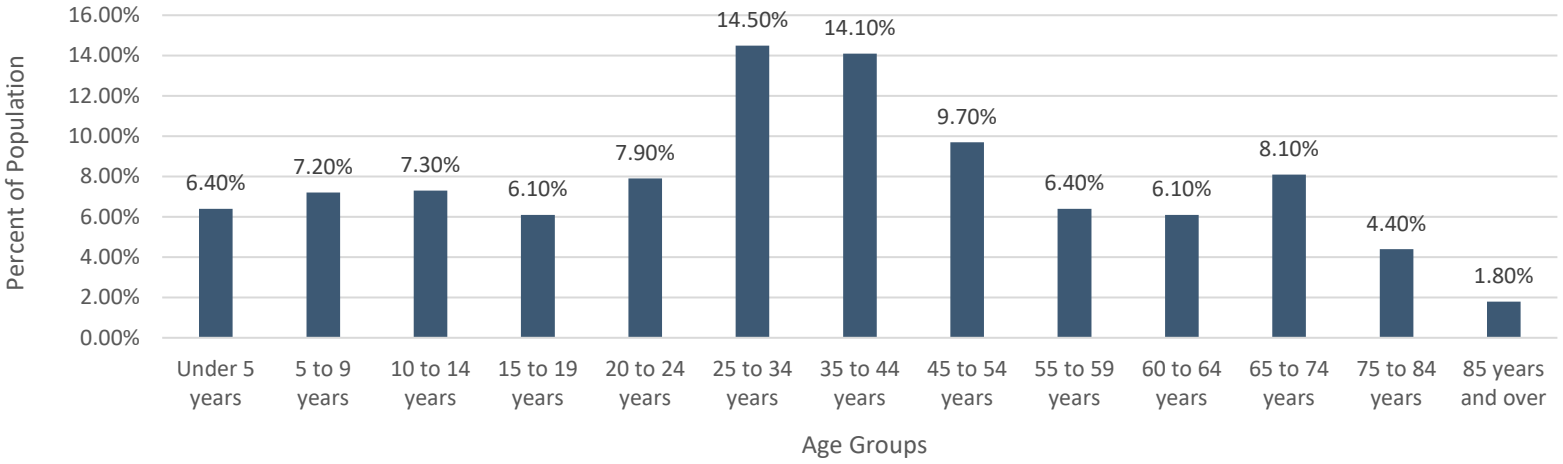
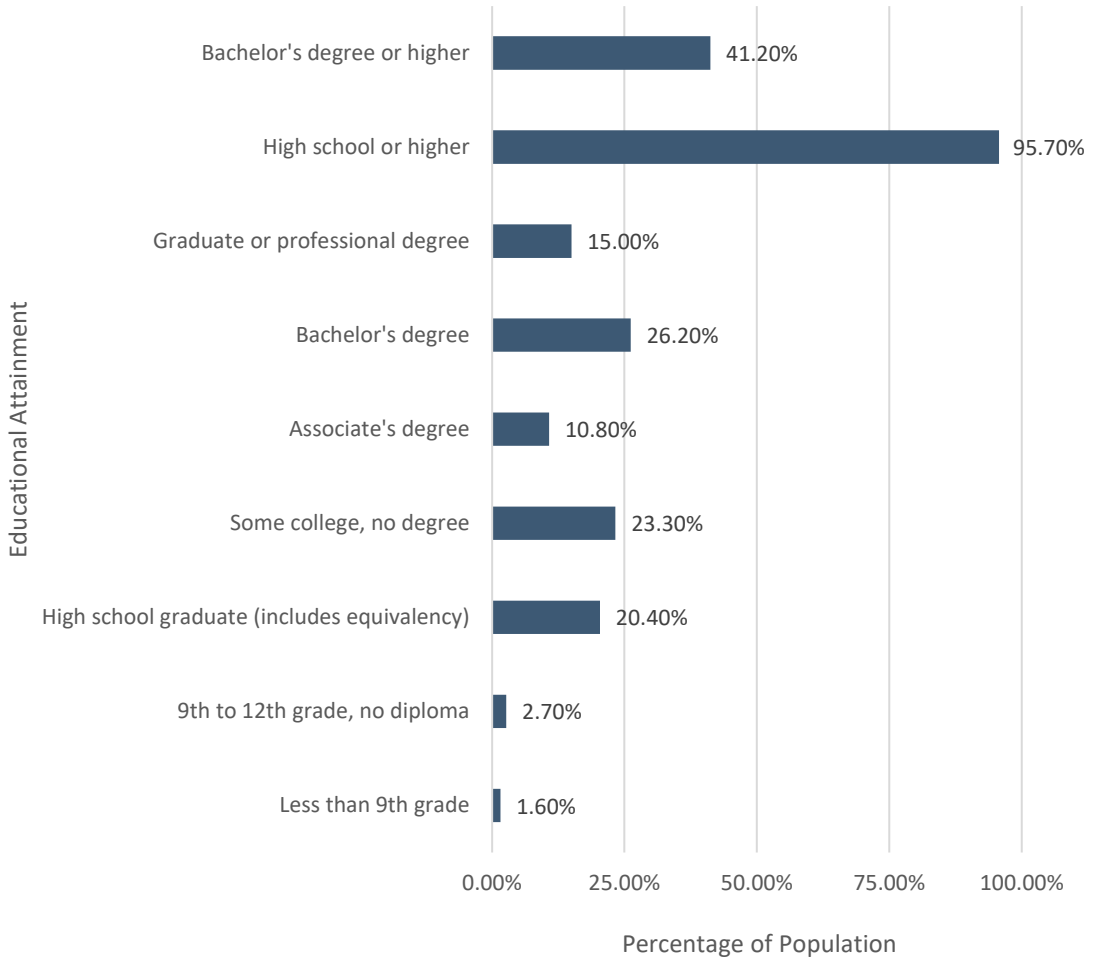


Figure 1.118: Population by Age, City of Bellevue, NE



Source: 2022 ACS 5-year summary

Figure 1.119: Educational Attainment, City of Bellevue, NE



Source: 2022 ACS 5-year summary

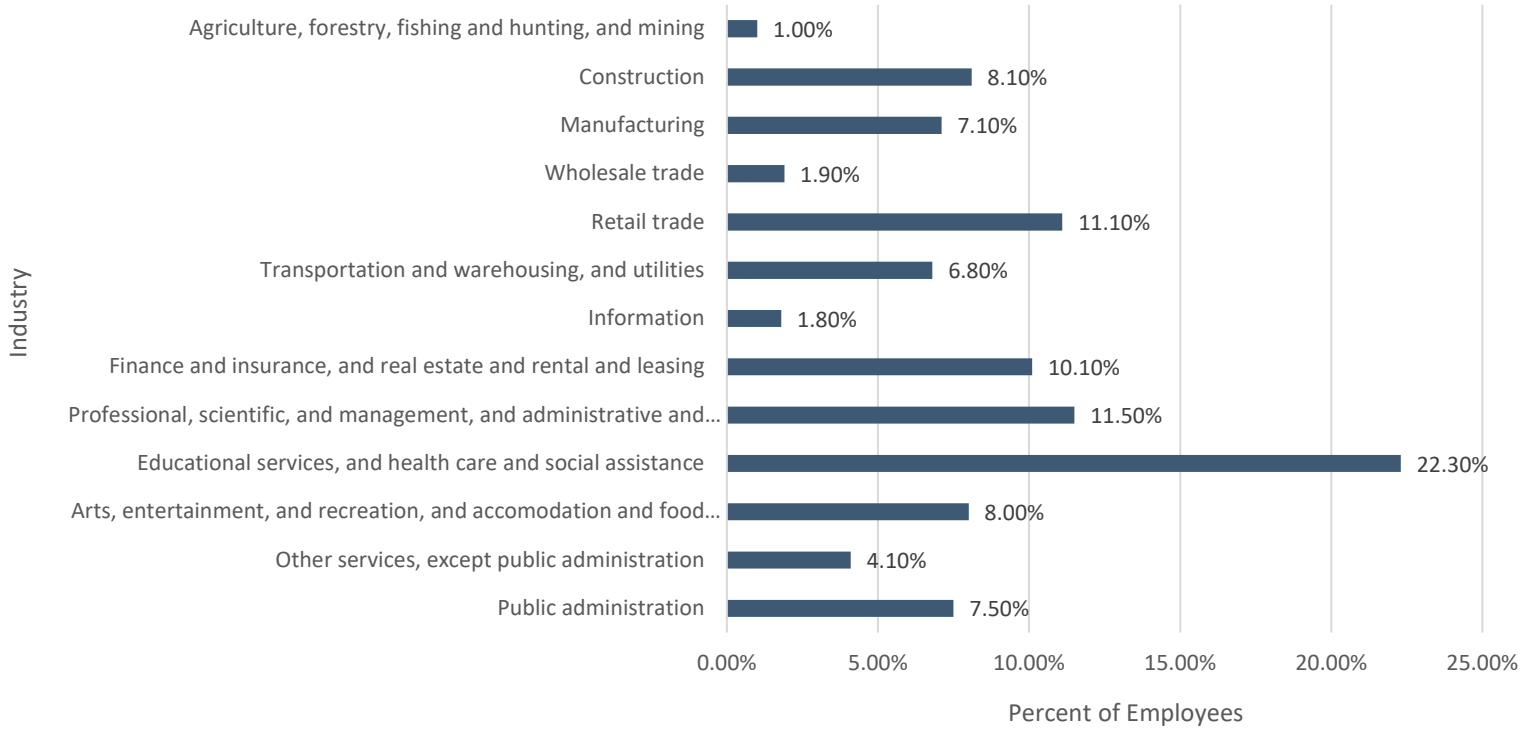
Educational Attainment

The educational attainment for residents 25 years old and older in Sarpy County is shown in Figure 1.119. Over 95% of the population has a high school degree or higher, and 52% of the population has received a higher education degree.

Economic Characteristics

As of 2022, the largest sectors employees in Bellevue work in are educational services, and health care and social assistance. Figure 1.120 shows each industry and the percentage of employees in them. According to the Census Bureau, roughly 80.6% of workers commute to work alone in either a car, truck, or van with the mean travel time to work 21 minutes (2022 ACS 5-year summary).

Figure 1.120: Employment by Industry, City of Bellevue, NE



Note: Industries below 5.00%: Other services, except public administration (4.1%); Wholesale trade (1.9%); Information (1.8%); and Agriculture, forestry, fishing, and hunting, and mining (1.0%).

Source: 2022 ACS 5-year summary

Household Income

The median household income in Bellevue is $96,282 according to the 2022 ACS 5-year summary. Adjusted income for all residents in Bellevue is broken down in Figure 1.121.

From the 2022 ACS 5-year summary, 2,043 households received food stamp/SNAP benefits in the past year in 2022. Full time working Females had a median income of $47,129 while males made $60,409.

Figure 1.121: Household Income, City of Bellevue, NE

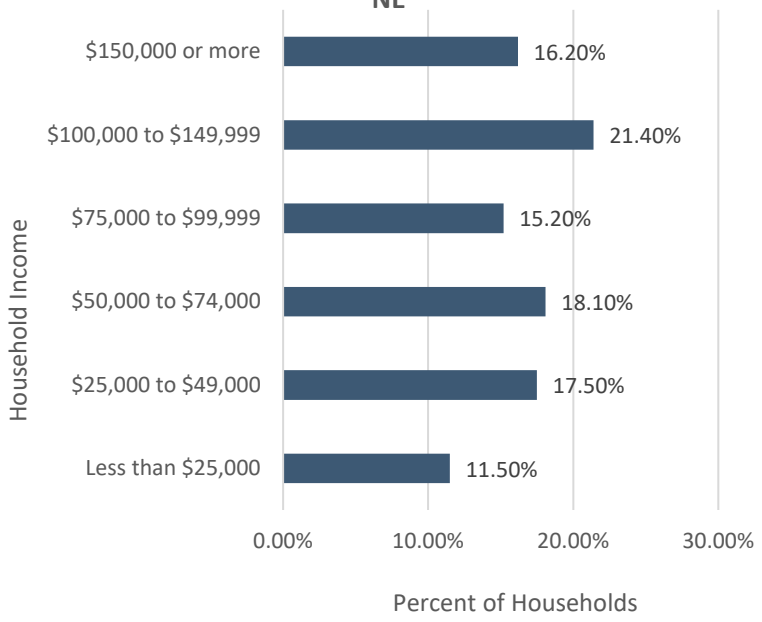
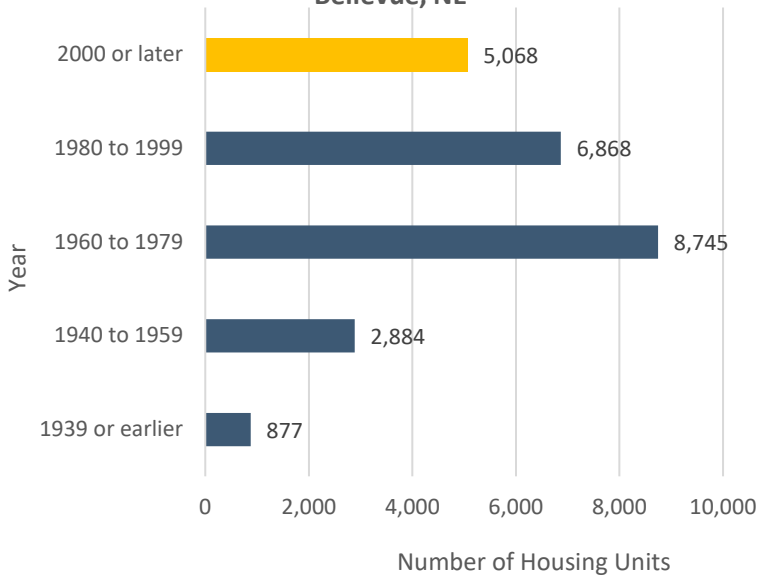


Figure 1.122: Age of Housing Units, City of Bellevue, NE



Source: 2022 ACS 5-year summary

Housing Conditions

There are 24,442 housing units in Bellevue, with no data available for vacant housing units based on the 2022 ACS 5-year summary data. Most of the housing units in Bellevue were built before 2000, accounting for about 79.3% of the city's housing stock (Figure 1.122).

Occupied and vacancy rates depend on the community, but it is generally healthy to have a vacancy rate that allows a reasonable number of choices for interested buyers and renters. Approximately 63.4% of the occupied units are owner-occupied and 36.6% are renter-occupied (Figure 1.123).

There are 853 households in Bellevue that do not have access to a vehicle, based on data from the 2022 ACS 5-year summary. About 96.6% of Bellevue's household units have access to at least one vehicle (Figure 1.124).

Figure 1.123: Owner- vs. Renter-Occupied Housing Units, City of Bellevue, NE

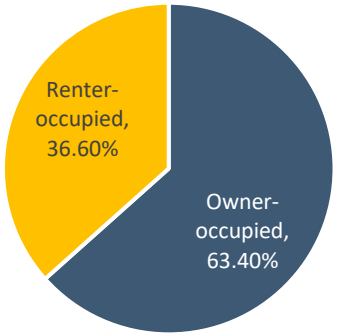
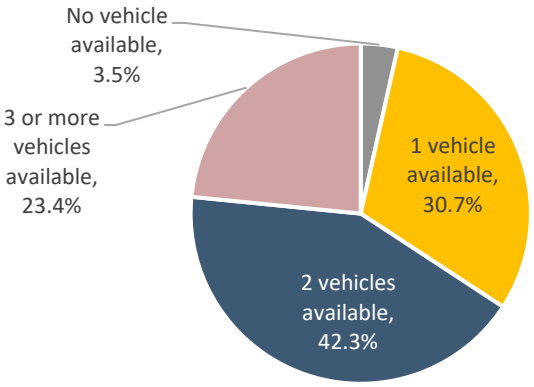


Figure 1.124: Vehicles per Household, City of Bellevue, NE

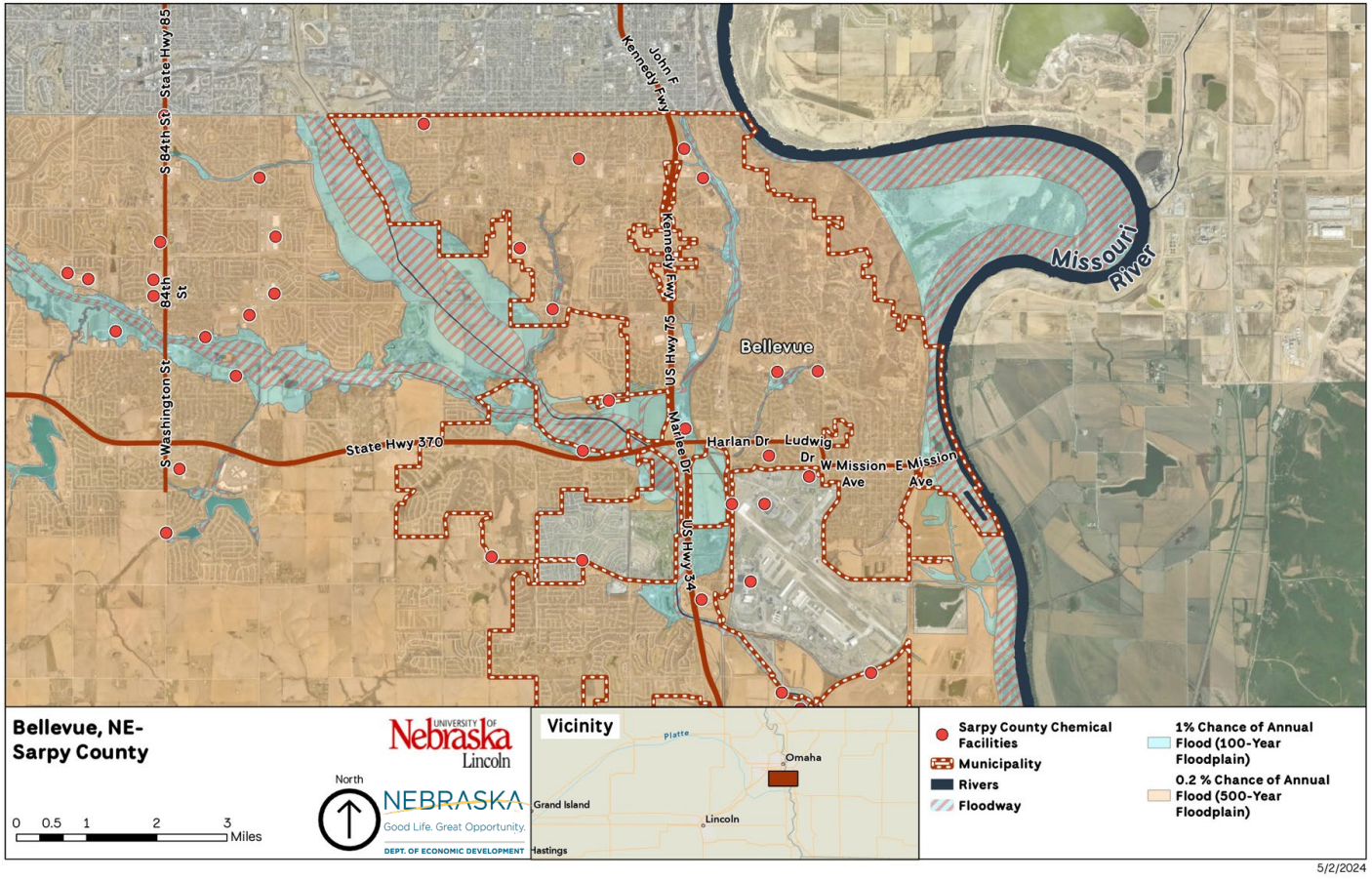


Source: 2022 ACS 5-year summary

Critical Infrastructure

Map 1.14 below shows different locations of chemical facilities within City of Bellevue.

Map 1.14: Chemical Facilities, City of Bellevue, NE

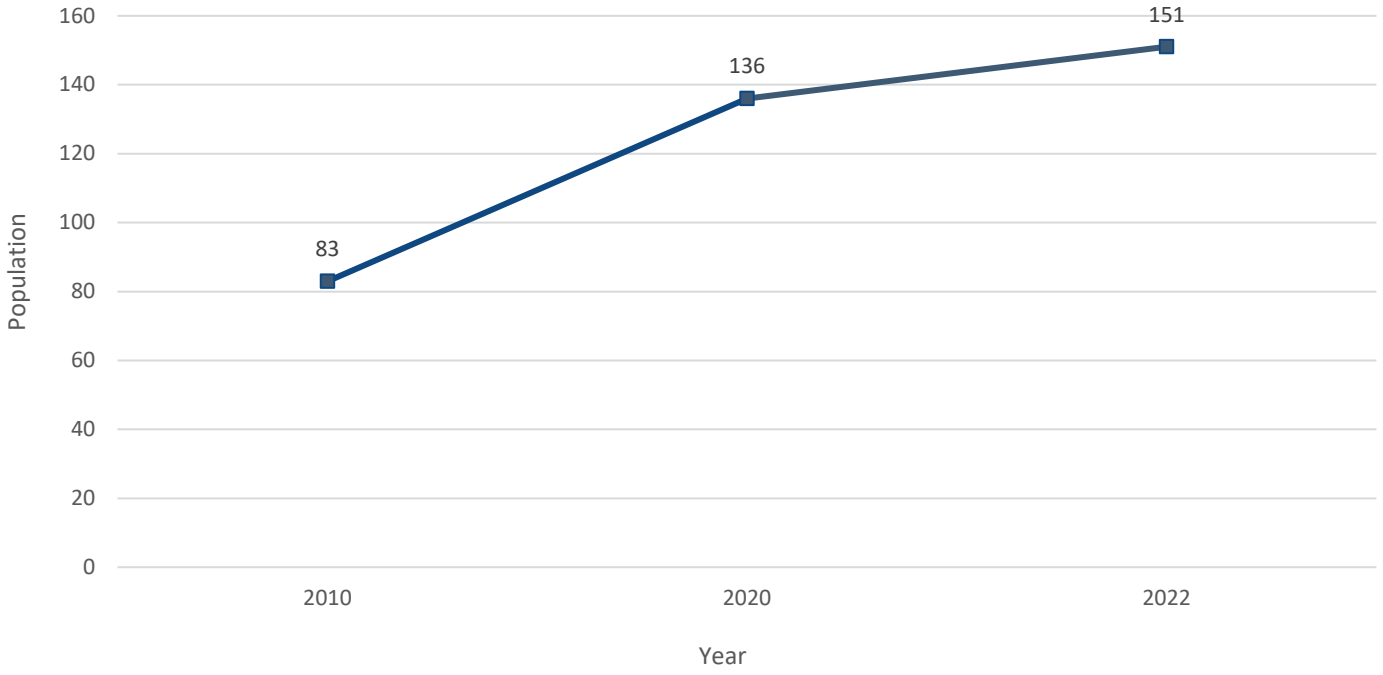


La Platte CDP

Population

La Platte is a Census Designated Place and has seen an increase in population over the past decade (Figure 1.125). Between 2010 and 2022, the population in La Platte has grown by 81.93%. According to the 2022 ACS 5-year summary, the population of La Platte is estimated to be 151 residents. This represents an 11% increase from the population of 136 recorded in the 2020 decennial census.

Figure 1.125: Population Change, La Platte CDP, NE



Source: 2000, 2010, 2020 Decennial Census

Age and Sex

La Platte has a higher percentage of male residents than females; based on the 2022 ACS 5-year summary, 59.6% of the population are male and 40.4% female. Figure 1.126 breaks down the age distribution. About 43% of La Platte's population is under 19 years of age, which is higher than Sarpy County. Additionally, the median age for La Platte is 24.6 years old.

Race

According to the 2022 ACS 5-year summary, the racial demographics of La Platte in Sarpy County, Nebraska are predominantly other races, accounting for 67.5% of the total population. The remaining 32.5% of the population is White (Figure 1.127).

Figure 1.127: Population by Race, La Platte CDP, NE

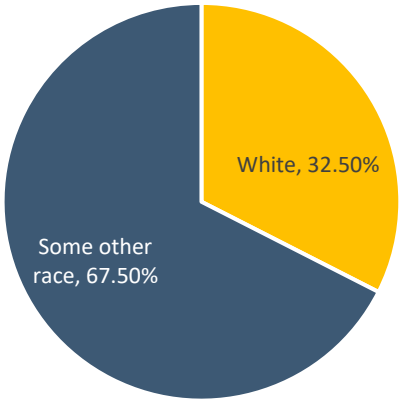
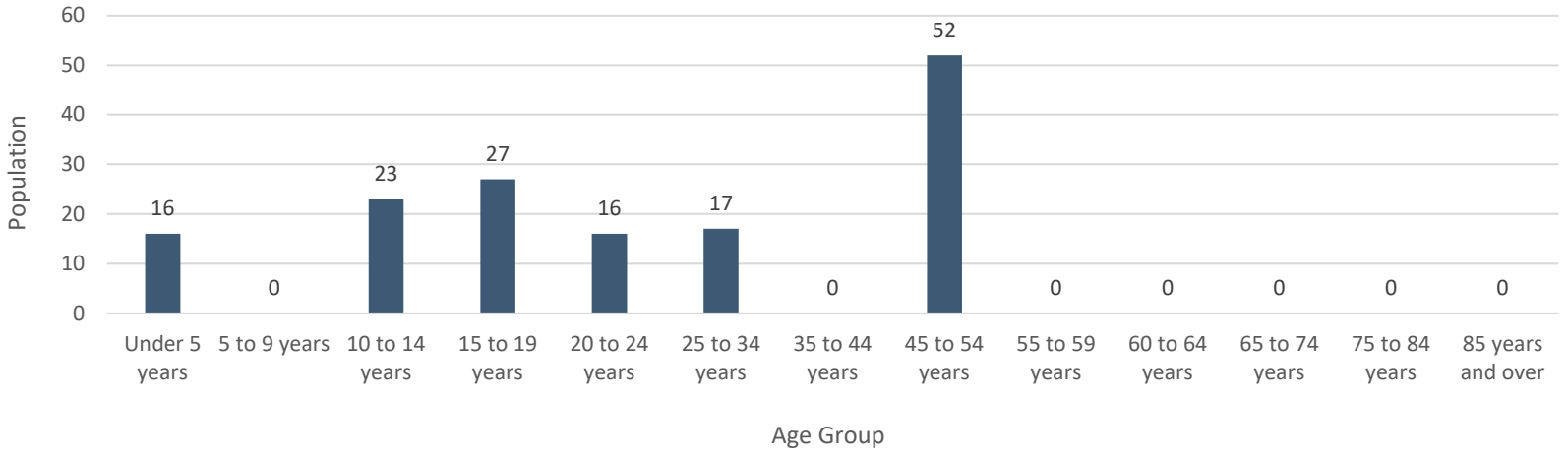
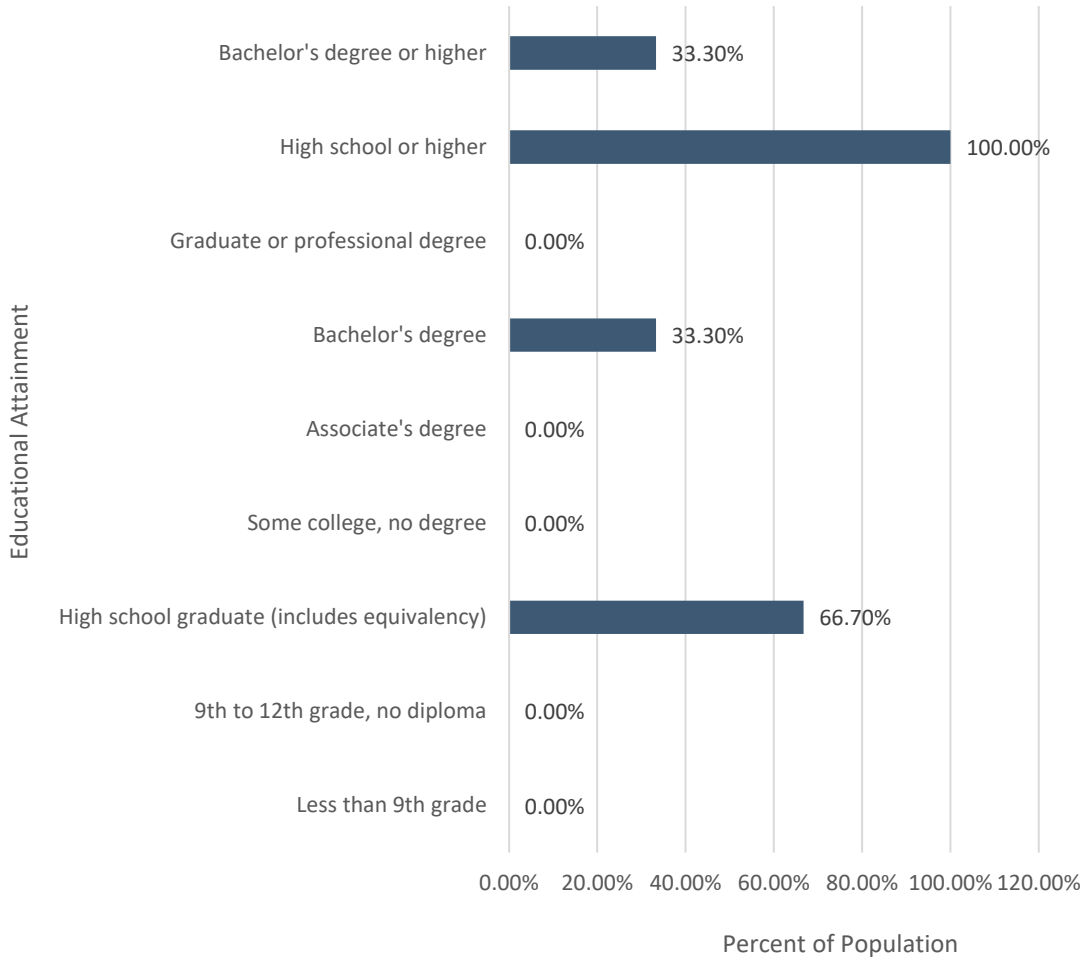


Figure 1.126: Population by Age, La Platte CDP, NE



Source: 2022 ACS 5-year summary

Figure 1.128: Educational Attainment, La Platte CDP, NE



Source: 2022 ACS 5-year summary

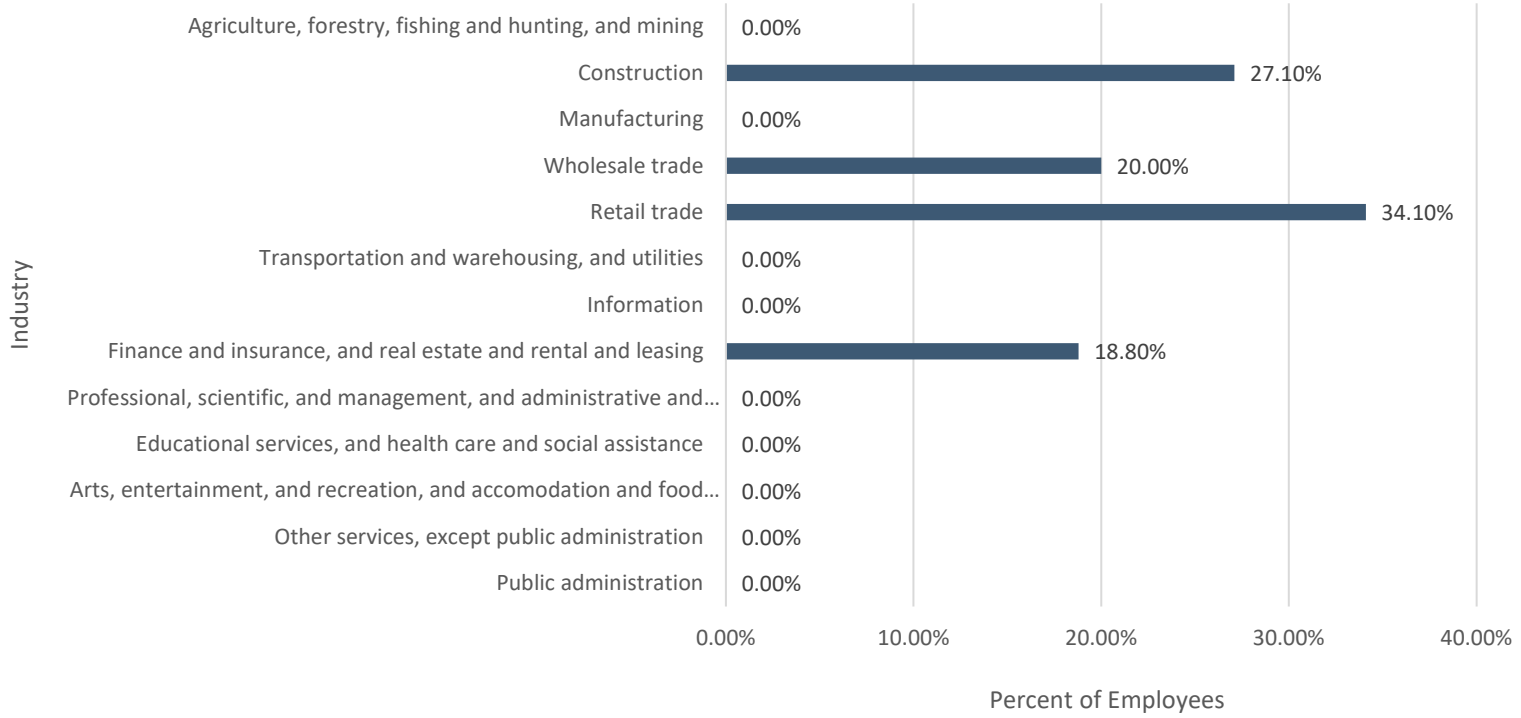
Educational Attainment

The education attainment levels in La Platte differ significantly to Sarpy County's. They boast a 100% graduation rate from high school with 33.3% of residents obtaining a bachelor's degree (Figure 1.128).

Economic Characteristics

As of 2022, the largest sectors employees in La Platte work retail trade at 34.1% followed by construction at 27.1%. Figure 1.129 shows each industry and the percentage of employees in them. According to the Census Bureau, 100% of workers commute to work alone in either a car, truck, or van with no data for a travel time. That's 62 people traveling daily for work. (2022 ACS 5-year summary).

Figure 1.129: Employment by Industry, La Platte CDP, NE



Source: 2022 ACS 5-year summary

Household Income

The median household income in La Platte is was not provided according to the 2022 ACS 5-year summary but varies between $50,000 to $99,999. Non-family households median income is $31,985. Adjusted income for all residents in La Platte is broken down in Figure 1.130.

From the 2022 ACS 5-year summary, 29 households (64.4%) received food stamp/SNAP benefits in the past year in 2022.

Figure 1.130: Household Income, La Platte CDP, NE

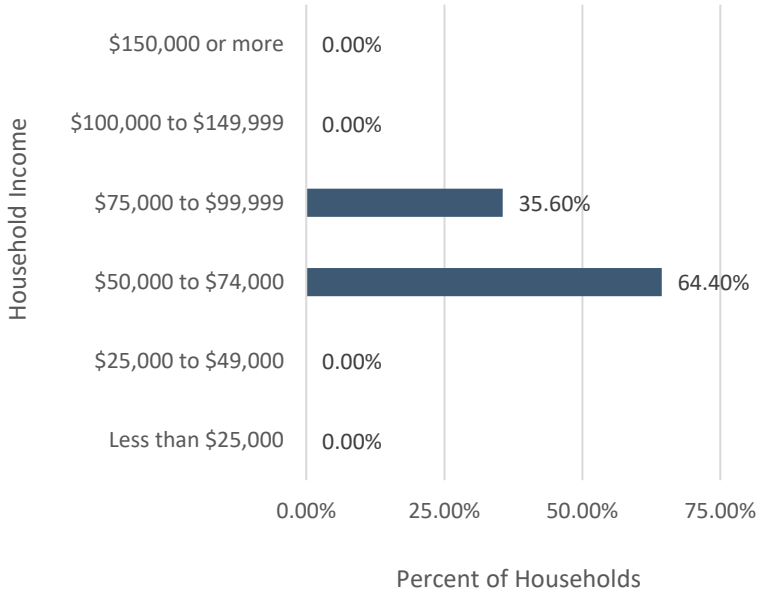
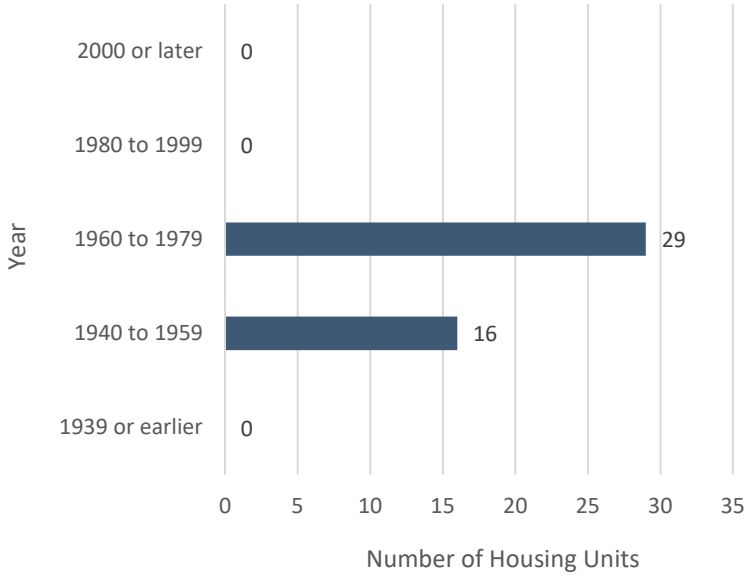


Figure 1.131: Age of Housing Units, La Platte CDP, NE



Source: 2022 ACS 5-year summary

Housing Conditions

There are 45 housing units in La Platte, with no data available for vacant housing units based on the 2022 ACS 5-year summary data. Most of the housing units in La Platte were built before between 1960 and 1979, accounting for about 64.4% of the housing stock (Figure 1.131).

Occupied and vacancy rates depend on the community, but it is generally healthy to have a vacancy rate that allows a reasonable number of choices for interested buyers and renters. No data was found to indicate vacancy rates or if occupied units were year-round or seasonal housing.

Due to the limited data provided, we're unable to determine the amount of housing units who don't have access to a vehicle. Based on the previous statistics of 100% of workers commuting, it could be inferred that all housing units with an employed person likely has a vehicle.

Figure 1.132: Owner- vs. Renter-Occupied Housing Units, La Platte CDP, NE

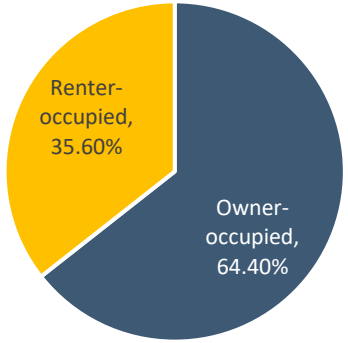
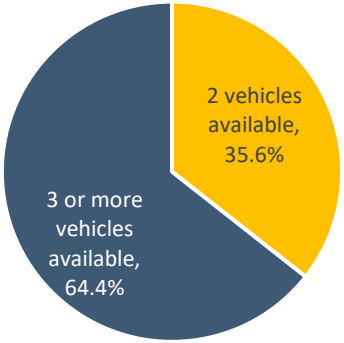


Figure 1.133: Vehicles per Household, La Platte CDP, NE

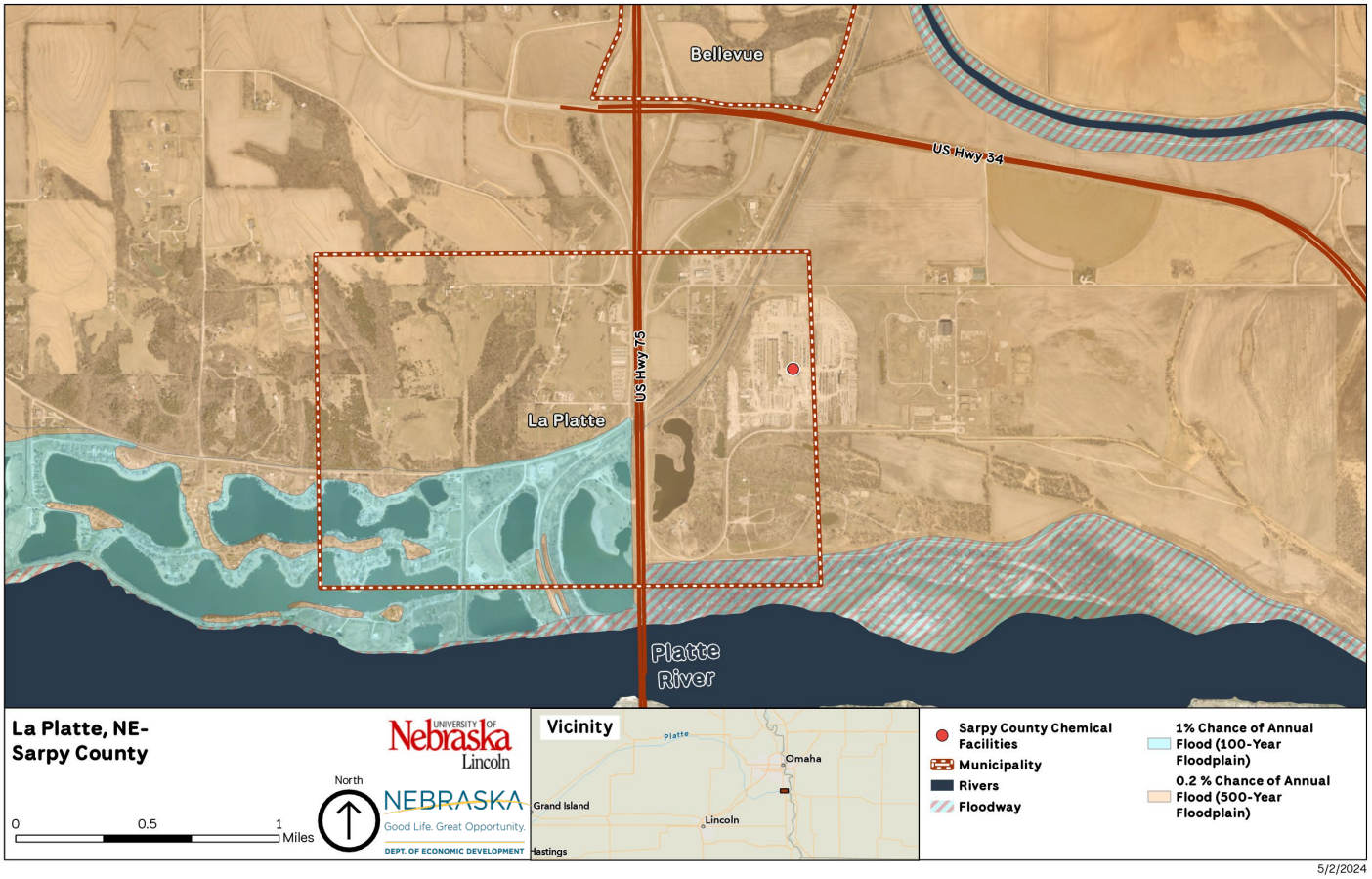


Source: 2022 ACS 5-year summary

Critical Infrastructure

Map 1.15 below shows different locations of chemical facilities within La Platte CDP.

Map 1.15: Chemical Facilities, La Platte CDP, NE



Chapter 2: Disaster History, Damages and Impacts

Introduction

Like most states, many flood problems in Nebraska are rooted in the initial development of communities along watercourses within the state. With its location on the Missouri River, Omaha played a role in the nation's westward expansion. During this time, water was vital for transportation, running mills, creating power, and homesteading; thus, most of Nebraska's communities and homesteads were built close to water sources. Flooding in Nebraska can affect urban and rural agricultural areas. Nebraska has several major watersheds and rivers, including over 5,000 wetlands, 2,000 natural lakes, and over 1,000 reservoirs and sandpit lakes. This chapter includes an overview of the disaster history, damages, and Impacts of floods in Dodge, Douglas, and Sarpy counties prior to 2019 and in 2019 (State of Nebraska, 2022).

Source: https://www.eemodelingsystem.com/efdc-insider-blog/in-the-news-spencer-dam-failure

Dodge County

Flooding Events

Dodge County-Wide 2019 Flooding Event

Beginning Wednesday, March 13th, 2019, a change in the weather temperature, a rainstorm, frozen ground, thick river ice, and high river levels lead to widespread flooding across Dodge County. For five days, multiple roadways and bridges were inundated, and many washed out completely. There were multiple reports of levees being overtopped and breached. The Platte River, Logan Creek, Maple Creek, Elkhorn River, and Pebble Creek all reached the flood stage. The Elkhorn River was forecasted to stay above the flood stage until Saturday, March 16th, and the Platte River was forecasted to stay above flood stage until Tuesday, March 19th. During this time, first responders and volunteers assisted in evacuating residents while communities sandbagged areas of concern. There were 20,770 calls, and 23 emergency evacuation notifications were sent to residents and businesses using the Dodge County Emergency Notification System (JEO Consulting Group, 2021).

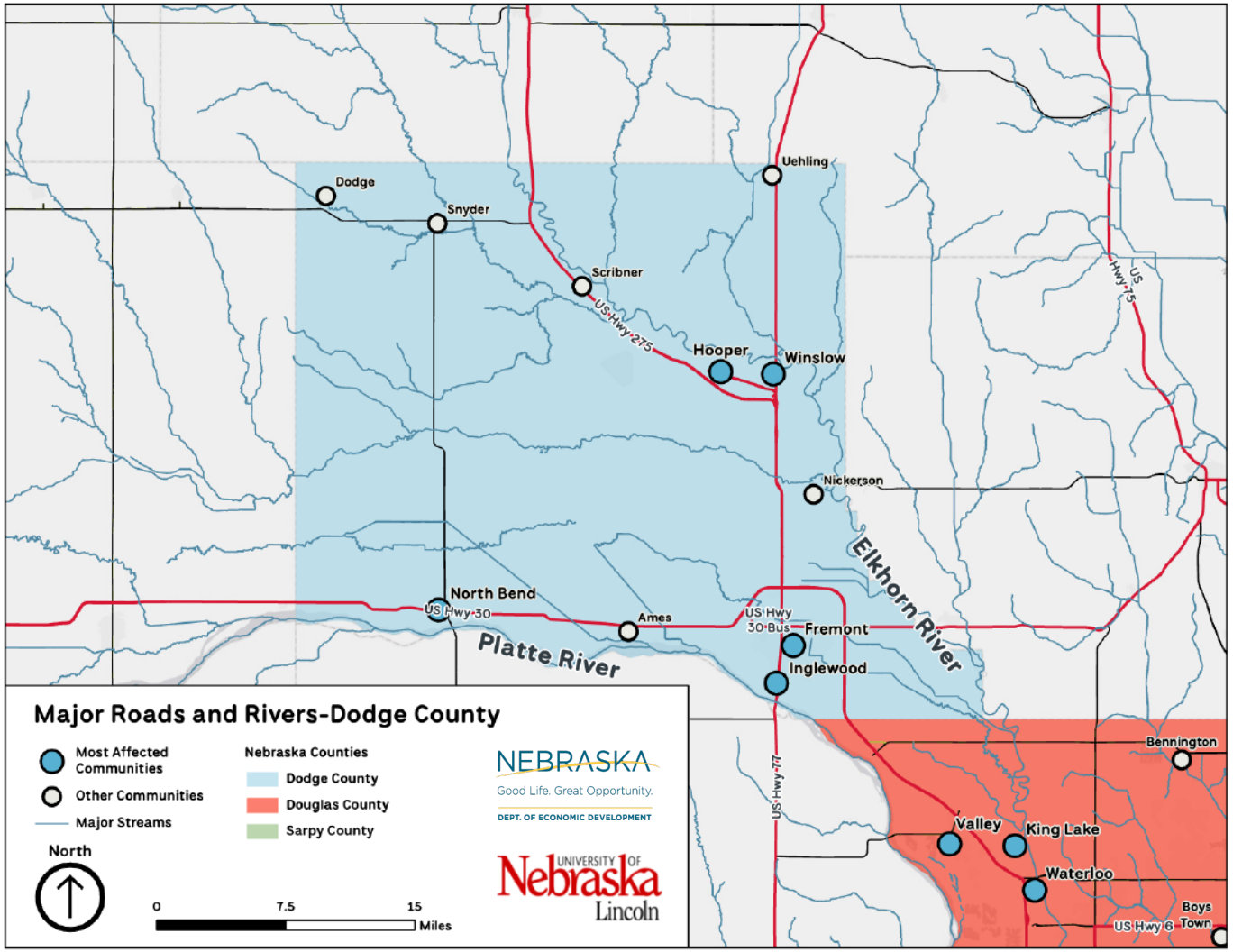
Dodge County residents were evacuated by late Wednesday evening, and the Village of Winslow was flooded by the Elkhorn River and evacuated on March 14th. On Friday, March 15th, water began overtopping the cutoff ditch near Highway 30, threatening northwest Fremont. Flood inundation model maps showed that this water had the potential to damage critical infrastructure, including the county's only hospital, Fremont Airport, and four assisted living facilities. The County Roads Department conducted 24-hour flood-fighting operations along Highway 30 to slow water flow into the area. On March 15th, all state highways into Fremont were closed. Flood waters damaged agricultural land, unincorporated areas, county roads, and bridges (JEO Consulting Group, 2021).

Dodge County-Wide Prior Flooding Events

Flooding has been a significant concern for Dodge County, especially after extensive flooding impacted the state in 2011, 2015, and 2019. The NCEI (National Center for Environmental Information) reported 84 flash flood events and 112 riverine flood events between 1996 and 2018 that caused over $455.6 million in property damage. Infrastructure throughout the district is in the floodplain, including significant portions of developed areas, the City of Omaha, the City of Papillion, the City of Valley, Offutt Air Force Base, and others (JEO Consulting Group, 2021).

Source: Nati Harnik. https://www.mprnews.org/story/2019/03/19/nebraska-floods-74-cities-65-counties-declare-state-of-emergency

Map 2.1: Communities affected by the 2019 flood event, Dodge County - NE



Effected Communities, Dodge County: Flooding Events

Ames CDP

2019 Flooding Event

The March 2019 flood caused a 1,000-foot breach in the Ames Dike, resulting in massive destruction of farms, homes, land, livestock, and crops from the dike down the river to the City of Fremont. Riverine flooding from ice jams in the spring is the biggest threat to the integrity of the dike. The Union Pacific Railroad rail lines, Highway 30, farmland, and residential structures from County Road 11 to the City of Fremont experienced the largest impacts of flooding. Much of this area also has poor stormwater drainage (JEO Consulting Group, 2020).

Note: Some communities do not have documentation of the impact of prior flooding events and/or the 2019 flooding event like the Village of Inglewood. Snyder does not have documentation for 2019 flooding events and Winslow and Ames do not have documentation for prior flooding events

Village of Dodge

Prior Flooding Events

A major flood occurred in June 1993, and this impacted five low-lying houses and washed one of them away. Flash flooding is the biggest concern in the lower west and south edges of the village. Pebble Creek is the largest body of water in the area, and no critical facilities have been damaged by it (Lower Elkhorn NRD, 2020).

2019 Flooding Event

On March 13th, 2019, a river gage at Scribner located near Pebble Creek peaked at 24 feet. This peak is the third highest on record for the community. Flood gates placed on Highway 275 kept water out of Scribner, likely saving it from major flooding (NCEI, 2024).

Source: Dodge County, NE Emergency Management

City of Fremont

Prior Flooding Events

On July 5th, 2000, there were flash floods in Fremont; heavy rainfall of 4 to 6 inches caused extensive flooding from North Bend to the Fremont area. On March 8-10th, 2010, an ice jam around the North Bend area caused flooding of agricultural lowlands from North Bend to around Fremont. In addition, several homes were threatened by the flood waters, and a few county roads were flooded. Some water damage was likely noted due to rising groundwater or backing up of sewers. The ice jam broke loose on March 10th, which caused additional jamming and flooding around the Big Island area near Fremont. Six to ten people had to be evacuated by boat from the rising waters. Property damage was estimated at $75,000.

On February 18th, 2011, an ice jam near the Highway 77 bridge caused flooding southwest of Fremont; the damage was minimal. On August 6th, 2013, rainfall from heavy thunderstorms created areas of street flooding across the city. A thunderstorm dropped about 1.8 inches in less than an hour, followed by a less intense storm less than an hour later. Many intersections in town were underwater (Lower Platte North NRD Multi-Jurisdictional Hazard Mitigation Plan | 2020 Pg 41), and in June 2016, a flash flood from heavy rains caused low land flooding. Around seven inches fell in the City of Fremont, threatening the county hospital, airport, and severe assisted living facilities as the 2019 flood did. (JEO Consulting Group, 2020).

2019 Flooding Event

The flooding problem was exacerbated during the March 2019 flood event due to the long-standing drainage issues in the city. Heavy rains combined with frozen ground created excessive stormwater that funneled to the Platte River, Elkhorn River, and Rawhide Creek. These waterways were also clogged with ice (JEO Consulting Group, 2020). On Friday, March 15th, 2019, water began overtopping the cutoff ditch near Highway 30, threatening northwest Fremont. Flood inundation model maps showed that this water had the potential to damage critical infrastructure, including the county's only hospital, Fremont Airport, and four assisted living facilities. Fremont was most affected and saw widespread urban flooding, especially in eastern Fremont. Basements in nearly 1,000 homes flooded in Fremont (JEO Consulting Group, 2020).

Source: Nebraska Department of Transportation. https://www.linkedin.com/pulse/nebraska-department-transportations-response-fremont-during-3owxc/

City of Hooper

Prior Flooding Events

Devastating floods in 1944, 1960, and 1962 necessitated the construction of a levee. In the city's comprehensive plan, it was noted that flooding in the 2000's destroyed a bridge along a recreational rail line and cut Hooper off from other stops on the route. Most of the city is in the 100-year floodplain (Lower Elkhorn NRD/JEO Consulting Group, 2020).

2019 Flooding Event

March 13th, 2019, water was reported on roadways at County Road G and County Road 18 near Hooper (National Centers for Environmental Information, 2024).

Source: Ryan Soderlin, Omaha World-Herald. https://www.nytimes.com/2019/03/14/us/bomb-cyclone-floods-midwest.html

Village of Nickerson

Prior Flooding Events

According to National Centers for Environmental Information (NCEI), there was heavy rain in Nickerson, which led to flooding in June of 2015. With ground already saturated from repeated heavy rainfall events in May and early June, another complex of thunderstorms producing very heavy rainfall moved across eastern Nebraska and western Iowa starting during the evening on the 10th continuing into the early morning hours on June 11th. This was followed by additional thunderstorms on the afternoon of June 11th over southeast Nebraska and southwest Iowa. This additional rainfall led to more significant flooding along area rivers (National Centers for Environmental Information, 2024).

2019 Flooding Event

The eastern part of the community is within the 100-year floodplain of the Elkhorn River, which poses a risk to residents and the local economy. In March 2019, many areas in northeastern Nebraska experienced severe flooding. Nickerson experienced damage to several houses, the One-Horse Saloon, the Post Office, Arlington Youth Foundation, Railroad Street, and the wastewater lagoon. In addition, many roads were inaccessible due to high water levels. The exact damage from the event is not yet known(Lower Elkhorn NRD/JEO Consulting Group, 2020).

City of North Bend

Prior Flooding Events

In June 2011, rainfall of at least 3 to 5 inches fell over much of the central portion of the state, with additional heavy rains the following several days. The flooding worked into the Platte River, causing it to rise above flood stage from around North Bend downstream to its confluence with the Missouri River. At North Bend the river crested a little below 8.5 feet early in the morning of June 14th. The river was above flood stage near North Bend for most of the period from the afternoon of June 13th through the morning of June 16th. The flooding mainly affected agricultural bottom lands along the river although some county roads and recreation areas were inundated with water (National Centers for Environmental Information, 2024).

2019 Flooding Event

The 2019 flooding event caused widespread, moderate to major, and in many cases historic, flooding across eastern Nebraska and western Iowa. 4 to 15 inches of snow cover remained across the mid Missouri River valley, and the ground was frozen with existing frost depths of 15 to 23 inches. Warm temperatures allowed all the snow to rapidly melt, and record moisture allowed 1 to 2.5 inches of rain to fall over 48 hours. Due to the frozen ground, and those 1 to 2 feet of thick ice remaining in area rivers, widespread, and in many cases, catastrophic flooding developed (National Centers for Environmental Information, 2024).

City of Scribner

Prior Flooding Events

The National Centers for Environmental Information (NCEI) data shows that Scribner has experienced seven flood events since 1996. Scribner also reported a heavy rain event that occurred in June of 1984, causing widespread flooding. This event occurred before their levee system was installed. Also, a series of heavy rains in June of 2010 caused groundwater to reach very high levels. Eventually, these heavy rains caused the east bank of the Elkhorn River to wash out just north of Scribner's River bridge, causing flooding to areas outside of the levee and closing County Road F for several days (Lower Elkhorn NRD/JEO Consulting Group, 2020).

2019 Flooding Event

Due to the frozen ground, and those 1 to 2 feet of thick ice remaining in area rivers, widespread, and catastrophic flooding developed on Wednesday, March 13th, 2019. Due to expansive levee breaches on many rivers and streams, the flood damage was particularly devastating to many communities. Four individuals lost their lives due to the extreme conditions, and several hundred people required rescue via air or boat. Tens of thousands of people were evacuated from their homes or businesses. Nearly 50 levees were breached on the Platte, Elkhorn and Missouri Rivers due to the large volume of water (National Centers for Environmental Information, 2024).

Village of Uehling

Prior Flooding Events

In 2014, a band of 2-3 inches of rain fell across the Logan Creek basin during the 24 hours ending June 15th. The heavy rain caused minor flooding along Logan Creek from near Pender through Uehling. Heavy rain caused Logan Creek to climb slightly above its 18-foot flood stage around the Uehling area from the afternoon of June 15th into the morning hours of the 16th. The flooding mainly impacted some farmland and a few roads near the creek (National Centers for Environmental Information, 2024).

2019 Flooding Event

On March 16th, 2019, the river gage at Uehling, operated by the USGS, peaked at 21 feet at 4 pm on March 15th. Minor flood stage is 18 feet, moderate flood stage is 19 feet while major flood stage is 21 feet. Preliminarily this peak is the highest on record. The only known damage was to county roads along Logan Creek. Other flooded areas were low-lying areas of Oakland which included their city park (National Centers for Environmental Information, 2024).

Village of Winslow

2019 Flooding Event

In March 2019, Winslow experienced a devastating flood event that damaged nearly every building in the community. Heavy rains and snow melt caused community's floodgate to give out, and a nearby levee overflowed by more than 2 feets. The resulting flood waters reached every part of Winslow, prompting evacuations. Approximately 20 residents had to be rescued, and another 9 were rescued in village's rural areas. Local planning team estimated that only 2 structures did not take water on their first floors. Preliminary inspections found 40 buildings to be uninhabitable and in need of repairs, and six buildings red-tagged due to foundation collapse. In addition to structural damage to buildings, floodwater also damaged many sidewalks and streets in community. Village's sewer and water services were also damaged and shut down during the event. Total damage numbers from flood event are not yet known. Floodplain maps show the entire village is within the 100-year floodplain (Lower Elkhorn NRD/JEO Consulting Group, 2020).

Village of Snyder

Prior Flooding Events

Several periods of heavy rain fell across Pebble Creek basin from 2010 June 8th to 14th which produced a prolonged period of high water and flooding along Pebble Creek near and west of Scribner. High water flooded and closed sections of Highways 275 and 91 near town as well as county roads and farmland in area. Pebble Creek near Scribner crested at just over 23 feet during the late afternoon of June 10th, flood stage is 18 feet. The creek near Scribner was above flood stage most of the period from around noon on the 10th until late in the afternoon on June 12th, although a few times during this stretch the creek dropped below flood stage (National Centers for Environmental Information, 2024).

Douglas County

Flooding Events

Douglas County-Wide 2019 Flooding Event

The March 2019 flood caused devastating damage along the Missouri, Elkhorn, and Platte Rivers and closed roads, damaged buildings, knocked out power, and led to several fatalities. Urban areas, industrial entities, utilities, transportation routes, and agriculture all suffered damage due to these floods. The planning area expects loss-inducing floods to occur annually, with 196 flooding events recorded by the NCEI over 24 years (JEO Consulting Group, 2021).

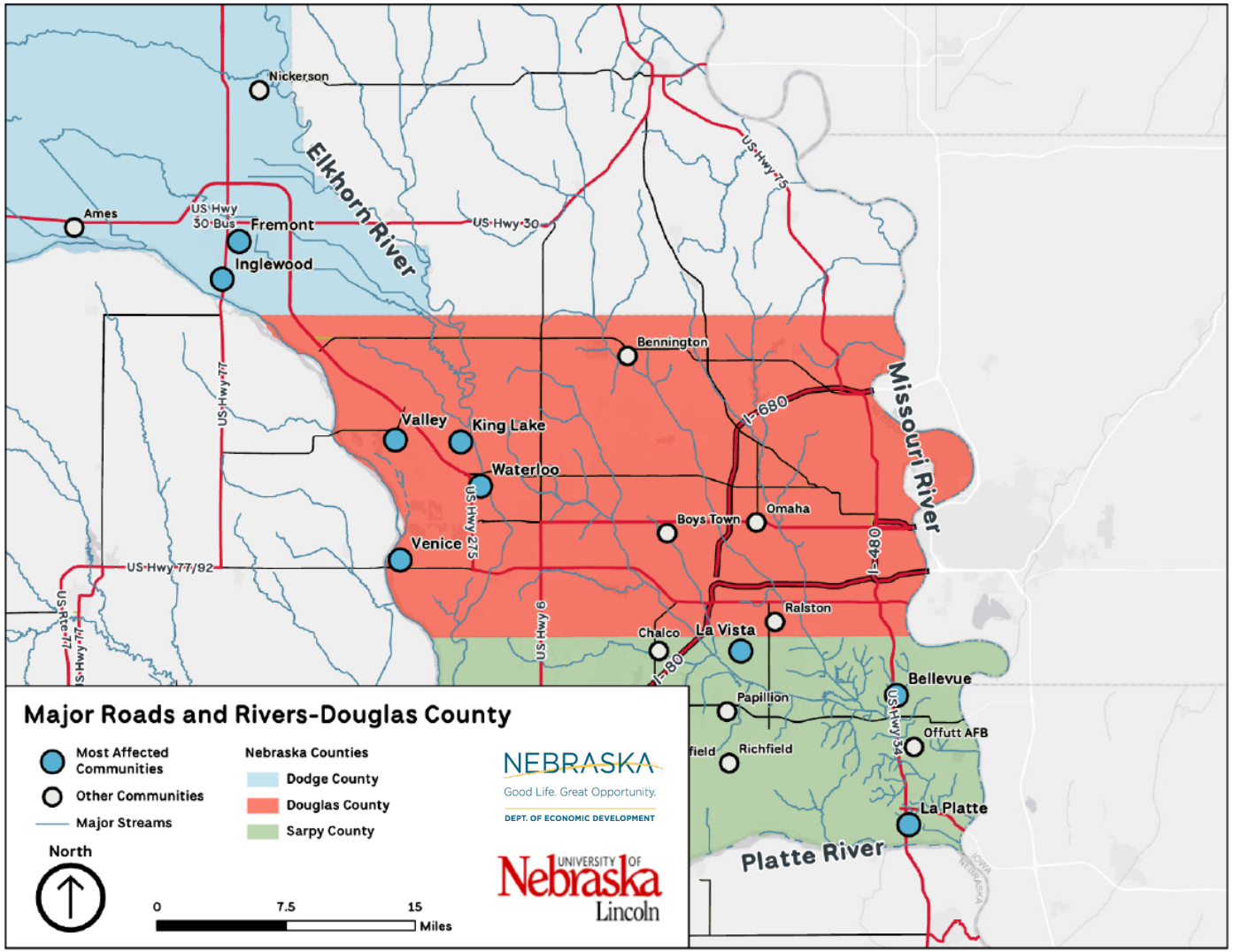
This event's impact included severe damage to homes, commercial buildings, agriculture, bridges, and roads. Agriculturally, hundreds of acres of pastureland and fields were destroyed by several inches to feet of sand and silt left behind by receding flood waters. The flooding event also occurred during calving season, resulting in the loss of hundreds of calves for ranchers across the state. Roads, bridges, and critical transportation routes across the state were blocked by flood waters or washed out entirely. At least 3 fatalities occurred during the flood event while the Nebraska National Guard performed dozens of rescues in inundated areas. During this event, no fatalities were reported within the P-MRNRD and six-county planning area.

Douglas County-Wide Prior Flooding Events

There is extensive documentation of multiple incidences of prior flooding events for Douglas County, particularly Omaha metropolitan area. These events are discussed in detail in the prior flooding section for the communities in following sections.

Source: https://www.tampabay.com/nation-world/watch-flood-records-set-in-midwest-as-floodwaters-head-downstream-20190318/

Map 2.2: Communities affected by the 2019 flood event, Douglas County, NE



Effected Communities, Douglas County: Flooding Events

City of Omaha

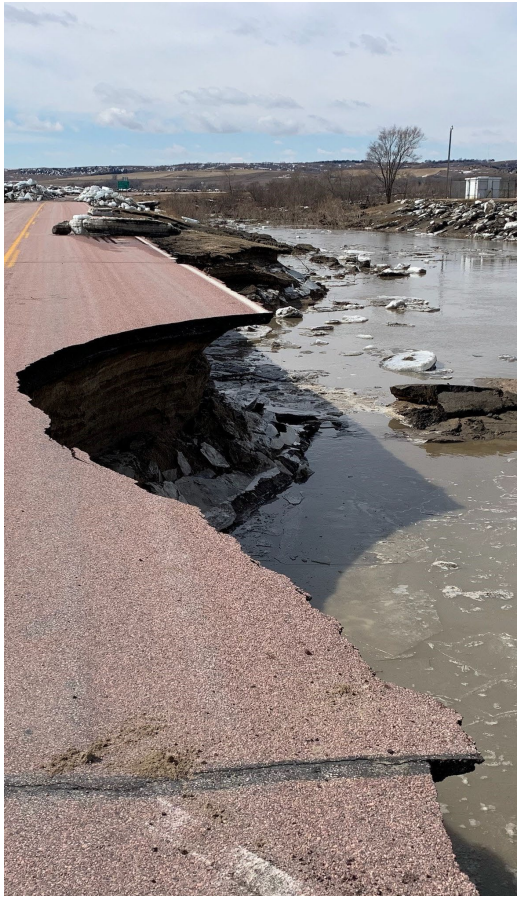
Prior Flooding Events

1999 Flooding Event

Record-setting rainfall caused extensive flooding over Omaha, Nebraska, Council Bluffs, Iowa, and surrounding counties. Rainfall at Eppley Airfield in Omaha totaled 10 inches for the 24-hour period, which was the highest rainfall recorded in a 24-hour period in Omaha since 1900. The heaviest rain was confined to the eastern part of Omaha and into Pottawattamie County, Iowa, with amounts in the 8 - 10-inch range confined the eastern part of Omaha and into Pottawattamie County Iowa with amounts in the 8 - 10-inch range. The rain caused extensive flooding along Cole Creek in the east-central part of Omaha, where 1 man drowned after his basement wall washed out. Other flooding was observed along the Big Papillion Creek, where two golf courses and a nursery experienced substantial damage (JEO Consulting Group, 2020).

2004 Flooding Event

Heavy rainfall in the Omaha metropolitan area caused flash flooding, especially near the Saddle Creek and Center Streets area, near the intersections of 96th and Q Streets, 17th, and Ames Avenue and 108th and Q Streets. Other flooding occurred when a pool of water 6 feet high developed near the Saddle Creek location, carrying off a few vehicles and flooding at least one apartment complex. Several businesses were flooded, and sewers backed up into properties. Eppley Airfield reported 2.66 inches of rain from the storm in just a several-hour period, while some locations in midtown Omaha received almost 3.5 inches of rain (JEO Consulting Group, 2020).



Source: Nebraska Governor's Office. https://www.dtnpf.com/agriculture/web/ag/news/world-policy/article/2019/03/20/gov-ricketts-flood-blizzard-far-aid-2

Omaha

2011 Flooding Event

In Douglas County, the river climbed to 29 feet, which is flood stage, at Omaha on May 27th and continued to rise into June. Flooding from the Missouri River closed a park and baseball fields on the northwest side of Omaha, and low areas around downtown on the river side of the levee began flooding when floodgates were installed. By the end of June at Omaha, the river had reached 35 feet and briefly hit 36 feet in late July. The South Omaha wastewater treatment plant was forced to send 6 million gallons of wastewater daily into the river beginning in early June due to flood waters affecting the facility. The high water and persistent pressure on levees forced Eppley Airfield and other businesses to monitor the situation constantly and have bumps on standby as either rains, storm sewer backups, or boils near the levee would force pumping of the water back over the levee. By June 22nd, Eppley had spent $2.5 million on flood prevention. Burlington Northern Railroad had to shut down one of its tracks to allow it to be used as a levee. Flood waters decreased to 34 feet by mid-August and continued to drop to 31 feet by the end of August. The USACE is estimated to have spent a little over $2 million on levee repair work in Omaha during the event. By the end of August, the City of Omaha's tab for the flood fight had totaled $10 million. The river had fallen below flood stage by mid-September (JEO Consulting Group, 2021).

2019 Flooding Event

The March 2019 flood event caused the State Highway 92 bridge over the Elkhorn River to wash out entirely. As of August 2020, this has been repaired. Other paved roads that were closed or significantly damaged during this flood event included: West Q Road, F Street, West Dodge Road, Pacific Street, Campanile Road, Reichmuth Road, East Meigs Street, 228th, 245th, 252nd, 264th, and 300 Street. Many unpaved roads in western Douglas County were also damaged (JEO Consulting Group, 2021).

Source: Ryan Soderlin. https://www.theguardian.com/us-news/2019/mar/16/nebraska-flood-man-dead-rescue-effort

Note: Some communities in Douglas county do not have documentation of the impact of prior flooding events and/or the 2019 flooding event, which are:

- Bennington
- Boys Town
- King Lake
- Ralston
- Valley
- Venice
- Waterloo

Sarpy County

Flooding Events

Sarpy County-Wide 2019 Flooding Event

The March 2019 flood event significantly impacted county infrastructure. Highway 34 was completely inundated between the county and Iowa. High water levels caused a breach in the 613/616 levee, and backflow conditions caused significant flooding along the Missouri River. High water levels and damage caused Highway 34 to close periodically throughout 2019. The Papio Natural Resource District and the county have inspected and repaired these levee sections on the east side of Highway 75, and the highway has since been reopened. Numerous other county roads were damaged during the flood event, specifically those serving lake properties and communities. A county maintenance shop near the Platte River was fully inundated and required evacuation of staff. Sarpy County Emergency Management Agency assisted with evacuating trailer parks near Bellevue and several sandpit communities, including Hanson Lake, Betty Lakes, and Hawaiian Village. Many evacuated residents stayed with family or friends; however, two shelter locations were open in the county – one through the American Red Cross and one faith-based operation in Bellevue. At its peak, up to 80 residents stayed in shelters which remained open for over 30 days. Other damage occurred to the Papillion Wastewater Treatment Facility, the Metropolitan Utilities District, which supplies water to the county, and Offutt Air Force Base (National Centers for Environmental Information, 2024).

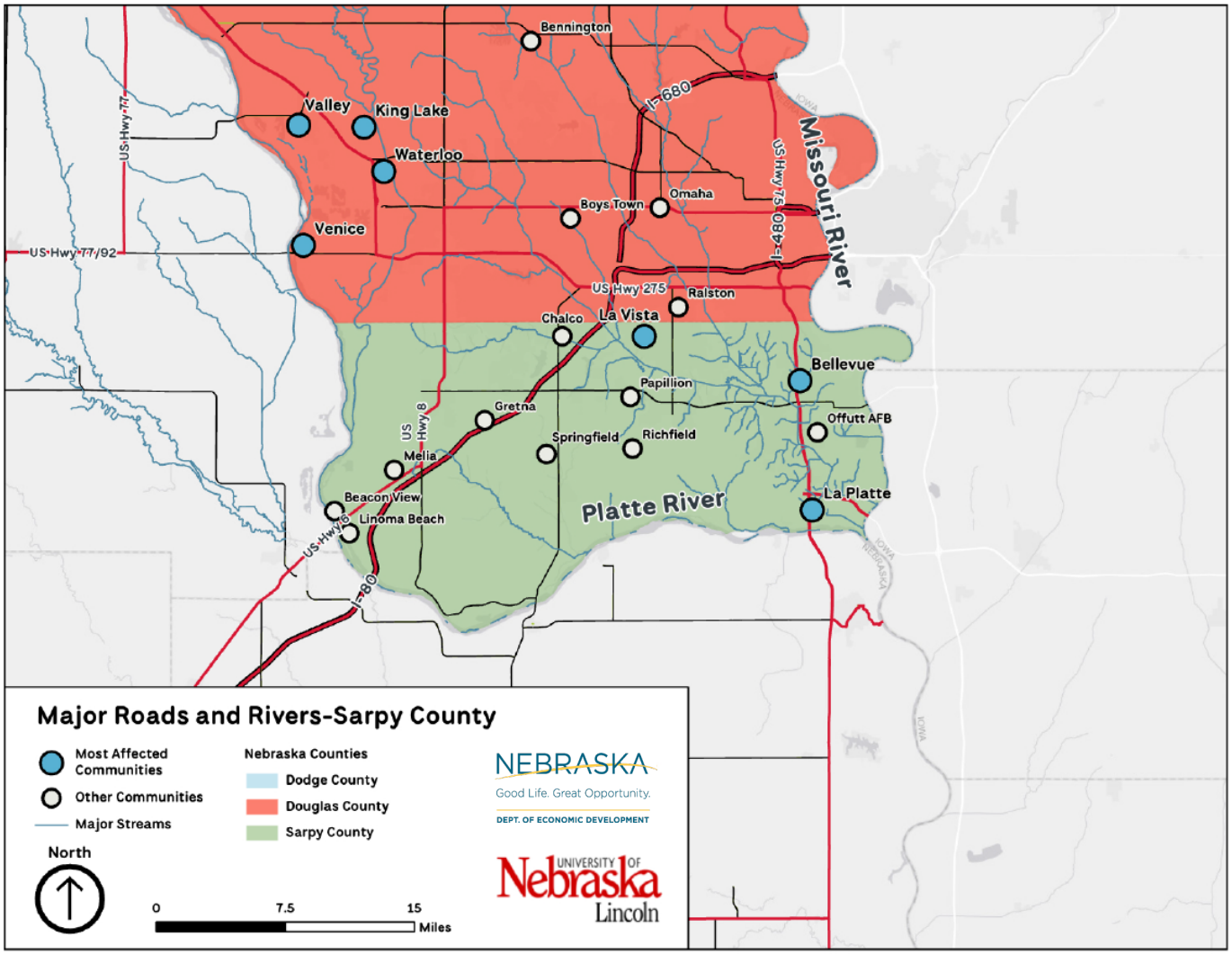
Sarpy County-Wide Prior Flooding Events

The county has seen significant flood events throughout the county in the past. The county is at risk of flash flooding with heavy rain events and riverine flooding with the Missouri River bordering the county's eastern edge. The NCEI reported 30 floods and 11 flash flood events which caused $422,248,000 in property damage and $1,577,124 in crop damages. In June 2014, flash flooding caused significant impacts to the county. Many roads were closed due to high water and power outages were reported across the county from thunderstorms that produced heavy rains of 7-8 inches (National Centers for Environmental Information, 2024).

Note: Some communities in Sarpy County do not have documentation of the impact of prior flooding events and/or the 2019 flooding event, which are:

- Beacon View
- Chalco
- La Vista
- Linoma Beach
- Melia
- Papillion
- Richfield
- Springfield

Map 2.3: Communities affected by the 2019 flood event, Sarpy County, NE



Effected Communities, Sarpy County: Flooding Events

City of Bellevue

Prior Flooding Events

In 2008, Heavy rain over sections of the Missouri River basin on June 4th and 5th, which eventually brought significant flooding downstream of Sarpy County, caused high water and some flooding along sections of the river in Sarpy County. A campground and marina near the river in the southeast part of town were flooded for a while on Thursday, June 5th into Friday the 6th. The flooding affected Bellevue but there were no fatalities reported (National Centers for Environmental Information, 2024).

2019 Flooding Event

On March 16th, there was damage to Offutt Air Force Base located near Bellevue, Nebraska. One-third of the base's main runway was inundated, along with one-third of Offutt's buildings, with several hundred employees, and several families displaced. East Mission and Mills County State Highway 10 toll road were impassable (National Centers for Environmental Information, 2024).

La Platte CDP

2019 Flooding Event

In March 2019 frozen ground and 1 to 2 feet of thick ice remained in area rivers leading to widespread, and in many cases, catastrophic flooding. Due to expansive levee breaches on many rivers and streams, the flood damage was particularly devastating to many communities. Several hundred people required rescue via air or boat. Tens of thousands of people were evacuated from their homes or businesses. Nearly 50 levees were breached on the Platte, Elkhorn and Missouri Rivers due to the large volume of water. One such levee breach along the Platte River near Leshara, Nebraska forced the evacuation of National Weather Service Omaha, located in Valley, Nebraska for 8 days (National Centers for Environmental Information, 2024).

Offutt Air Force Base CDP

2019 Flooding Event

Levee R-613 failed causing major flooding at Offutt Air Force Base and the Papillion Creek Wastewater Plant. A 971mb bomb cyclone moved out of the central Rockies on Wednesday, March 13th, 2019, and helped to create widespread, moderate to major, and in many cases historic, flooding across eastern Nebraska and western Iowa (National Centers for Environmental Information, 2024).

Overall Impacts of 2019 Flooding Event

Many flooding problems in Nebraska are rooted in the initial development of communities along watercourses and floodplains within the state. Residents may be at risk depending on their proximity to hazard-prone areas. Although there have been several other flooding events in Nebraska, the 2019 flooding event greatly impacted the social and economic sectors of the affected areas because of its severity.

Economic Impact

The cost of the damage has surpassed $1.3 billion, state officials said, according to The Associated Press. That includes $449 million in damage to roads, levees, and other infrastructure; $440 million in crop losses; and $400 million in cattle losses. Nebraska Governor Pete Ricketts estimated that more than 2,000 homes and 340 businesses were damaged or destroyed by the flood costing $85 million. The state declared a federal disaster declaration, which would quickly free up funds from the Federal Emergency Management Agency (Schwartz, 2019).

Agricultural Losses

The 2019 flood was devastating to agriculture as it tore through pasture lands and crop fields. Occurring in the middle of calving season, hundreds of calves perished while adult cattle were swept away and drowned or were stranded on islands (2022 State of Nebraska Flood Hazard Mitigation Plan Pg 15). In addition, levee breaches added to flooding over widespread agricultural lands, compounding the economic losses related to the 2019 event. (Nebraska State , 2021)

Infrastructural Losses

Building damage can result in additional losses to a community by restricting a building's ability to function properly. Income loss data accounts for business interruption and rental income losses, as well as the resources associated with damage repair and employment and housing losses. Flood damage is directly related to the depth of the potential flooding. For example, a two-foot flood generally results in approximately 20 percent damage to the structure, which translates to 20 percent of the structure's replacement value. (Papio-Missouri River NRD, 2021).

Most buildings and businesses are both at risk of damage from flooding. Infrastructure, transportation routes, including road and rail segments and bridges, are at risk for inundation and damage. In Fremont for instance, flood inundation model maps showed that this water had the potential to damage critical infrastructure, including the county's only hospital, the Fremont Airport, and four assisted living facilities. Basements in nearly 1,000 homes flooded in Fremont. Wastewater facilities are at risk, particularly those in the floodplain. Critical facilities, especially those in the floodplain, are at risk of damage. (Papio-Missouri River NRD, 2021).

Infrastructural Losses

The March 2019 flood event caused the State Highway 92 bridge over the Elkhorn River to wash out entirely. As of August 2020, this has been repaired. Other paved roads that were closed or significantly damaged during this flood event included: West Q Road, F Street, West Dodge Road, Pacific Street, Campanile Road, Reichmuth Road, East Meigs Street, 228th, 245th, 252nd, 264th, and 300 Street. Many unpaved roads in western Douglas County were also damaged (Papio-Missouri River NRD, 2020).

Source: David Carson. https://omahadailyrecord.com/content/levees-damaged-2019-floods-still-vulnerable

Social Impact

Loss of Lives

Four individuals lost their lives due to the extreme conditions, and several hundred people required rescue via air or boat. Tens of thousands of people were evacuated from their homes or businesses. Nearly 50 levees were breached on the Platte, Elkhorn and Missouri Rivers due to the large volume of water. One such levee breach along the Platte River near Leshara, Nebraska forced the evacuation of National Weather Service Omaha, located in Valley, Nebraska for 8 days.

Impact on Low-Income and Minority Population

Vulnerable populations are more susceptible to the impacts of disasters and may experience more long-term effects due to the loss of their social support network. Excessive flooding has led to loss of lives, two individuals lost their lives, hundreds had to be rescued by air or boat, and tens of thousands were evacuated. (2022 State of Nebraska Flood Hazard Mitigation Plan Pg. 14).

An updated national study examining social vulnerability as it relates to flood events found that low-income and minority populations are disproportionately vulnerable to flood events. These groups may lack needed resources to mitigate potential flood events and resources necessary for evacuation and response. In addition, low-income residents and renters are more likely to live in areas vulnerable to threat of flooding yet lack the resources necessary to purchase flood insurance. Flash floods are more often responsible for injuries and fatalities than prolonged flood events. Other groups that may be more vulnerable to floods, specifically flash floods, include the elderly, those outdoors during rain events, and those in low-lying areas. Elderly residents may suffer from a decrease or complete lack of mobility.

Chapter 3: Flood Risk Mapping

Introduction

This chapter explores flooding effects on several Nebraska Communities, that have been identified as having been majorly affected by 2019 March Flood Event. These include small communities such as Winslow, Hooper, North Bend, and Inglewood in Dodge County, Waterloo and Valley in Douglas County. Large Nebraska municipalities such as Bellevue (Sarpy), Fremont (Dodge), and La Vista (Sarpy), have also been identified as majorly impacted. Unincorporated communities and Census-Designated Places such as La Platte (Sarpy), Venice, and King Lake (Douglas)* are also identified in the document. To show the flooding impacts on the Nebraska communities, the chapter will present following maps:

*All Maps for Census Designated Places (CDPs) include approximate boundaries

2019 Flood Inundation Maps

In 2019, Nebraska experienced a catastrophic flood on March 16. Information gathered from satellite imagery has produced an accurate spatial representation of where the floodwaters were at their highest out of the Platte, Elkhorn, and Missouri Rivers, and their various tributaries. These flood inundation maps utilized in conjunction with parcel maps and census blocks can help to explain who was impacted by the 2019 floods and can give state agencies and local municipalities valuable insights on understanding the who of impacts in the 2019 flood event. See Map 3.2 to Map 3.12.

National Flood Hazard Layer (NFHL) Maps

NFHL Maps have been created to visualize the floodplain in each of the identified most affected communities. FEMA and the Nebraska Department of Natural Resources update floodplain maps periodically. These maps are based on the most recent FEMA shapefiles available to the public for interpretation and evaluation. See Map 3.13 to Map 3.23.

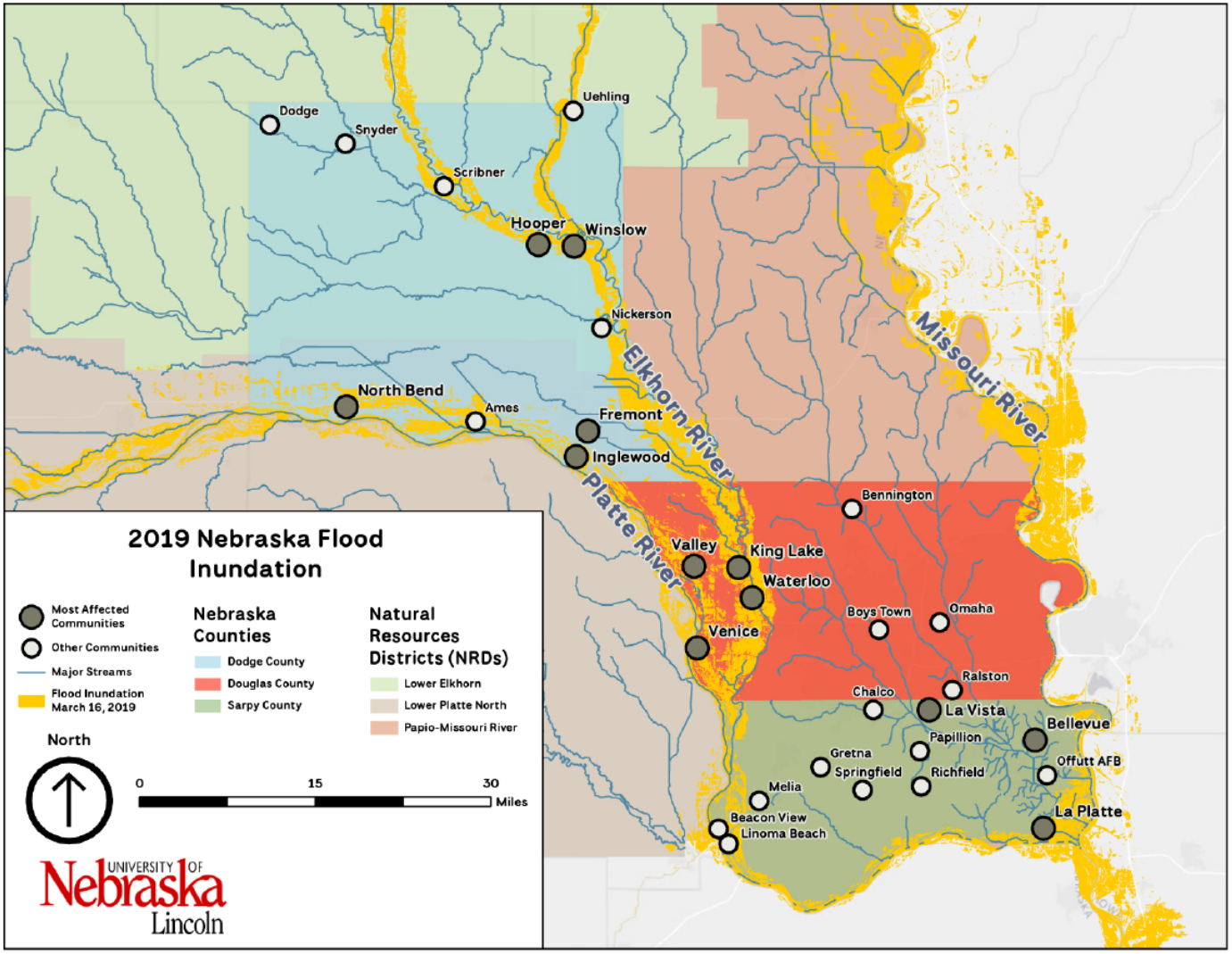
Tax Parcel Data Maps

Tax Parcel maps will help to indicate what properties and help to estimate the amount (dollars) of damage that occurred in the 2019 floods and can help to predict what future property damage can look like again in a flood occurrence event. See Map 3.24 to Map 3.45.

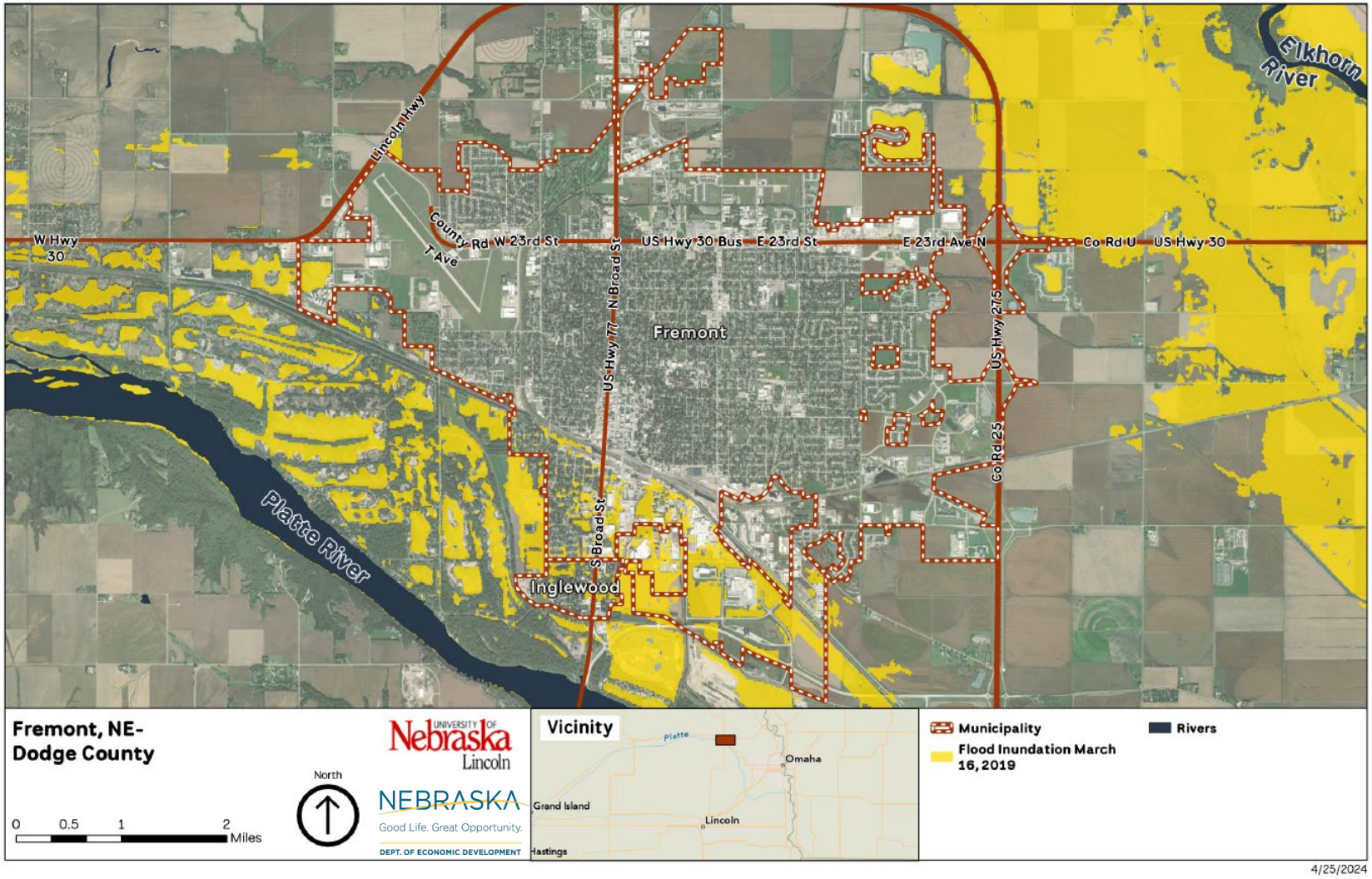
Demographics

Understanding who lives in the floodplain, who was impacted by the 2019 flood, and what % of population are minority populations is a critical piece of information to continue to promote flood mitigation policies in the wake of the 2019 flood. See Map 3.46 to Map 3.68.

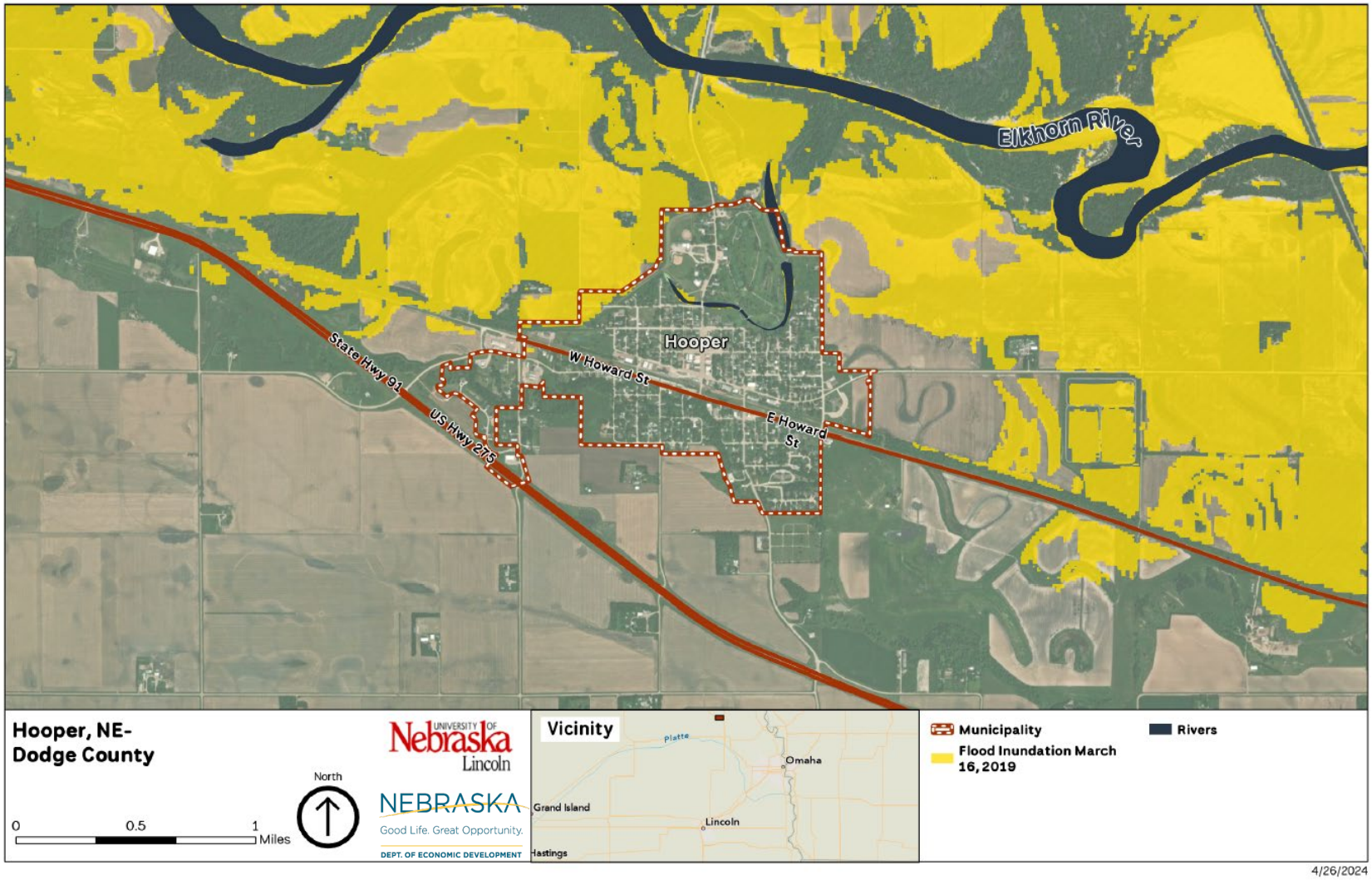
Map 3.1: 2019 Flood Inundation Map Platte, Elkhorn, and Missouri Rivers



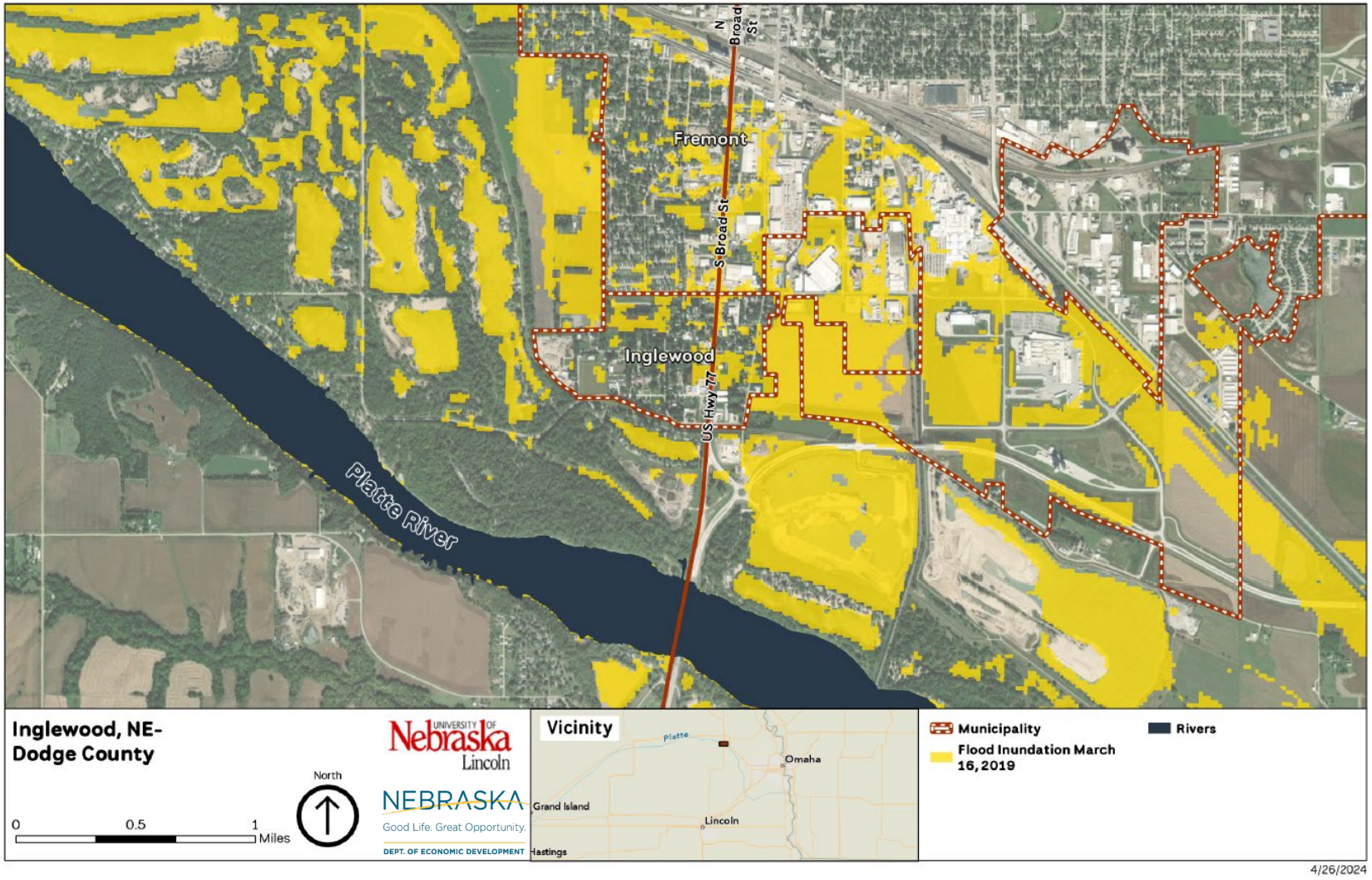
Map 3.2: 2019 Flood Inundation Map, City of Fremont, Dodge County, NE



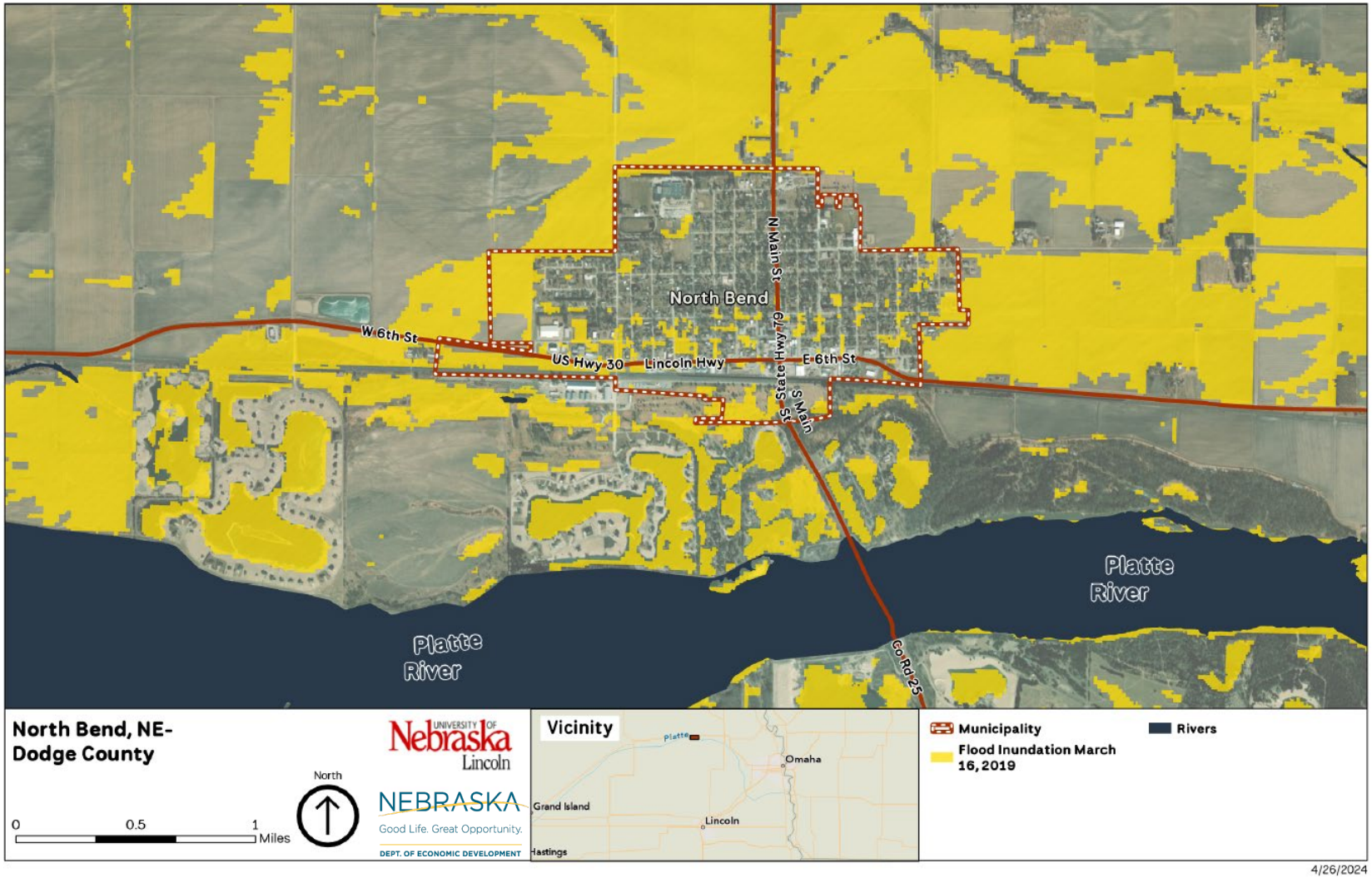
Map 3.3: 2019 Flood Inundation Map, City of Hooper, Dodge County, NE



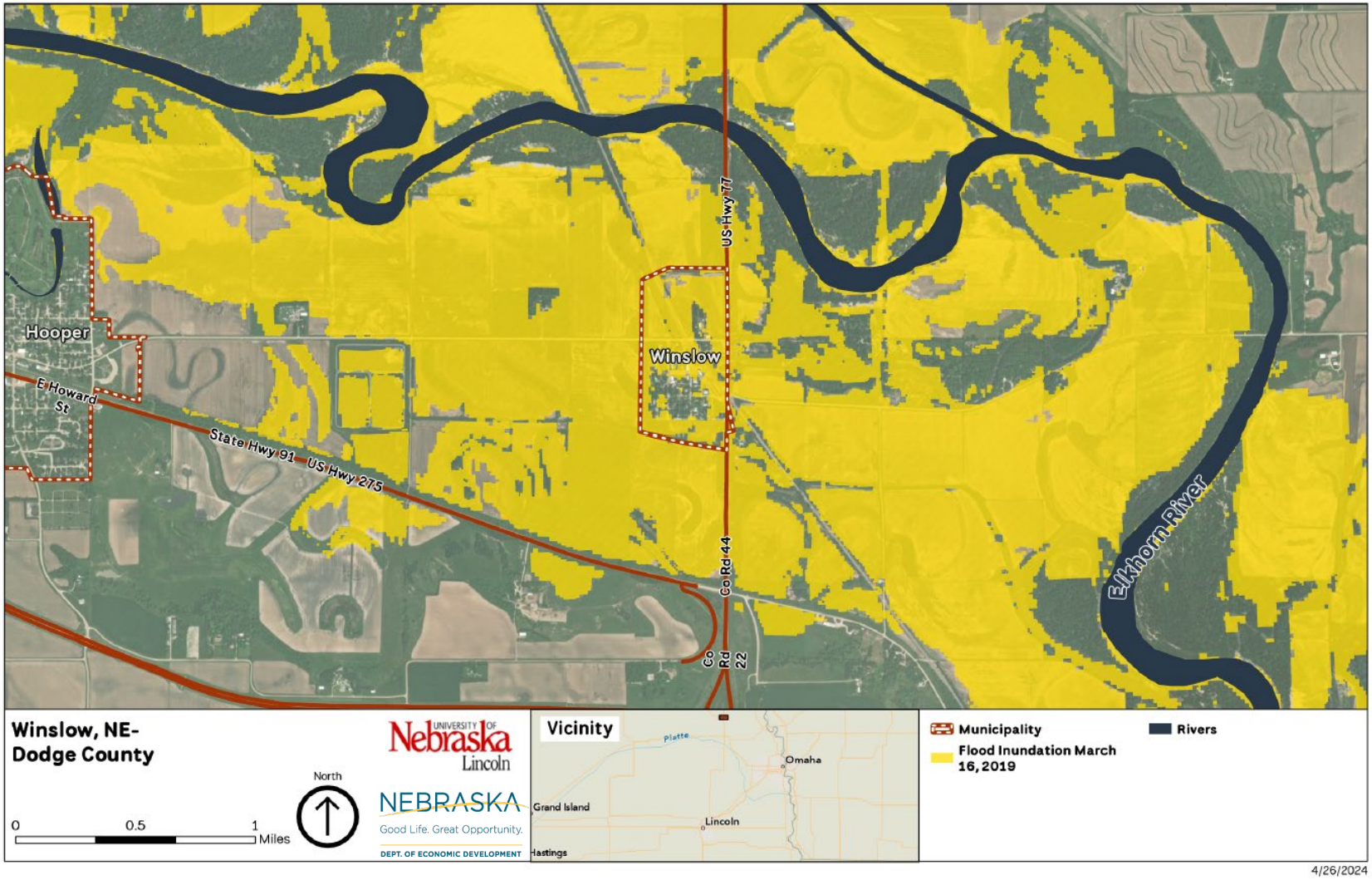
Map 3.4: 2019 Flood Inundation Map, Village of Inglewood, Dodge County, NE



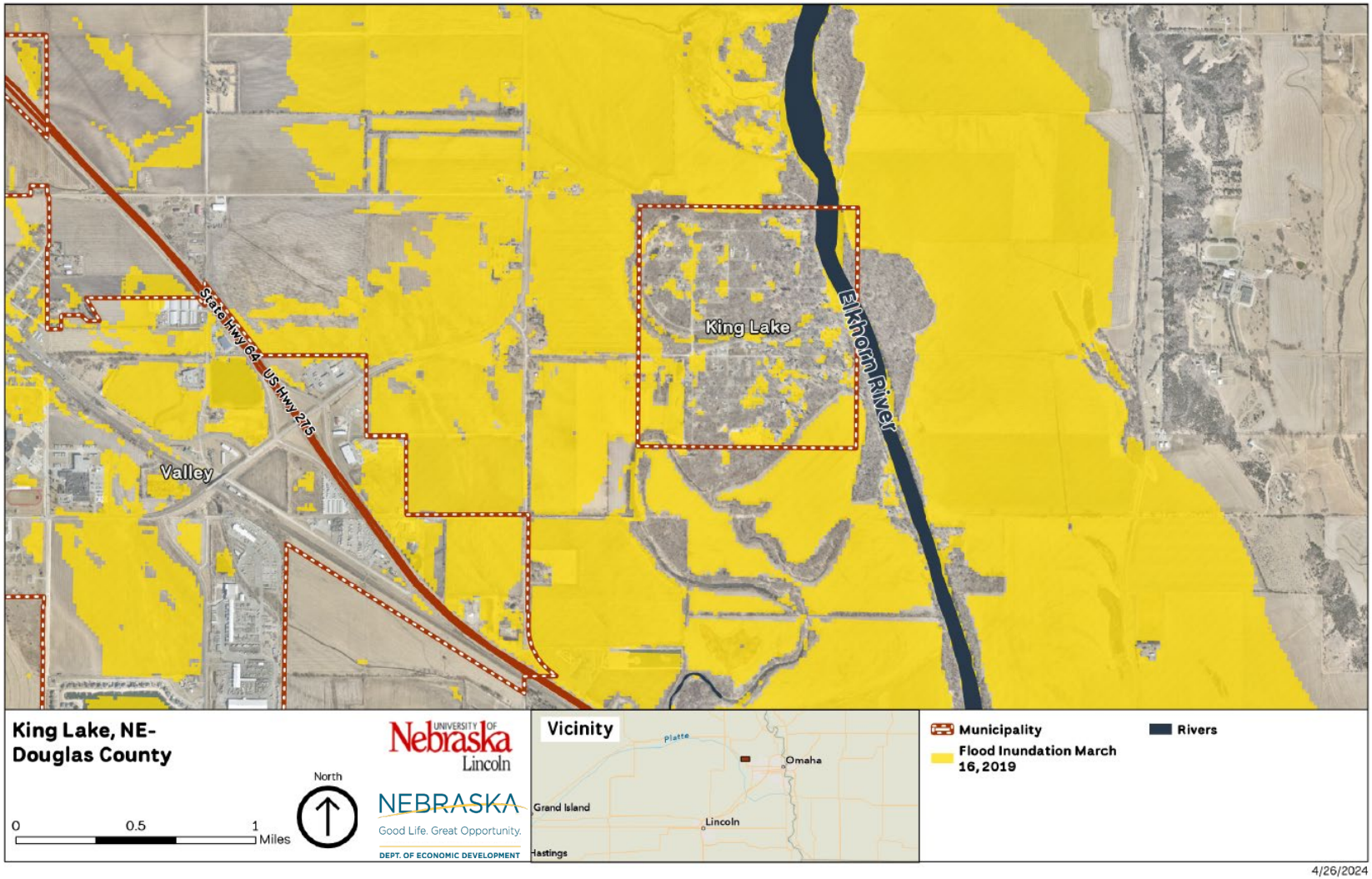
Map 3.5: 2019 Flood Inundation Map, City of North Bend, Dodge County, NE



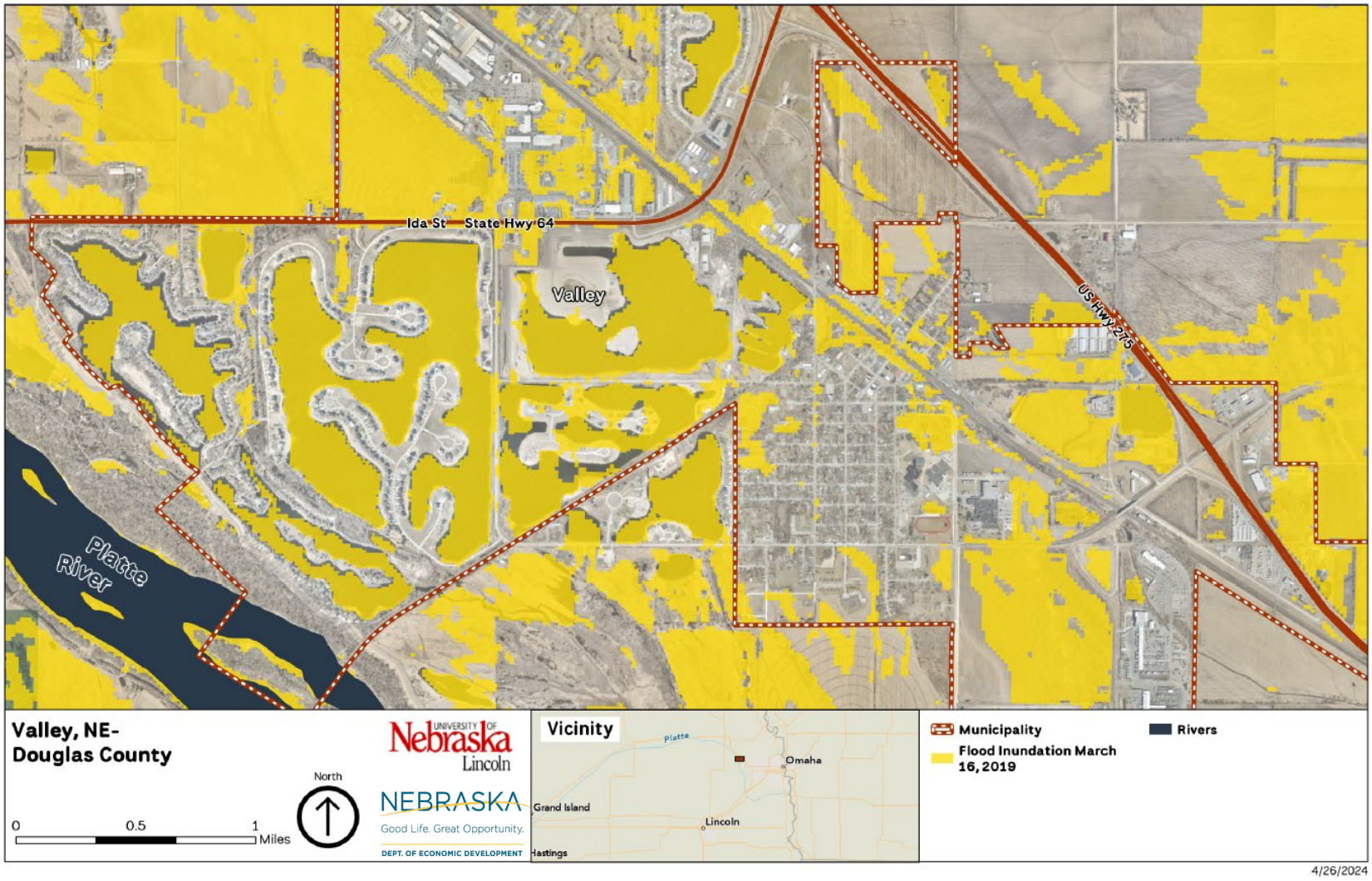
Map 3.6: 2019 Flood Inundation Map, Village of Winslow, Dodge County, NE



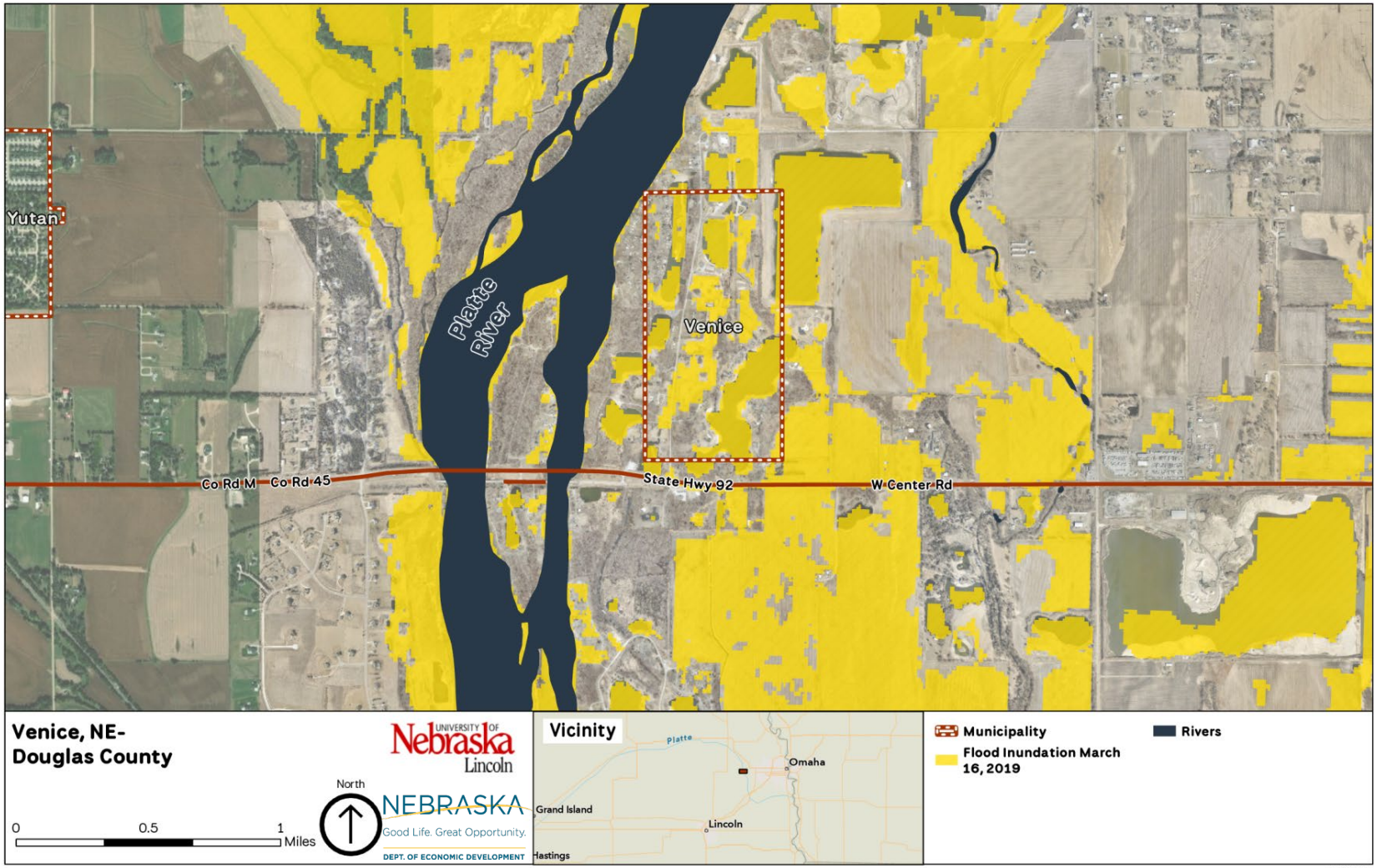
Map 3.7: 2019 Flood Inundation Map, King Lake CDP, Douglas County, NE



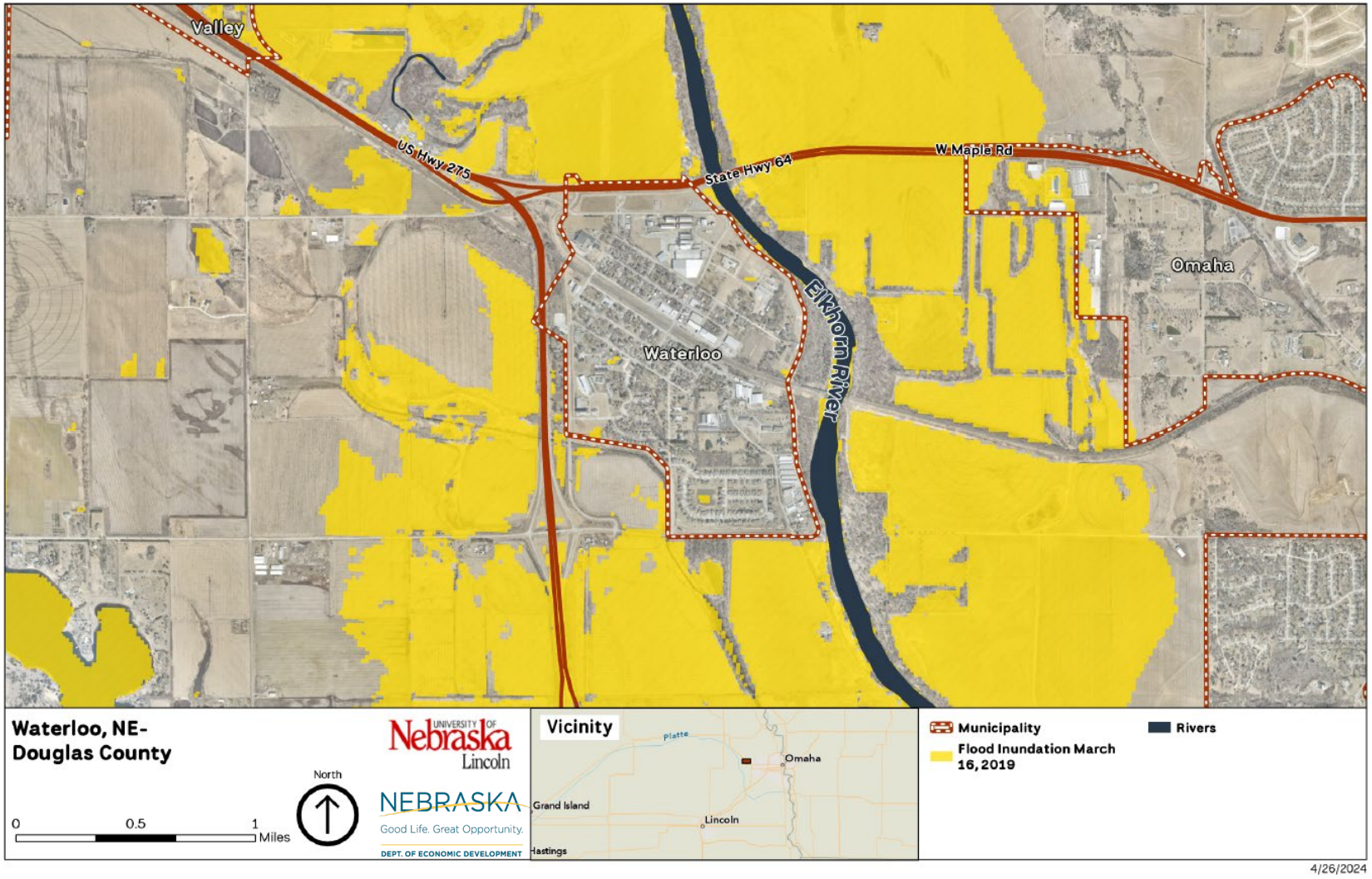
Map 3.8: 2019 Flood Inundation Map, City of Valley, Douglas County, NE



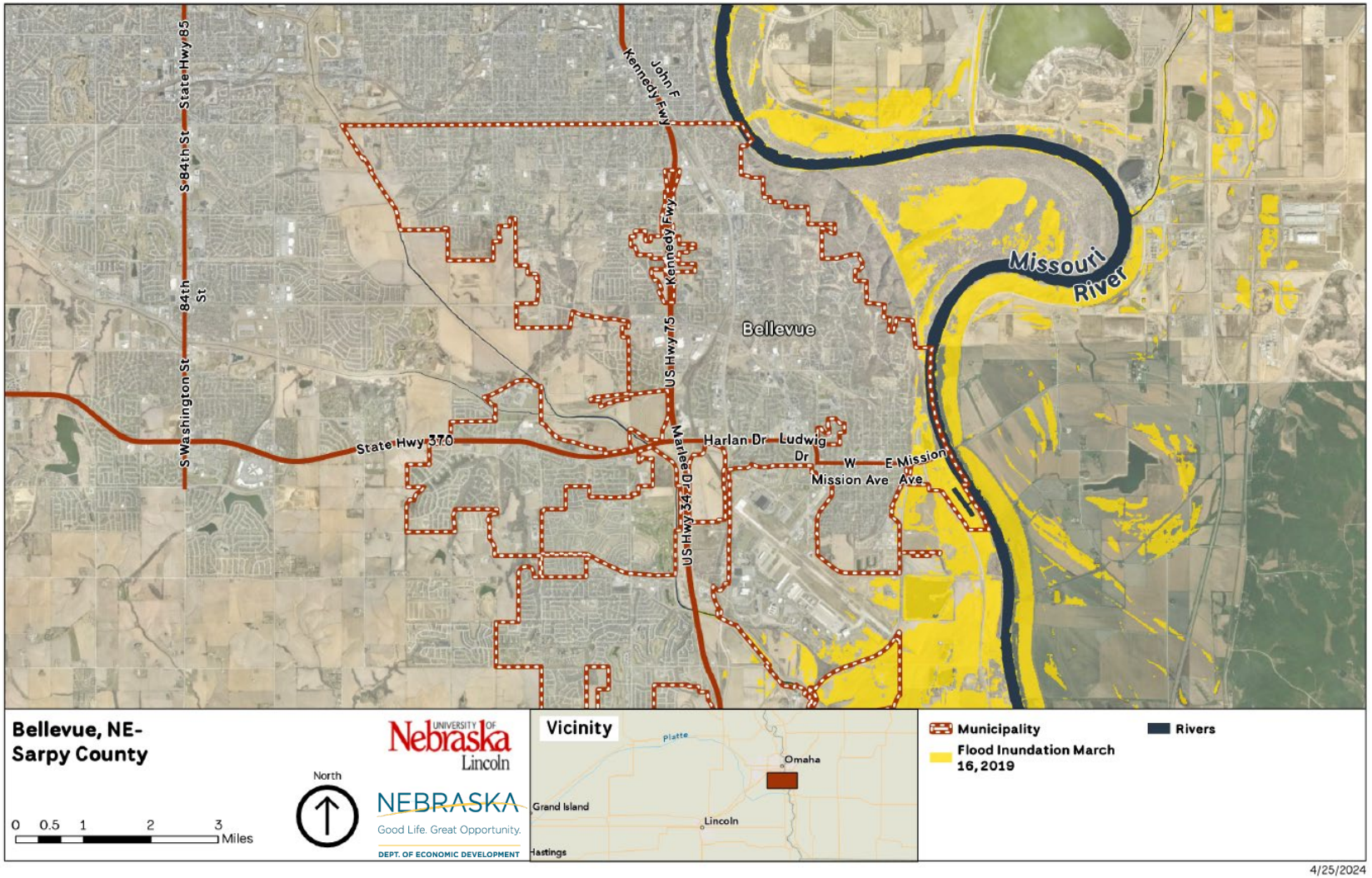
Map 3.9: 2019 Flood Inundation Map, Venice CDP, Douglas County, NE



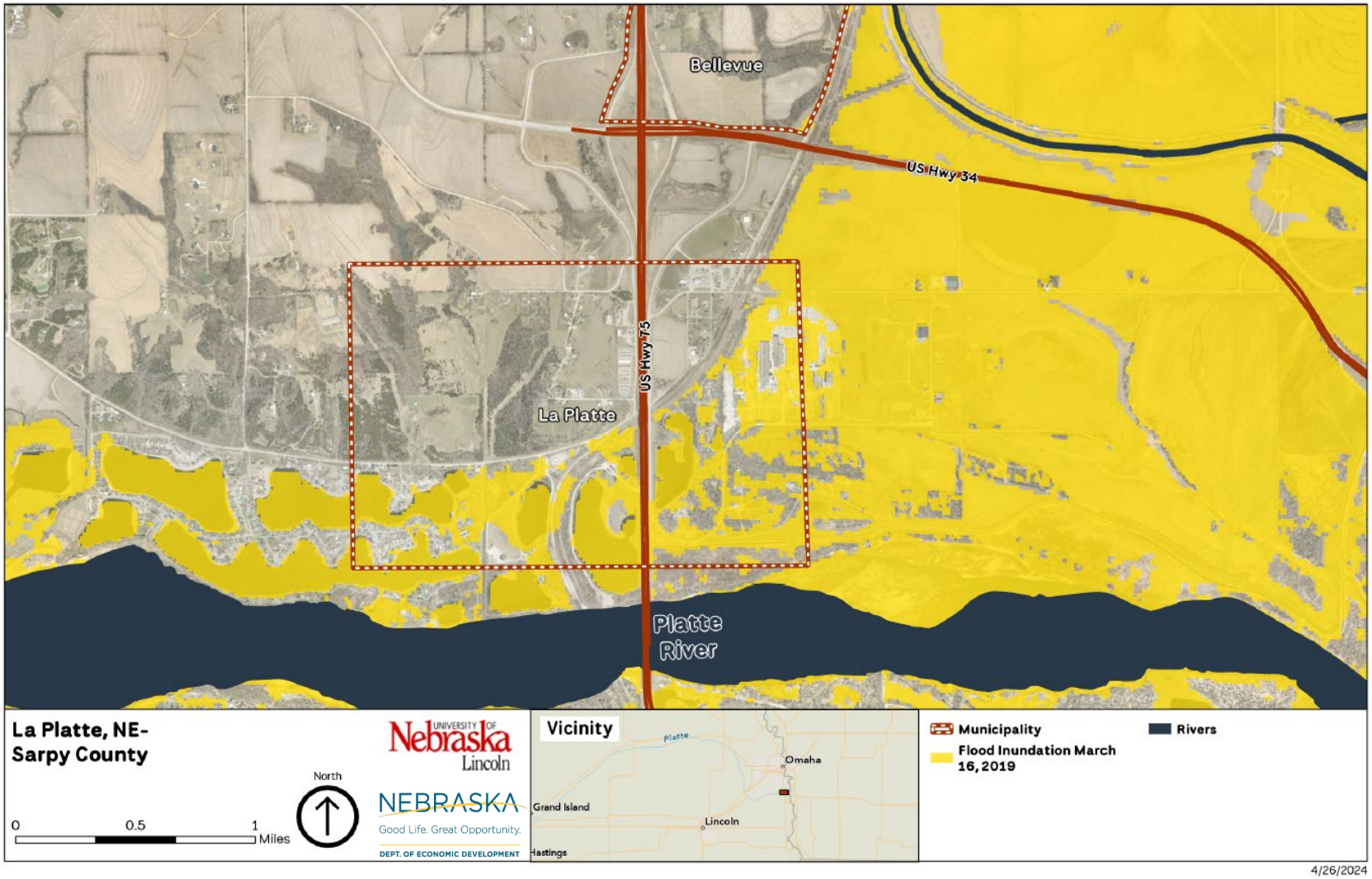
Map 3.10: 2019 Flood Inundation Map, Village of Waterloo, Douglas County, NE



Map 3.11: 2019 Flood Inundation Map, City of Bellevue, Sarpy County, NE



Map 3.12: 2019 Flood Inundation Map, La Platte CDP, Sarpy County, NE



National Flood Hazard Layer (NFHL) Maps

The National Flood Hazard Layer (NFHL) indicates what areas are most vulnerable to flood events based on annual percentage chance. In the past these have commonly been referred to as 100 and 500-year flood plains, however recent changes in terminology have been initiated by FEMA and other federal agencies to use the terms,1% Annual Chance, 0.2% Annual Chance etc.

1% Chance of Annual Flood (100-Year Floodplain)

“Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). SFHA are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood” (FEMA). The 100-Year Floodplain is the second most vulnerable floodplain type. In these areas development may occur but there must be regulations for construction to be built. In the case of Fremont, NE many buildings were built prior to floodplain regulations went into effect.

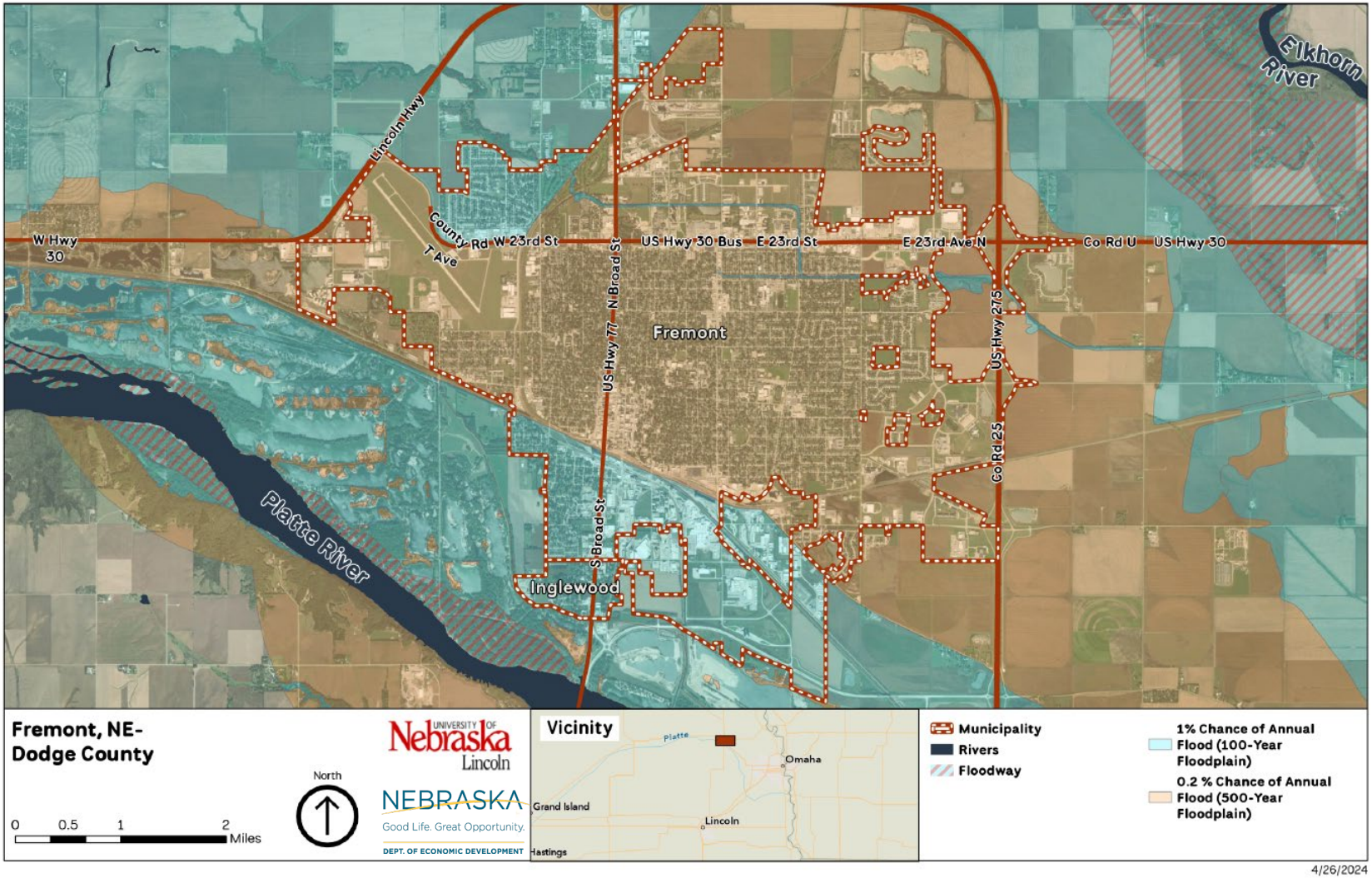
0.2% Chance of Annual Flood (500-Year Floodplain)

“The "500-year flood" corresponds to an AEP (annual exceedance probability) of 0.2-percent, which means a flood of that size or greater has a 0.2-percent chance (or 1 in 500 chance) of occurring in a given year” (USGS). The 500-Year Floodplain is the least likely to experience a major flood event. However, as stated above from the USGS there is still a risk of a flood event occurring.

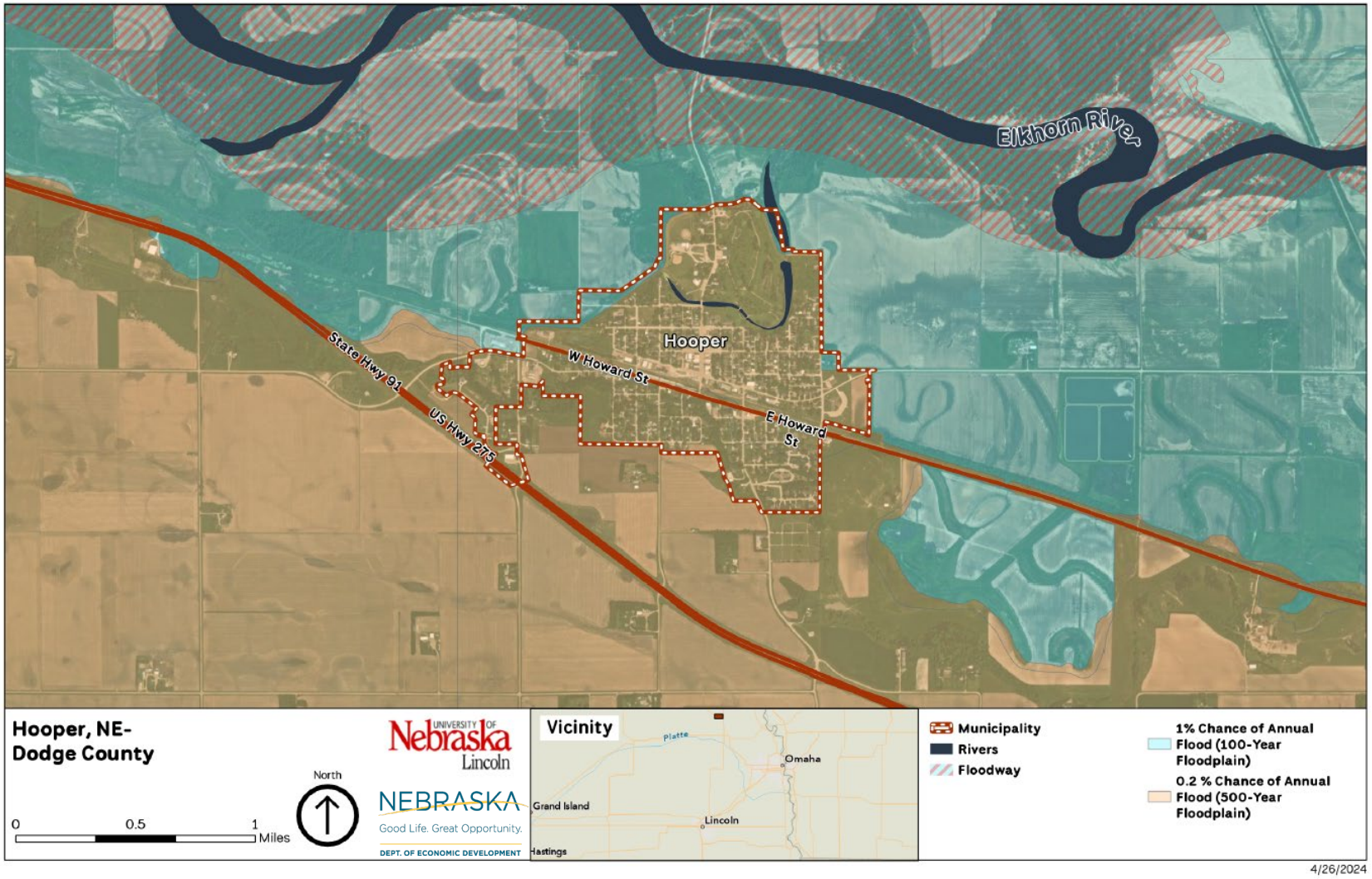
Floodway

A "Regulatory Floodway" means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Communities must regulate development in these floodways to ensure that there are no increases in upstream flood elevations. For streams and other watercourses where FEMA has provided Base Flood Elevations (BFEs), but no floodway has been designated, the community must review floodplain development on a case-by-case basis to ensure that increases in water surface elevations do not occur or identify the need to adopt a floodway if adequate information is available” (FEMA). Floodways are the most stringent restriction regarding floodplain regulation. This area is designated as the most prone to flooding and development in the floodway is extremely limited.

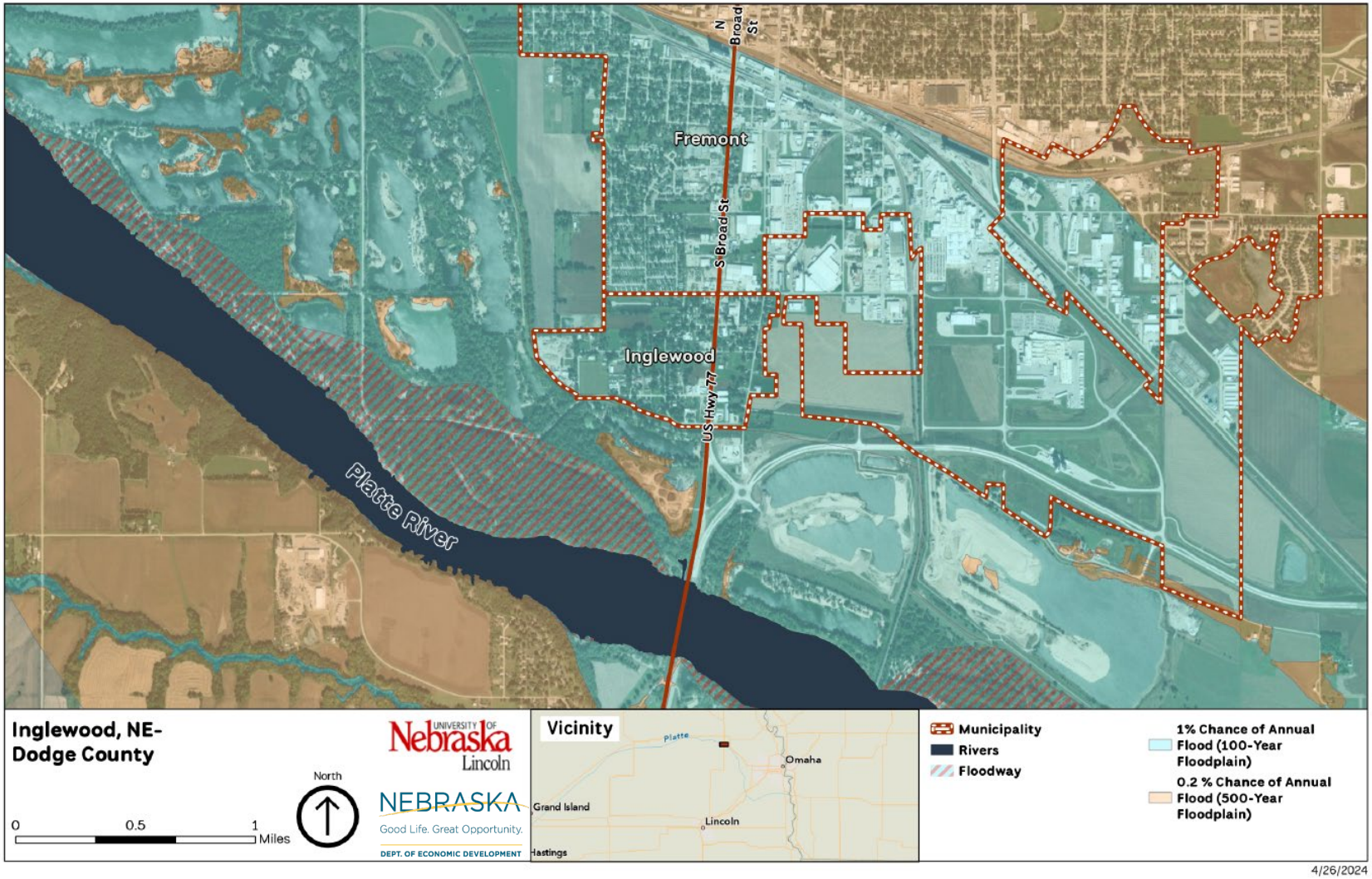
Map 3.13: National Flood Hazard Layer, City of Fremont, Dodge County, NE



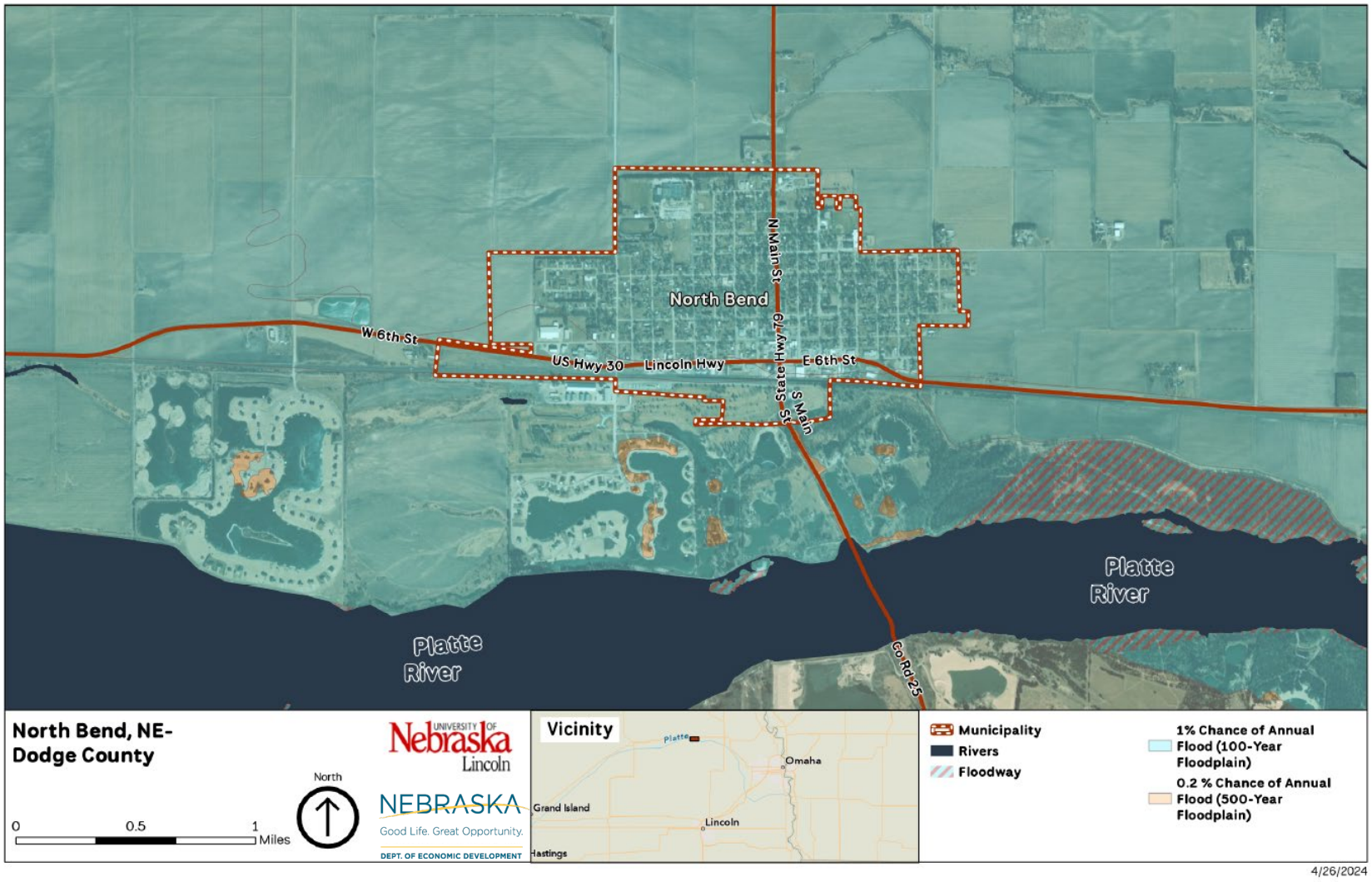
Map 3.14: National Flood Hazard Layer, City of Hooper, Dodge County, NE



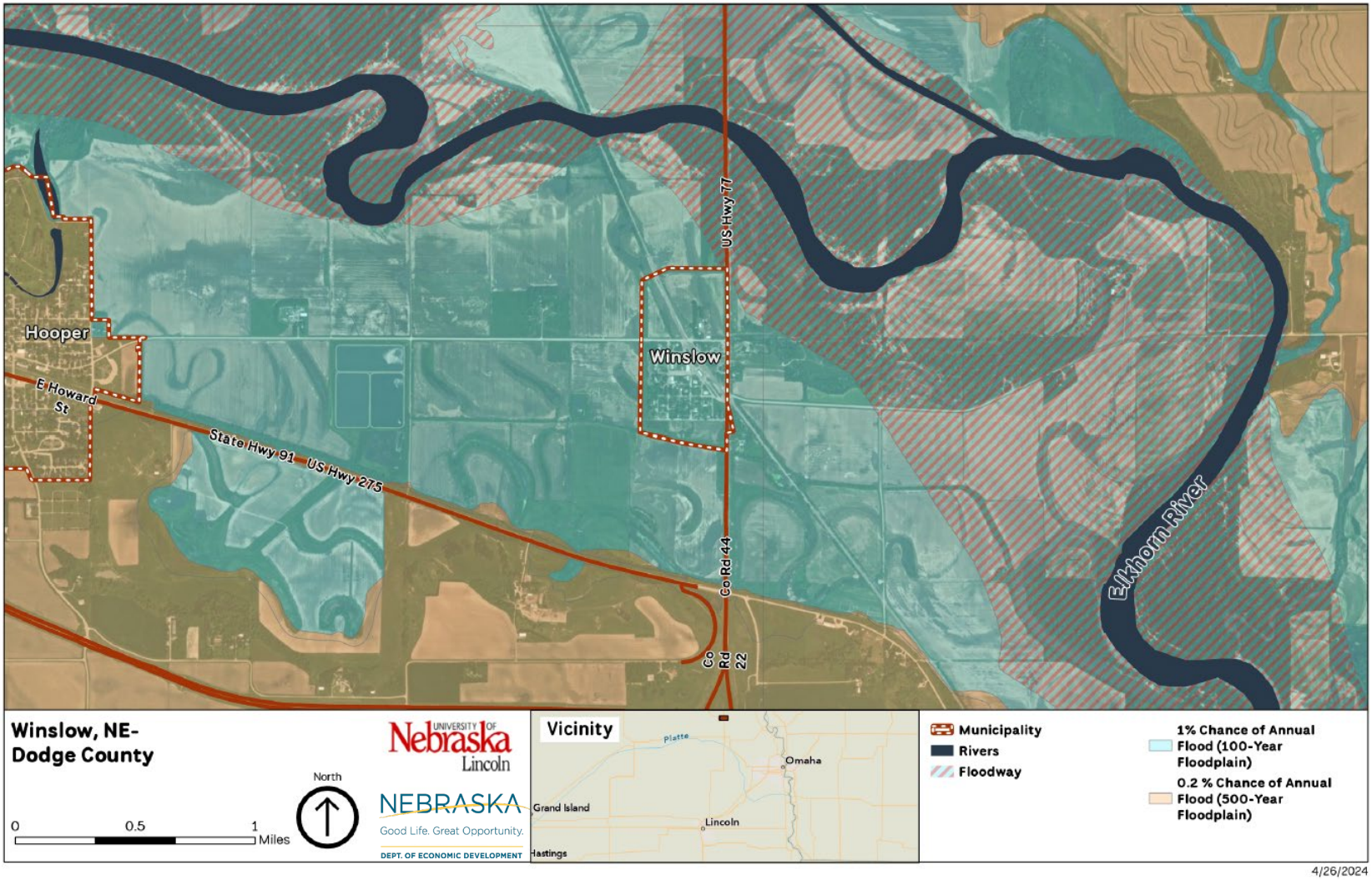
Map 3.15: National Flood Hazard Layer, Village of Inglewood, Dodge County, NE



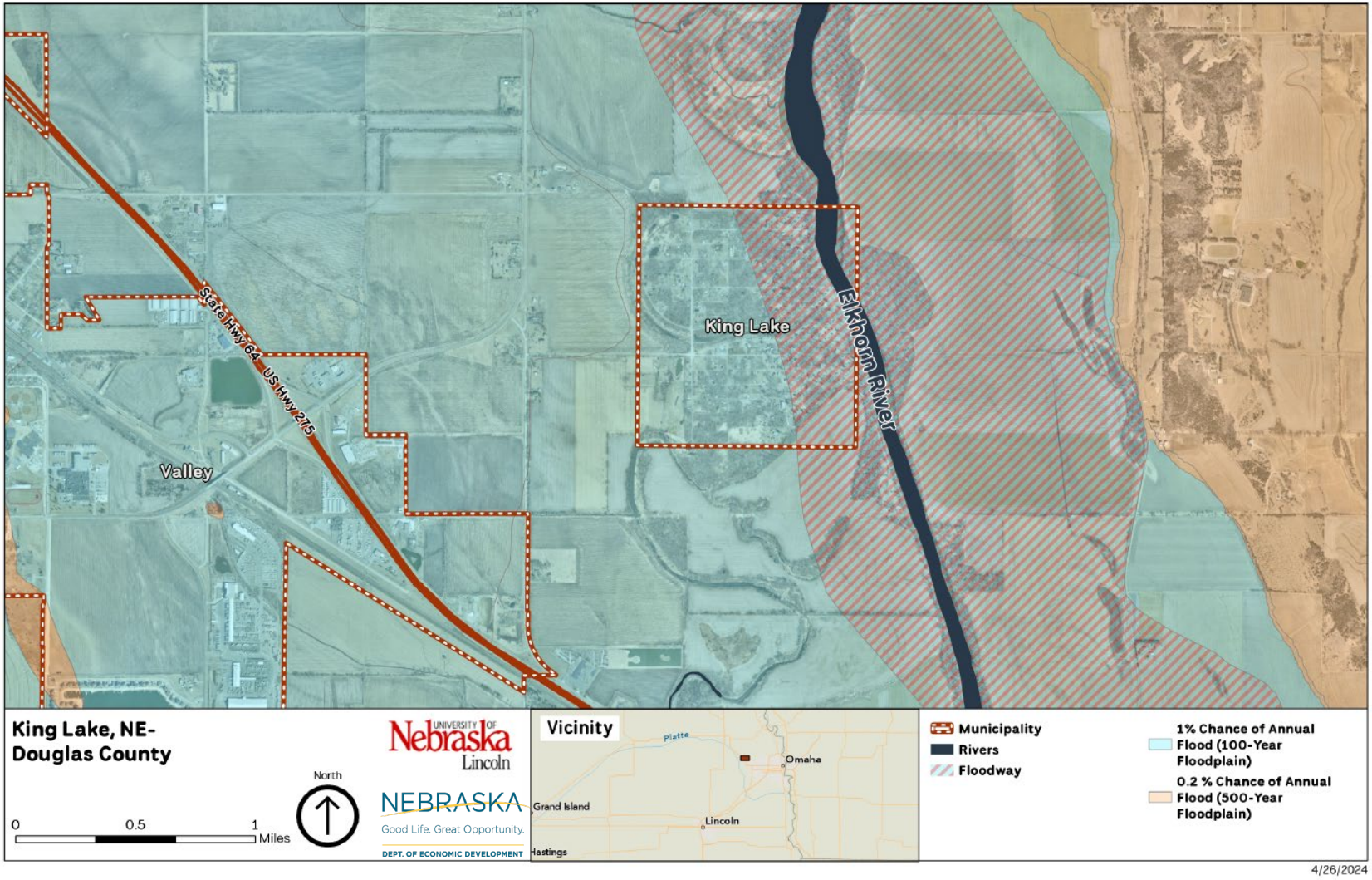
Map 3.16: National Flood Hazard Layer, City of North Bend, Dodge County, NE



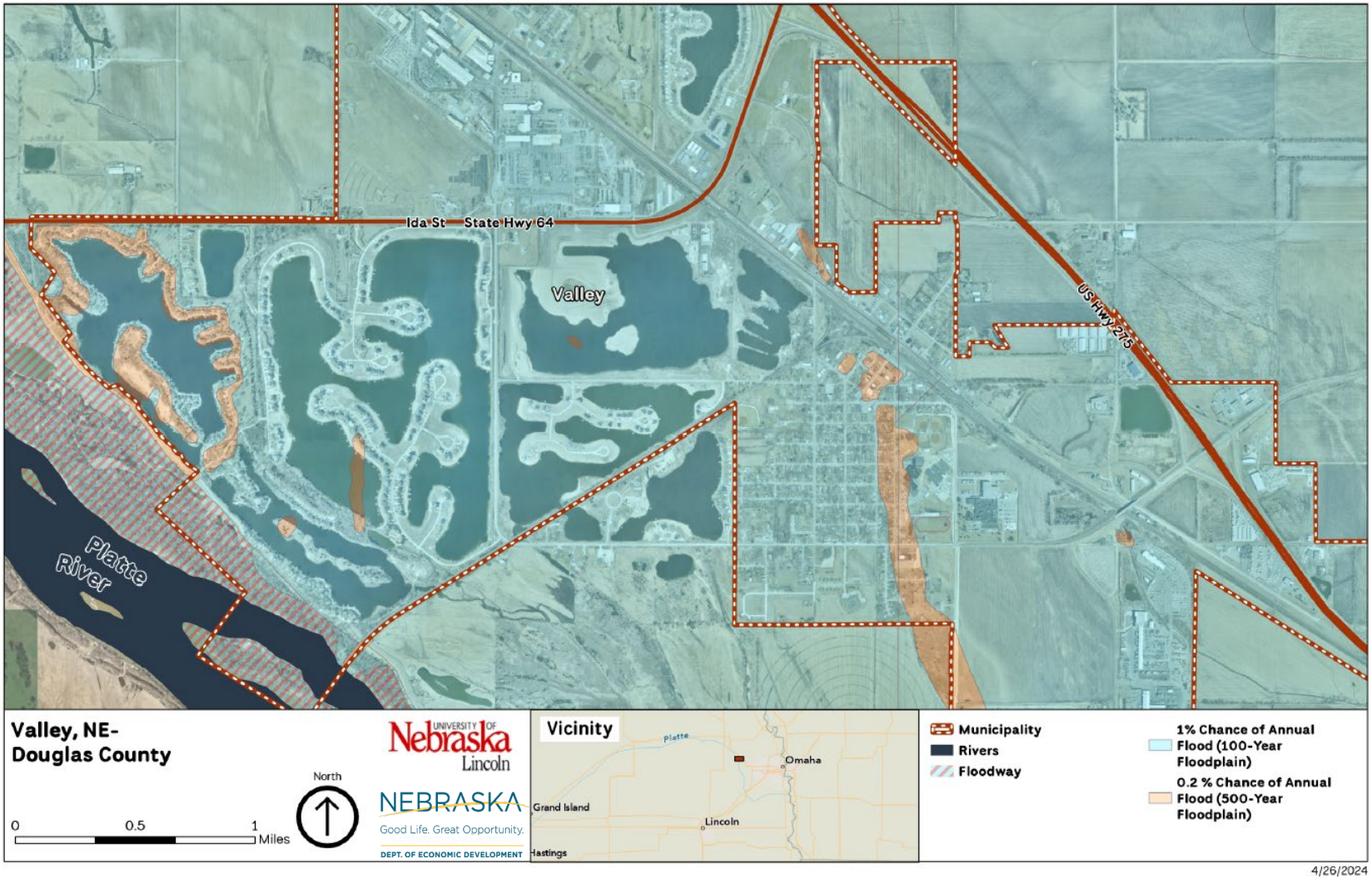
Map 3.17: National Flood Hazard Layer, Village of Winslow, Dodge County, NE



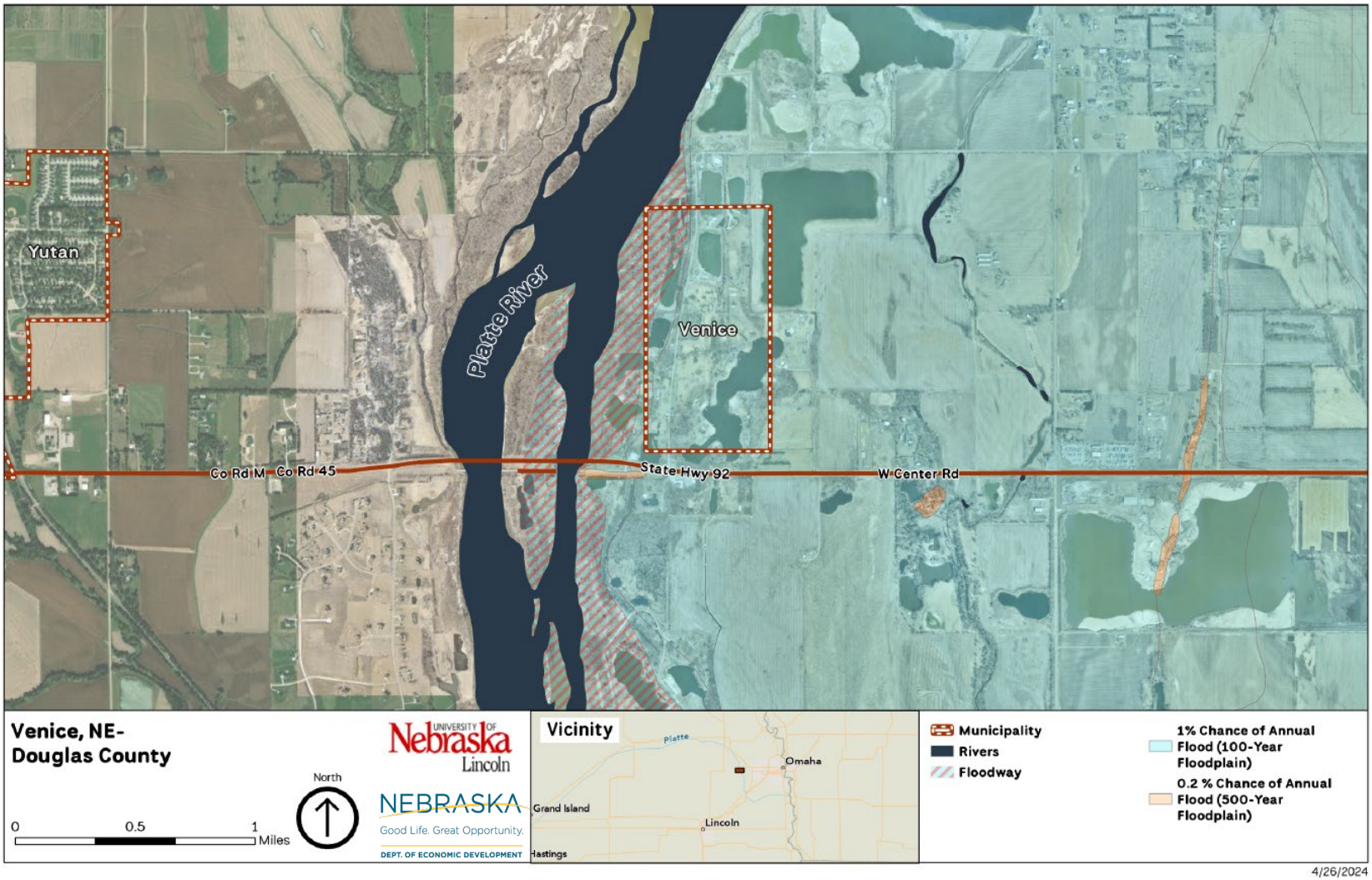
Map 3.18: National Flood Hazard Layer, King Lake CDP, Douglas County, NE



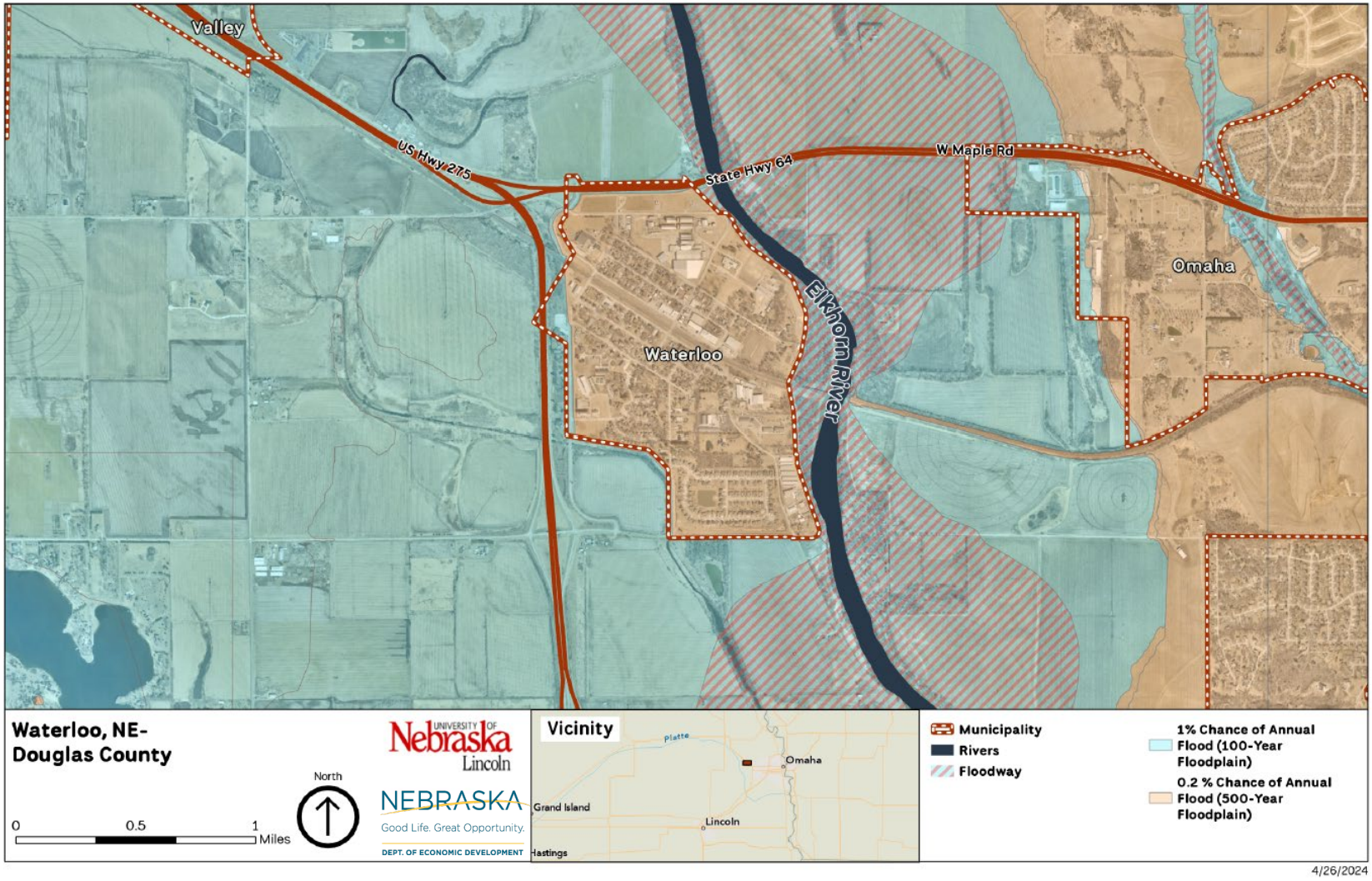
Map 3.19: National Flood Hazard Layer, City of Valley, Douglas County, NE



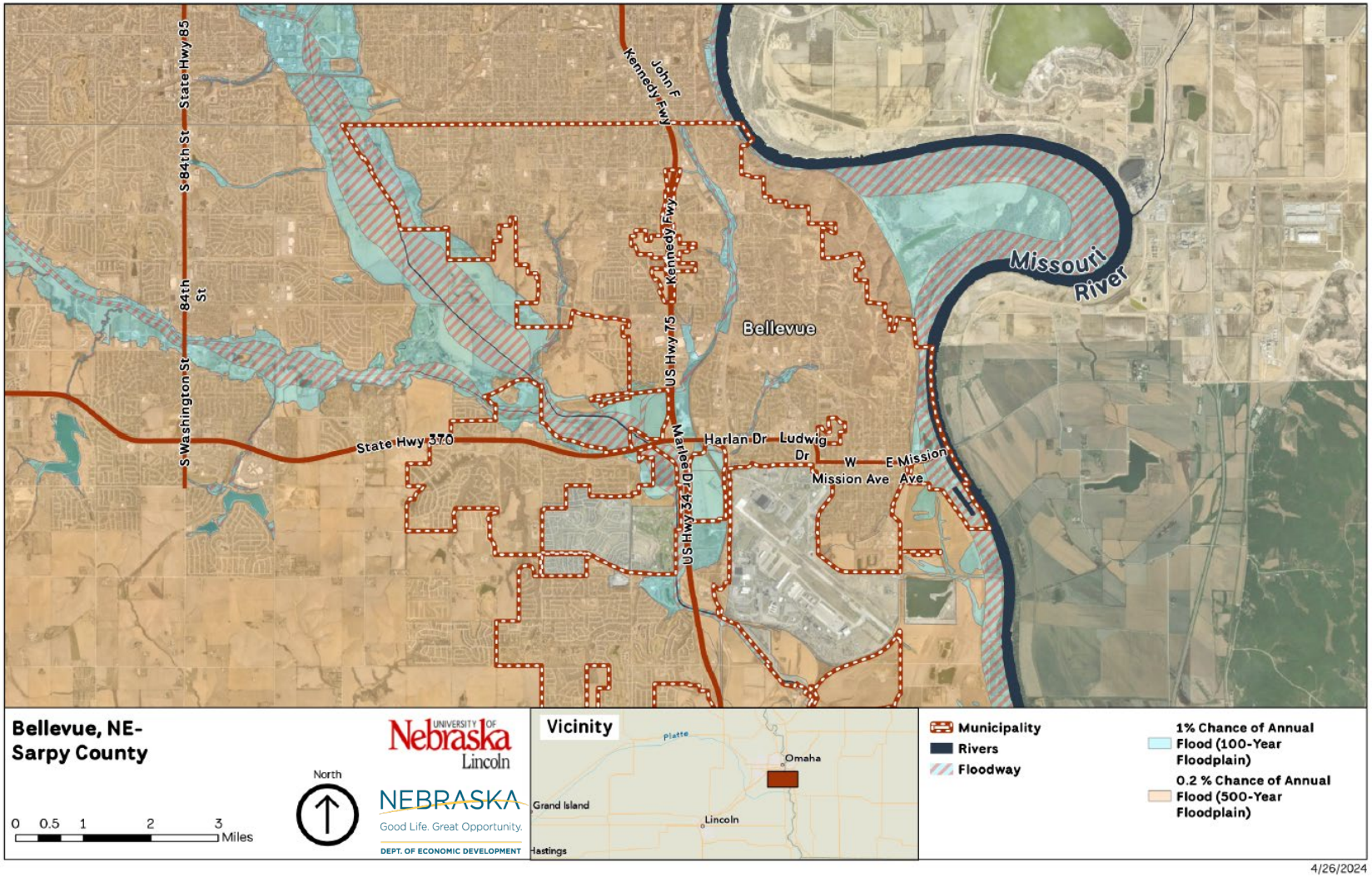
Map 3.20: National Flood Hazard Layer, Venice CDP, Douglas County, NE



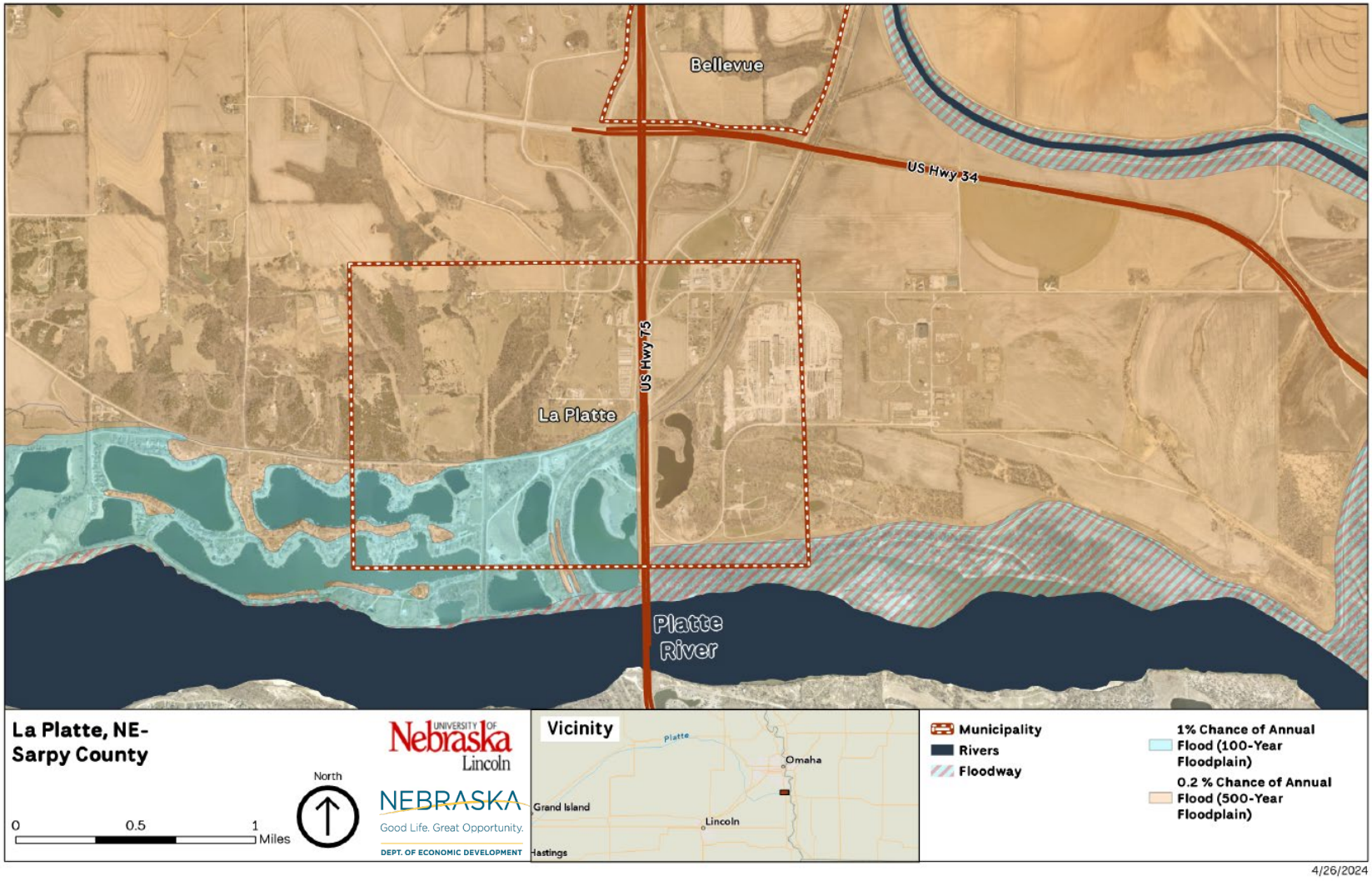
Map 3.21: National Flood Hazard Layer, Village of Waterloo, Douglas County, NE



Map 3.22: National Flood Hazard Layer, City of Bellevue, Sarpy County, NE



Map 3.23: National Flood Hazard Layer, La Platte CDP, Sarpy County, NE



Tax Parcel Data Maps

Tax Parcels provide many different types of data that can be explored. GIS Tax Parcel Data is provided by Nebraska County Assessors and can also be available via Open Data ArcGIS Online Portals as published by local counties and other government entities. According to the Nebraska State Legislature, a tax parcel is defined as “a contiguous tract of land determined by its boundaries, under the same ownership, and in the same tax district and section.” These individual tracts of land provide multiple relevant data types for evaluation and analysis. For this project two different sections within the Tax Parcel data have been evaluated and mapped including the total land value of Tax Parcels that were located within the 2019 Flood Inundation and the age of structures that were affected by the Flood of 2019.

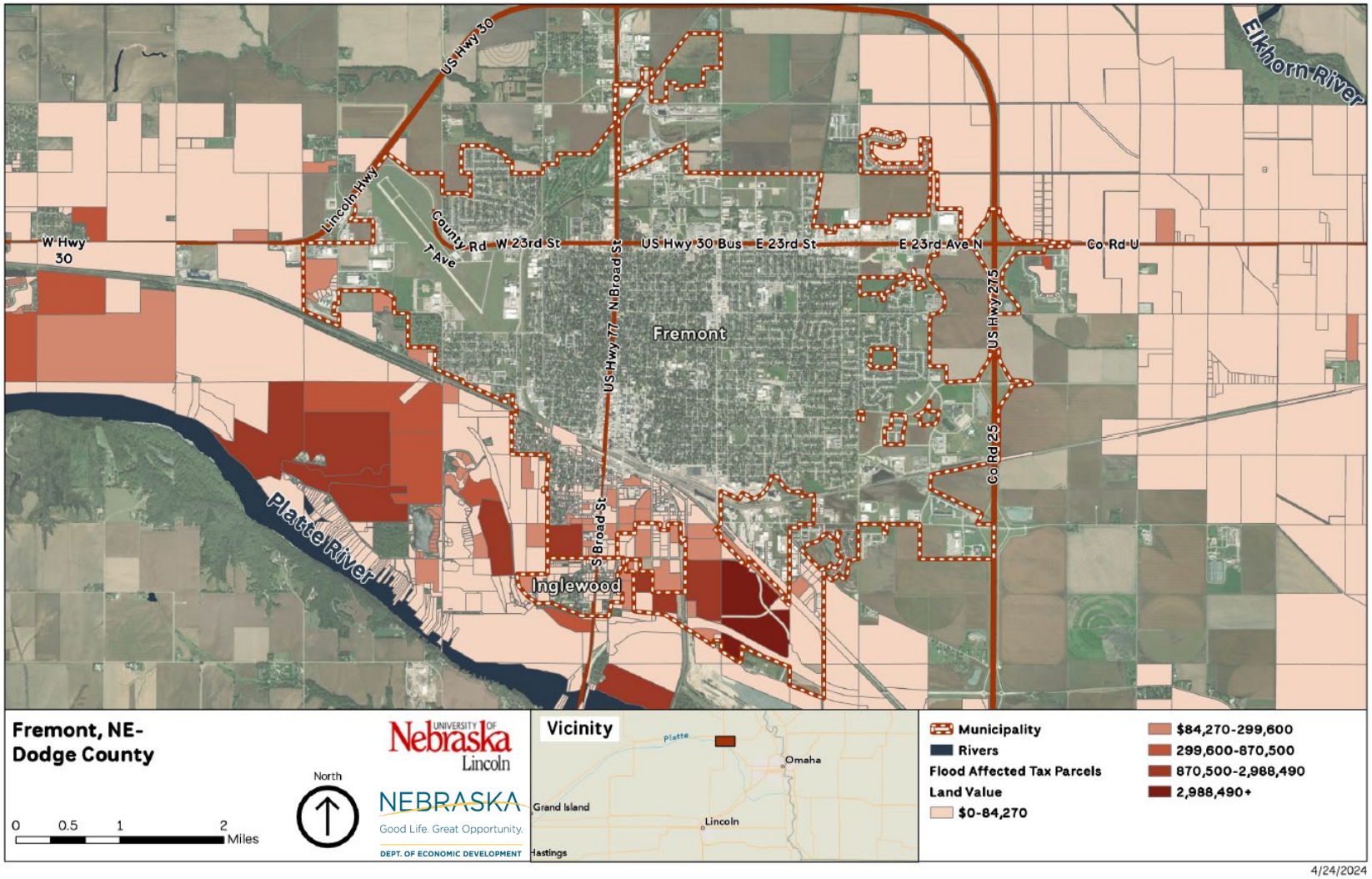
Total Land Value

The total land value maps indicate how much the property is worth based on the assessments from the County. These maps show how much property is located within the floodplain and how it was affected by the 2019 Flood.

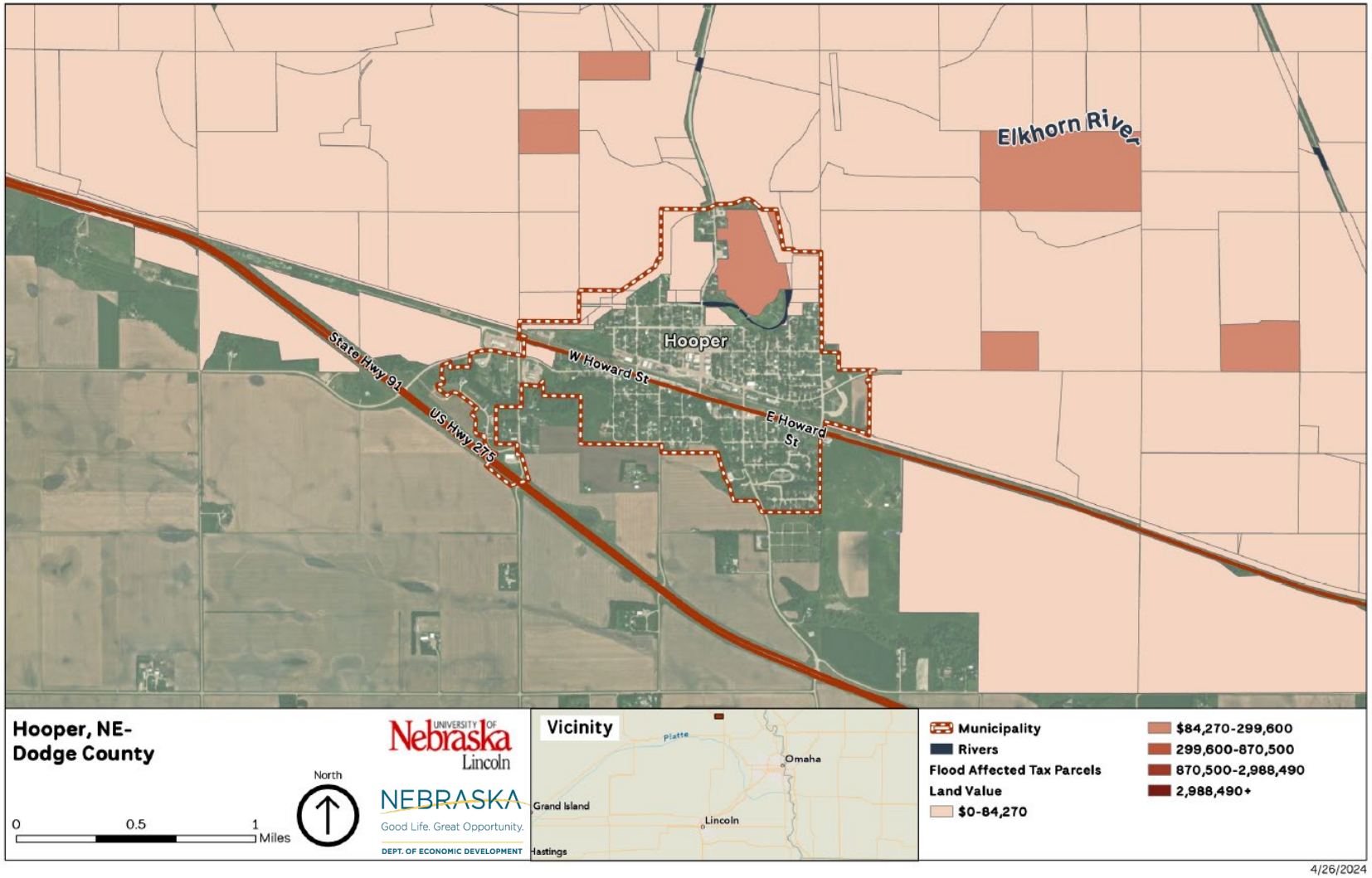
Age of Structures

The age of structures within the land parcels indicates the timeframe that each building was constructed. They are mapped by decade until the 1940s. This information can help to indicate when buildings were constructed and even indicate that despite flood events, new construction within the floodplain is still occurring.

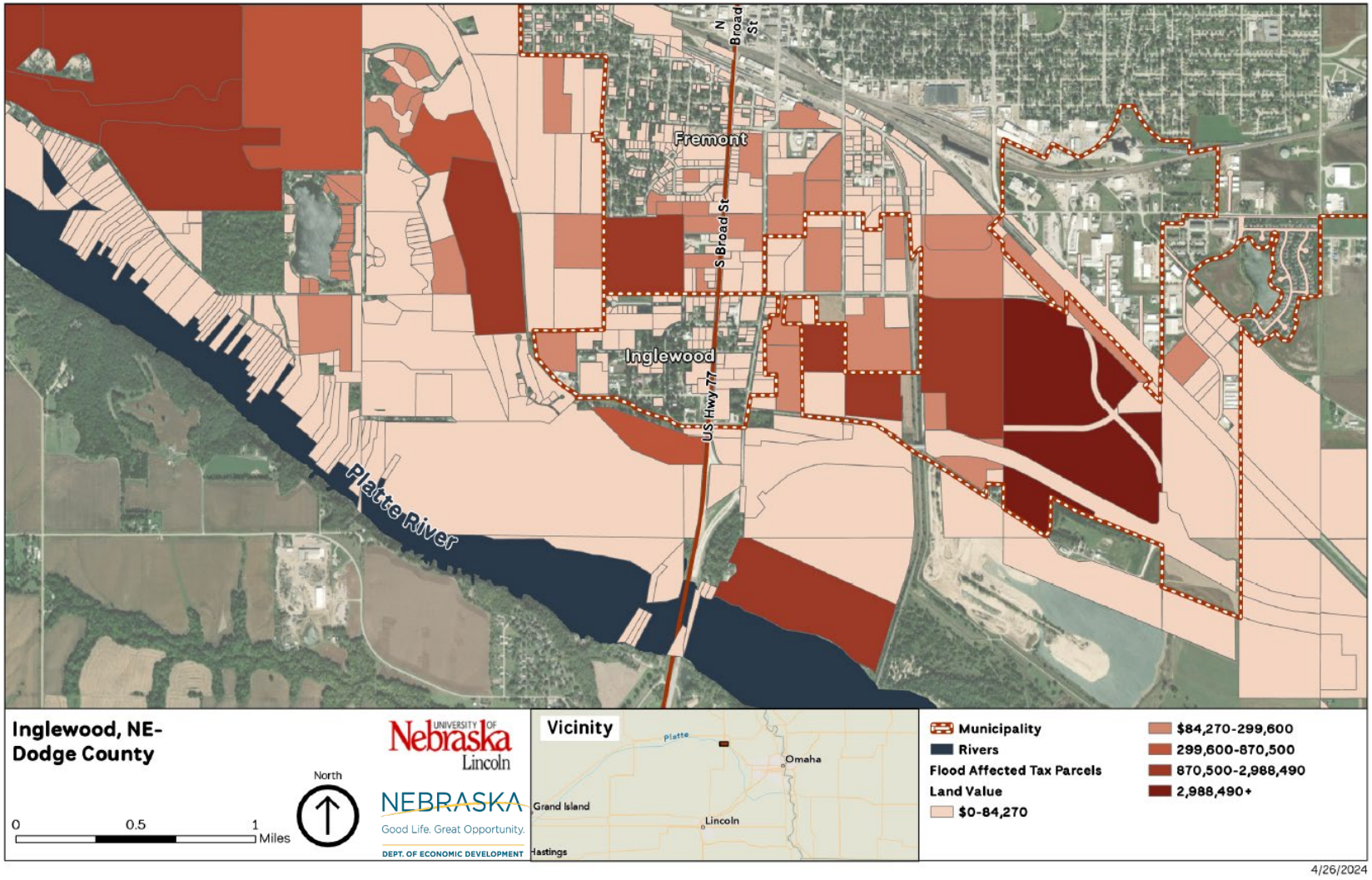
Map 3.24: Total Land Value affected by 2019 Flood by Tax Parcels, City of Fremont, Dodge County, NE



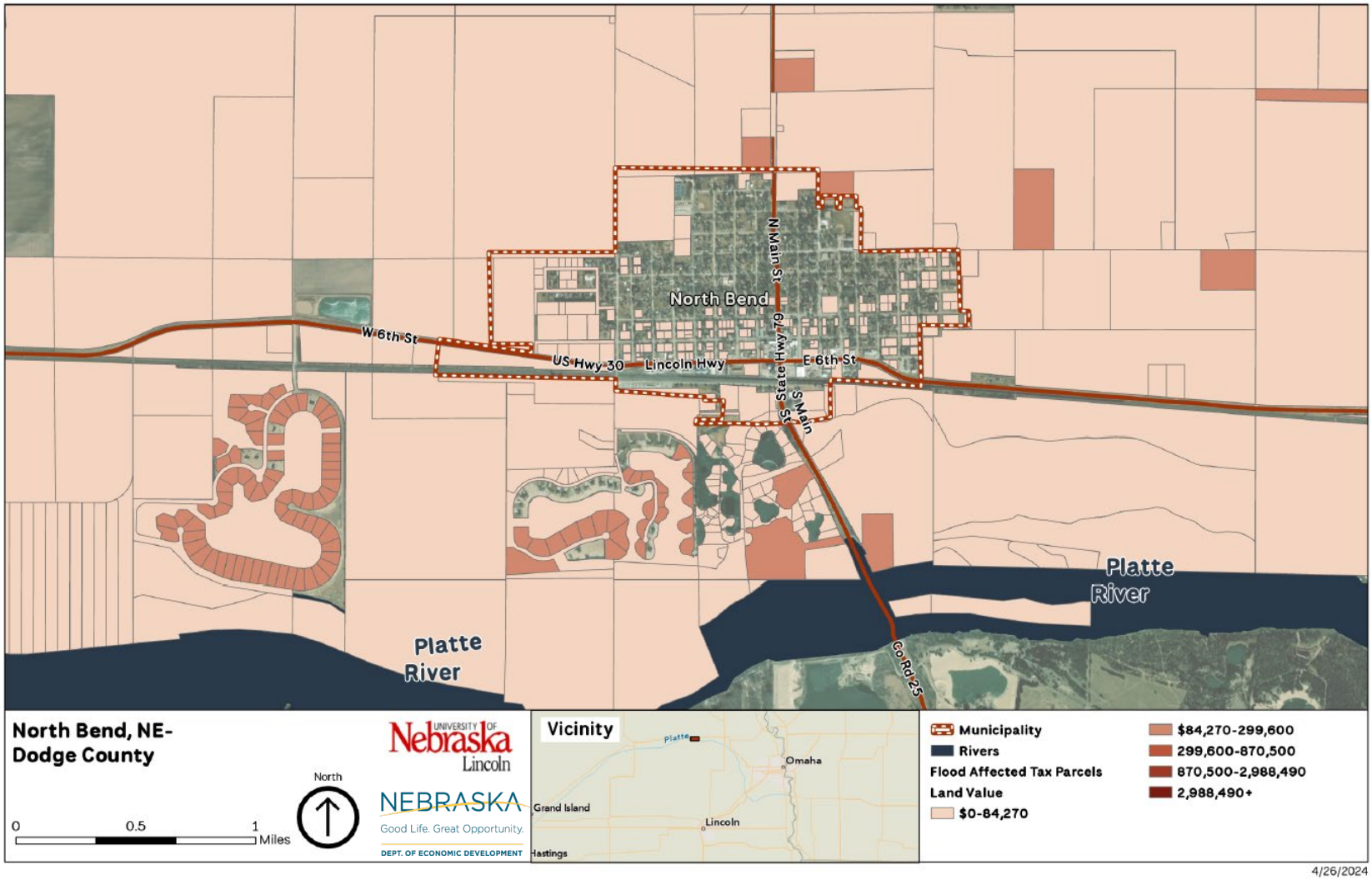
Map 3.25: Total Land Value affected by 2019 Flood by Tax Parcels, City of Hooper, Dodge County, NE



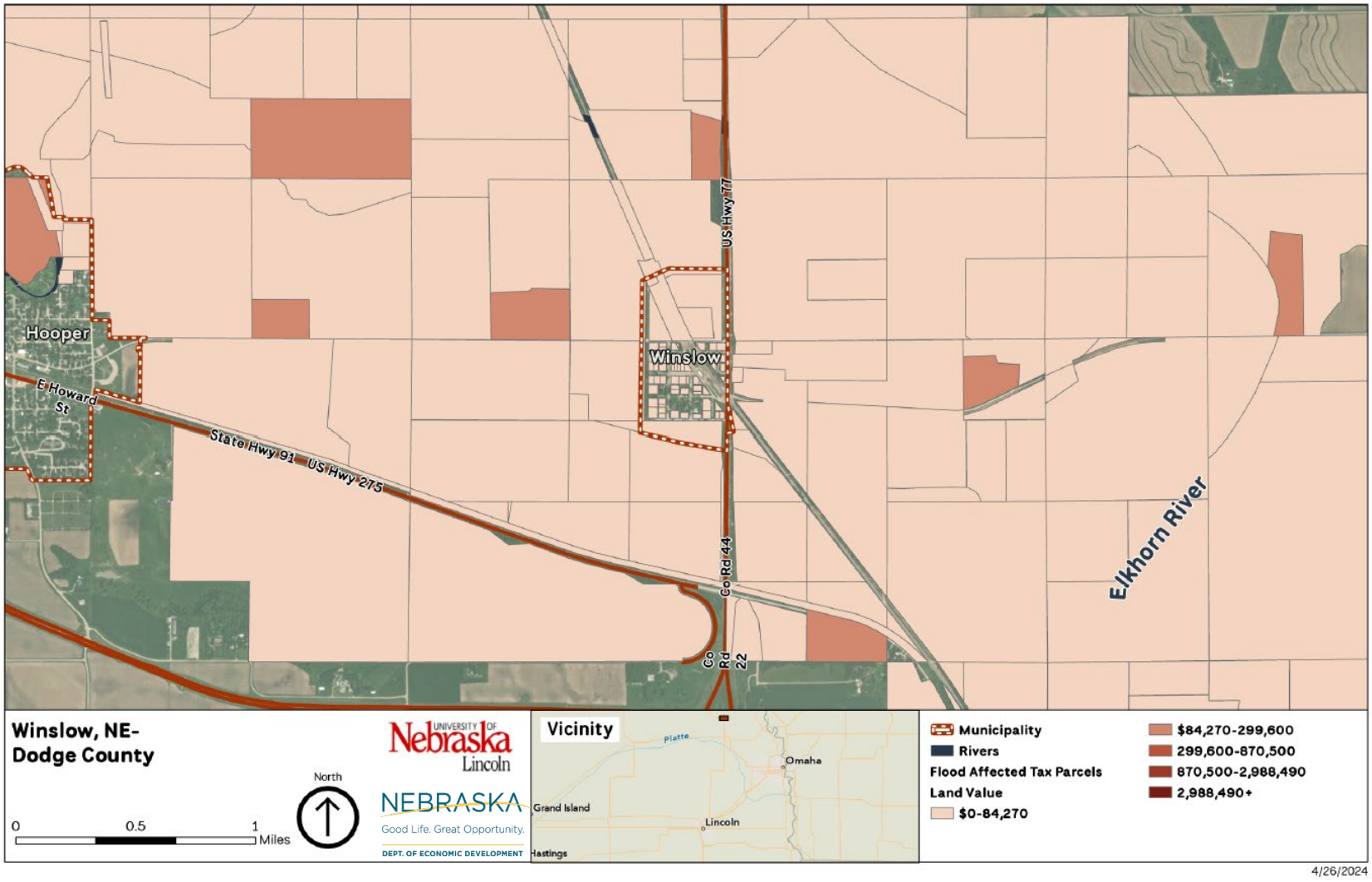
Map 3.26: Total Land Value affected by 2019 Flood by Tax Parcels, Village of Inglewood, Dodge County, NE



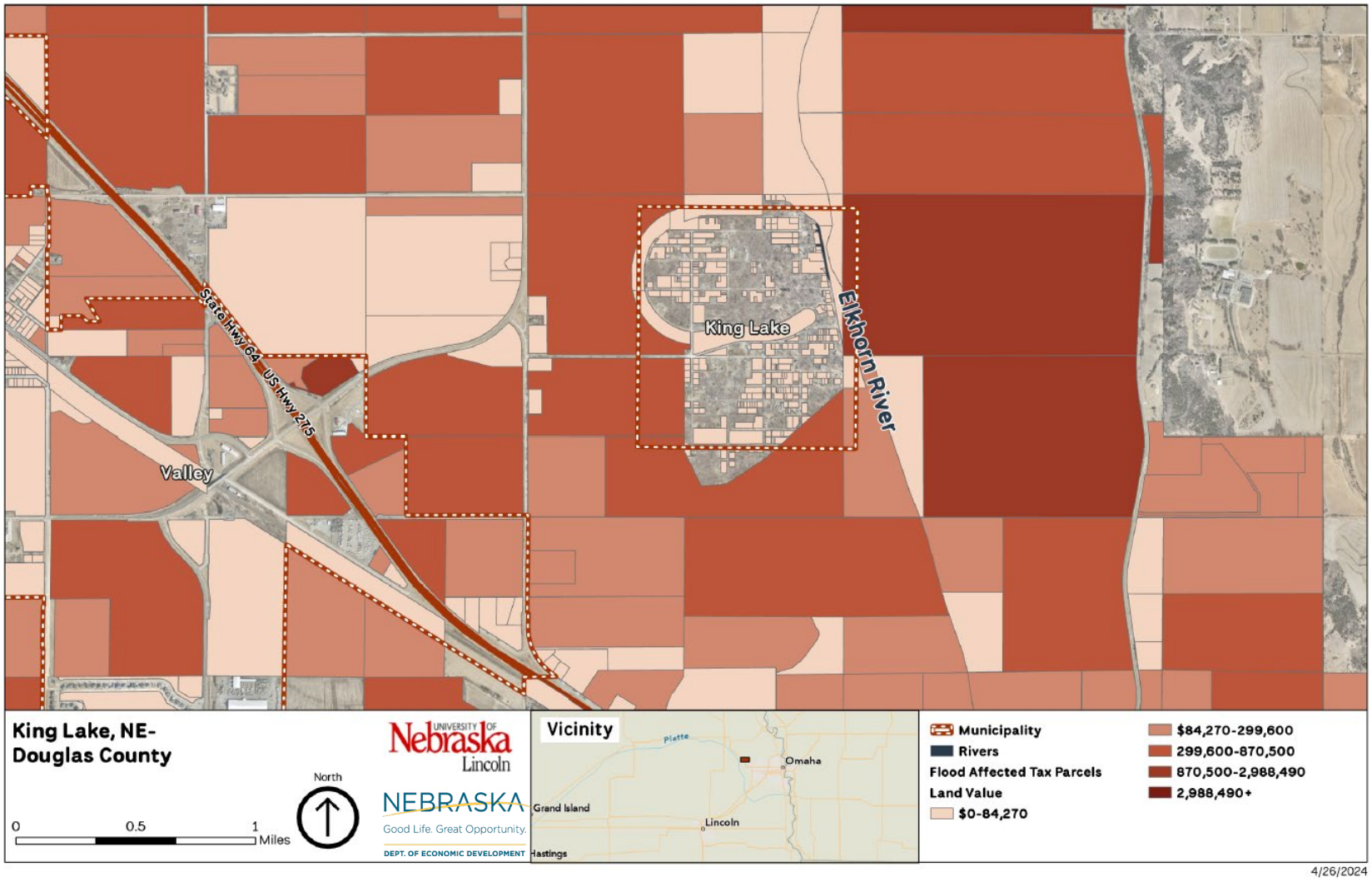
Map 3.27: Total Land Value affected by 2019 Flood by Tax Parcels, City of North Bend, Dodge County, NE



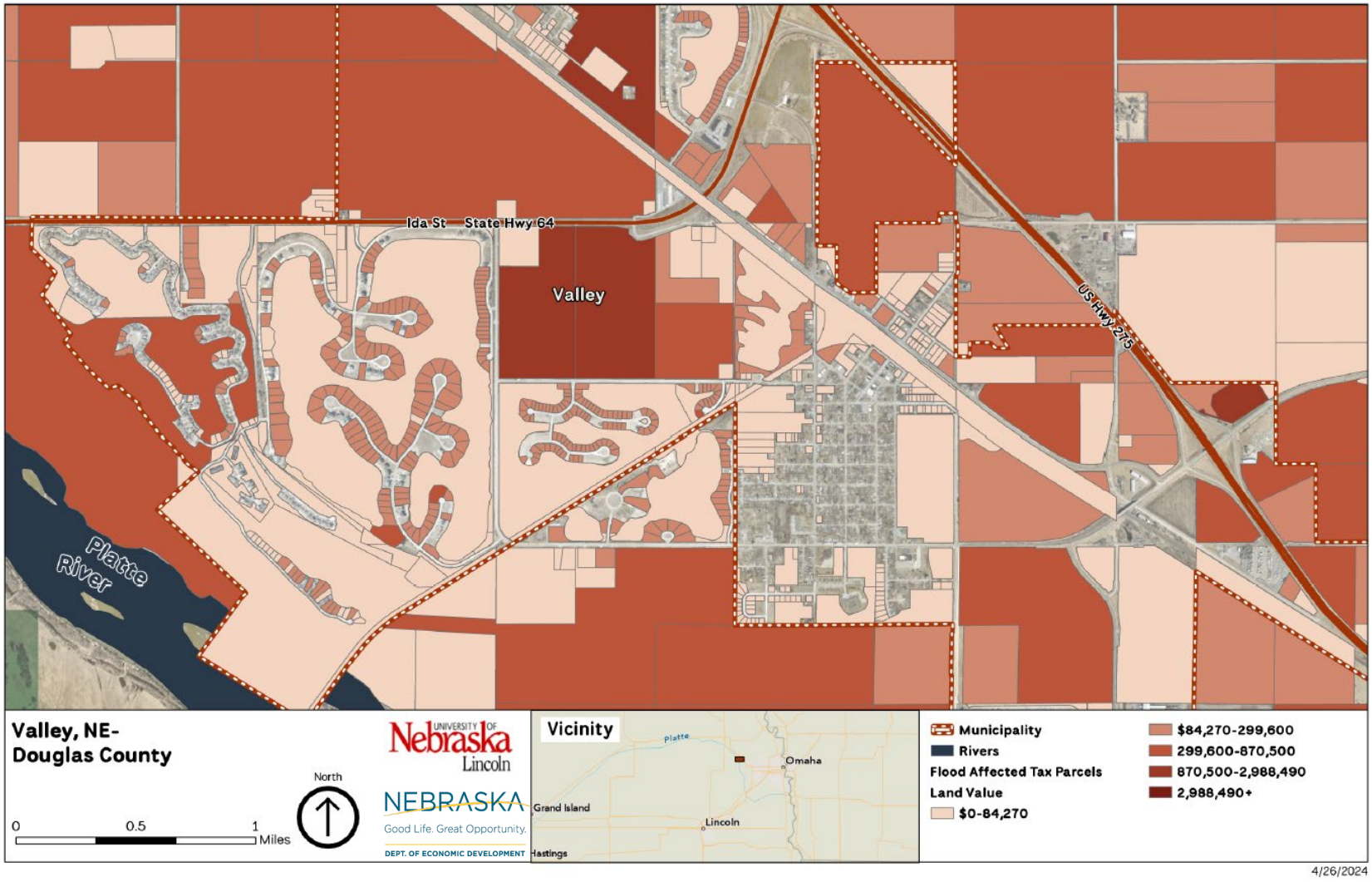
Map 3.28: Total Land Value affected by 2019 Flood by Tax Parcels, Village of Winslow, Dodge County, NE



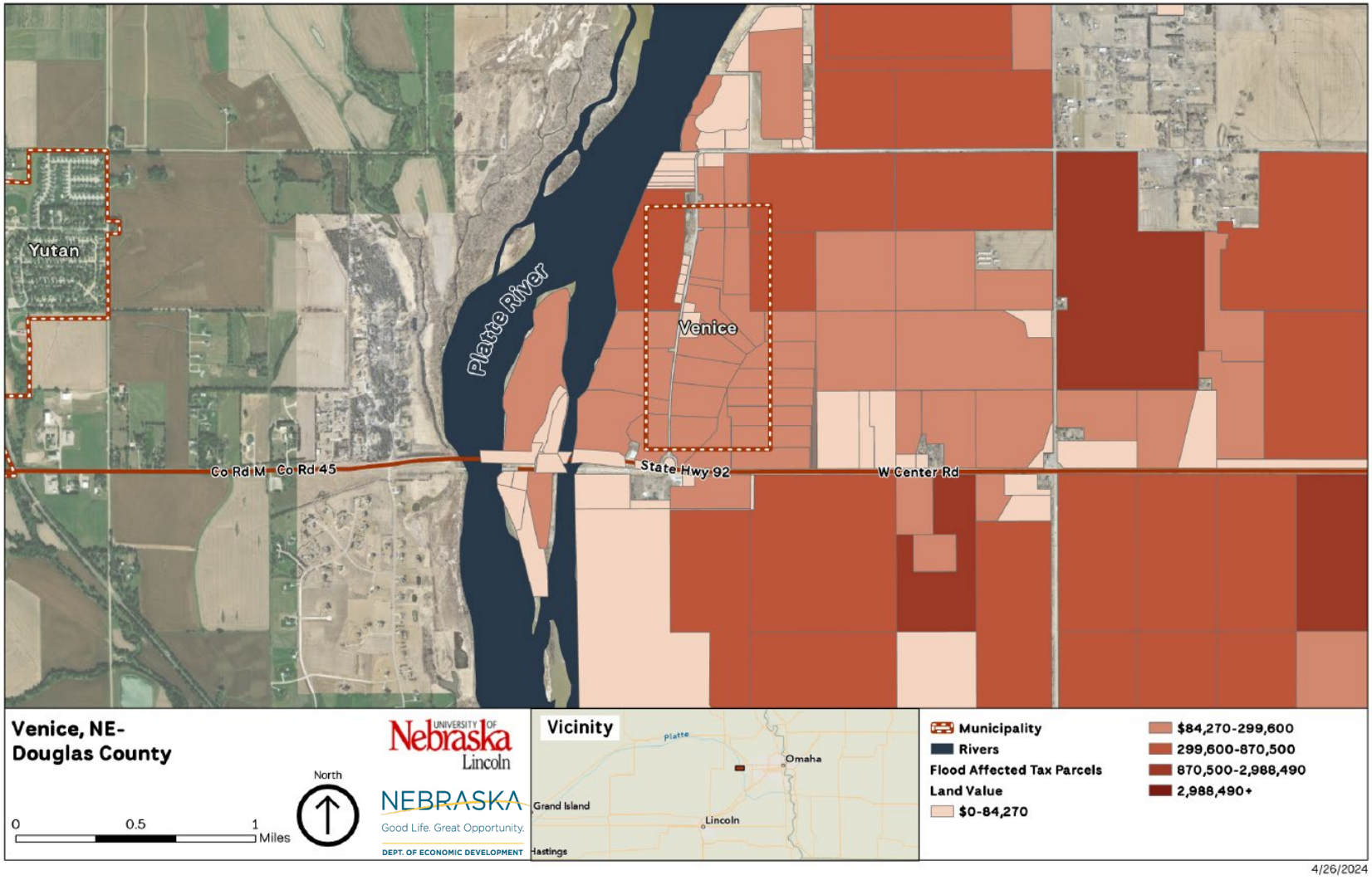
Map 3.29: Total Land Value affected by 2019 Flood by Tax Parcels, King Lake CDP, Douglas County, NE



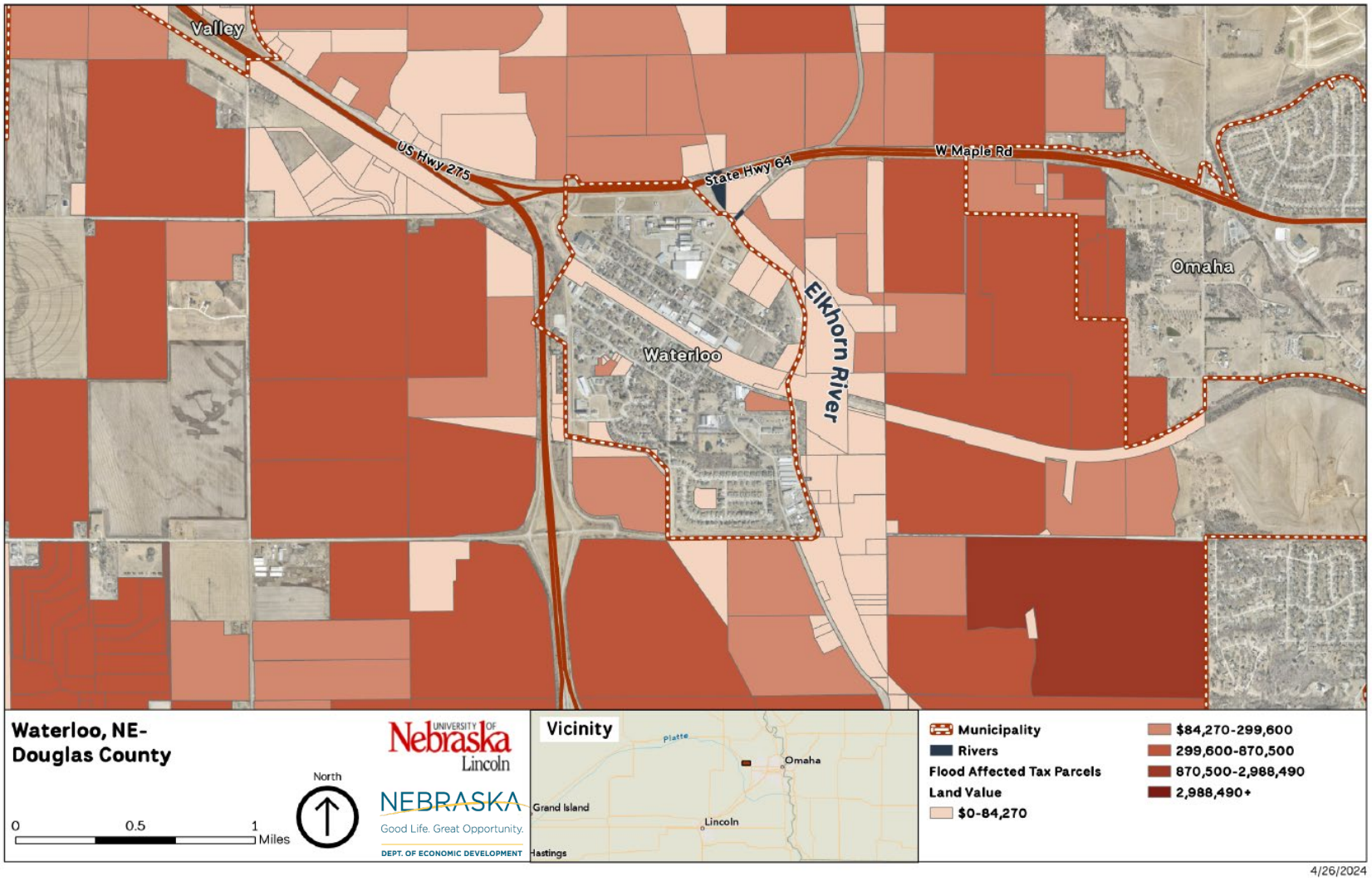
Map 3.30: Total Land Value affected by 2019 Flood by Tax Parcels, City of Valley, Douglas County, NE



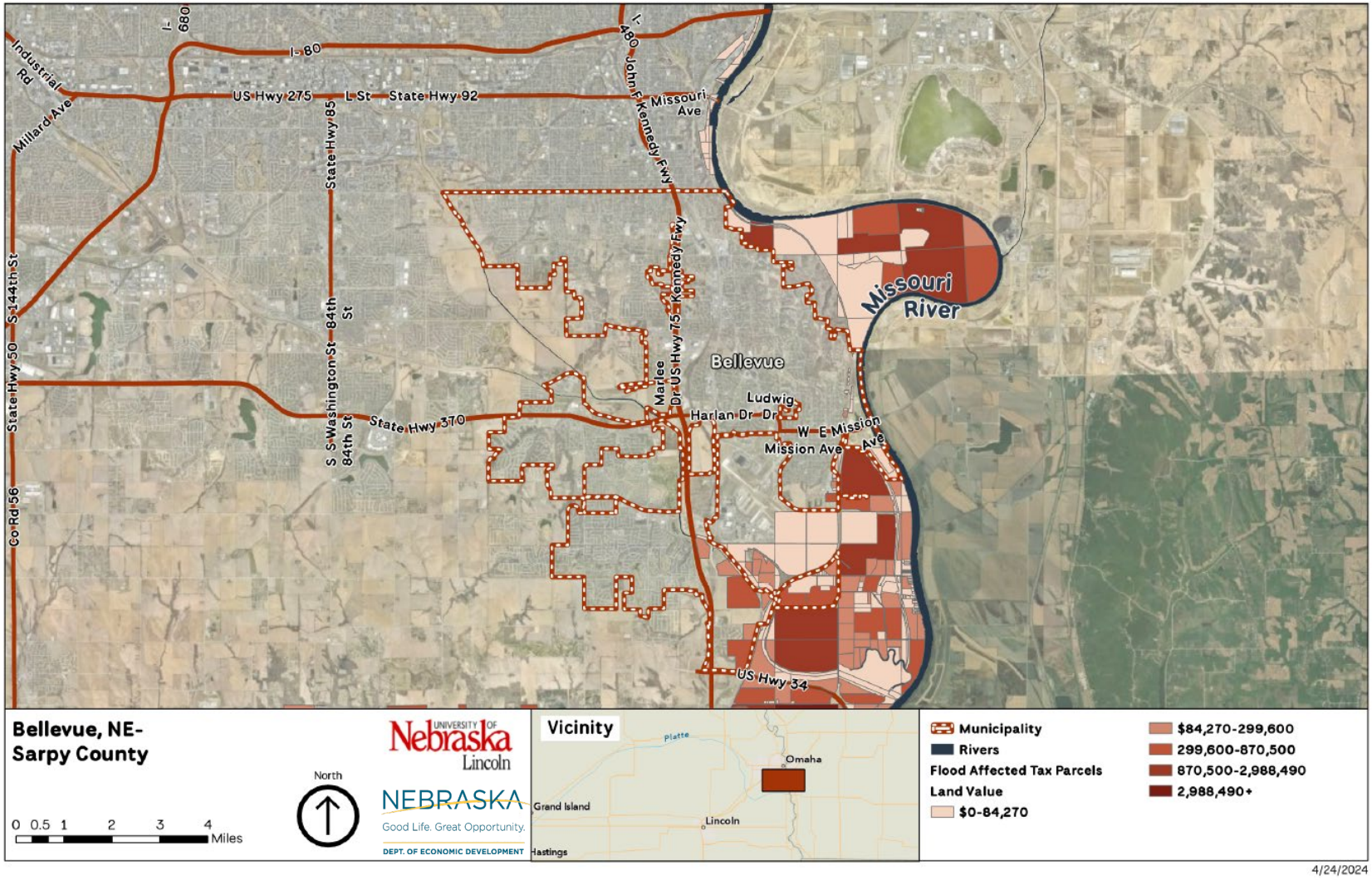
Map 3.31: Total Land Value affected by 2019 Flood by Tax Parcels, Venice CDP, Douglas County, NE



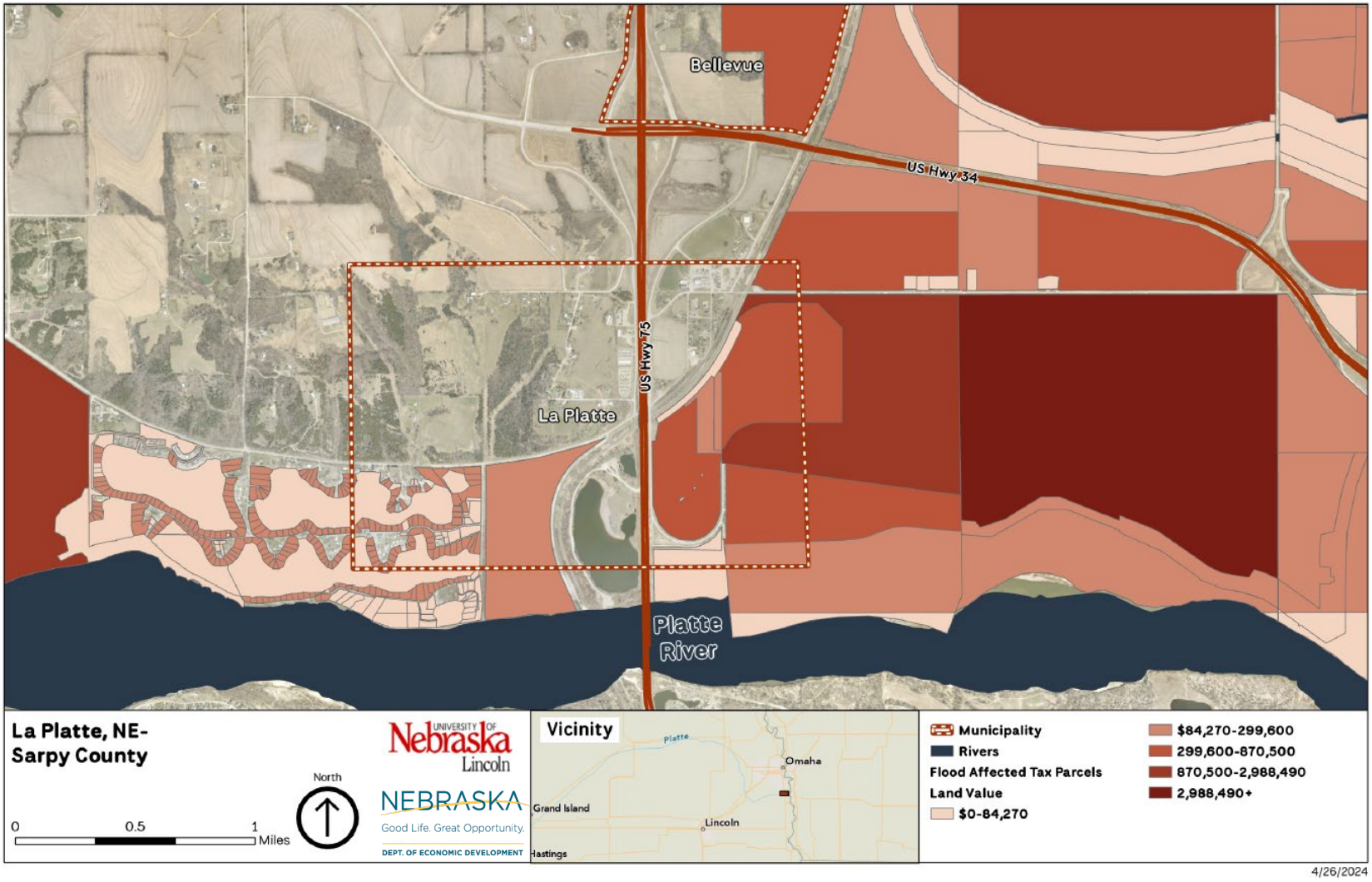
Map 3.32: Total Land Value affected by 2019 Flood by Tax Parcels, Village of Waterloo, Douglas County, NE



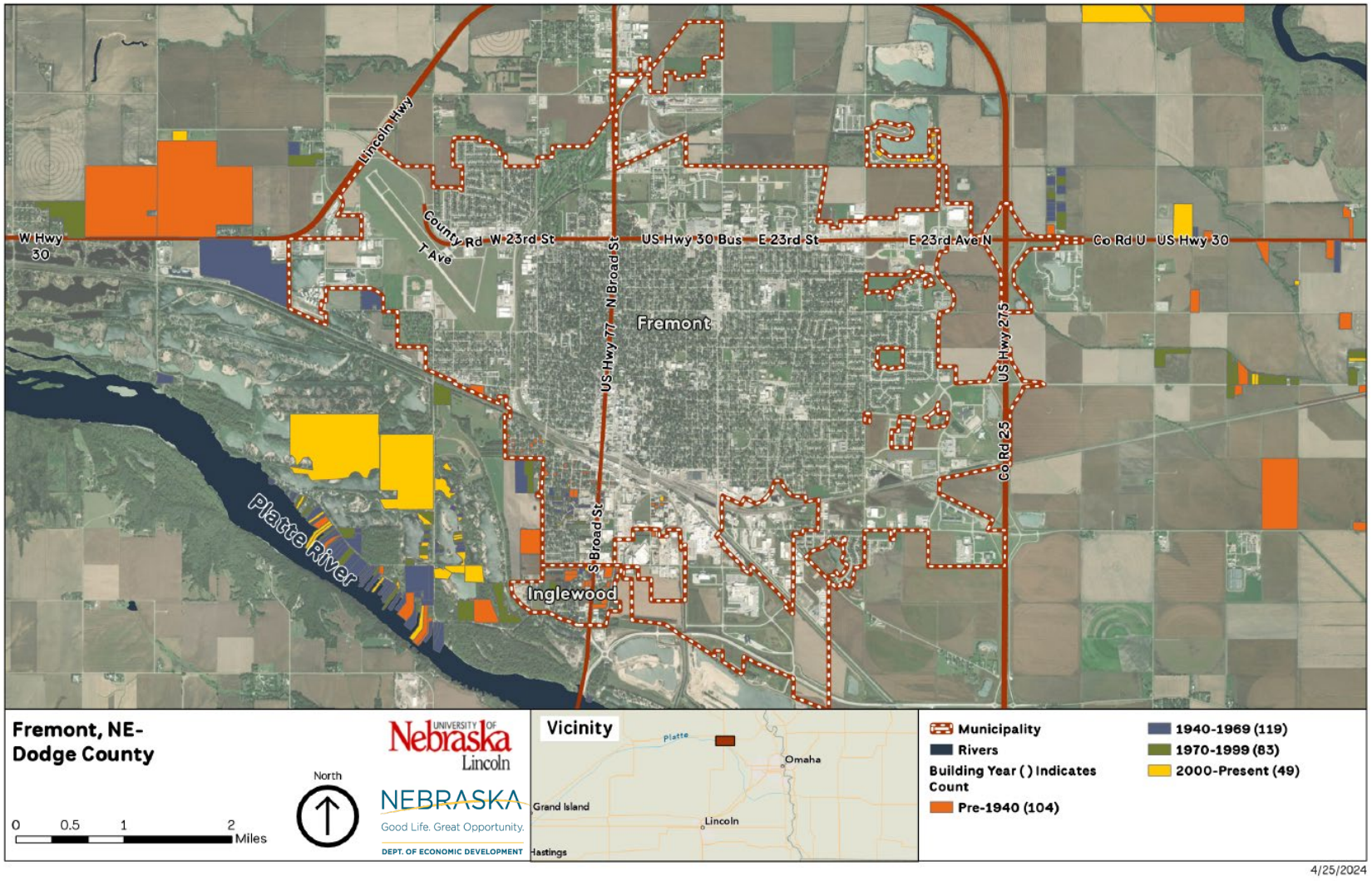
Map 3.33: Total Land Value affected by 2019 Flood by Tax Parcels, City of Bellevue, Sarpy County, NE



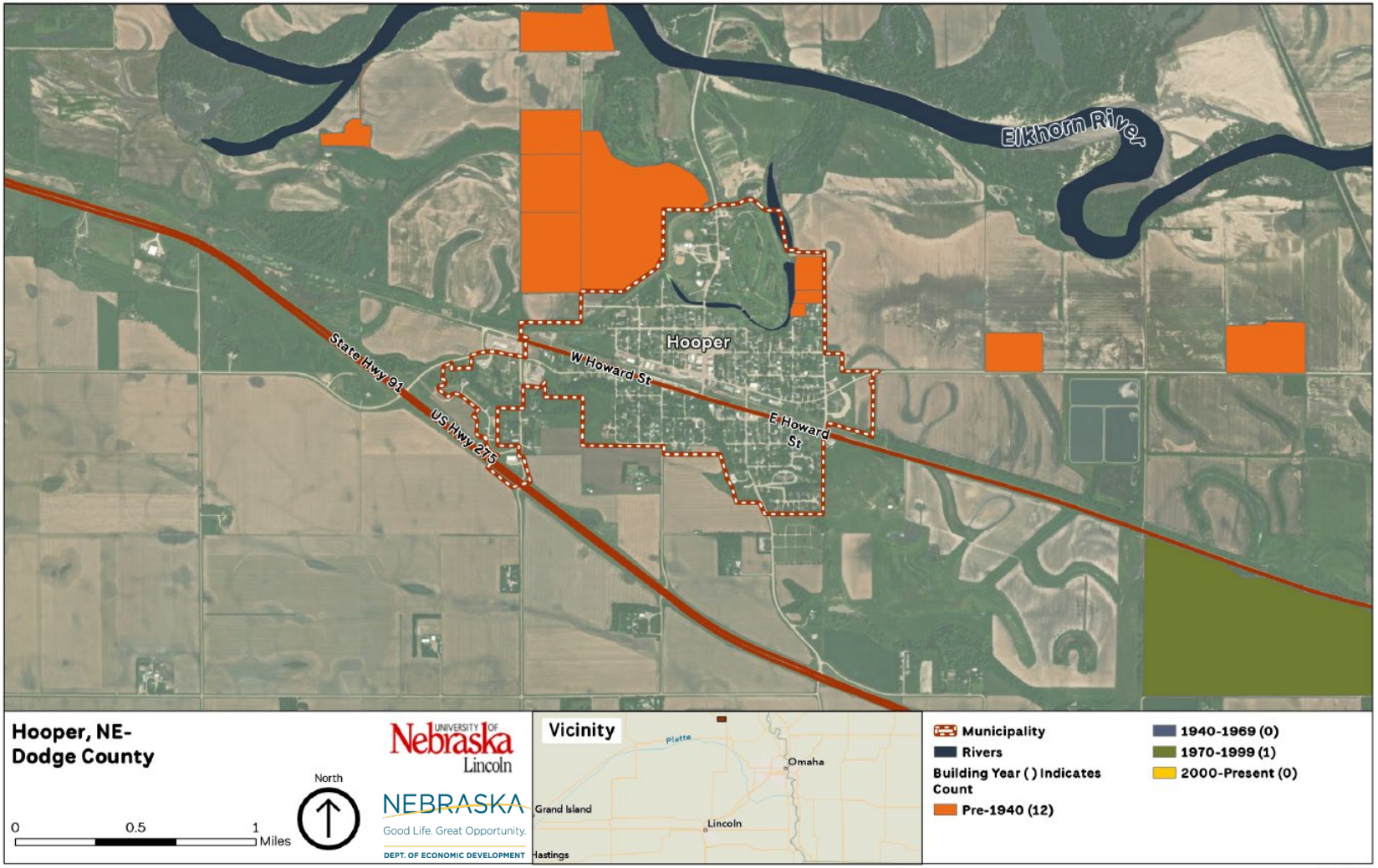
Map 3.34: Total Land Value affected by 2019 Flood by Tax Parcels, La Platte CDP, Sarpy County, NE



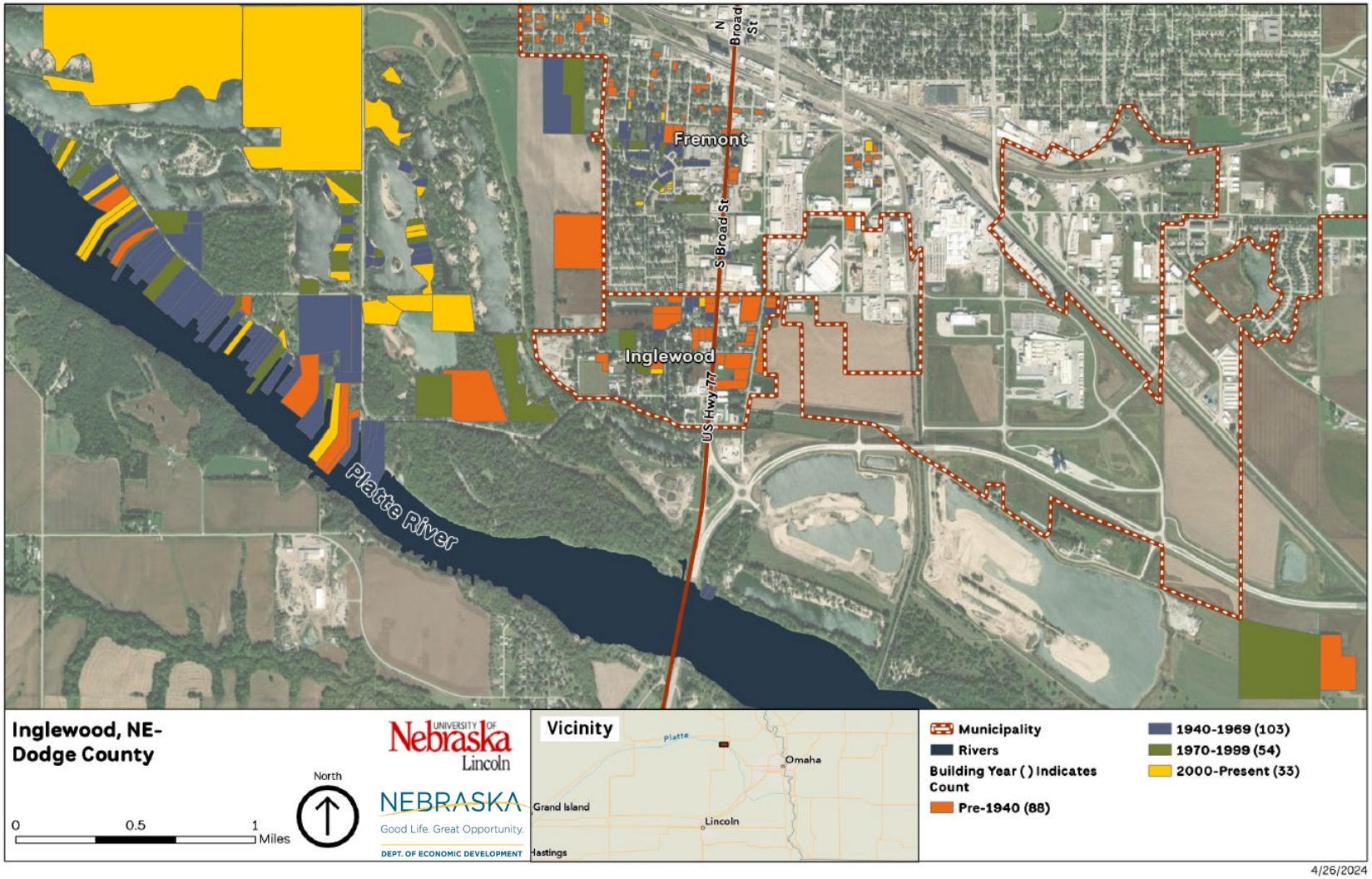
Map 3.35: Age of Structures Impacted by 2019 Flood by Tax Parcels, City of Fremont, Dodge County, NE



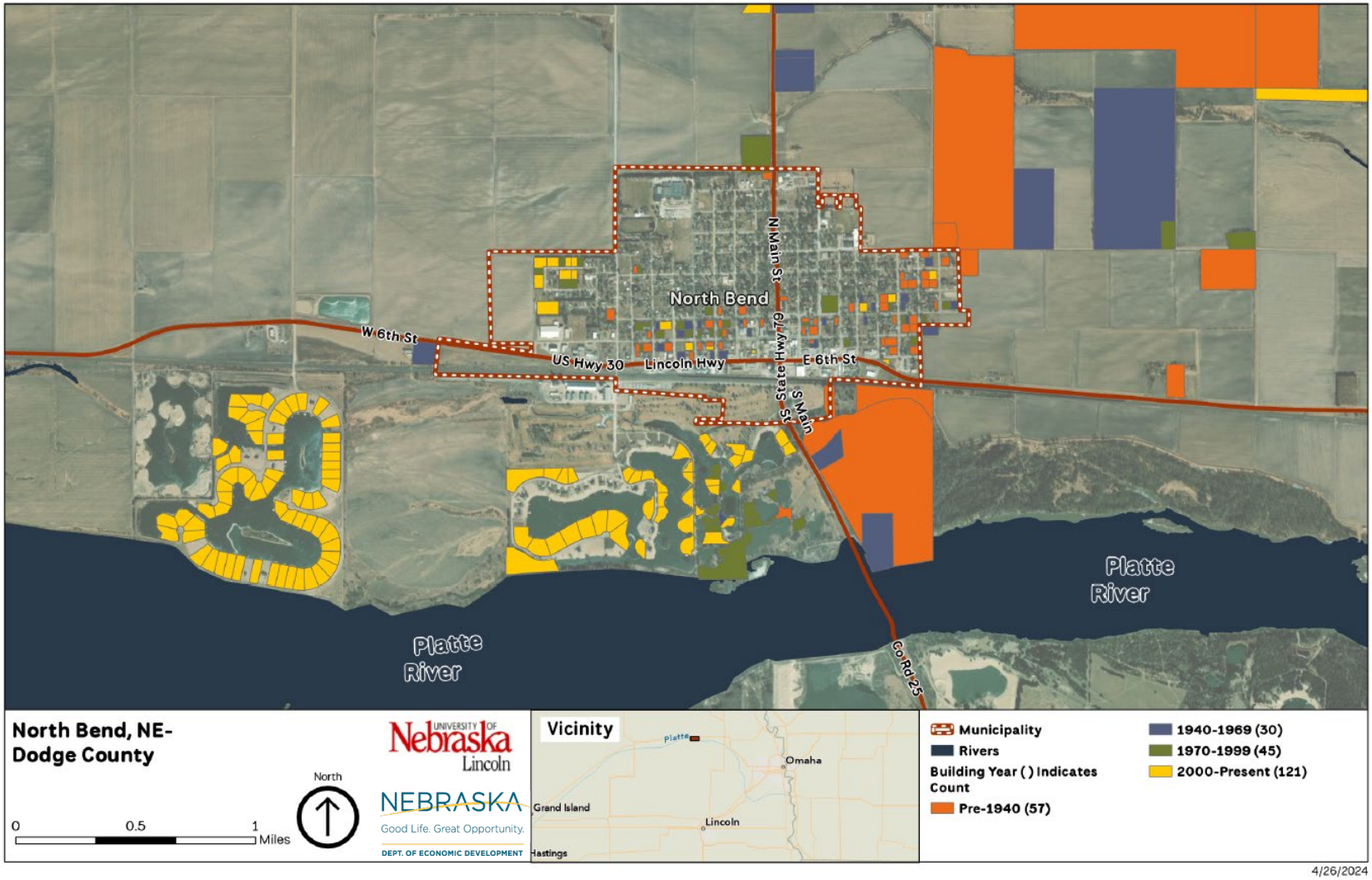
Map 3.36: Age of Structures Impacted by 2019 Flood by Tax Parcels, City of Hooper, Dodge County, NE



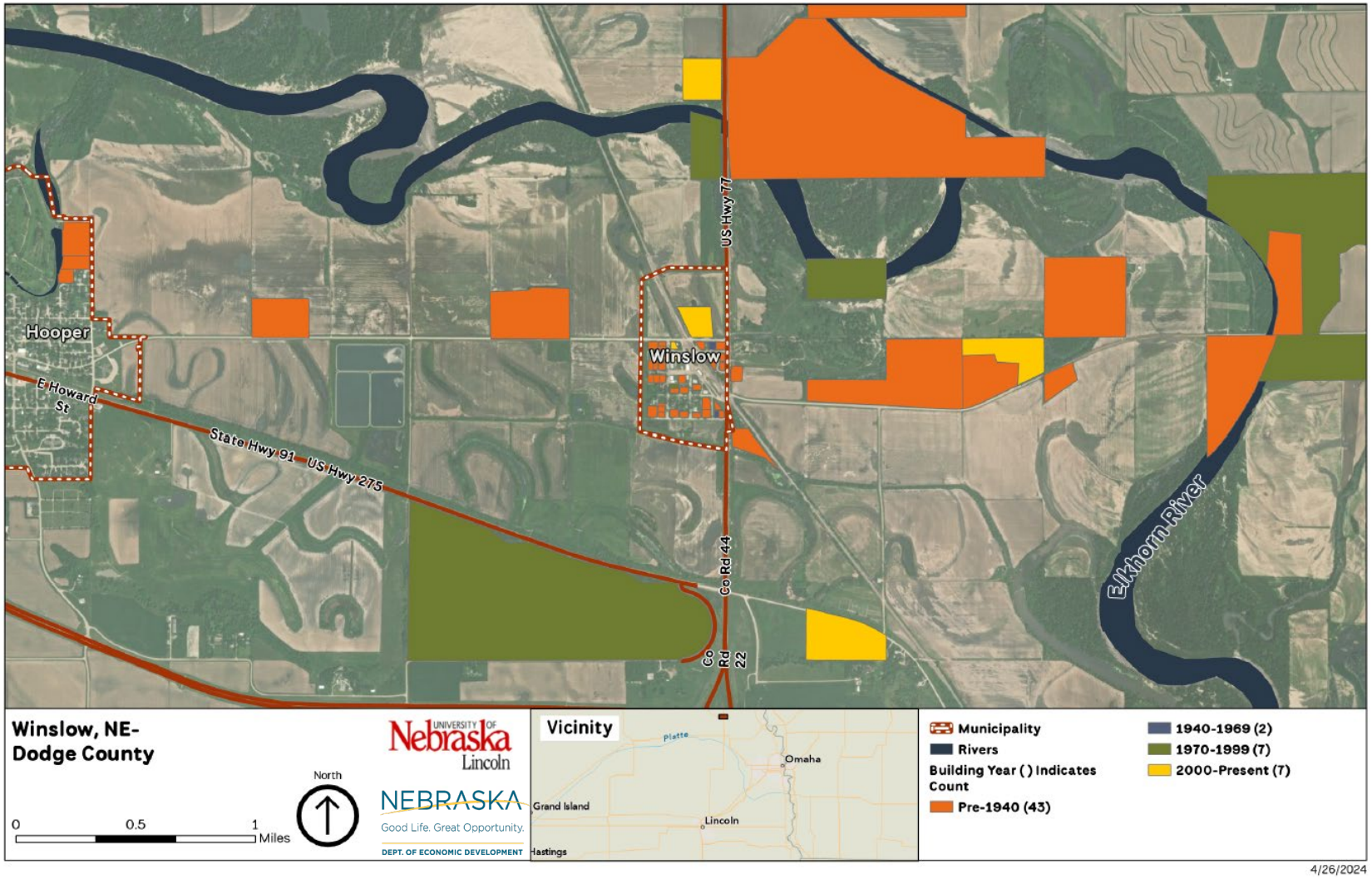
Map 3.37: Age of Structures Impacted by 2019 Flood by Tax Parcels, Village of Inglewood, Dodge County, NE



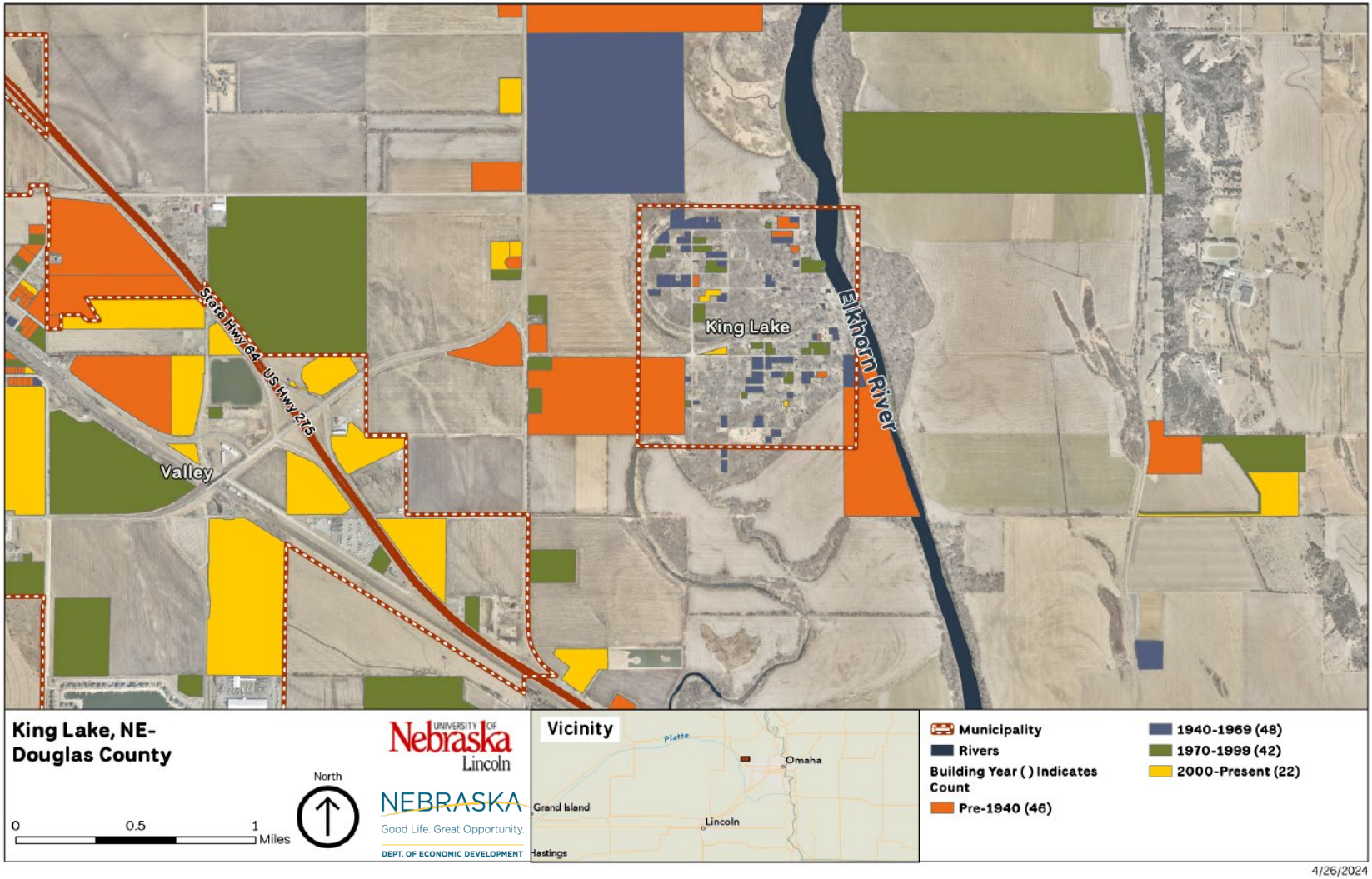
Map 3.38: Age of Structures Impacted by 2019 Flood by Tax Parcels, City of North Bend, Dodge County, NE



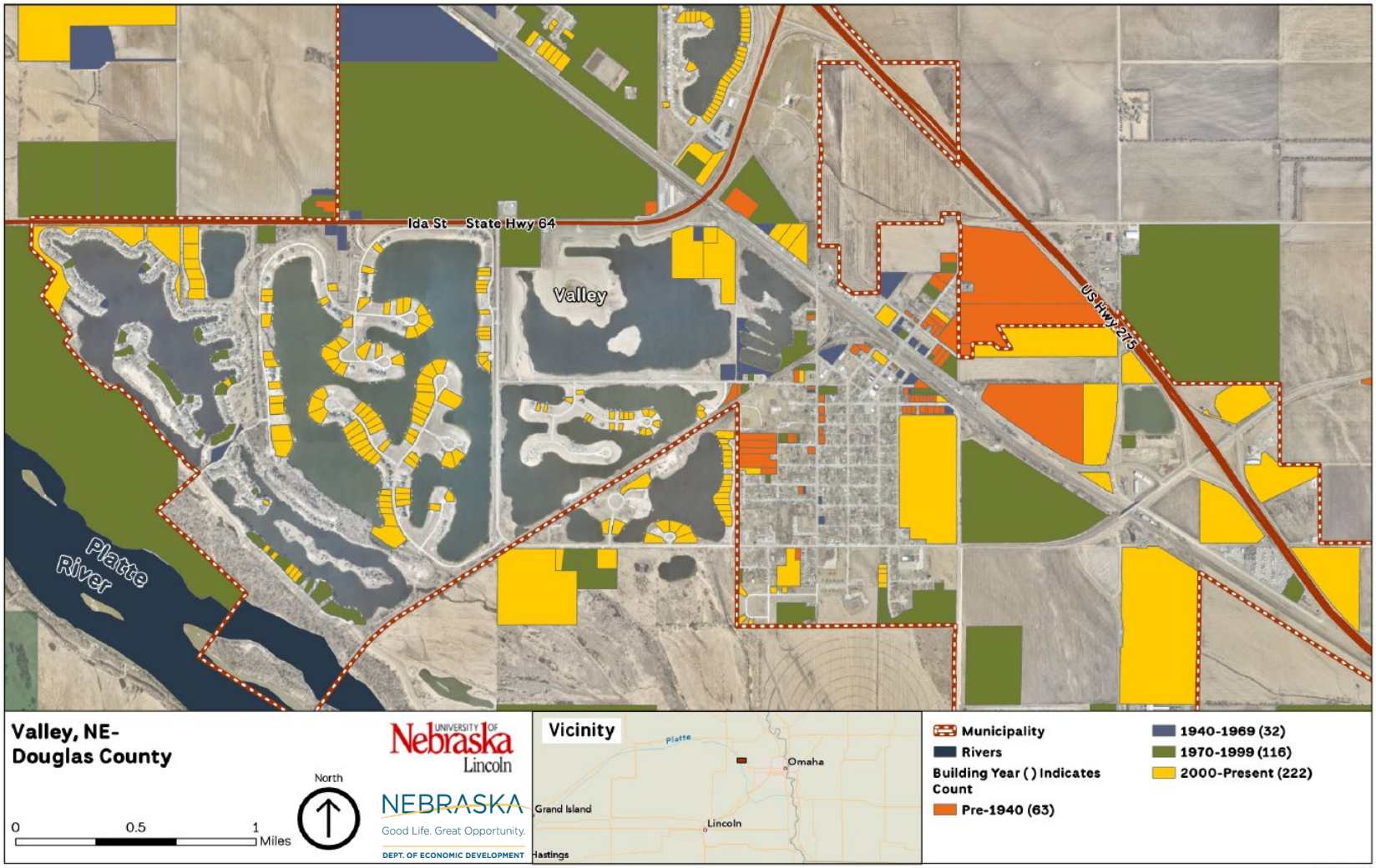
Map 3.39: Age of Structures Impacted by 2019 Flood by Tax Parcels, Village of Winslow, Dodge County, NE



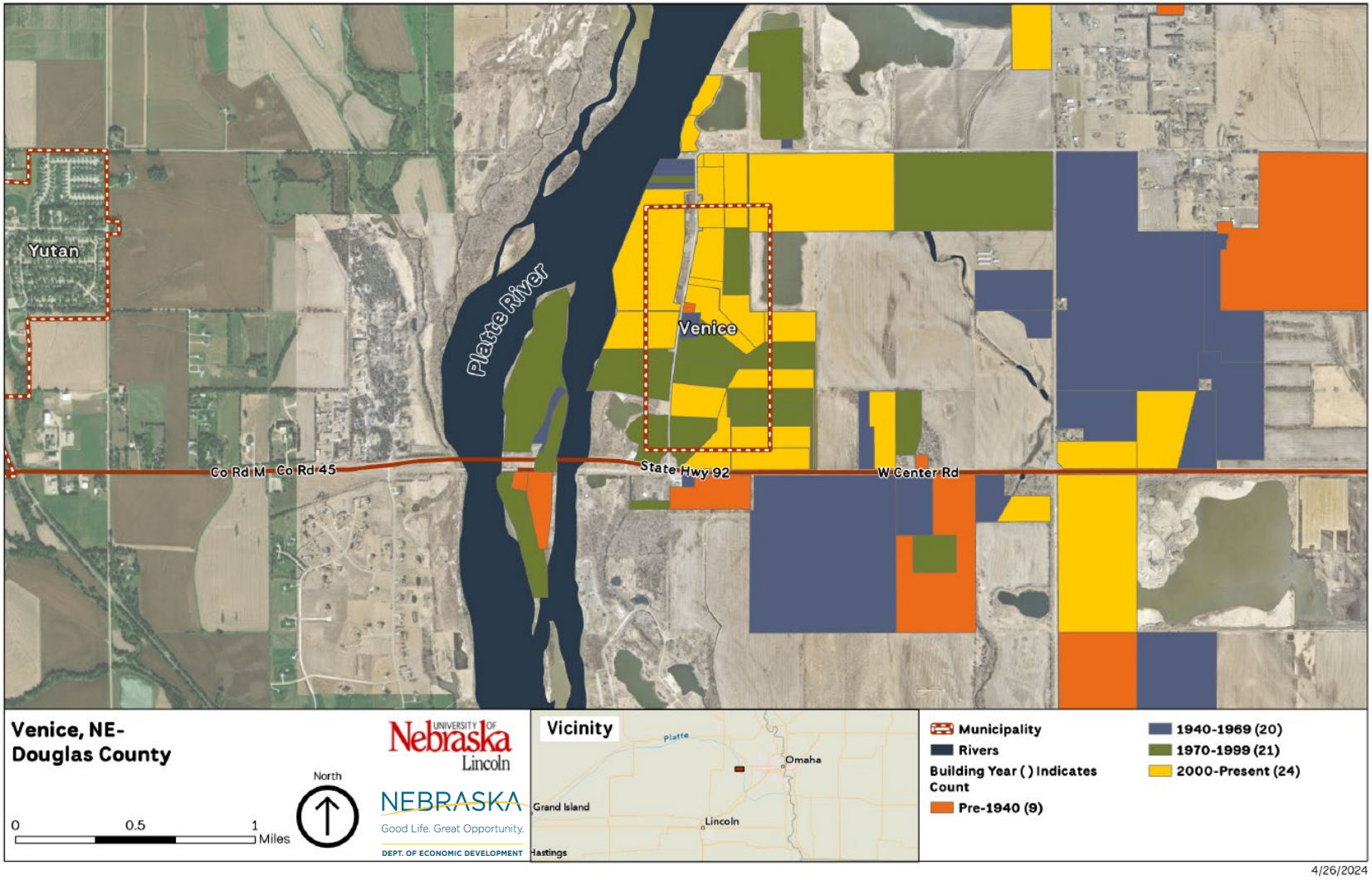
Map 3.40: Age of Structures Impacted by 2019 Flood by Tax Parcels, King Lake CDP, Douglas County, NE



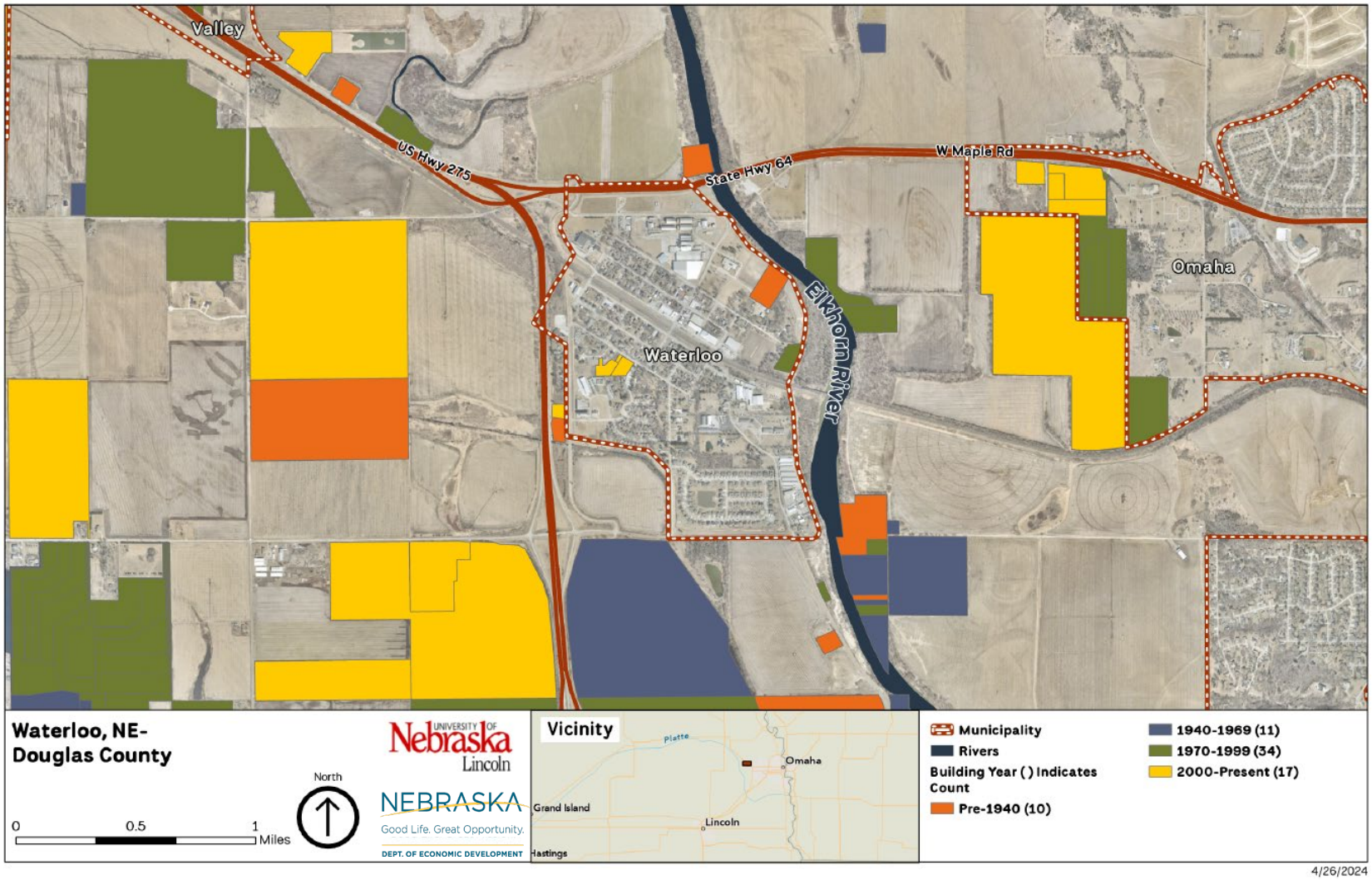
Map 3.41: Age of Structures Impacted by 2019 Flood by Tax Parcels, City of Valley, Douglas County, NE



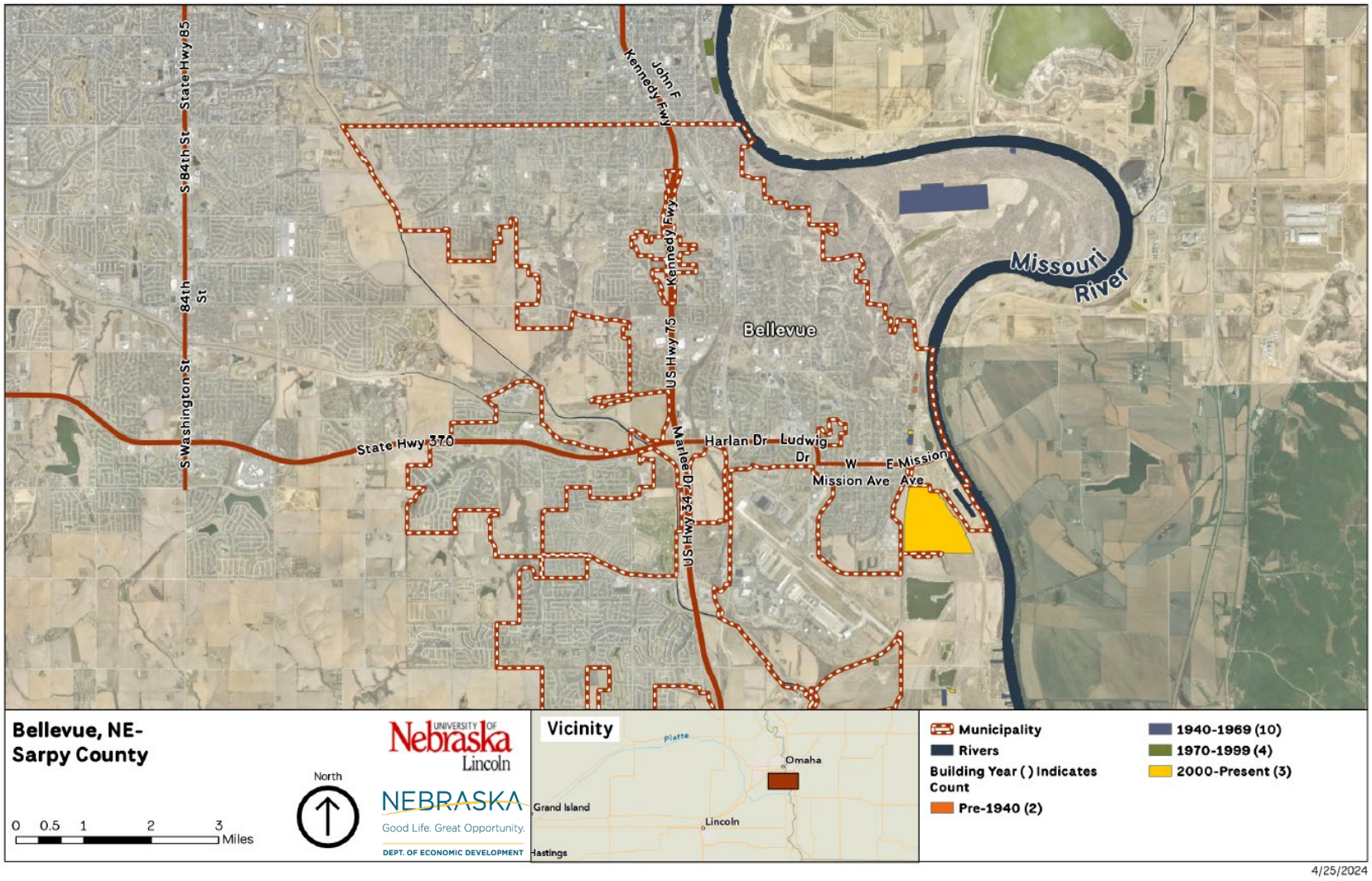
Map 3.42: Age of Structures Impacted by 2019 Flood by Tax Parcels, Venice CDP, Douglas County, NE



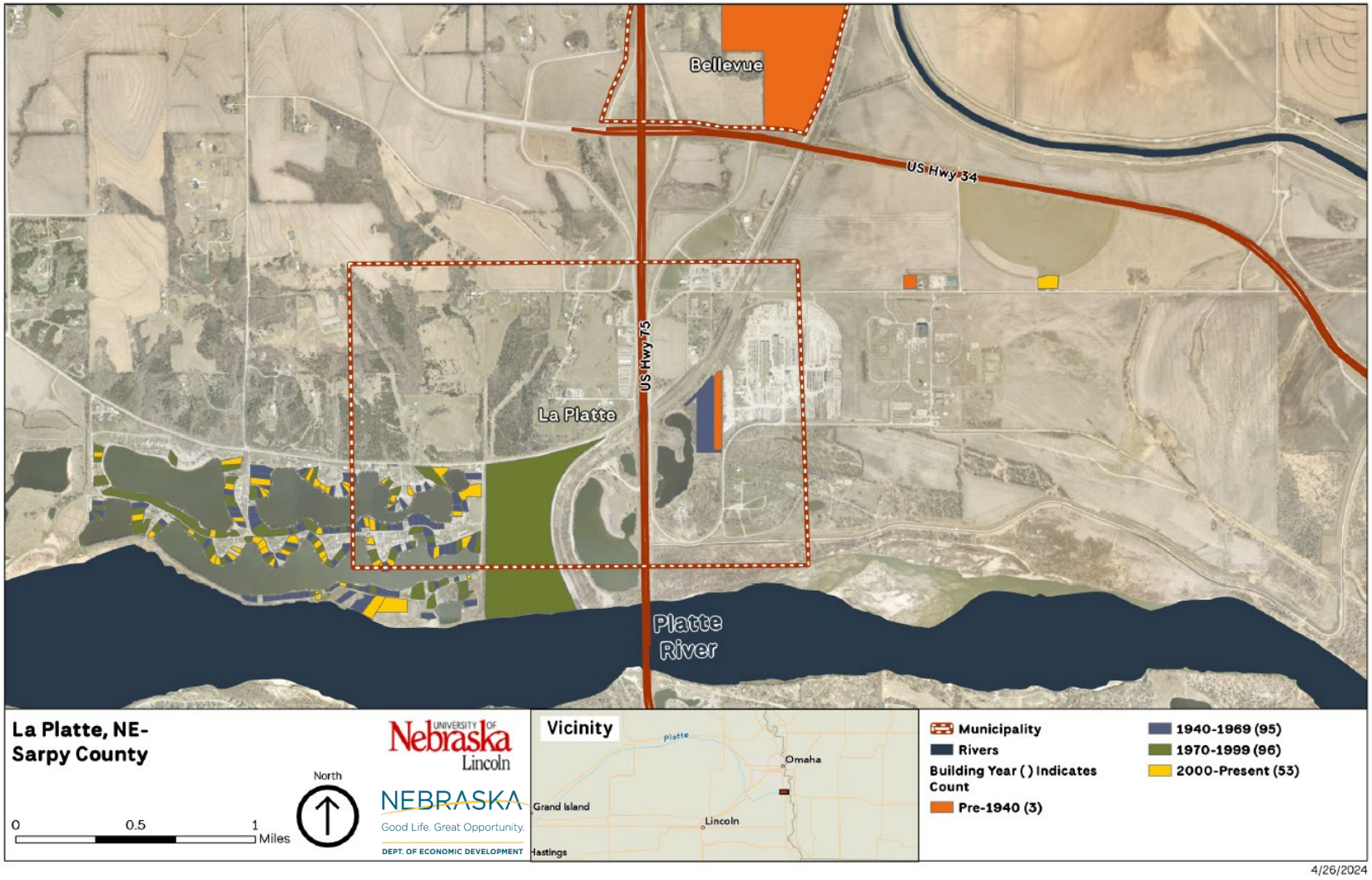
Map 3.43: Age of Structures Impacted by 2019 Flood by Tax Parcels, Village of Waterloo, Douglas County, NE



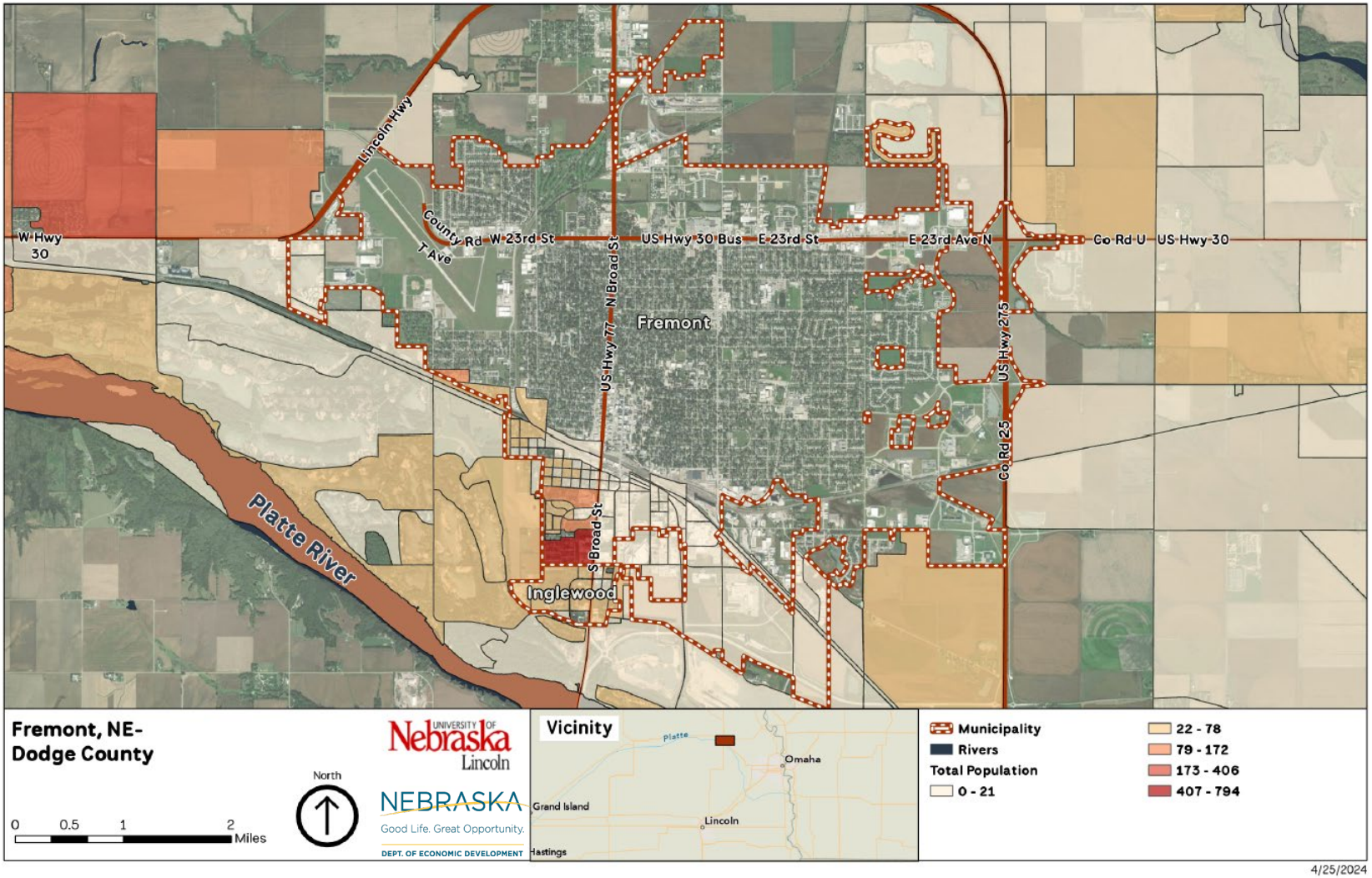
Map 3.44: Age of Structures Impacted by 2019 Flood by Tax Parcels, City of Bellevue, Sarpy County, NE



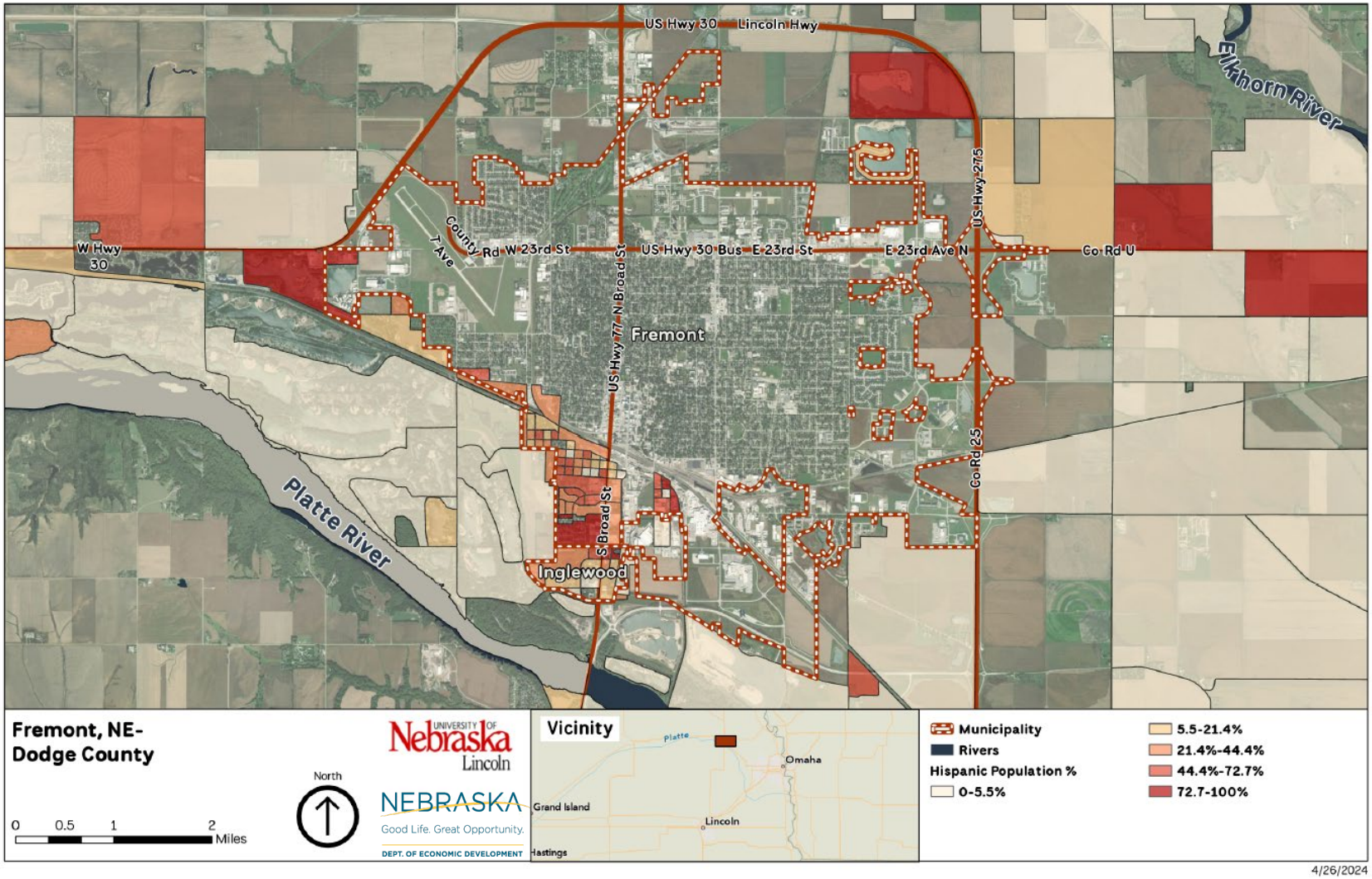
Map 3.45: Age of Structures Impacted by 2019 Flood by Tax Parcels, La Platte CDP, Sarpy County, NE



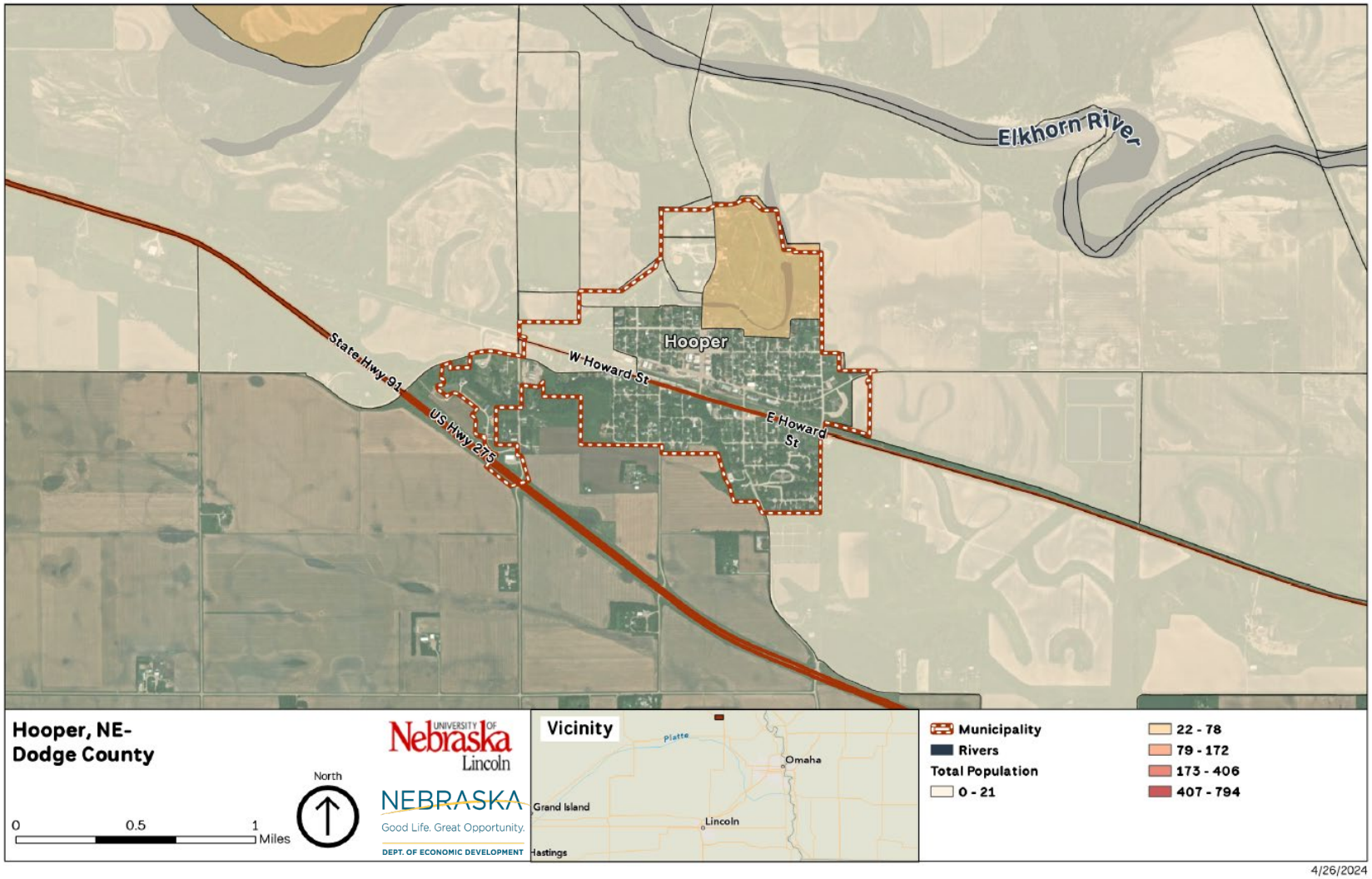
Map 3.46: Floodplain population, City of Fremont, Dodge County, NE



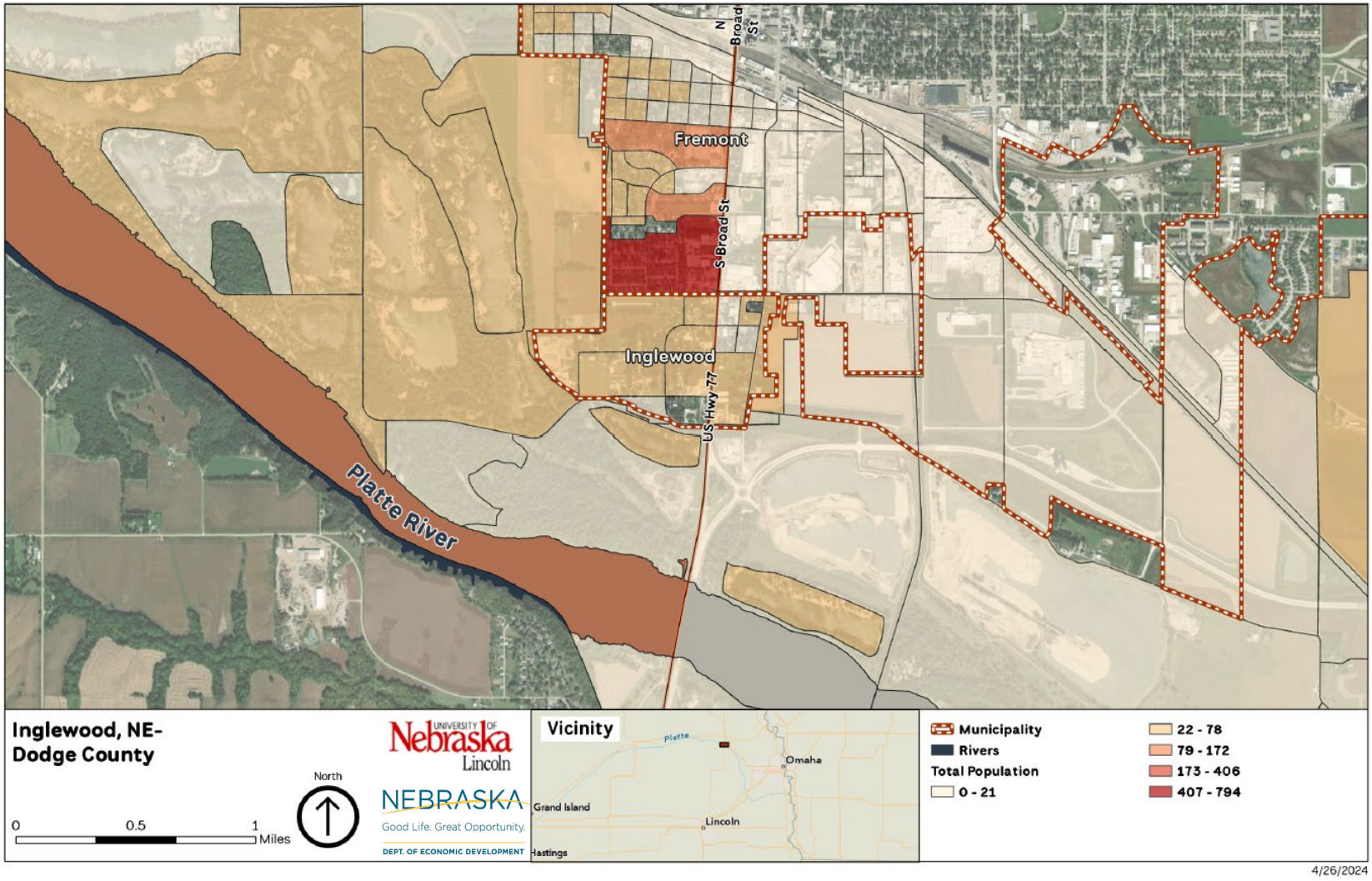
Map 3.47: Fremont Hispanic Floodplain population, City of Fremont, Dodge County, NE



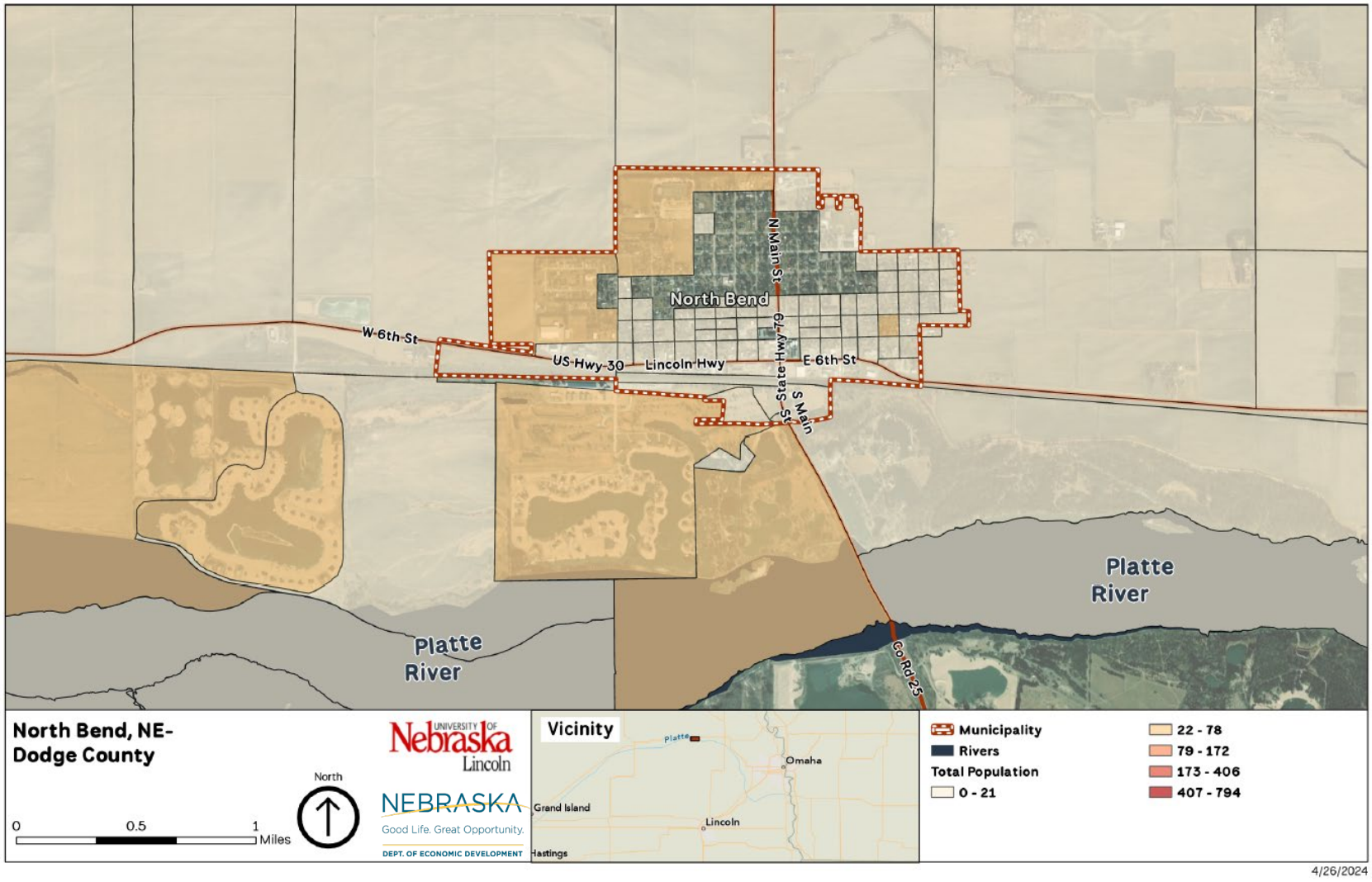
Map 3.48: Floodplain population, City of Hooper, Dodge County, NE



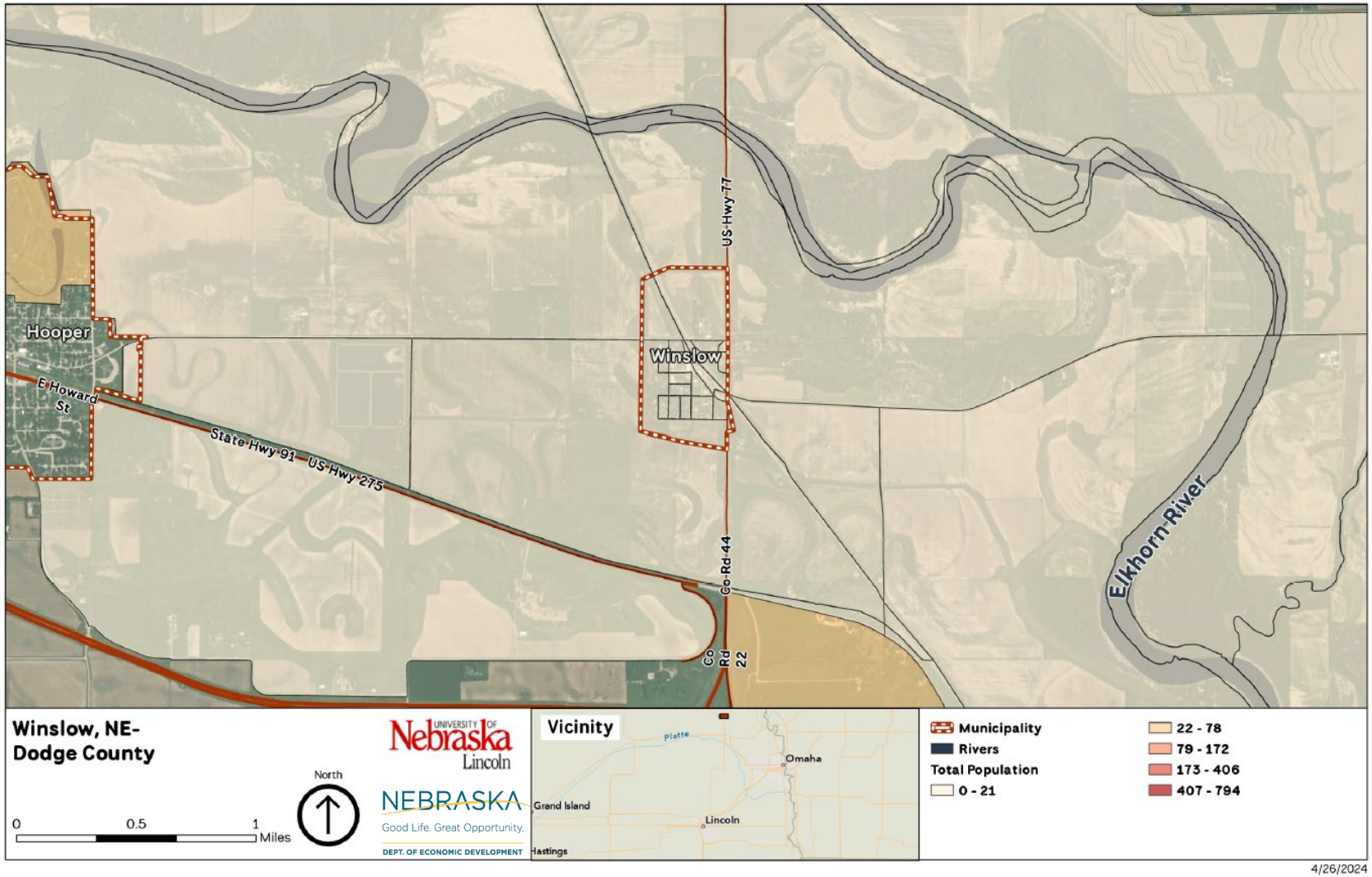
Map 3.49: Floodplain population, Village of Inglewood, Dodge County, NE



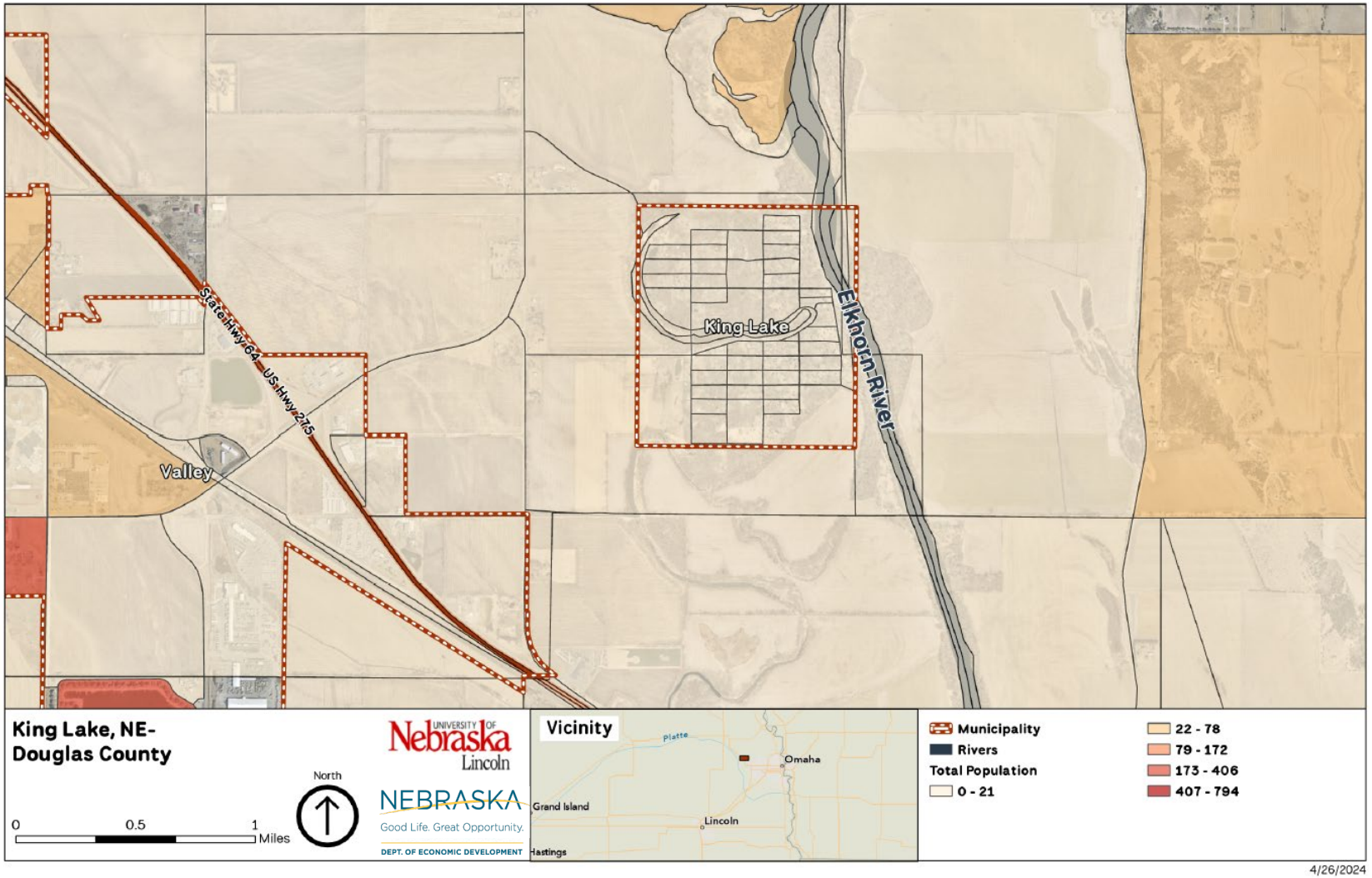
Map 3.50: Floodplain population, City of North Bend, Dodge County, NE



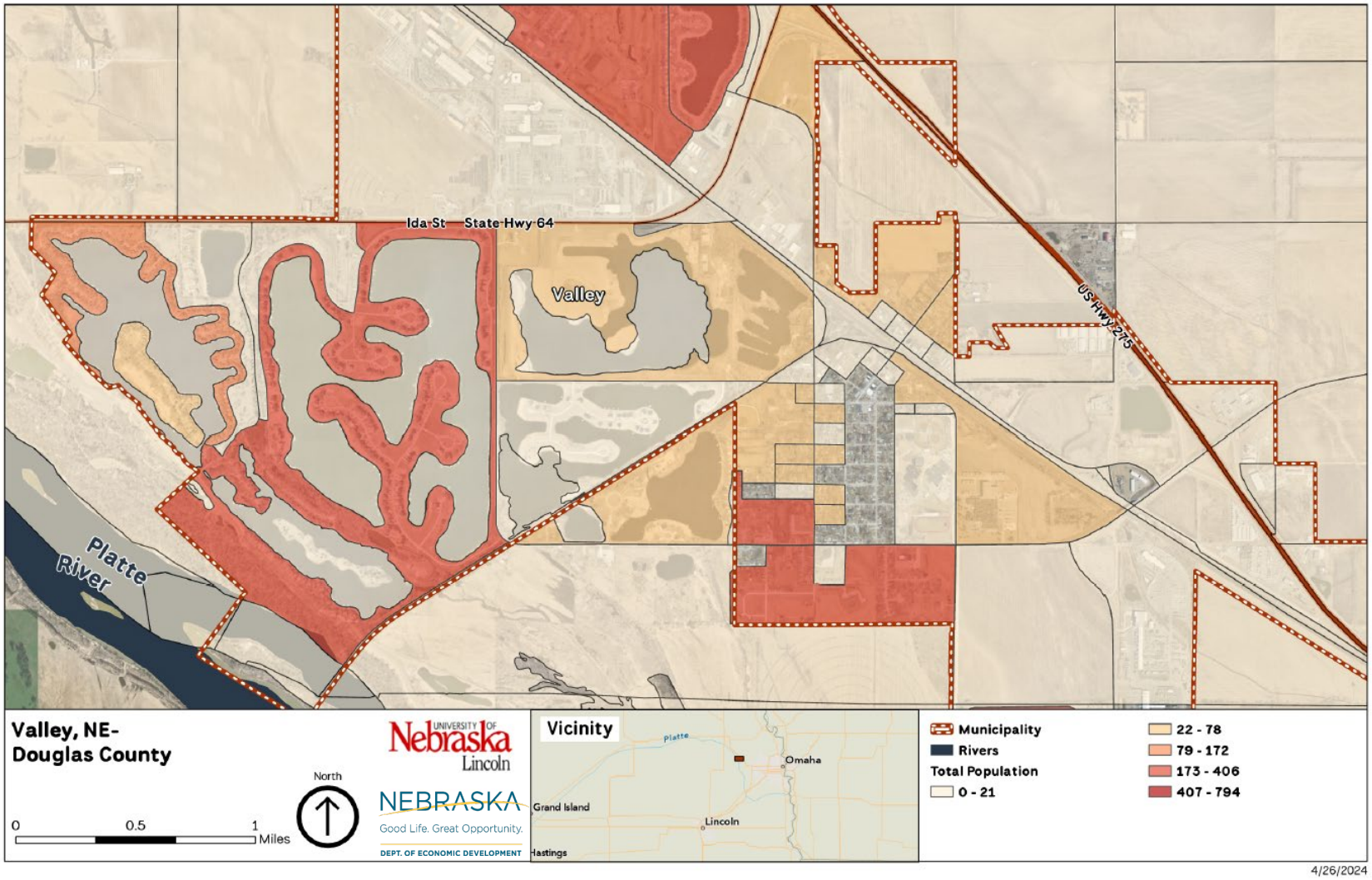
Map 3.51: Floodplain population, Village of Winslow, Dodge County, NE



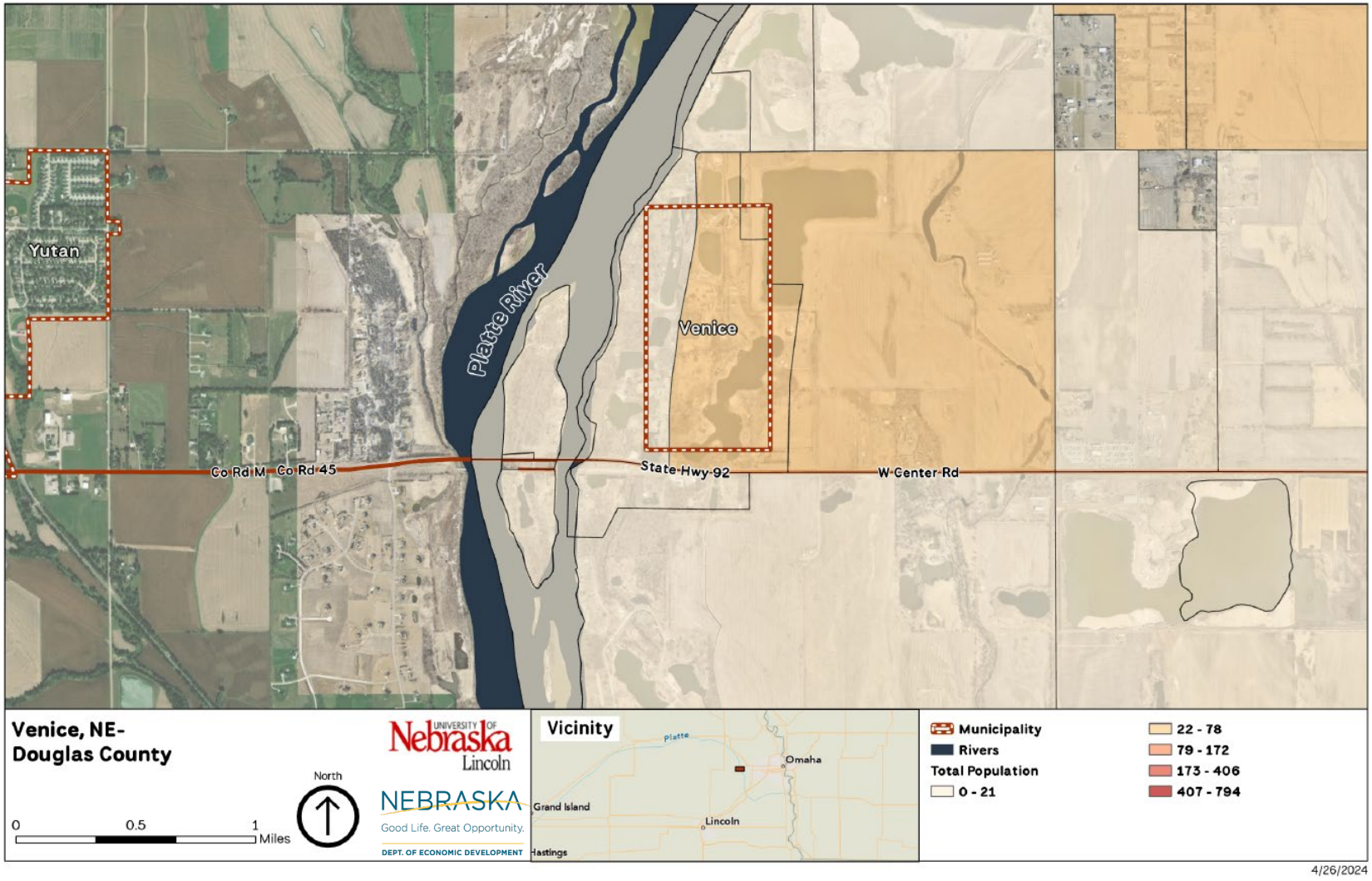
Map 3.52: Floodplain population, King Lake CDP, Douglas County, NE



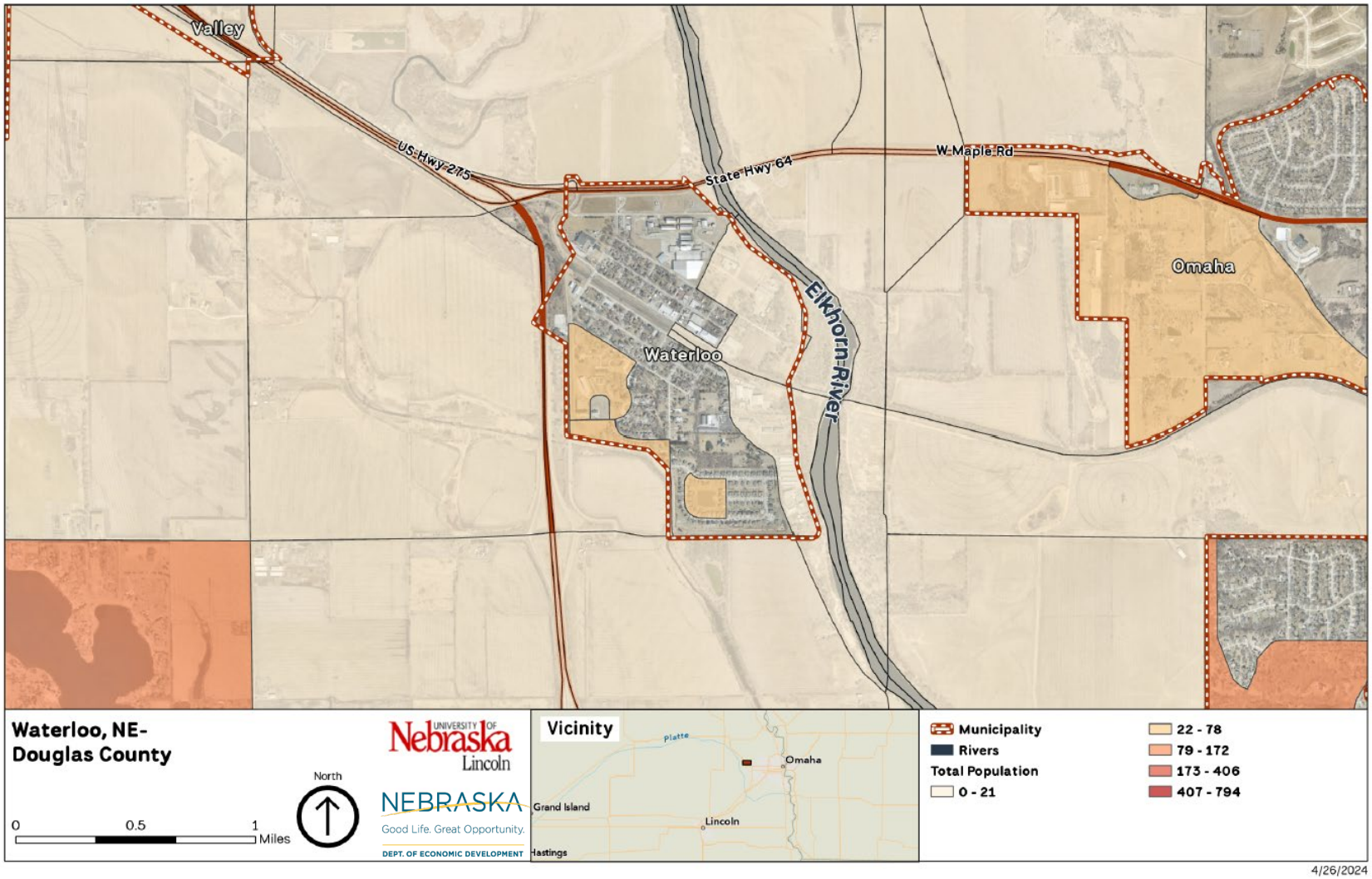
Map 3.53: Floodplain population, City of Valley, Douglas County, NE



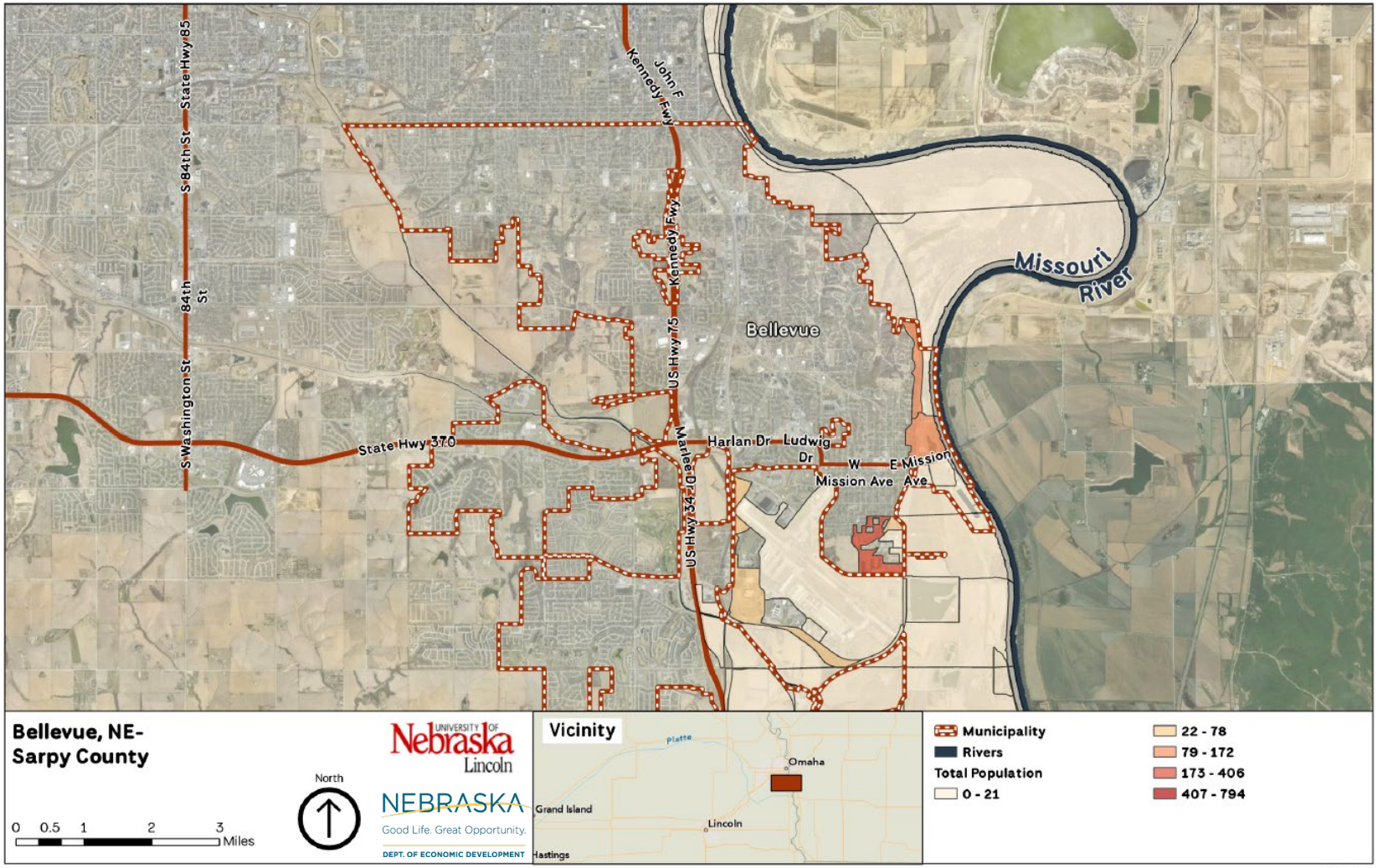
Map 3.54: Floodplain population, Venice CDP, Douglas County, NE



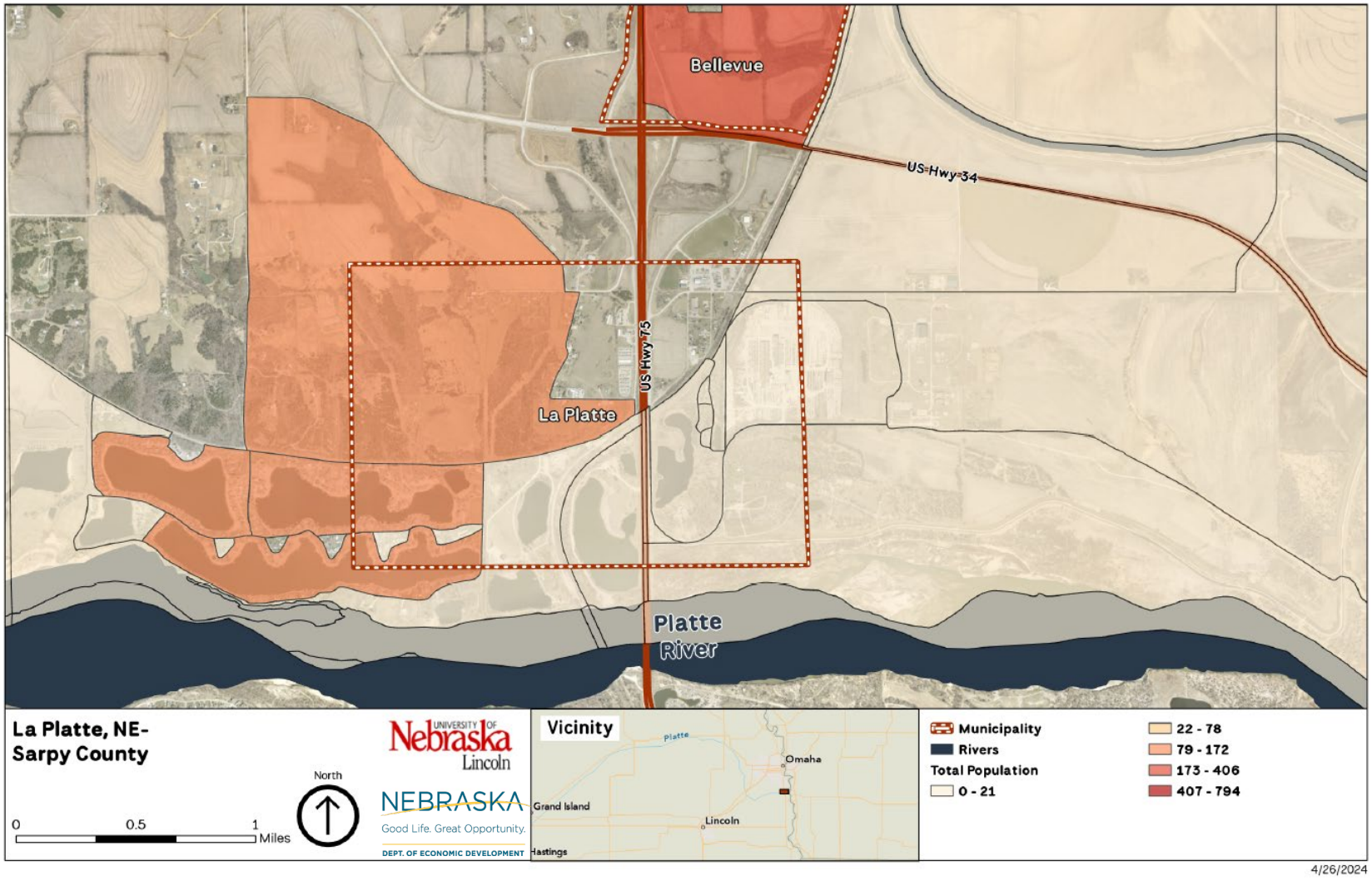
Map 3.55: Floodplain population, Village of Waterloo, Douglas County, NE



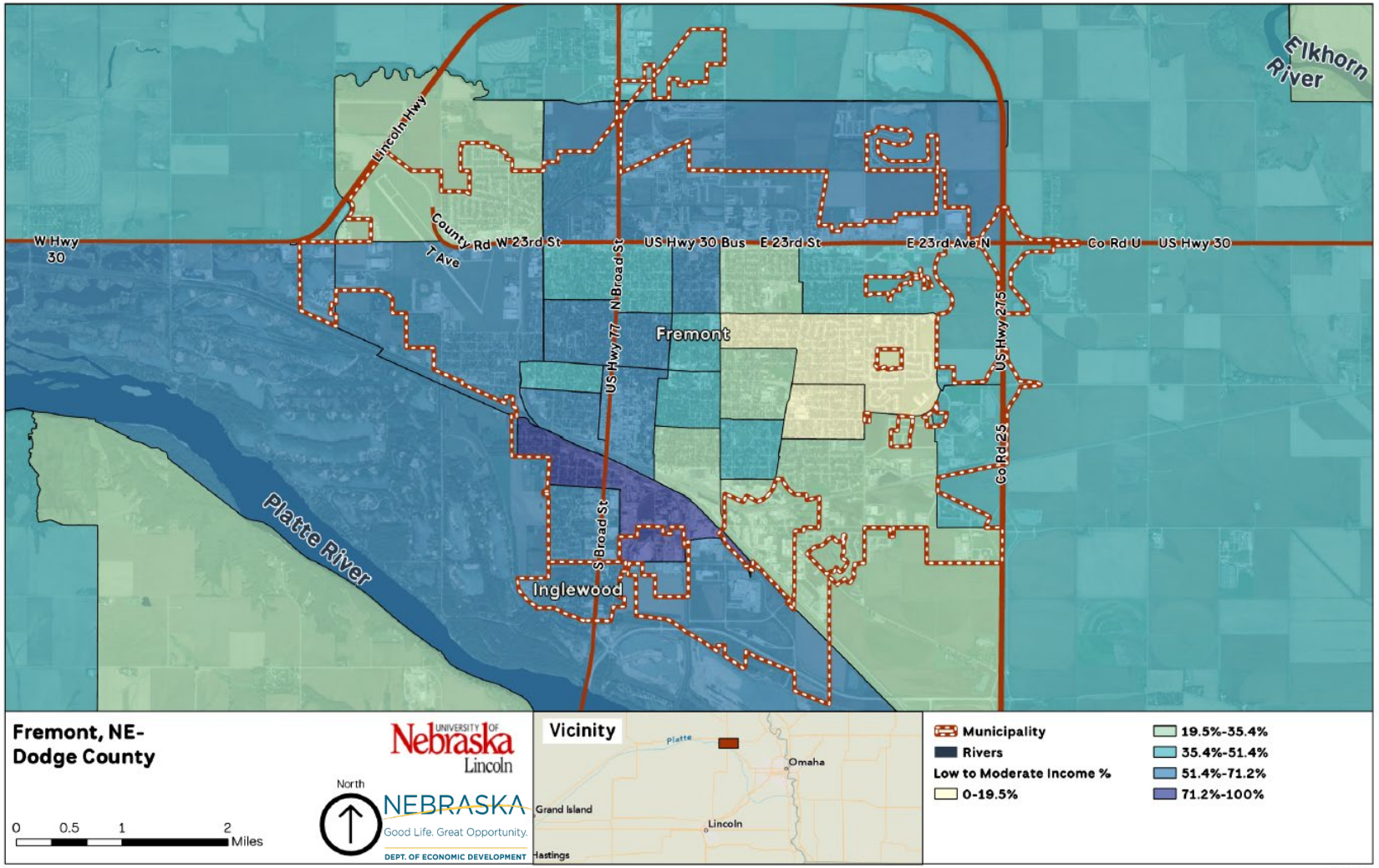
Map 3.56: Floodplain population, City of Bellevue, Sarpy County, NE



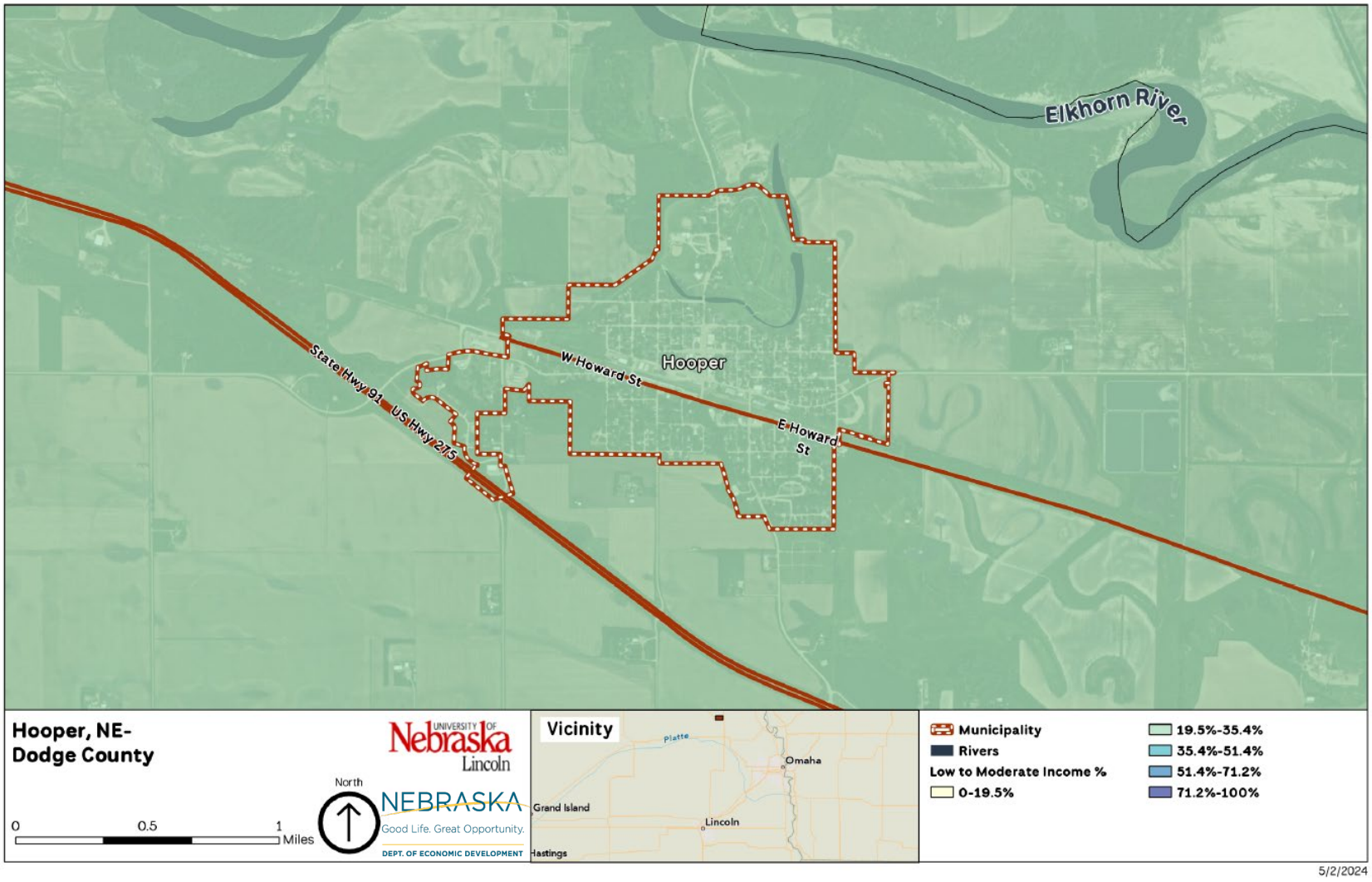
Map 3.57: Floodplain population, La Platte CDP, Sarpy County, NE



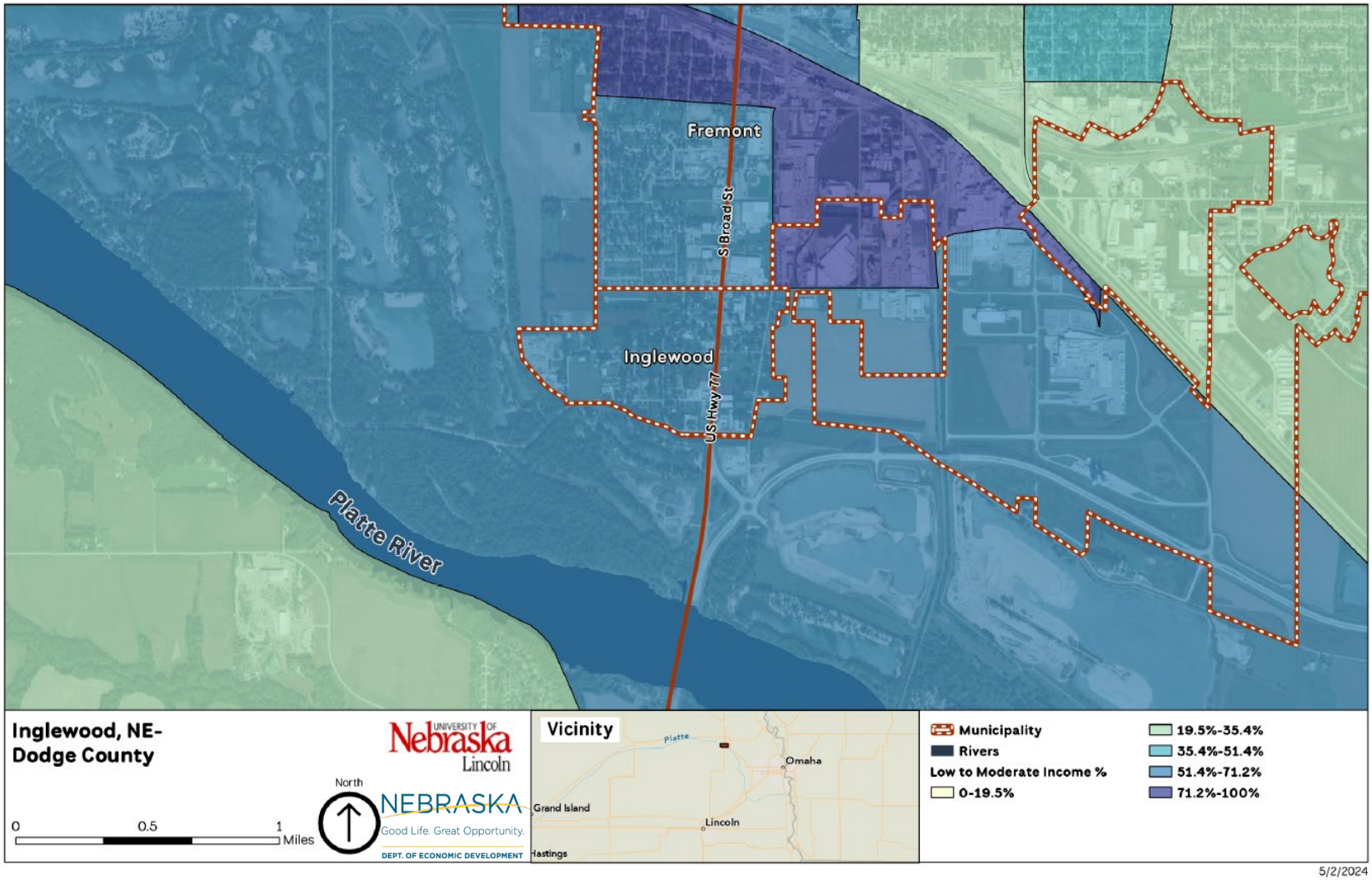
Map 3.58: Floodplain population by income, City of Fremont, Dodge County, NE



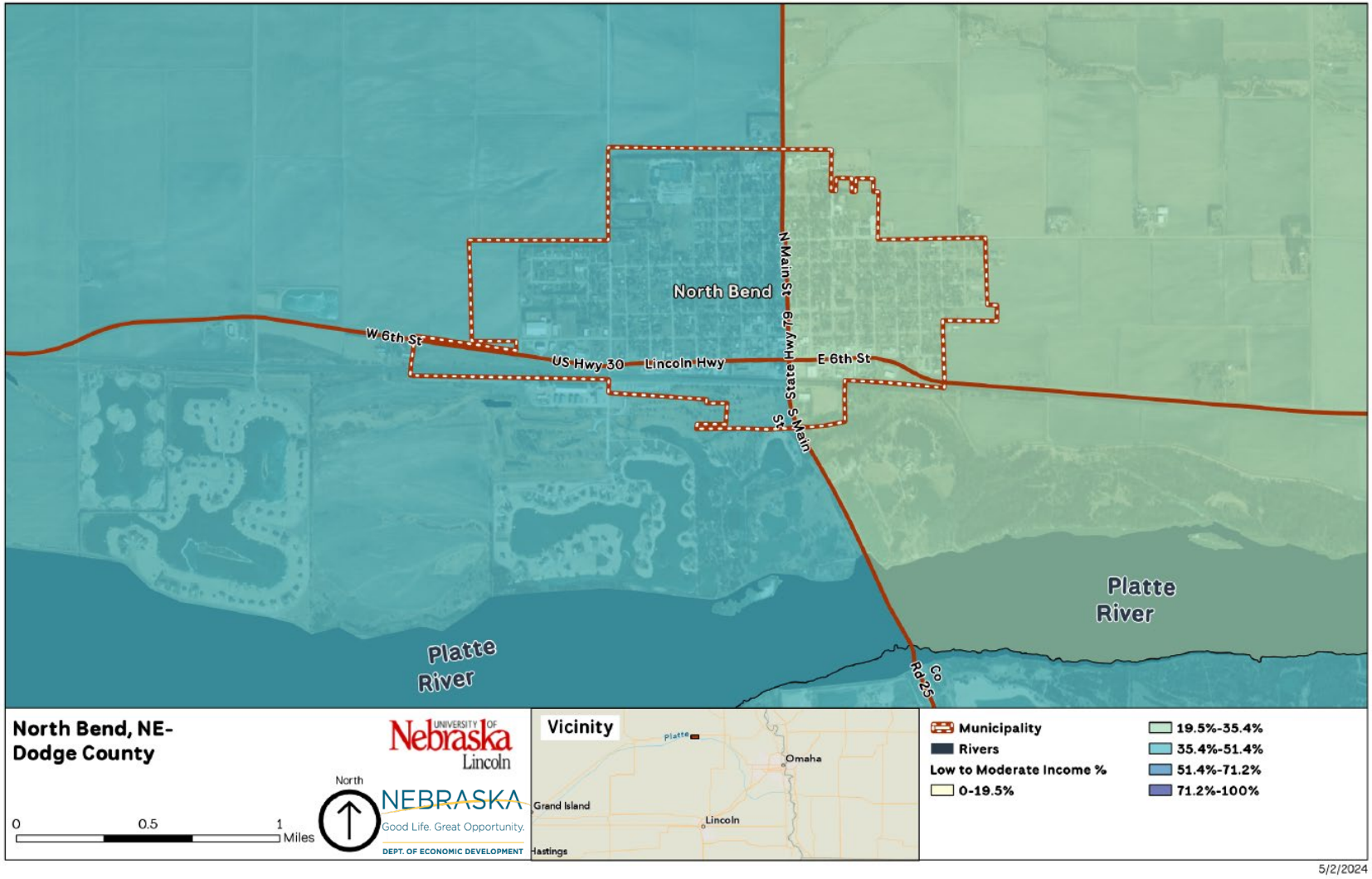
Map 3.59: Floodplain population by income, City of Hooper, Dodge County, NE



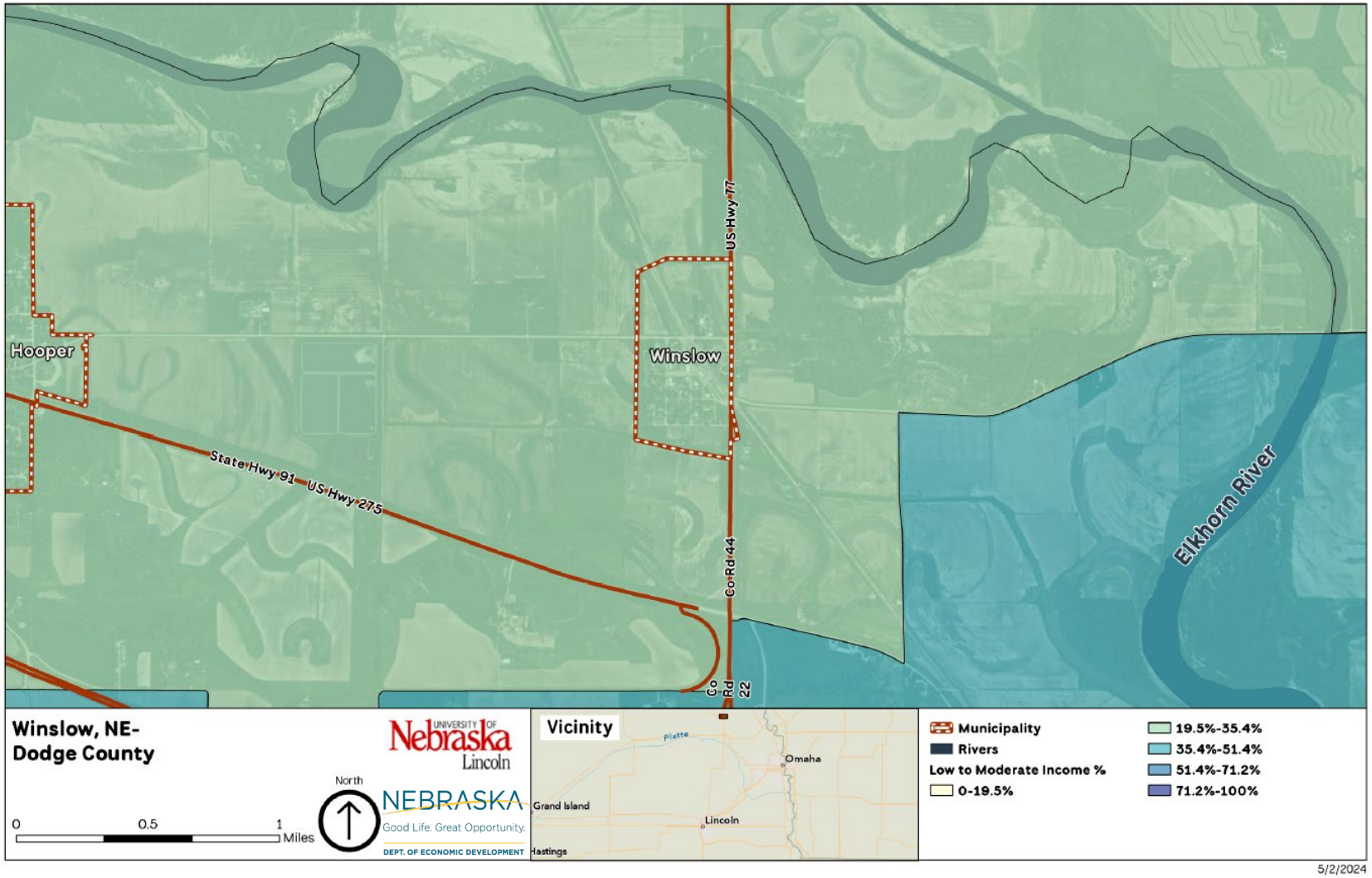
Map 3.60: Floodplain population by income, Village of Inglewood, Dodge County, NE



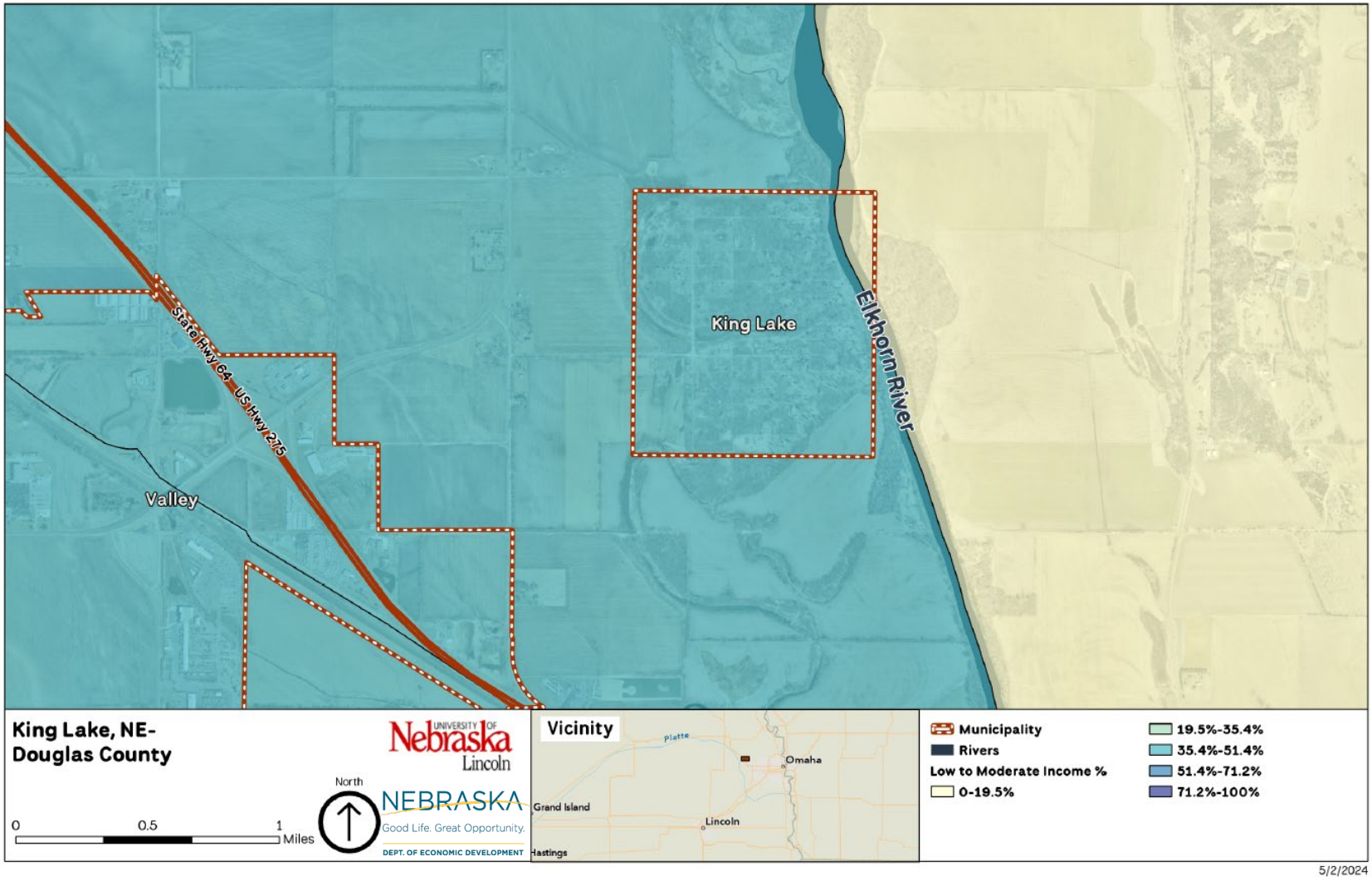
Map 3.61: Floodplain population by income, City of North Bend, Dodge County, NE



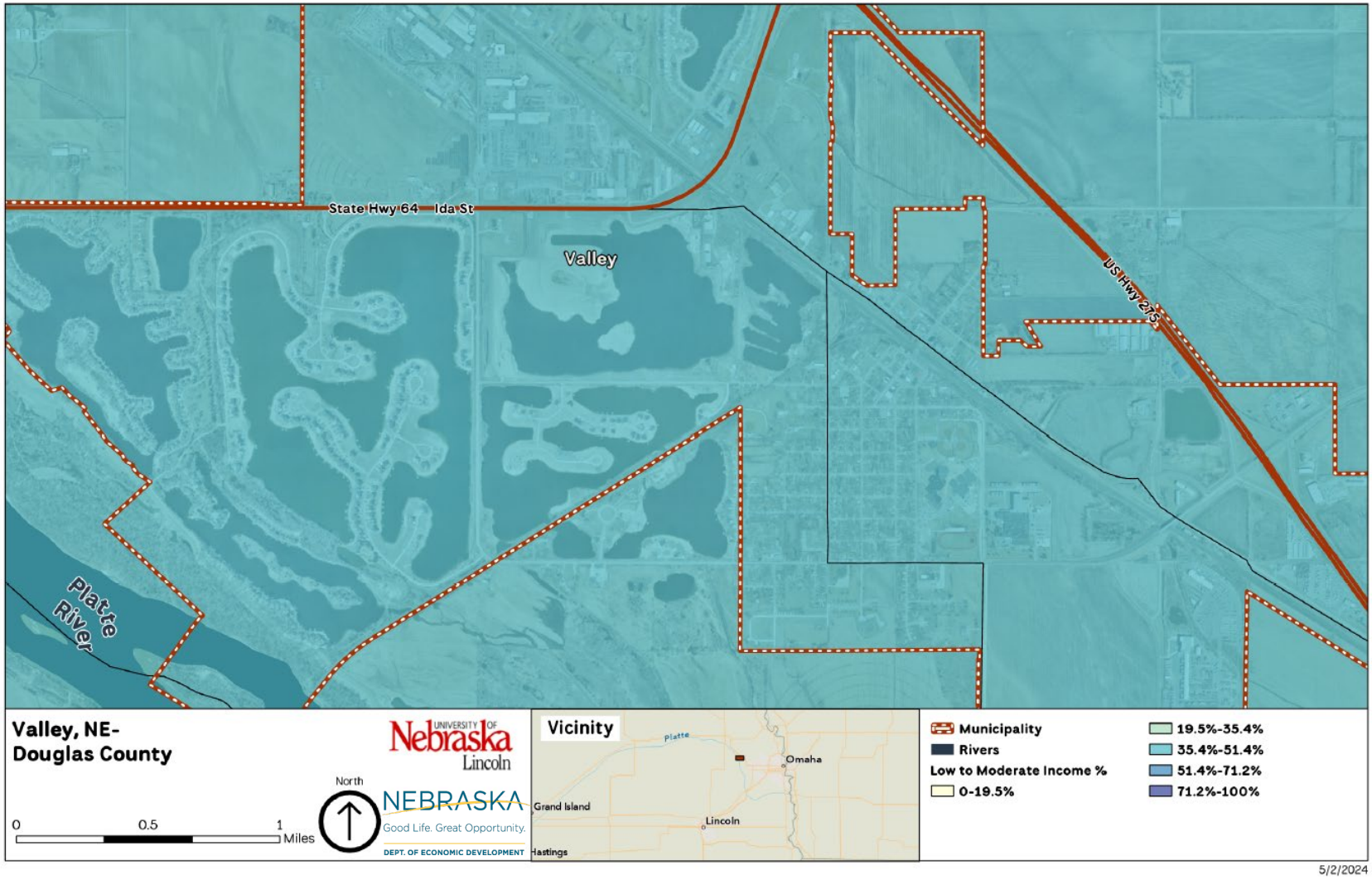
Map 3.62: Floodplain population by income, Village of Winslow, Dodge County, NE



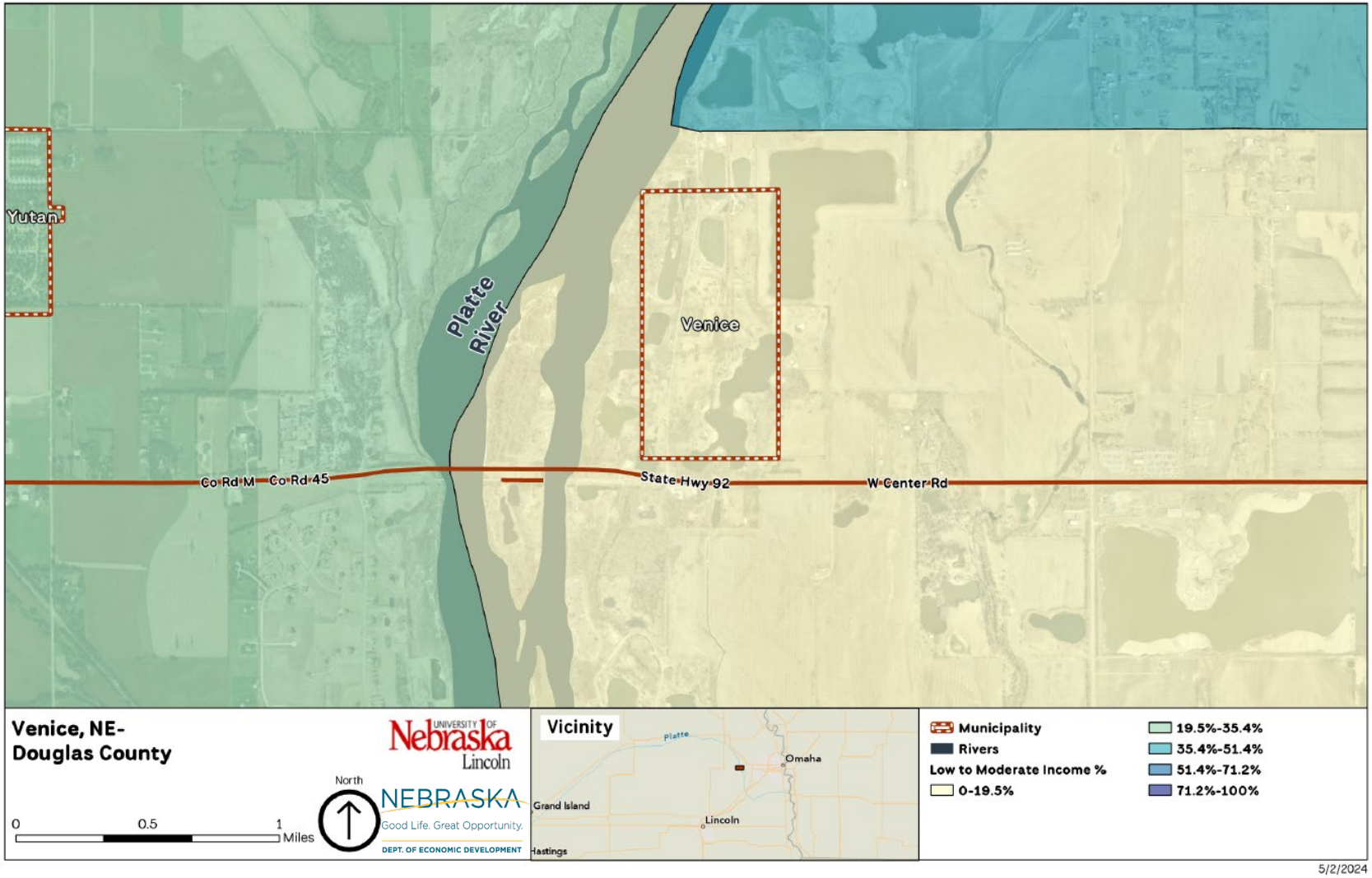
Map 3.63: Floodplain population by income, King Lake CDP, Douglas County, NE



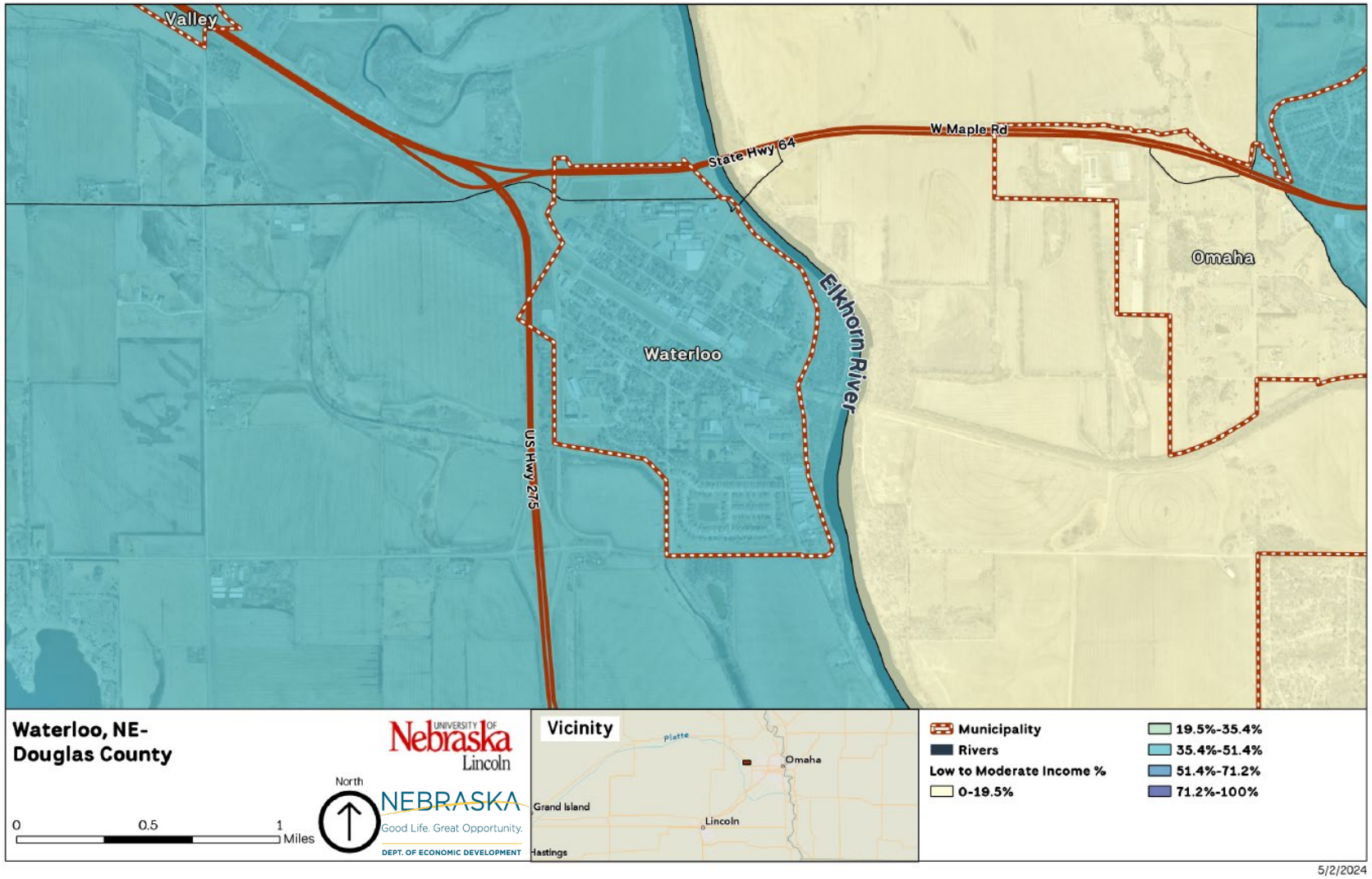
Map 3.64: Floodplain population by income, Valley, Douglas County, NE



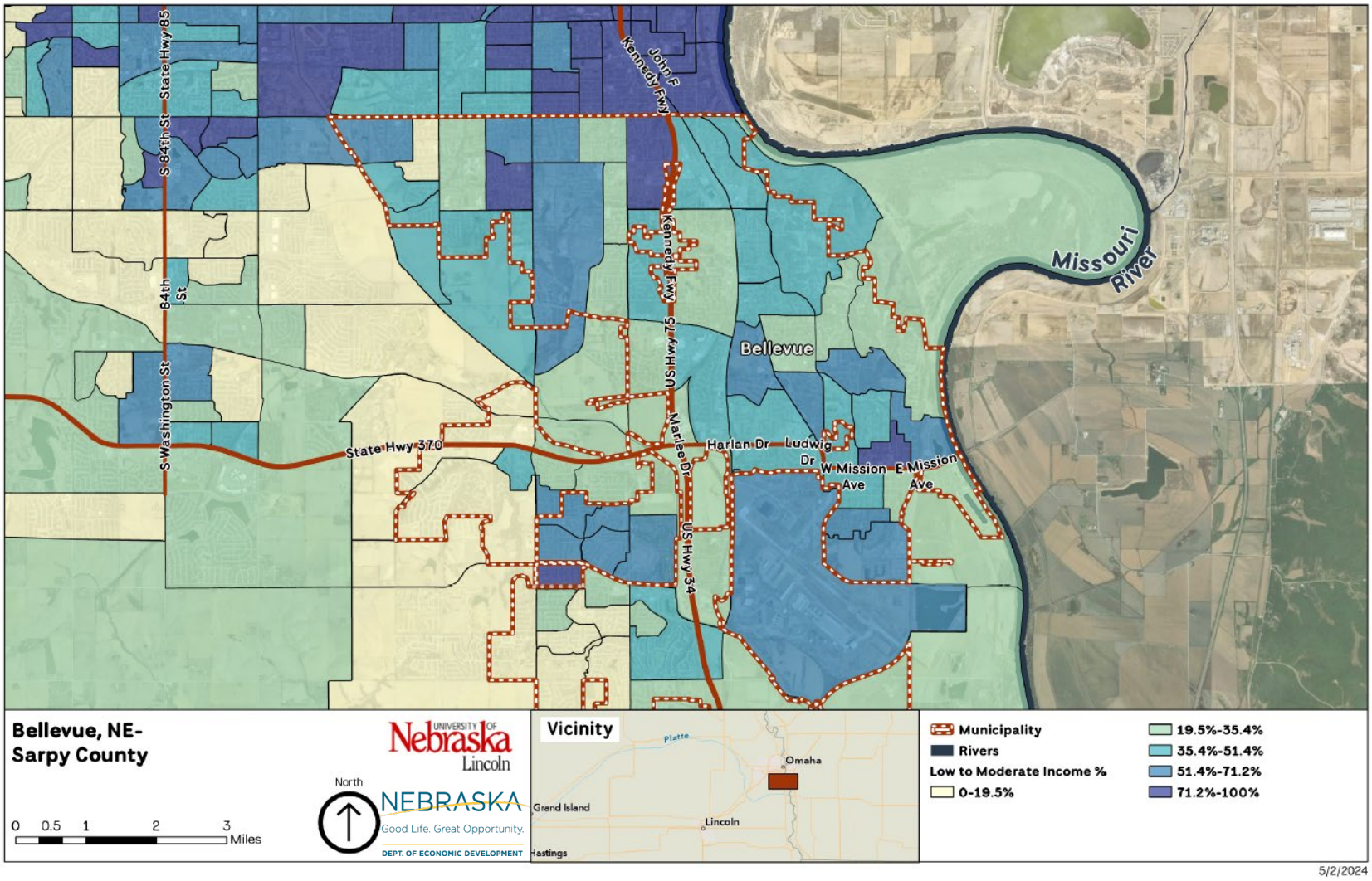
Map 3.65: Floodplain population, Venice CDP, Douglas County, NE



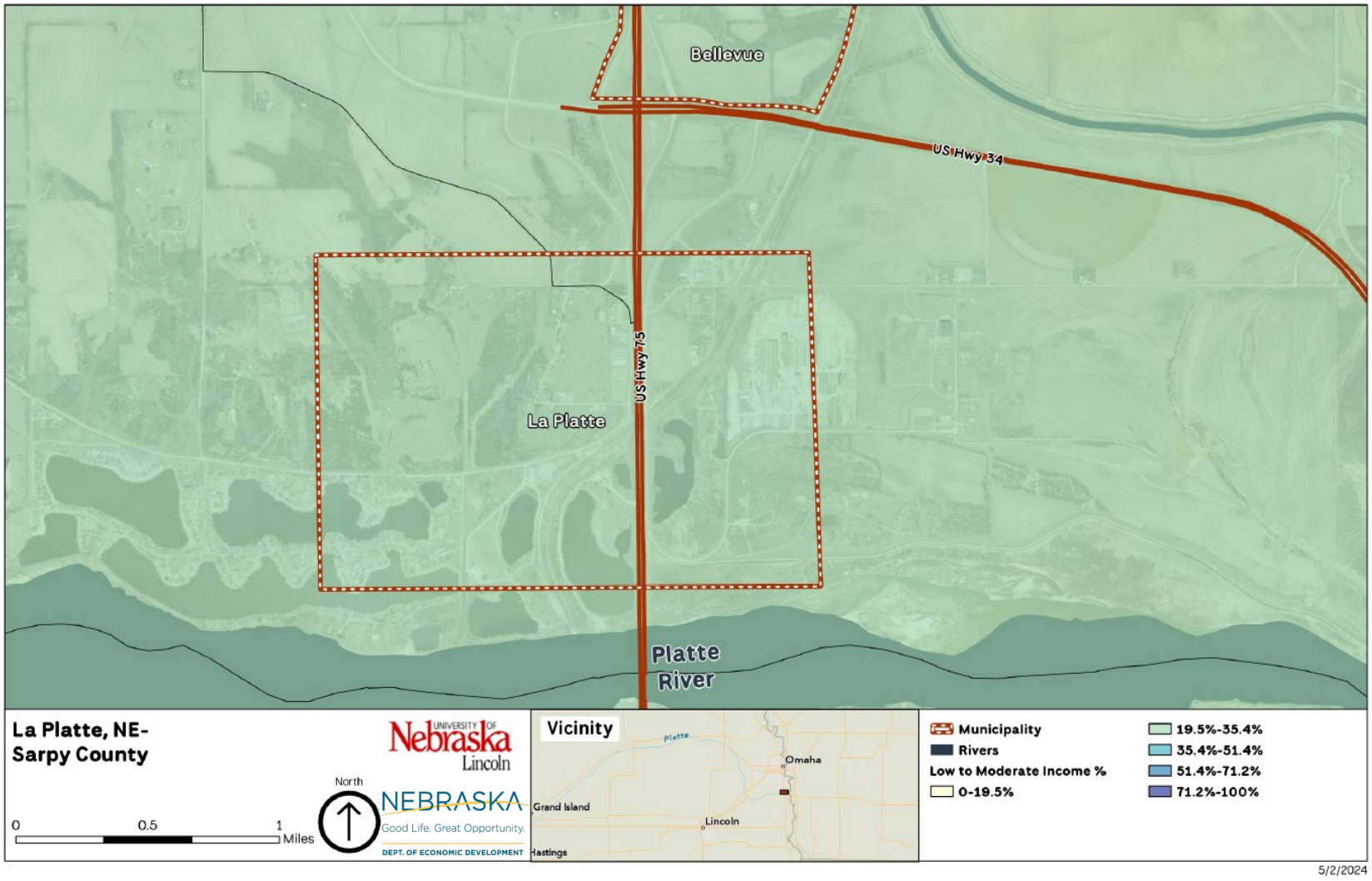
Map 3.66: Floodplain population by income, Village of Waterloo, Douglas County, NE



Map 3.67: Floodplain population by income, City of Bellevue, Sarpy County, NE



Map 3.68: Floodplain population by income, La Platte CDP, Sarpy County, NE



Chapter 4: Mitigation Measures and Recommendations

Dodge County

Mitigation Measures

Drainage ditches were used in the southern portion of Dodge County in and around the lakes to take in all potential overflow from the 2019 flood. Fremont also used river gauges to measure and record water flowing in the Platte River while monitoring the river's discharge. Gauges measure, record, and monitor river depth. Ice jams occur when floating ice on the river accumulates enough to minimize and inhibit further progression of downstream river flow. Sadly, ice jams can cause ice dams better known as upstream flooding. Ice jam flooding, also known as outburst flooding, occurs when the jams are released.

The National weather service provides data and information to help further combat and mitigate flood plain hazards. Snow impact is also monitored and reported. The Corps 205 study which was conducted for an aquatic ecosystem restoration comprehensive study for the Lower Platte River could be restored for improved resiliency efforts. The study's purpose is to be better enabled to evaluate deteriorated habitats, minimizing flood risks, and enhancing resiliency in the watershed. This study was aiming to find integrated data to determine projects that could be done across the watershed to rehabilitate and broaden the quantity, quality, and diversity of riverine, wetland, and riparian habitats. This would further enable the Lower Platte River corridor to obtain and retain infrastructure reliability for future flood mitigation.

The Lower Platte River Corridor Alliance is aiming to study 3,000 square miles in eastern Nebraska. The Lower Platte South will be the local sponsor for the comprehensive study. Dodge County has labeled the entirety of Fremont, the Rawhide Watershed, the Platte River, and Lower Platte River corridor as being the hazard and risk awareness area in Dodge County. Lakes for stormwater runoff, building a berm, levees on the highway, non-structural approaches, and detention cells that capture peak runoff were the best mitigation practices carried out by Dodge County.

Dodge County has further proposed ideas for watershed management. It has no wetland preservation strategies. Dodge County has nothing in place for dealing with erosion and sedimentation. It has implemented levees in Ames, Scribner, North Bend, Timber wood, Fremont, Union, and Winslow. The only hazard mitigation acquisitions in Dodge County were in Winslow. Levees, cut off ditches, and drain water ditches are the stormwater structures provided by Dodge County. Dodge County's structure retrofits are repairing banks and bridges. Furthermore, the Lower Platte River is home to three federally endangered and at-risk species, with several other species with conservation status. Even though this is about Dodge County, the Lower Platte River spans twenty-four communities as well as eight counties, making this no insignificant matter.

Sustainable water supply and habitat preservation are priorities for Dodge County and the Lower Platte River Corridor as water supply could potentially affect fifty percent of Nebraska's population. The record floods from 2019 caused significant damage to transportation networks and corridors, habitats, properties, and water/wastewater infrastructure. Dodge County should be aided in restoring habitats and assessing flood risks to Lower Platte River Corridor which has the largest sustained population growth in Nebraska. The area also has rural and communities with low socio-economic status. Dodge County needs more restrictive floodplain regulations, like limiting development in the floodplain, redefining substantial loss for homes, and an increase for more than one foot above for the free board requirement.

Fremont is trying to implement a stormwater master plan in efforts to identify areas with stormwater issues and possible drainage and pipe enhancements. Evacuation plans for levee failure are also part of the desired mitigation measures sought. County also wants to conduct tabletop exercises for disaster preparedness like a levee failure response and other community responses. Flood mitigation measures are desired to reduce flooding and flood risks from North Bend to Fremont along the Platte River. There is also a desire to minimize the number of structures situated in the floodplain by monitoring developments and structures elevations, while being strict and cautious when issuing building permits for development in the floodplain. Raising structures and filling basements are desired measures. Dam failure warning systems and floodwater level alert systems are also desired. Enhancing evacuation plans if levees fail is another mitigation priority The county also needs stormwater shelters for places like trailer parks, schools, and health care/childcare facilities, and short-term shelters for rural residents.

Creating mutual aid agreements through the Water/Wastewater Agency Response Network is another approach the county is trying to take. Further, Fremont wants to implement a permanent emergency response center, and furthermore desires to lower its community rating system from eight to six and is keen on formulating a plan for the same. Another strategy in Fremont's mitigation actions and efforts is implementing backflow protection to prevent flooding from excess stormwater into resident homeowners' basements. Fremont wants to create Environmental Planning and Policy to make it easier for Fremont to be able to respond to disasters.

Figure 4.1: Drainage ditches in the planning area

Source: Platte Township Flood Risk Assessment

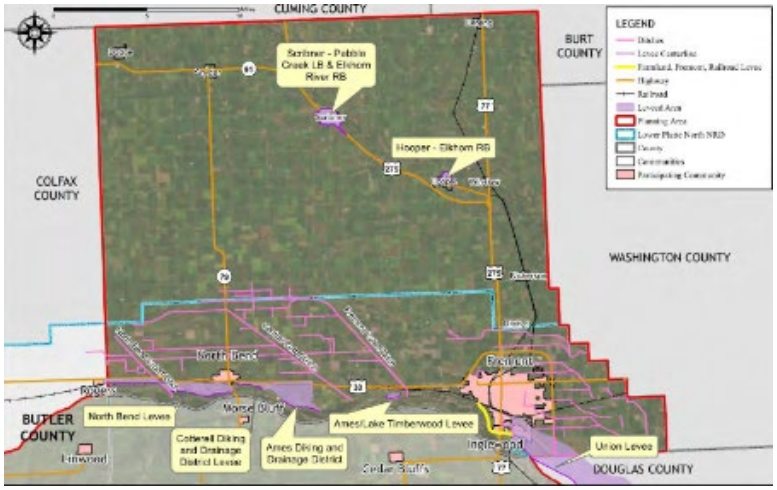
Dodge County

Recommendations

Levees

Dodge County should implement more levees on highways, retention cells, and drainage ditches near the lakes and Platte River. To maintain natural habitats, protect endangered wildlife and the county's communities are commendable priorities. Investing in storm water run-off would be another important infrastructural recommendation for Dodge County. Improving and enhancing storm water systems is essential in protecting the community and ensuring safe conditions.

Figure 4.2: Levee and Ditch locations, Dodge County



Source: Lower Platte North NRD Hazard Mitigation Plan 2020

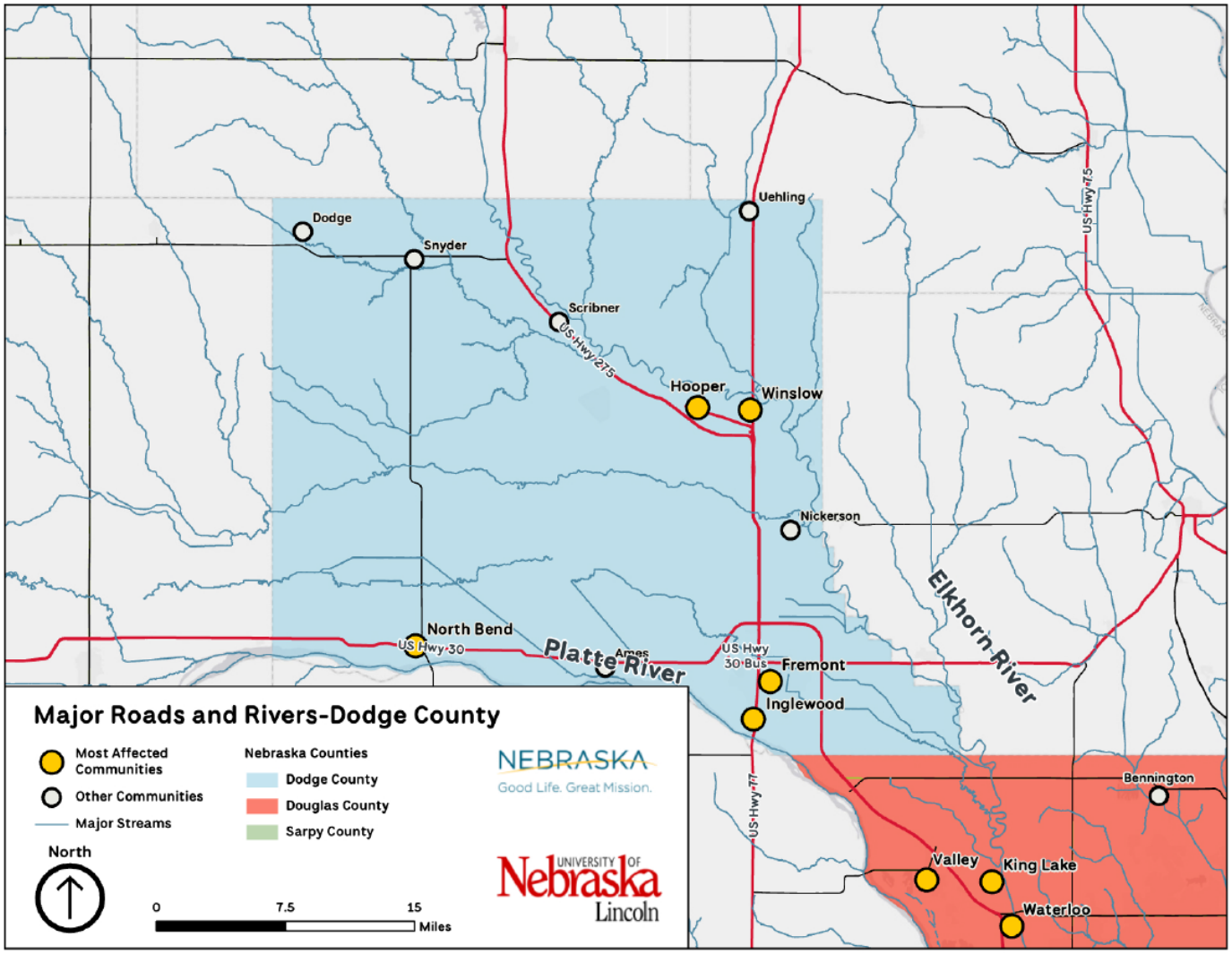
Sustainable Transportation Infrastructure

Focus on the county's major transportation routes is essential as it can be instrumental in mitigating devastating effects from hazardous events. Map on next page is illustrating Dodge County's major transportation routes. Highway 77, Highway 30, Highway 275 are the major highways in Dodge County, also state roads 79 and 91. Improving stormwater drainage on major roads and highways in Dodge County is recommended.

Sustainable infrastructure investments in equipment and systems that are designed to meet the population's essential service needs including roads, bridges, telephone pylons, hydroelectric power stations, etc. is needed. Infrastructure projects, maintenance, and innovations should be based on sustainable principles. These sustainable principles should consider economic, social and environmental insinuations. The International Institute for Sustainable Development (IISD) states that sustainable infrastructure assets are not limited to protecting natural ecosystems but optimizes the use of natural ecosystems and their "infrastructure services".

Increase investment in education, research and development is required. Fremont certainly should maintain and improve warning systems for flooding and water levels from river gages. An emergency response and preparedness plan are also a must to mitigate future hazard risks.

Map 4.1: Major Transportation Routes, Dodge County



Fremont Municipal Airport

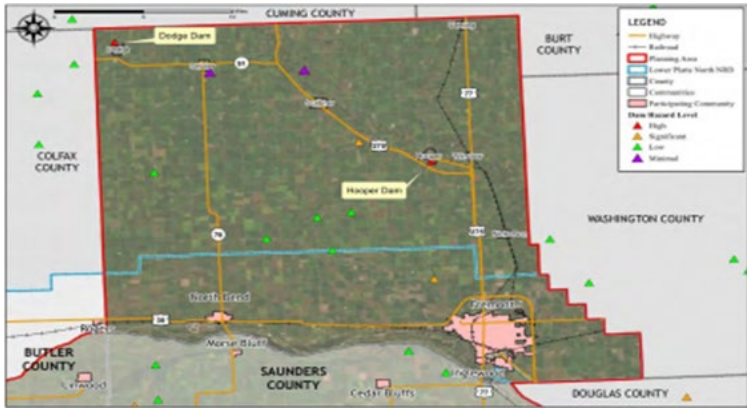
Fremont has a municipal airport and a chapter of Civil Air Patrol. In emergencies a municipal airport can be essential for not only getting people out of harm's way, but also for emergency aid supplies and services if the roads are damaged. The Lower Platte North Natural Resources District Hazard Mitigation Plan states that the airport can cater to commercial jets when it pertains to aircraft. This plan should certainly include improved drainage on the runways, streets, and parking lots in and around the airport. Hangars at airports could be used for shelter, storing supplies, and emergency aid equipment during floods. Trench drains are often incorporated at hangar doors, inside the hangar doors, inside the hangar itself. Drains are needed for the terminal areas, fueling/ fuel storage areas, the parking area, and de-icing areas. Size and strength will be specific to the Fremont Municipal Airport. Marine grade materials in construction is a smart way to go.

There are also NFIP regulations that have minimum building criteria requirements for buildings in special flood hazard areas. NFIP regulations constitute the inclusion of flood resistant materials in buildings constructed. The NFIP regulations for flood damage-resistant materials are codified in Title 44 of the Code of Federal Regulations, in Section 60.3(a)(3), which states that a community shall: “Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a flood prone area, all new construction and substantial improvements shall (ii) be constructed with materials resistant to flood damage.” Furthermore, all building materials below the base flood elevation must be flood damage resistant, regardless of the anticipated or historic flood risks.

Dams in Dodge County

Dodge County has 12 dams in their planned area. Two of the dams in Dodge County’s planning area have high hazard potential for floods. According to the Lower Platte North Natural Resources District Hazard Mitigation Plan 2020, high hazard potential means that if the dam fails, loss of life is possible. Failure of the dam could also result in serious damage and the potential loss of homes, industrial/ commercial buildings, highways and major roads. Elevating dam elevation and reinforcing the dam's structural materials should be implemented in Fremont and Dodge County. Furthermore, they need to update the dam failure alert systems and technology like alarms, sirens, and river gages. Frequent inspection of the dams is a recommendation for better hazard mitigation response.

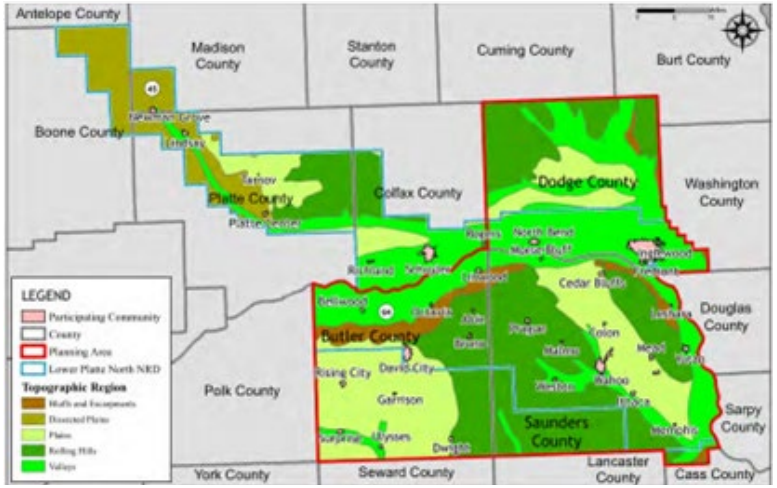
Figure 4.4: Dam locations, Dodge County



Source: Lower Platte North NRD Hazard Mitigation Plan 2020

Conduct a study to understand patterns of ice blockage formations. It should be assumed that ice jams may form anywhere along the Platte River and where ice jams do occur, stages could be high enough to cause levee failure. Implement elevated levees and floodwalls. Fremont has long standing drainage issues in the city because of its flat terrain, so better storm drainage needs to be implemented. Particularly near Rawhide Creek, in the Washington Heights housing subdivision, and on 19th Street. Excessive stormwater also funneled to the Platte River, Elkhorn River, and Rawhide Creek. Implement elevated wells, when flooded the elevated wells will mitigate flood damage.

Figure 4.5: Planning Area Topography



Source: Lower Platte North NRD Hazard Mitigation Plan 2020

Topography

A map of the topography of the Dodge County area is also important. Understanding the natural and built features can enhance Dodge County's ability to determine in what ways they can use the natural and built areas to their advantage. There are also topographic land surveys or TOPOs. Land survey services are asked to produce TOPOs for construction and architectural projects, environmental restoration and property improvements, to fulfill regulatory requirements for construction codes, guidance for setting up grading or drainage ditches, when land developed for one purpose is being used for another purpose (Skidmore, 2024).

Projects can't be successful if the elevation and features of a parcel of land are not accounted for in the development, improvement, or construction plans (Skidmore, 2024). The floods in Fremont as stated before took a devastating toll on local municipal businesses, infrastructure, homes, roads and major transportation corridors, agricultural fields, etc. The Lower Platte North Natural Resources District Hazard Mitigation Plan 2020 states that numerous communities along the Elkhorn and Platte rivers had sought out new mitigation strategies and plans after the floods. They also created new special districts for diking and drainage, while simultaneously joining the planning effort to qualify for mitigation funding. Hazard mitigation funding goes toward any sustainable action that reduces or eliminates long-term risk to people and property from future disasters, according to FEMA. Dodge County should seek sustainable infrastructure and non-structural approaches to combat and mitigate future flood damage. Being sustainable means, it will stand the test of time lasting generations mitigating and combating hazards especially flooding.

The Dodge County - West Fremont Scoping Project

West Fremont-Platte Township in Dodge County is considering developing numerous structural and non-structural alternative approaches to reduce the risks from flooding. The flood risk assessment's focus area is west of Highway 77/Broad, located south of UPRR tracks. The approaches being considered are based on hydrologic and hydraulic models which the Rawhide Creek WFPO are working along with the Project. Structural alternative approaches considered in the project are five different scenarios of farmland levee improvements and modified levee alignments. Further structural alternative approaches include improvements to Ridgeland Road culvert and Hormel Park improvements.

Also, potential lake berm improvements are considered. The Old North Channel overflow is another structural alternative being considered. The last structural alternatives being considered in the project are improvements to Fremont's cutoff ditch outfall and cutoff embankments with five total scenarios. The project's nonstructural alternatives include building modification and programmatic techniques aimed at addressing policies and ordinances while conforming buildings to flood risk to minimize prospective damages. The project lists the preferred alternatives to pursue for assessing and mitigating flood risk.

The project seeks to prioritize nonstructural approaches. The first preferred nonstructural approach is figuring out the necessary approach for flood risk assessment based on the accumulated data and findings. Furthermore, would be the commencing method to flood risk mitigation with various samples of building types.

The Project also drafted up a Nonstructural Mitigation Pilot Project. Elements of the project include finding ten different buildings for the Pilot Project from flood risk areas. Property assessment approaches and recommendations sought by the Pilot Project specifically deal with retrofitting structures, utilities mitigation, selected acquisitions, and other case by case approaches.

Further progression of executing the preferred alternatives agenda would be by evaluating floodplain management ordinances. The last agenda for the advancement of the preferred alternatives would be stakeholder and community engagement. This is so that a planning team can be established, and to seek out the correct techniques of conducting outreach and acquiring the right tools to carry out engagement. The next step that should be carried out from Dodge County- West Fremont Scoping Project should be finding and assessing the ten desired building sites. After that, it would be wise to figure out who will be in the floodplain management small group and who will be on the implementation planning team.

Another recommendation would be utilizing emergency anchor institutions as part of a hazard mitigation response to storms and flooding in the Dodge County and Fremont area. They could be used as emergency shelters and facilities with backup emergency generators. They could also be used to stockpile and store food, and even provide meals for the community and locals dealing with the devastating damage due to hazardous events like flooding. The ten desired building sites could be places like hospitals, assisted living facilities, auditoriums, churches, community centers, schools, etc. These already existing institutions often have the infrastructure and resources available to deal with recovery and response.

Flood Mitigation Projects in City of Fremont and Dodge County

There are a number of projects in progress that are in City of Fremont and Dodge County that need to be completed. In the Lower Plate North Natural Resource District, Hazard Mitigation Plan update is underway and must be completed. Fremont and Dodge County needs to finish the Rawhide Creek Watershed Plan and Environmental Assessment for Flood Prevention to figure out and prioritize specific structural or nonstructural actions to obtain flood risk reduction for Rawhide Creek. It will help identify the most cost-effective locations for flood risk reduction improvements. Enhance the 4.2-mile North Bend Cutoff Ditch's capacity to convey flood waters into the Platte River. The City of North Bend needs to obtain easements along the levee to maintain the levee. By obtaining the easements the City of North Bend can use federal funds to repair future damage to the levee.

The City of Fremont obtained the easement for the flood-damaged levee repaired at the Rod and Gun Club. This makes it an applicable candidate for federal funds to help with proper maintenance. Fremont has a Public Warning Project to explore the necessity of increasing flood warning capabilities for the City. The Nebraska Silver Jackets are conducting an analysis to aid the city prepare to submit for grants to purchase outdoor warning sirens or public warning devices. The City of Fremont, Railroad, Farmland Levee was evaluated and can be potentially included as a levee in the U.S. Army Corps of Engineers (USACE) PL 84-99 program. Participation requires repairing and maintaining the levee to meet the standards under the USACE program, which Fremont and Dodge County should try.

Village of Inglewood

Inglewood needs to invest in a backup generator for emergencies. Deepen drainage ditches and clean out culverts that were damaged in the 2019 flood. Clean out ditches and culverts along Ridgeland Avenue, Prospect Avenue, Main Street, Boulevard Street, Park Street, and Cloverly Street. Develop a flood mitigation and resiliency plan. Stormwater system improvements may include pipe upsizing and additional inlets. Retention and detention facilities may also be implemented to decrease runoff rates while also decreasing the need for other stormwater system improvements. Install storm sewer lines on Boulevard Street from Prospect street to just south of Ridgeland intersection and on Main Street from Cloverly Street to just south of the Sherman property on Main Street. Inglewood's major transportation networks include Highway 77, Ridge Road, and Cloverly and Ridgeland Avenues. This is all according to the Lower Platte North Natural Resources District Hazard Mitigation Plan 2020.

North Bend

Repair flood damage to the dike and streets from March 2019 floods. Replace water meters throughout the community that were damaged in the 2019 flood. Install new water meters are floodproof and have automatic readers. Storm water system improvements including pipe upsizing and additional inlets. Retention and detention facilities may also be implemented to decrease runoff. Conduct drainage studies and create a stormwater masterplan, according to the Lower Platte North Natural Resources District Hazard Mitigation Plan 2020

Farmland and Agricultural Land

Farmland and agricultural lands are also critical to the Dodge County area. According to the Lower Platte North Natural Resources District Hazard Mitigation Plan 2020 there are 676 farms in Dodge County and 585 of them had harvested cropland. The farmland consists of crops and livestock, and more significantly many businesses use their products in marketing, processing, and producing. These farms generate employment, opportunity, food, income, and economic opportunities in the Dodge County area.

These farms are on 132,558 acres (about twice the area of Athens, Georgia) of land. Preserving and protecting them during flooding and hazard mitigation is important as agriculture is the backbone of Nebraska. Hazard mitigation efforts that could help farmers and the community could be incentivizing farmers to plant trees on their lands, changing their crop types, and restoring riparian vegetation. Levees and reservoir basins can also be used to prevent crops and livestock from drowning.

Building raised garden beds may also help to protect the plants. When built out of adequate materials, they will last for years and are a sustainable option for plants and crops. They can be built out of concrete, treated wood, raised bed kits and slabs. Farmers may even want to consider creating a bog or pond on their land as this may help with waterlogging. Irrigation channels and ditches would be phenomenal when they are designed with designated run-off areas. This is a good option for the farmers going forward, if they aren't constructing them to flow towards roads or water courses.

Farmers can apply through the USDA's Natural Resources Conservation Service Land easement program that could help them recoup losses if forced to abandon their fields. The USDA also offers crop insurance and other forms of federal assistance that can benefit the farmers and assist in counterbalancing losses after disasters. The USDA has a Farm Service Agency, Natural Resources Conservation Service, and Risk Management Agency that can provide many options to help farms recover from hazards, according to the USDA. There is Noninsured Crop Disaster Assistance Program which has coverage for crop losses and prevents crop planting from natural disasters, and it covers crops not covered by federal crop insurance. There is the Livestock Indemnity Program for livestock owners who experience excessive livestock deaths due to natural disasters including flooding.

There is Emergency Conservation Program which helps ranchers and farmers rehabilitate their farmland and conservation structures that were damaged due to natural disasters. There is also the Emergency Watershed Protection Program which provides financial relief and professional federal advice to alleviate impending threats to life and property due to floods and other disasters. There are other programs and loan options through the USDA like the Emergency Loan Programs, however the programs from the USDA are the most relevant and applicable to farmers and ranchers dealing with loss of livestock, land, and crops. Education awareness and thorough communication of these programs is important and should certainly be a part of the hazard mitigation plan for Dodge County and the City of Fremont.

Douglas County

Mitigation Measures

The hazard avoidance areas for Douglas County are the Elkhorn, Missouri, and Platte River. The stormwater regulations are the county's floodplain management. Hazard and Risk Awareness areas in Douglas County River has very little communication for benefiting the public with education and awareness. So, buyouts for Douglas County would be the best mitigation practice because it removes risk.

The Papillion Creek Watershed is the watershed management the county handles. Wetland preservation is done through the Army Corps of Engineers. Erosion and sedimentation are handled by the municipal department of environment and energy. Separate storm sewer systems have been implemented, Federal government regulations were developed during and after construction of the sewer systems. Levees are located along the Papio watershed on Missouri and Platte Rivers. Structure retrofits and stormwater structures are the wastewater facilities along the Missouri River. Douglas County has acquired King Lake, Cole Creek, receiving funding from the city.

Climate impacts within the region, particularly on the eastern and western borders of Douglas County are increasingly susceptible towards increasing significant weather-related disasters such as the 2019 flooding. The county is expected to see noticeable changes in temperatures, precipitation levels and significant events.

According to a University of Nebraska report (Understanding and Assessing Climate Change: Implications for Nebraska, 2014) Nebraskans can expect the following from the future climate:

- Increase in extreme heat events (days over 100˚F)
- Decrease in soil moisture by 5-10%
- Increase in drought frequency and severity.
- Increase in heavy rainfall events.
- Increase in flood magnitude.
- Decrease in water flow in the Missouri River from reduced snowpack in the Rocky Mountains
- Additional 3-40 days in the frost-free season.

As the most populous of the three counties, there are increased at-risk population subgroups such as the elderly, homeless, ill, children, among others who may need additional assistance in an emergency. Incorporation across the county to meet the needs and be aware of these members is increasingly important as climate related events rise over the years.

Within the Omaha metropolitan area, the main areas of concern were along the Missouri River. There are several levee systems across the river along with major infrastructure such as Cooper nuclear station, and Eppley Airfield the largest airport in the state all located on the river.

The levee systems include Macy, Lake WaConDa, Omaha, and Missouri River Levee Units R-616, R-613, R-573, R-562, R-548, R-520, R-513, and R-512.3 (Army Corps of Engineers, 2022). These levees which have been added over the decades act as a primary defense towards flood risk mitigation efforts and help protect critical facilities. Because of the scale and size of the Omaha area it has many vital components to its economy that could be impacted by flood risk and overall natural disasters. Rail, transit hubs, historical infrastructure, power centers, among others are key to the economic and overall success of the region.

The largest areas of concern for the region include downtown north, and south Omaha. North and south Omaha being minority-based communities and lower income neighborhoods, bring increased risk to long lasting impacts of flood risks such as those seen in 2019. There are a number of tributaries within Douglas County that under certain flood circumstances could be at greater risk of flooding and impacts within the metro areas, Papillion creek for example.

King Lake

King Lake as one of the notable communities for concern, especially the community located on the edge of the Elkhorn river. With only one road available in or out of the community as well as location of some properties on the rivers edge raises concern for long term effects of flooding in years to come (State of Nebraska Flood Hazard Mitigation Plan, 2022). Such efforts can be looked at based on historical patterns such as that seen in 2019 in communities like King Lake and others. FEMA and state government agencies have had success during the 2019 period, but it is noteworthy that long term planning is needed.

Valley

Valley in Douglas County, is comprised of several residential based lake communities. The community was part of the evacuation ordered as a result of the 2019 flood (State of Nebraska Flood Hazard Mitigation Plan, 2022). A main concern for Valley is ice jamming and breeches of floodways or protective measures that the community has put in place. The community has encountered the new development with raised elevations and stricter building standards to prevent damage seen during this flood event. Because of the overall nature of the geographic region and community who lives within this flood vulnerable region, increased mitigation efforts on the part of the community are strongly encouraged. The community has resources listed online that outline flood insurance, hazard FAQs, flood mapping, among other community resources to alert residents to the conditions of flood risk.

Venice

Venice a smaller community located on the Platte River which host a number of residents along with Two Rivers State Park, is highly susceptible to flood damage and high risk. Highway 92, which connects the community across the river acts as the only local connection between both sides of the river. Due to the nature of the 2019 flooding and ice jamming that can occur within the region the highway has been reconstructed in previous years to update overall infrastructure needs (State of Nebraska Flood Hazard Mitigation Plan, 2022). The state park is being structured to only host residents temporarily acts as a strong flood water basin, reducing the risk of overall loss of property for nearby permanent residents.

Douglas County

Recommendations

Following the outlines and reports from the 2019 flooding and the 2022 State of Nebraska Flood Hazard Mitigation Plan there are a number of potential recommendations for these communities to limit any future damages with flood related events. Many partnerships between organizations at the local, state, and federal levels can help facilitate engagement and strategies to best serve these communities and those throughout the state. The importance of data, funding, mitigation opportunities, and historical information can provide many possibilities for mitigation. Mitigation as a whole gives the communities within Douglas County something to build from and come together in a resilient and impactful way.

Throughout the King Lake area it would be advisable to expand road and transportation access to at least two entry/exit points. Having clear road networks throughout the area above flood levels allows for better evacuation facilitation and emergency response times. Monitoring the areas flood levels with tools and reporting to track floodwater risks is needed. The community at-large, including all structural properties, should identify building codes that raise buildings above flood elevations and expand building strength to withstand future flood events likely to occur in the years to come. These effects protect the residents while allowing them to remain where they are comfortable. Managing river access through potential dams/levees along with community education will help.

Valley, as a new developing community, should continue to expand its flood mitigation efforts. Look at building design and foundation elements such as raised base flood elevations, installing flood barriers, and using materials to protect against flood damage within properties. The community can design in such a way to allow for drainage systems, retention pools, grading slopes, and run-off management. Because the community is so close to the Platte River having emergency supplies and services nearby to speed up and facilitate quick response when needed saves not only time but also resources. The community should continue educating its residents on flood risk and overall disaster mitigation and management.

Regarding Venice, continue with improvements such as those seen with highway 92, strengthening structural conditions resulting in limited impact from future occurrence. According to FEMA, flood mitigation is defined as, “Any sustained action that reduces or eliminates long-term risk to people and property from the effects of floods.” This community has a unique approach to reducing risk, with the involvement of Two Rivers state park which could act as a buffer zone or increase water levels. Looking into the addition of potential dams/levees and means to reduce or limit impacts of ice jamming. Local based solutions such as these throughout Douglas County have long-lasting impacts. These mitigation efforts add to the value that the communities will be promoted through long-term success.

The Omaha metro area should continue working with agencies and Army Corps of Engineers to maintain, add, and manage dams and levee systems within the region along with supporting vital infrastructure. Through early investments and long-range strategic planning, the community can act on a large scale to reduce long occurring impacts of flooding.

Communication and educational outreach are important for hazard mitigation as the occurrences of flood events increase. Following state and federal plans to spread outreach and communication of these events such as flood insurance programs, location-based knowledge, procedures and protocols, and overall knowledge that benefits community response and resilience. Education outreach can occur from as early as elementary school where class-based activities and lessons could be conducted regarding flood and hazard safety, as done with other public safety initiatives. Educational outreach across all boundaries and communities, where communication may be challenging such as low income, minority based, and other vulnerable groups increase attention should be given. Partnerships with local nonprofits and government agencies could help facilitate stronger local connections in a well-received manner. Understanding government programs that exist as well as best practices promotes everyone's ability to reduce risk in such events like as those seen in 2019. Communication channels must most importantly be lasting and responsive to all participants locally and leadership. Residents need to know proper procedures and professional need further communication with responsible parties when questions or concerns arise. Clear lines of channels need to be established and universally addressed throughout the counties.

Source: Jeff Bundy. https://www.nytimes.com/2019/03/16/us/nebraska-flooding.html

Sarpy County

Mitigation Measures

The stormwater regulations within the county are the main floodplain management tools. The hazard avoidance area for Sarpy County is the Elkhorn and Platte River. Buyouts for Sarpy County would be the best mitigation practice, as it poses for the greatest risk avoidance effort on a long-term scale. Southern Sarpy County houses the primary watershed management the county handles. Wetland preservation is done through the Army Corps of Engineers. Erosion and sedimentation are handled by the Municipal department of environment and energy. Separate storm sewer systems have been implemented, Federal government regulations were developed during and after construction of the sewer systems. Levees are located along Several systems on the Papio watershed on Missouri and Platte Rivers. Structure retrofits and stormwater structures are the Wastewater facilities along the Missouri River.

According to the FEMA Local Mitigation Handbook, mitigation contains several defined emergency management activities that should be considered and implemented when considering local mitigation practices. Sustained actions taken to reduce or eliminate long-term risk to life and property from hazards. Prevention actions are inherently necessary to avoid, deter, or stop an imminent threat or actual act of terrorism. Protection actions are essential to secure the homeland against acts of terrorism and manmade or natural disasters.

Preparedness actions taken to plan, organize, equip, train, and exercise to build and sustain the capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation. Response actions are necessary to save lives, protect property and the environment, and meet basic human needs after an incident has occurred. Recovery actions are necessary to assist communities affected by an incident to recover effectively. This is all according to the FEMA Local Mitigation Handbook.

Source: https://www.ketv.com/article/sarpy-county-flood-victims-weigh-options-on-rebuilding/27011045

Sarpy County

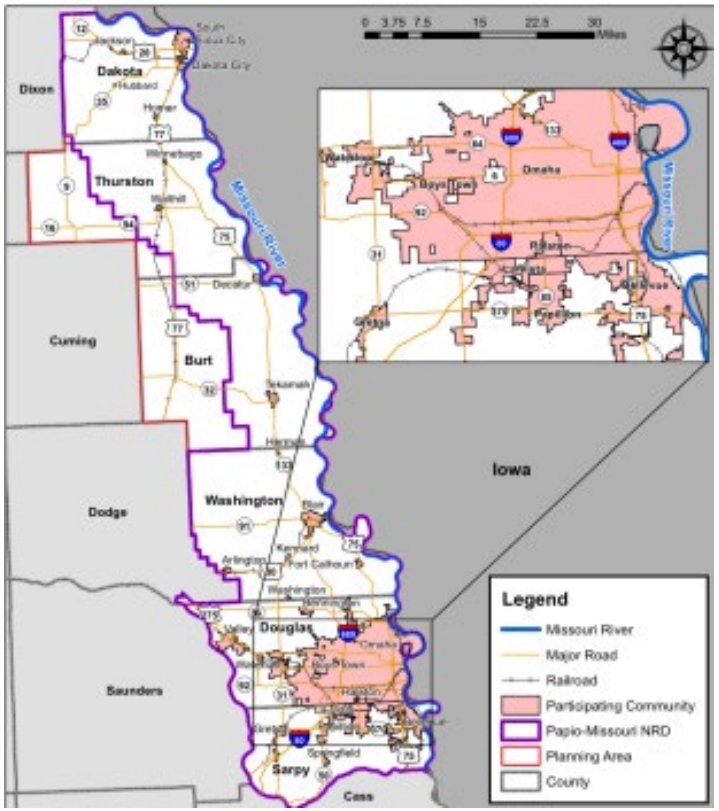
Recommendations

According to the Papio-Missouri River NRD Hazard Mitigation Plan from 2021 Sarpy County has had zero dam failures. However, Sarpy County has experienced six levee failures with unknown damage estimates. Sarpy County has a 1% annual approximate probability of levee failures. There are a recorded 22,748 people and 8,019 structures in the affected area if levee failure would occur. Sarpy County has a 100% annual probability of flooding emphasizing the need for increased attention. There were 1196 flooding events that occurred 24 times a year. Below is a map showing the Douglass and Sarpy County planning areas. The map outlines flood risk areas by outlining and illustrating major roads, waterways, watersheds, and rivers.

Dams in Sarpy County

Sarpy County has thirty-four total dams, with eighteen being assessed as low hazard risk, four being significant hazard risk, and twelve are high hazard risk dams in Sarpy County. Dam failures in Sarpy County have never happened, and the dams worked as anticipated during the 2019 floods. Sarpy County however should continue to maintain and monitor the dams as they are still potentially vulnerable. Emergency Action Plans are mandated for all high hazard dams just in case there is a failure. Any new dams in Sarpy County will also have action plans. Below is a map of Sarpy County's thirty-four dams.

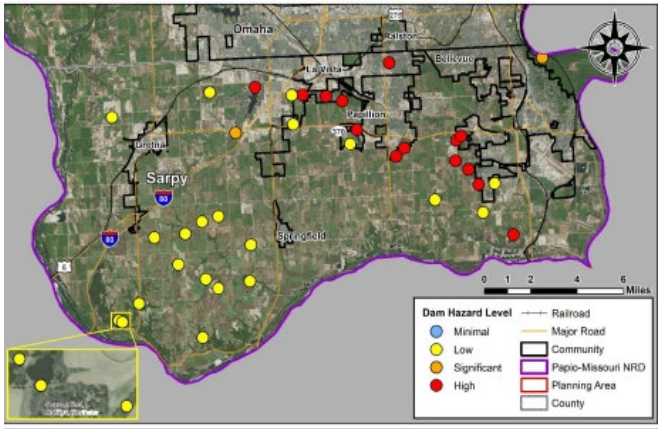
Figure 4.6: Planning Area, Sarpy County



Source: 2021 Papio-Missouri River NRD Hazard Mitigation Plan

Flooding is a top hazard priority for Sarpy County. There are few regulations for flood control along the Platte River, unlike the Missouri River. The Platte River has a well-documented record of being a significant issue for Sarpy County. The NCEI reported thirty flood and eleven flash flood events which caused $422,248,000 in property damage and $1,577,124 in crop damages, according to the 2021 Papio-Missouri River NRD Hazard Mitigation Plan. In June 2014, flash flooding caused catastrophic impacts to the county. Many roads were closed due to high water and power outages were reported across the county from thunderstorms that produced heavy rains of approximately eight inches, according to the 2021 Papio-Missouri River NRD Hazard Mitigation Plan.

Figure 4.7: Dams, Sarpy County

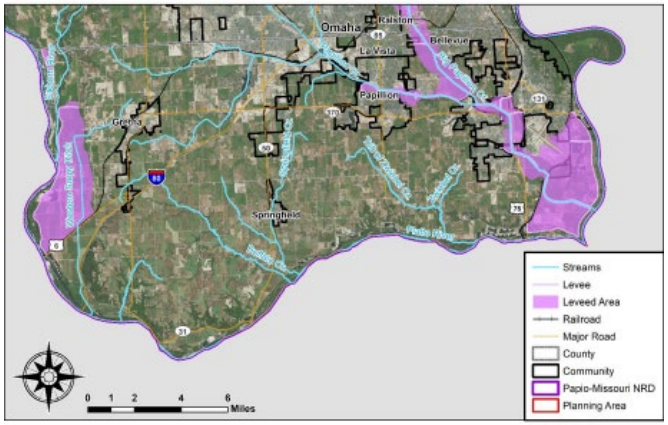


Source: 2021 Papio-Missouri River NRD Hazard Mitigation Plan

Levees in Sarpy County

There is a Hanson Lake levee west of Hanson Lake, owned and maintained by Sarpy County. Sarpy County has levees scattered throughout the county. There are 18 levees in Sarpy County, and 13 are in the Papillion Creek system. Many of the 13 Papillion Creek Levee Systems were damaged during the 2019 Flood. Sarpy County and the City of Omaha should agree to a cost sharing agreement to invest in modifications, enhancements, monitoring, and maintaining the levees in Sarpy County. Sarpy County must ensure that the levees do not lose their FEMA accreditation. These levees protect infrastructure, major transportation corridors, Highway 34 bridge access, Union Pacific Railroad and Burlington Northern Railroad lines, residential areas, Offutt Air Force Base, etc.

Figure 4.8: Levees, Sarpy County



Source: 2021 Papio-Missouri River NRD Hazard Mitigation Plan

Multi-Jurisdictional Approach

Sarpy County partnering with the City of Omaha and Douglas County is strongly recommended for Sarpy County and their hazard mitigation efforts to combat and minimize devastating effects of flooding. The City of Omaha itself has more resources and in 2023 had a revenue that was $44 million over projection and ended 2023 with $8 million in surplus (Mackinnon, 2023). More importantly Sarpy County already accepted $272.8 million for their budget for funding projects like new road construction, sewer system improvements, and master plan improvements to Sarpy campus.

These three projects alone account for an estimated $57.1 million. That money combined with assistance from the City of Omaha would be major and can ensure that Douglas and Sarpy Counties will have better, and more sustainable infrastructure that will mitigate flood hazard effects. Neighborhoods like The Sands Trailer Park were heavily damaged by flooding along the Platte River in Bellevue back in 2019 and was forced to close. FEMA aided Sarpy County and the park owners in clearing all forty homes in the mobile home park.

Further recommendations would be to remain in good standing with the NFIP. Siren surveys to see where there are flaws in the system. Improve emergency communication system. Upgrade and improve levees MR-R613 and MR-R616 to maintain FEMA accreditation. Establish stormwater development committee or council. Obtain and seek acquisitions that are voluntary for structures that are prone to flooding. Backup generator investments are a good recommendation.

Incentivize developers to build outside of floodplains by means of regulations. That is to restrict and regulate all developments in the floodplains. Weather radio inventory to see who has what and where more weather radios are needed for schools and critical facilities. Another important recommendation is furthering the education of building inspectors and Certified Floodplain Managers (CFM). Trench drains and slotted drains for Aircraft Hangars at Offutt Air Force Base also. The hangars at Offutt could also be built or renovated with flood damage-resistant sustainable materials approved by FEMA for NFIP requirements. Sarpy County should educate local farmers about the USDA and their programs to help with crop, land, and livestock losses. Sarpy County should promote the education of the USDA services and that can contact their Farm Service Agency, Natural Resources Conservation Service, and Risk Management Agency that can provide many options to help farms recover from hazards, according to the USDA.

City of Bellevue

The City of Bellevue has already acknowledged flooding as a priority concern and Harlan Lewis Road and Industrial Drive received the worst damage. Lots of businesses either relocated or have closed due to the flooding in 2019 in Bellevue. 149 NFIP policies are in effect in Bellevue at $35,975,400. Bellevue is also attempting to raise the 36th street bridge so that it won't have to face anymore closures, like the floods did in 2019. Raising this bridge is a must, as it will alleviate flooding and road closures for the future. For the City of Bellevue, the greatest losses from flood damage occurred outside the floodplain. The Planning team and first responders need to work together when dealing with flood response measures.

Levee modifications, enhancements, and maintenance are expected to cost around $42 million. The same recommendation for a cost and resource sharing program between the City of Omaha and Sarpy County should also include the City of Bellevue for any future needs. Consider that the two levees in Bellevue MR R-613 and MR R-616 are also in Sarpy County, further reinforcing the need for all the cost sharing agreement among the three entities. The City of Omaha, the City of Bellevue, and Sarpy County working together for levee improvements, infrastructure improvements, and hazard mitigation plans, will help in being able to save lives, property, local business and economy, land, etc.

A multi-jurisdictional approach is recommended by FEMA and NEMA by means of natural resource districts, regional emergency management, and the counties cooperation. FEMA specifically states it recommends a multi-jurisdictional approach due to it providing a comprehensive approach to the mitigation of hazards that affect multiple jurisdictions. It enables economies of scale by leveraging individual capabilities and sharing cost and resources. It avoids duplication of efforts, and imposes external discipline on the process, according to FEMA. A multi-jurisdictional approach is comprehensive in reducing the effects of natural disasters in the planning process. A part of FEMA Requirement § 201.6(b): 2 –An opportunity for neighboring communities, local, and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests to be involved in the planning process. These communities getting involved in the multi-jurisdictional approach is essential to the prosperity and overall well-being for these communities through the hazard mitigation process.

Dam and Levee Failure Concern

Dam failure is listed as a top hazard concern for the City of Omaha, Douglas County, and Sarpy County. This is due to people living downstream in high hazard dam areas. Businesses and employees may face difficulties without work or business due to dam failure flooding. Critical facilities are also vulnerable to damage from dam failure flooding. Stress on systems is also a factor, can further limit availability and supply of water. That can lead to problems for energy production and reservoir services.

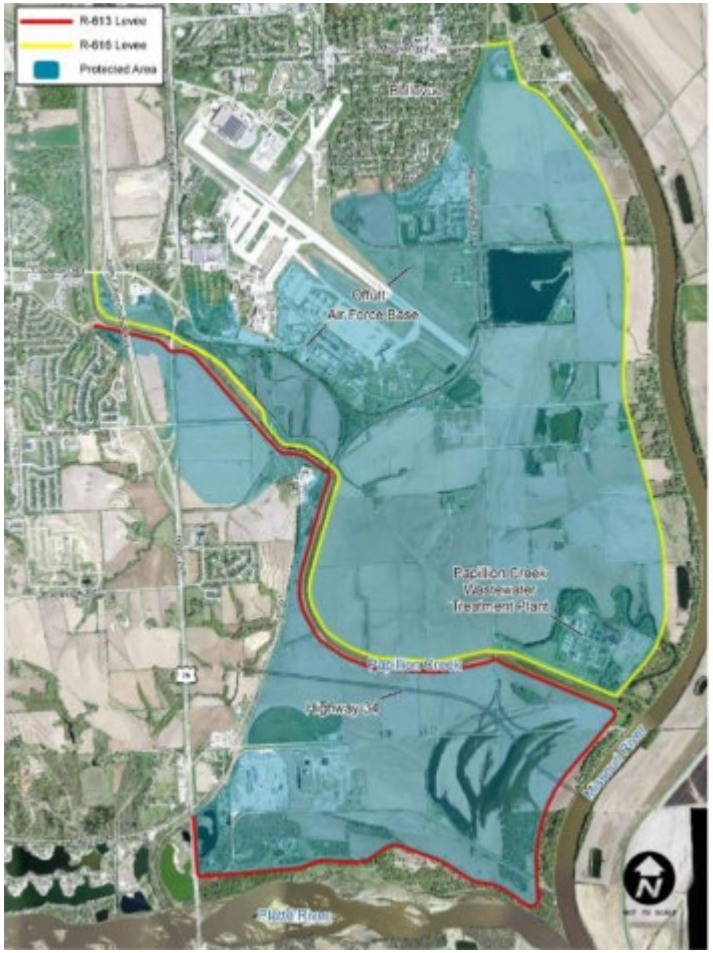
Bellevue participates in NFIP. Levee failure is a top hazard concern for Douglas County, the City of Omaha, Sarpy County, the City of Bellevue, and the City of La Vista. Prioritize enhancing vehicle access and mobility during a levee failure. Have strong evacuation plans. Homes, industries, and businesses are at risk when levee failure occurs.

Levee raises, seepage berms, and rehabilitated pipe penetrations are the main improvements for the MR R-613 and MR R-616 levees to keep accreditation requirements for protecting the one percent annual flood on FEMA's FIRMs and earning PAL (Provisionally Protected Levee) designation. For accredited levees in moderate-risk areas there are no mandated flood insurance purchases. De-accredited levels are not PAL eligible, are mapped high risk, and are mandated to purchase flood insurance. Protecting and inspecting the levee embankment is also critical to the integrity of the levee. This will help to deal with or minimize undesirable vegetation growth, animal control, and depressions in the embankment. In flood damage reduction channels inspect for erosion. Prepare and train for floods, and stockpile necessary supplies for floods.

The Papio-Missouri River NRD has had a continuing program since 1968 to build channel and levee improvements along Papillion Creek and Big Papillion Creek. These improvements are complete from Capehart Road in Bellevue, Nebraska, upstream through Sarpy County except for tie-back levees along Mud Creek, and a short portion on the right bank upstream from the West Papillion Creek confluence. Channel straightening by local desires happened on Papillion Creek, Big Papillion Creek, and West Papillion Creek, and on portions of Buffalo Creek, Springfield Creek, Mud Creek, Betz Road Ditch, and Squaw Creek. Tieback levees have been constructed along the downstream portions of Mud Creek, Betz Road Ditch, and Squaw Creek, also by local interests. Bellevue needs to upgrade and improve levees MR-R613 and 616 to preserve FEMA accreditation. These levees protect Offutt and the Papillion Creek Wastewater Treatment Plant at the mouth of the river. Bellevue should also reconstruct and raise the 36th Street Bridge over the west branch of Papillion Creek north of Highway 370. Continue to monitor and update the Hazard Mitigation Plan.

Bellevue has natural disaster/ safety related school programs. Bellevue also has an emergency operational plan at the county level with Sarpy County. Has floodplain ordinances, a stormwater management plan, floodplain management plan, and a floodplain management administration. Bellevue should become storm ready certified. The R-613-616 levee was overtopped during the 2019 flood, and repairing and maintaining this levee system is a priority for Bellevue. The levee modifications required for accreditation include levee raises, seepage berms, and rehabilitated pipe penetrations, according to the 2021 Papio-Missouri River NRD Hazard Mitigation Plan.

Figure 4.8: Missouri River R613-616 Levees



Source: 2021 Papio-Missouri River NRD Hazard Mitigation Plan

City of La Vista

For La Vista dam failure is not a priority concern. There are two high risk dams in La Vista, and they are the Thompson Creek and Prairie Queen dams. La vista has been proactive and currently has in place evacuation plans for both dams. It is recommended to maintain and inspect both dams. Flooding is a top hazard concern, and this is because of increased development in La Vista. There are no historic records of flooding in La Vista from 1996-2019, yet low-level neighborhoods are susceptible to flooding from heavy rainfall. Heavy rains have resulted in erosion causing infrastructure damage. It is recommended that heavy rain monitoring, and improved stormwater runoff and storm drains be implemented in La Vista. Also, maintain a budget for further improvements dealing with stormwater runoff. La Vista is participating in the NFIP with thirty-six policies for $10,248,000 according to the 2021 Papio-Missouri River NRD Hazard Mitigation Plan. There are no repetitive flood loss properties in La Vista. La Vista also added water quality basins for treating stormwater runoff along the 84th Street redevelopment area and should monitor and maintain the basins.

Inadequate stormwater drainage was found along the railroad in central La Vista. Two bridges on top of Hell Creek were damaged, at Olive Street and Harrison Street due to flood waters. Furthermore, a sanitary sewer siphon was damaged. La Vista is also in the Big Papillion-Mosquito Watershed Flood Risk Report. The Papio-Missouri River NRD does channel and levee improvements along the Papillion and Big Papillion Creeks. These creeks have received channel straightening improvements because of local interests. Tieback levees also by local interests have been constructed in the area like Mud Creek and Squaw Creek.

La Vista has been proactive in working on several projects that are aimed at enhancing flood response and reducing the risk of impacts. La Vista is trying to enlarge a culvert crossing at a railroad crossing. Another railroad crossing has drainage issues being addressed. Studies on erosion from heavy rain events is a good recommendation for La Vista. La vista should replace a sewer siphon on the east side of the community. Levee failure is not a priority concern for La Vista, as there are levee protected areas within La Vista. The protected levee areas are situated on the east side of La Vista's jurisdiction. Levees near La Vista give one percent annual flood risk protection, are FEMA certified, and are also owned by the Papio-Missouri River NRD. Levee failure would potentially damage utilities and recreation.

La Vista has a floodplain ordinance, a floodplain management plan, a stormwater management plan, a floodplain administration, and is part of the NFIP. However, La Vista isn't storm ready certified and should seek becoming certified. Finalize the Thompson and Hell Creek projects for bank stabilization and channel improvements. Thorough maintenance and monitoring are a must for the Thompson and Hell Creek projects. Continue reducing impacts of stormwater at major culverts and drainage ditches with stabilization improvements. Get sanitary and improvement districts to join in on channel stabilization projects. Maintain and improve bridges and culverts, like Hell Creek's two bridges which have been acknowledged as being eligible for the enhancements. Harrison Street bridge has already been completed. Olive Street bridge should be the next bridge to receive upgrades. Keep and maintain good standing with the NFIP, especially floodplain management practices, requirements, and regulation enforcement and updates.

Case Studies

Case Studies Across Nebraska

Grand Island, NE

The city of Grand Island and surrounding communities shows the impact of community connections between local, county, and state agencies to take an all-hands approach to hazard mitigation efforts in this case flood resiliency. Through these efforts taken on projects that span the region and are multilayered in their approach for flood risk management.

Beatrice, NE

The city of Beatrice focuses on community prioritization that has saved the city millions of dollars in potential loss through their approach of buy back and resident investment. Taking on a now 40 plus year initiative to prioritize mitigation efforts through proactive response as opposed to reactive can show communities throughout the state the value of early investment.

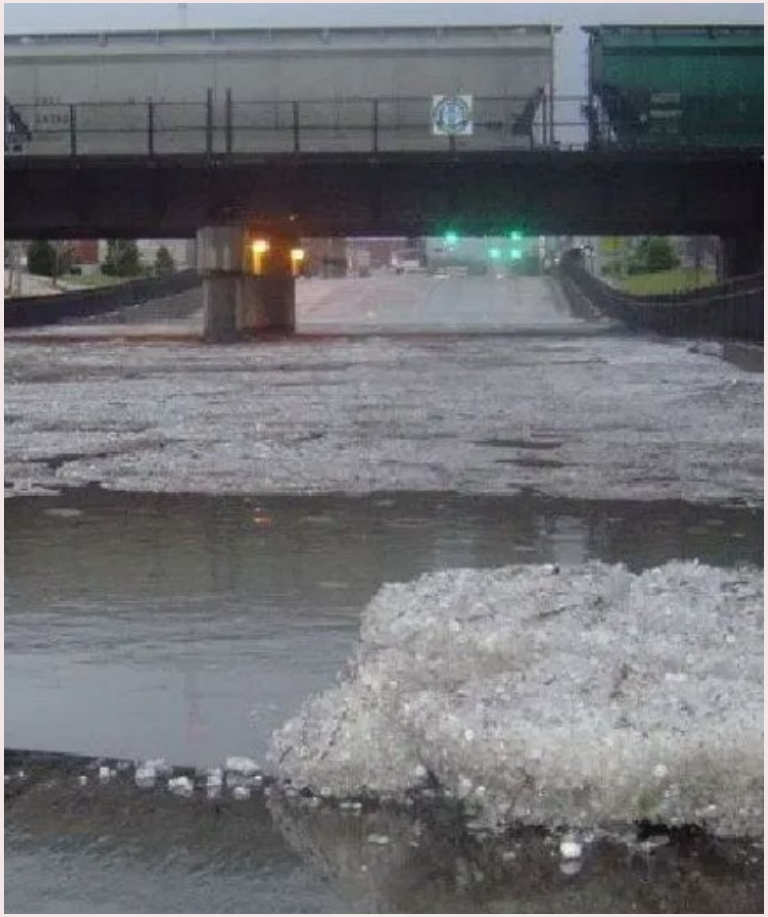
Antelope Valley (Lincoln), NE

Within the heart of Lincoln, the Antelope Valley project provides the value of large scaled urban investment of flood mitigation efforts while adding and addressing the value of aesthetics, economic revitalization, housing expansion, transportation, and recreation opportunities. Flood mitigation efforts in the urban core which could have resulted in millions of dollars in lost damages, infrastructure loss, and immobility are all now reduced showing the impact of how when you invest in mitigation the results are often unseen due to effectiveness.

Grand Island

In the heart of Nebraska, Grand Island shows how communities can leverage mitigation projects such as in the case of flooding in economically efficient ways. As a mid-sized city for the state and geographic location that is relatively low lying, flooding can pose impactful challenges for the community. Flooding in the community comes from heavy rain, local rivers, and nearby watersheds. Not only is the community thinking about mitigation at the local level but also at the regional level due to the nature of mitigation opinions. This shows how one community's investment can spread out and create partnerships that save and support neighboring communities as well. Major flood events that have shown the impact and importance of flood management in the area include 1984, 1993, 1999, 2005, 2017, and 2019 with several mid and smaller-sized flood events in between.

The community of Grand Island and surrounding areas have learned lessons of proactive response, strong leadership, and partnership participation. The Upper Prairie – Silver – Moore's project along with the Wood River are examples of regional problems that both the city, surrounding areas, as well as state and federal partnerships have allowed to promote mitigation. The Central Platte NRD has been a key stakeholder in Grand Island's mitigation efforts at times acting as an advocate for the community when the Army Corps of Engineers' vision for mitigation did not fit the community's wants and needs. The resilience of partnerships is shown heavily in the case of the city.



Source: https://nebraska.tv/archive/hastings-hail-grand-island-flood-of-2005-one-for-the-ages

Wood River Diversion Project

This project was a multi collaborative effort lead by the Army Corps of Engineers, Nebraska NRD, Central Platte NRD, Both Hall and Merrick counties, as well as Central City and Grand Island to install a series of levees and flood control efforts along the Platte River to protect the city and in the process save millions of dollars in losses. The project cost $15.5 million dollars to complete but projected savings in damages of $23 million dollars.

Upper Prairie – Silver – Moores Project

This project was a partnership between Central Platte NRD, Hall and Buffalo counties and the city of Grand Island to build a series of dams, levees, and water detention centers to the north of the city for 5,000-acre feet. The project began in 2007 with construction and finished just recently in 2019. Due to this project in 2020, FEMA accepted Flood Map revisions that removed 600 existing structures from the flood plain.

The Partnerships of city, county and state organizations gives the community real input and value of the work being done. With the structure of Nebraska NRDs, the community and state agencies were able to come together and find a unique approach to the community here rather than from a standard approach plan as shown by the Army Corps of Engineers whose plan would have pushed flood waters onto farmlands. Understanding the value of community and the residents who live in such areas is critical to understanding the mitigation paths that can occur. Mitigation principles that align with flood reduction while also meeting the needs of the people who ultimately will fund large parts of the project through tax dollars and live with the results.

When thinking about large-scale regional hazard mitigation efforts such as those in Grand Island and neighboring communities, there is also concern of jurisdictional control and regulation of such projects. Having strong communication that exists in this case study shows how future challenges can be avoided in terms of regulatory control, maintenance, and future flood mitigation. Through establishing strong networks in the process and across years the communities and agencies are set to have a more meaningful impact collaboratively.

Beatrice

A story of long-term visioning's ability to lead to millions of dollars in potential losses being saved, Beatrice is leading in the state of Nebraska for its efforts to combat natural disasters head on. The Big Blue River running through Beatrice contributes to the communities' largest concern for flood mitigation and management. Since the late 1900's there have been several large-scale flood events in 1973, 1984, 1993, 2015, and 2019. Progressively as the floods occurred the city saw sizable reductions in loss and damage. This case highlights the value of a proactive approach.

In 2018, FEMA and the Nebraska Department of Natural Resources conducted an economic benefit analysis towards Beatrice in their mitigation efforts and found that at the time the community had saved $8 million dollars in potential loss providing a return on investment of approximately 263%. This economic value can be critically important to smaller communities across Nebraska where funds and resources are limited heavily and populations declining. This investment not only protects the community, but also expands upon the natural green space and contributes to local economic development. The city has a multifaceted approach to mitigation including the following efforts:

Funding:

- Utilizing city funds
- Private contributions and philanthropy
- FEMA programs (Hazard Mitigation Grant, Flood Mitigation Assistance, and Project Impact Grants)
- HUD Programs (Community Development Block Grants)

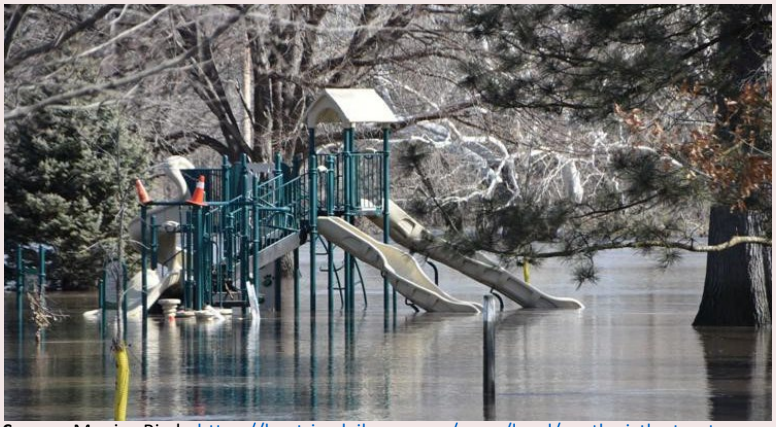
Land acquisition:

- Identify where properties lie within the floodplain
- Buy as people are willing to sell and rehouse
- Prohibit future development in undeveloped lands
- Turn into green recreation spaces
- Plan for future flood plains

The community first started its approach to hazard mitigation during the early 1970's and 80's, even before its recent significant flood events. The value added in dollars saved back in the early initiative era has exponentially increased the cost of savings in dollars today. As the community has been invested heavily in this effort for over 40 plus years, it has been able to become part of the community's identity and historic planning practices. Proactive mitigation has become the norm here where otherwise is often seen as a response approach in other communities. Shifting our mindset and prioritizing something that we may not see the effects of but will in the long run feel economically adds tremendous value to small rural communities across the state.

The effects of proactive response to mitigation allow for roadways to stay open when otherwise would be flooded, houses not flooded, emergency services having uninterrupted access, protected public infrastructure, among other benefits that we often see during post flood cleanup efforts. The city understood the immovable nature of the river and choose to act accordingly with its development in mind post 1973.

Areas of flooding are limited to primarily recreation areas due to property buy out and redevelopment of spaces to green areas.



Source: Monica Birch. https://beatricedailysun.com/news/local/south-sixth-street-reopens-after-flood/article_42c29657-6927-5c82-9673-d7e16eca12cb.html

Source: Jory Schweers. https://journalstar.com/news/local/crime-courts/sheriff-u-s-highways-77-and-136-in-beatrice-remain-closed/article_4f3d4a7a-f1f5-5c56-9701-54968d73b8db.html?mode=nowapp

Antelope Valley (Lincoln)

In the heart of Lincoln, the Antelope Valley project provides the community with an impactful solution to flood mitigation and management. Comprising of the city's largest public works project in its history, the $240 million effort to not only transform the area into being somewhere free from flood risk, but also adding value into the community through economic revitalization and recreational enjoyment.

In the middle of the program between O street and R street sits Union Plaza a recreational area that features environmental education efforts, playgrounds, trails, plants native to the state, as well as a hub for the surrounding neighborhood linking its economic wealth to the surrounding commercial spaces. Through connectedness and revitalization, efforts have supported the development of the telegraph district as a mixed-use development community and increased investment in new housing and commercial spaces in the additional neighboring spaces. Pictures given show Union Park, trails, and amphitheater, between O St. and R St.

Source: https://www.lpsnrd.org/projects/completed-projects/antelope-valley-project

The mitigation efforts aim to channel 100-year floods through this path by levees and natural paths linking salt creek to Holmes Lake reservoir. In 2015 in one of the most recent flood events the city faced, the areas surrounding the antelope valley project remained largely unflooded while other communities around the city had increased water levels showing the value and protections that flood mitigation efforts can bring to local communities. Avoiding the risks and damages that come through unregulated efforts such as property damages, destruction of the built environment, pollution, risks to water and power supplies, among others that have been seen time and time again with historic flood events. This green belt initiative shows the level that green recreation spaces can act as a response to mitigation within communities not taking away from valuable resources and landscape but add increased economic value.

The given picture is of Weir flood control at N and South St. It is a low-head dam that controls flood levels going into the Antelope valley region just south of Union Park.

Plans such as these show how increasingly developed and built environments can still be invested in to provide community mitigation efforts while not taking away from the area. In this case, the project addressed flood risk needs and ignited neighborhood development efforts that will bring in value for years to come. According to FEMA the overall hazard benefit cost ratio is for every $1 spent on mitigation efforts the community saves $6 in potential loss.

Source: https://www.lpsnrd.org/projects/completed-projects/antelope-valley-project

Overall Recommendations

Floodplain & Stormwater Management

Floodplain Mapping

Accurate and updated mapping of floodplains helps identify areas at risk of flooding like as seen in 2019, allowing authorities to enforce appropriate regulations and zoning.

Floodplain Regulations

Implement and enforce regulations that restrict or guide development in flood-prone areas and update throughout the years to adjust with floodplains. These regulations may include limits on building heights, construction materials, and land use zoning.

Floodplain Zoning

Establish zoning ordinances that designate floodplain areas for specific uses and activities, such as recreational areas, agricultural land, or green spaces, while restricting high-risk developments. Move away from any new development within these designated areas.

Infrastructure Improvements

Upgrade stormwater drainage systems, bridges, culverts, and levees to improve flood resilience and reduce the impact of flooding on communities.

Climate Change Adaptation

Incorporate projections of future climate change impacts, such as increased precipitation and sea-level rise, into floodplain management strategies to ensure resilience against changing flood risks.

Flood Insurance

Encourage property owners in flood-prone areas to purchase flood insurance to protect against financial losses due to flooding events.

Building Codes

Inspections and Enforcement

Building departments conduct inspections to verify compliance with floodplain regulations and building codes. Enforcement mechanisms, such as fines or penalties for non-compliance, help ensure that structures are built to withstand flood hazards effectively.

Flood Zone Designations

Building codes typically incorporate flood zone designations established by floodplain management authorities. These zones classify areas based on the likelihood and severity of flooding, such as Special Flood Hazard Areas (SFHAs) identified by the Federal Emergency Management Agency (FEMA).

Base Flood Elevation (BFE)

Building codes often require structures within SFHAs to be constructed above the BFE. It is the elevation to which floodwaters are anticipated to rise during a base flood event with a 1% annual chance of occurrence (referred to as the 100-year flood). Depending on local regulations and floodplain maps, building codes may mandate specific elevation requirements for different types of structures. For instance, residential buildings may be required to elevate habitable floors above the BFE, while non-residential structures might have different elevation criteria.

Accessibility and Safety

Building codes prioritize the safety and accessibility of structures during floods, ensuring that evacuation routes remain accessible and that emergency services can reach affected areas. Requirements may include safe egress options, emergency lighting, and flood-resistant access points.

Utilities and Mechanical Systems

Codes often mandate the placement of utilities and mechanical systems above anticipated flood levels or their floodproofing if located below the BFE. This helps prevent damage to electrical, HVAC, and plumbing systems during floods, reducing repair costs and post-flood recovery time.

Retrofitting

Through adjustments or modifications to existing structures or infrastructure to reduce the risks posed by natural or man-made hazards. Such examples may be structural reinforcements, floodproofing, stormwater/drain management, among others to allow properties to remain unaffected or limit impact through disasters.

Community Education, Resilience & Awareness

Educational Campaigns, Workshops and Training

Launch educational campaigns to inform residents about the various hazards that affect the community, such as the 2019 flooding. Use a variety of channels, including social media, websites, flyers, and community events, for outreach. Organize workshops, training sessions, and seminars to teach residents about hazard mitigation strategies broadly as well as specific to their community at-large, emergency preparedness, evacuation procedures, first aid techniques, and disaster recovery resources. This can be done in collaboration with local emergency management agencies, community organizations, and experts to provide comprehensive training.

Community Meetings

Host regular community meetings where residents can learn about hazard mitigation initiatives and actively participate in planning processes. Engage community leaders, elected officials, and experts to facilitate discussions and address concerns. Community led initiatives.

Informative Resources

Develop interactive tools and resources, such as online hazard maps, preparedness checklists, evacuation route planners, and emergency contact lists, to empower residents to take proactive measures to mitigate hazards and protect themselves and their families. Tailor outreach materials and communication strategies to address the cultural and linguistic diversity of the community.

Partnerships with Schools and Neighborhood Associations

Collaborate with schools and educational institutions to incorporate hazard awareness and preparedness into the curriculum. Organize drills, simulation exercises, and school-based initiatives to educate students, teachers, and parents about disaster response and safety measures at the community levels. Partner with neighborhood associations, homeowner associations, and community groups to disseminate information, foster communication networks, and mobilize residents for collective action.

Community Resilience Events

Organize community resilience events, such as preparedness fairs, safety demonstrations, and neighborhood clean-up days, to promote a culture of resilience and foster connections among residents, businesses, and emergency responders.

Media Partnerships

Collaborate with local media outlets, including newspapers, radio stations, television channels, and online platforms, to share hazard mitigation messages, share success stories, and highlight community resilience efforts.

Green Infrastructure

Constructed Wetlands

Constructed wetlands are human-made ecosystems designed to mimic natural wetlands. They treat stormwater and wastewater by filtering pollutants, removing excess nutrients, and improving water quality. Constructed wetlands also provide habitat for diverse plant and animal species and enhance recreational and aesthetic values.

Urban Forests

Urban forests comprise trees, shrubs, and other vegetation in urban areas. They help mitigate flooding by intercepting rainfall, reducing surface runoff, and increasing soil infiltration rates. Urban forests also improve air quality, reduce urban heat island effects, and provide numerous social, economic, and environmental benefits.

Green Streets

Green streets incorporate green infrastructure elements such as trees, permeable pavement, and bioretention features into urban roadways. They manage stormwater runoff, reduce flooding, improve water quality, enhance pedestrian safety, and beautify neighborhoods.

Community Gardens

Community gardens are shared spaces where individuals and groups cultivate fruits, vegetables, flowers, and herbs. They contribute to urban greening, improve soil health, and reduce stormwater runoff by increasing vegetation cover and soil permeability.

Rain Gardens

Rain gardens are shallow depressions planted with native vegetation that capture and absorb rainwater from rooftops, driveways, and other impervious surfaces. They filter pollutants, reduce erosion, and recharge groundwater. Rain gardens also enhance biodiversity and provide habitat for pollinators and other wildlife.

Building Design

Permeable pavement includes porous materials such as pervious concrete, permeable asphalt, and permeable pavers that allow water to infiltrate through the surface into the ground below. These surfaces help reduce stormwater runoff, replenish groundwater, and minimize flooding by capturing and storing rainwater. Green roofs are vegetated roof covers installed atop buildings. They consist of a waterproofing layer, drainage system, growing medium, and vegetation. Green roofs absorb rainwater, reduce stormwater runoff, provide insulation, and mitigate urban heat island effects. They also offer habitat for birds, insects, and other wildlife.

Land Use Planning & Floodplain Restoration

Assessment and Planning

Conduct comprehensive assessments of floodplain conditions, including hydrology, topography/GIS, and current land use. Use this information to develop floodplain restoration and mitigation plans that prioritize areas for intervention and identify restoration goals specific to the local community.

Ecological Restoration

Restore natural floodplain features, such as wetlands and buffers to enhance floodwater absorption, reduce erosion, and improve water quality. Implement habitat restoration projects that reintroduce native vegetation and promote local biodiversity.

Floodplain Connectivity

Enhance connectivity between floodplain areas and adjacent riverine systems to allow for natural floodplain inundation and sediment deposition processes. Restore channels and remove barriers to flow to improve waterway connectivity.

Sustainable Land Use Practices

Encourage sustainable land use practices in floodplain areas, such as low-impact development, green infrastructure, and conservation easements. Promote flood-resilient agriculture, floodplain-compatible development, and the preservation of open space.

Funding and Incentives

Secure funding sources and provide incentives, when possible, for floodplain restoration and mitigation projects, such as grants, loans, tax incentives, and conservation easements. Leverage public-private partnerships and innovative financing mechanisms to support large-scale restoration efforts. Utilize all levels of government efforts and collaboration from local, state, and federal levels.

Chapter 5: Case Study for Community Rating System (CRS)

Preparation of Community Engagement Event

Stakeholder Engagement

To prepare for the Fremont community engagement event, stakeholder engagement was crucial to prepare and execute the event. The stakeholders involved in preparing for the April 1st event helped the group define the event goals and objectives. By defining goals and objectives, the group was able to outline how to communicate with the stakeholders before, during, and after the public event. Stakeholders that aided and coordination for the event are listed below:

- Karl Dietrich, JEO
- Jennifer Dam, City of Fremont
- Laura Briggs, Keene Memorial Library
- Jeff Forward, Fremont Tribune
- Justin Letterman, Director of Public Works for the City of Fremont

Media Plugs for Event

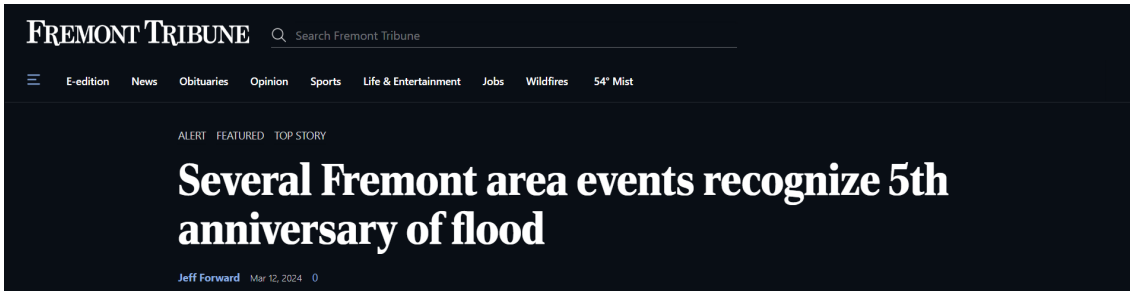
The group created media plugs for the April 1st event by coordinating with stakeholders involved in the event preparation. Listed below are the items used to engage the public for the April 1st event.

Fremont Radio Show Announcement

Justin Letterman, the Director of Public Works shared information for the April 1st Community Engagement event on the City of Fremont Mayor's radio broadcast on March 25th, 2024.

Newspaper Article

The event was promoted in the local newspaper, Fremont Tribune on March 12th, 2024, and article written by Jeff Forward. The article provided an overview of the 5th anniversary of the 2019 flood event and information on the April 1st community engagement event.

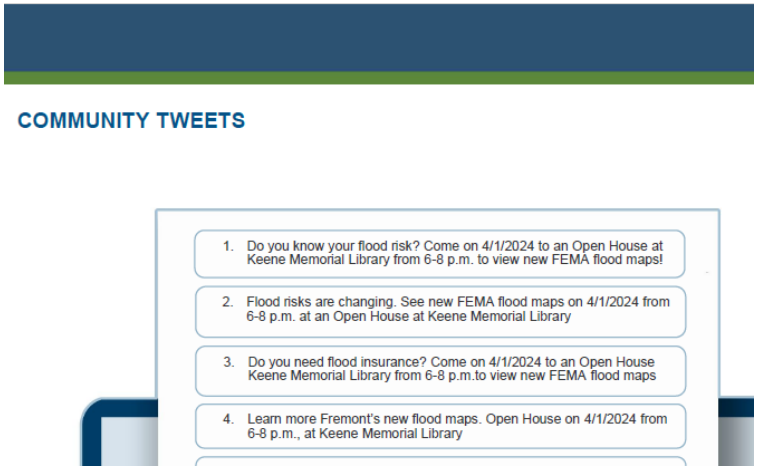


Library Calendar

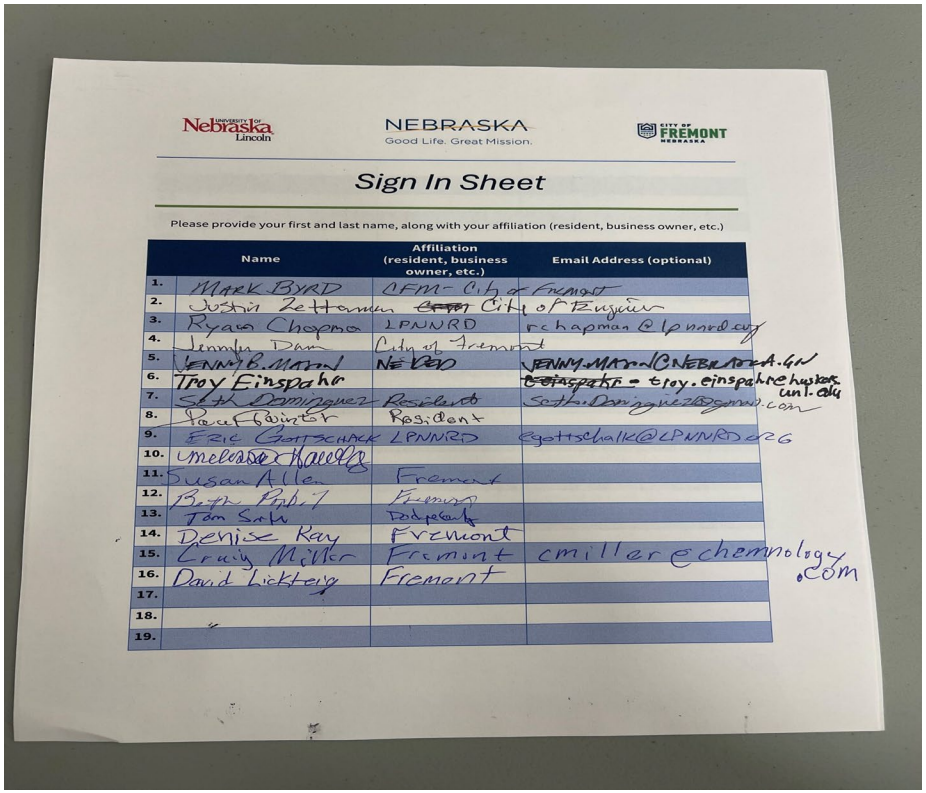
The event information was hosted at Keene Memorial Library in Fremont, NE. Laura Biggs of Keene Memorial Library helped provide an event space and promote the event on the library's calendar. The flyer was written in English and Spanish for the event.

UNL Extension E-mail

An email was sent by Angi Heller, an Engagement Zone Coordinator on behalf of UNL Extension to promote the April 1st Community Event to UNL personnel, Dodge County employees, and other parties who may have had an interest in sharing or attending the event. The email was sent on March 24th, 2024.



Community Engagement Event Materials



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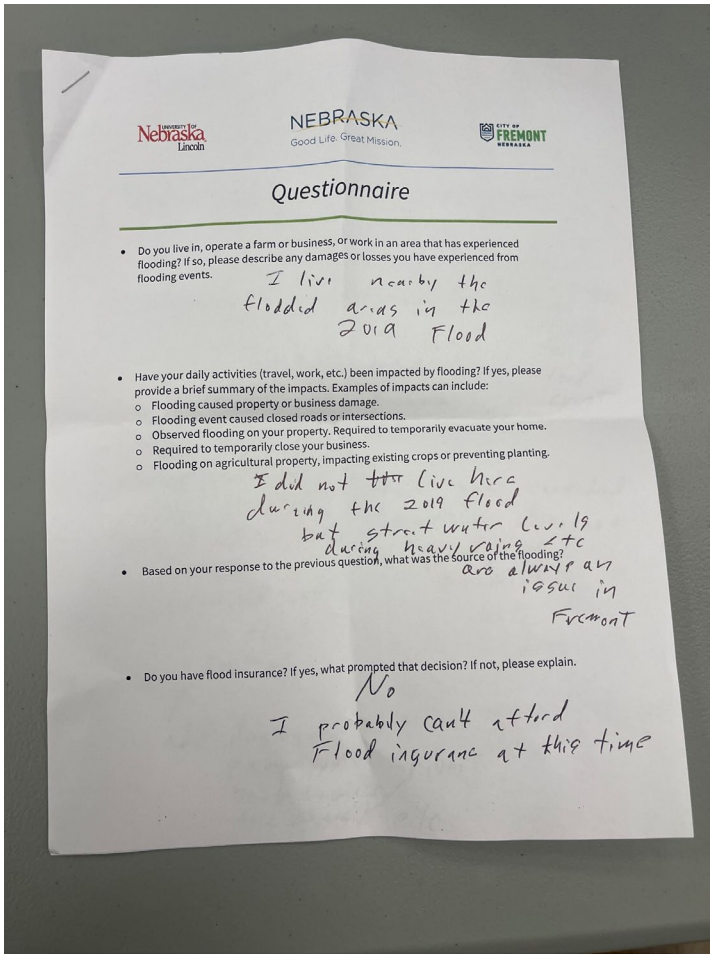
Sign In Sheet

Please provide your first and last name, along with your affiliation (resident, business owner, etc.)

	Name	Affiliation (resident, business owner, etc.)	Email Address (optional)
1.	MARK BYRD	CFM- City of Fremont	
2.	Justin Zettaman	City of Fremont	
3.	Ryan Chapman	LPNNRD	rchapman@lpnnrd.org
4.	Jennifer Dam	City of Fremont	
5.	JENNY B. MANN	NEDED	JENNY.MANN@NEBRASKA.GOV
6.	Troy Einspahr		troy.einspahr@unl.edu
7.	Seth Dominguez	Resident	Seth.Dominguez2@gmail.com
8.	Paul Painter	Resident	
9.	Eric Gottschalk	LPNNRD	egottschalk@LPNNRD.org
10.	Melissa Hall		
11.	Susan Allen	Fremont	
12.	Beth Rubi	Fremont	
13.	Tom Soth	Fremont	
14.	Denise Ray	Fremont	
15.	Craig Miller	Fremont	cmiller@chemnology.com
16.	David Lickteig	Fremont	
17.			
18.			
19.			



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Questionnaire

- Do you live in, operate a farm or business, or work in an area that has experienced flooding? If so, please describe any damages or losses you have experienced from flooding events.

  I live nearby the flooded areas in the 2019 Flood

- Have your daily activities (travel, work, etc.) been impacted by flooding? If yes, please provide a brief summary of the impacts. Examples of impacts can include:
  - Flooding caused property or business damage.
  - Flooding event caused closed roads or intersections.
  - Observed flooding on your property. Required to temporarily evacuate your home.
  - Required to temporarily close your business.
  - Flooding on agricultural property, impacting existing crops or preventing planting.

  I did not live here during the 2019 flood but street water levels during heavy rains etc are always an issue in Fremont

- Based on your response to the previous question, what was the source of the flooding?

- Do you have flood insurance? If yes, what prompted that decision? If not, please explain.

  No
  I probably can't afford Flood insurance at this time

Stakeholder Discussion and Community Feedback

Stakeholder Discussion

For Chapter 1

There were a few comments made regarding previous flooding events and their regional impacts. Some impacts included the dangers of floodwater carrying hazardous materials throughout its path and handling the aftermath of cleaning up and repairs. Policies on building and land use in flood-prone areas were also brought up, along with the different types of protective measures that can be set in place for physical structures.

For Chapter 2

A timeline was created for major flood events and was presented to the community members at the open house meeting that took place in Fremont, NE. Because of its flat terrain, Fremont has long-standing drainage issues making stormwater runoff extremely low, this makes most of the areas around Fremont at at high risk for flooding. Even though the residents who attended the open house meeting stated that they live outside the 100-year floodplain, they still think that in case of another serious flood event, most of Fremont would be impacted. The timeline of the major flooding events we used started from July 5th, 2000, March 8-10th, 2010, February 18th, 2011, August 6th, 2013, June 2016, and March 2019 which was the worst in recent history.

Stakeholder Discussion

For Chapter 3

Fremont community members that discussed the maps that displayed the 2019 floodwater locations and current Flood maps from FEMA had comparable stories to share. Most of the residents that engaged in this discussion lived outside of the 100-year floodplain, which is mostly concentrated in the southern side of the city, closest to the Platte River. According to U.S. Census Data and GIS Analysis the population of Fremont that lives within the floodplain of the Platte River is 2,180. The residents that discussed the floodplain and inundation maps did not indicate they resided in it. There was a common mantra among the residents that "we live by the high school." Stakeholders including professionals and residents alike indicated that a future flood event would still have a serious impact on Fremont.

For Chapter 4

Fremont community members discussed potential recommendations and insights based upon the 2019 flood. Highlighted and special focus was aimed towards Improvements of the physical infrastructure (levees, dams, etc.). Listed below were the improvements discussed:

- Improvements in stormwater drainage
- Promotion of nonstructural alternatives (retrofitting, utility, mitigation, land acquisition)
- Update local planning and design standards as well as building codes
- Encourage purchasing of flood insurance, Preservation of the natural open space
- Improvement of emergency management capacity (warning systems, notification, emergency exercises)
- Increase education on flood risk, preparation, and mitigation strategies

Community Feedback

For Chapter 1

Many attendees who stopped at the board with information on the Community Rating System and the function of the open house understood that flooding in the area is a concern. One attendee had questions regarding the differentiation between CRS and the funding mechanisms the Federal and Nebraska Emergency Management Agency hold. As a response, the purpose was explained that this open house would allow Fremont to boost their CRS score to reduce flood insurance rates for community members.

There were few comments or input made regarding the demographics for Fremont. All comments regarding the community's demographics related to the varying statistics for each category displayed. Regarding the data regarding the number of vehicles households had, the aspect of other modes of transportation was brought up, and how there is an increasing amount of public and active transportation options in Fremont.

For Chapter 2

According to what we gathered from the feedback of those who attended and from the articles, the community members have identified new mitigation measures and new special districts such diking and drainage districts have joined the planning effort to be eligible to mitigation funding. Additionally, Fremont and Schuyler conducted a flood risk reduction and parcel level flood risk assessments as a part of this plan.

For Chapter 3

Some Fremont residents shared their personal stories of where they were when the flood came back in 2019. Many indicated their problems that they had to experience during the flood event. Some residents had differing opinions on what caused the flood and why the 2019 flood event was particularly problematic. Residents indicated that they were not sure why people were still buying homes and property within the floodplain and some expressed concern about the effects of future flood events. There was a sentiment of wanting to move past the flooding that occurred and continue to be a strong and vibrant Fremont.

For Chapter 4

Fremont residents shared their input into where they believe further focus should be prioritized and overall perceptiveness of mitigation measures. Residents were asked to mark with a green or red sticker if they would be in favor of the above-mentioned recommendations. Green for in favor, Red for oppose. Many residents outlined their positions through dialogue and generally approved of all outlined measures and strategies.

Overall Summary of the Event

The goal of the April 1st event was to provide residents a chance to visit with community and county officials to learn about newly released flood maps, known as Flood Insurance Rate Maps (FIRMs), and potential flooding in their community. It was observed that community engagement and participation occurred at all the chapter stations. Many of the residents felt comfortable sharing their stories of the 2019 flood and voiced their opinions and concerns moving forward in the community. UNL students and faculty onsite listened and provided answers to residents' feedback and questions. By engaging with the community, the group was able to provide mitigation measures and recommendations referenced in Chapter 4: Mitigation Measures and Recommendations in this document.

University of Nebraska – Lincoln staff attended the event to photograph the event for potential upcoming media coverage. Photos from the April 1st event is provided below in the Event Materials section. Sign-in sheets were present, and surveys were handed out to residents who participated in the event. The sign-in sheet and completed surveys are provided in the Event Materials below. Hand out materials with additional information were provided to participating residents. The hands are provided below in the Event Materials section.

A takeaway from preparing and planning for open house events is to aim to host events in a flood-affected area in the community. An attempt was made to host the April 1st event at the elementary school in the flood plain, however, the school was undergoing construction and could not host the event.

Conclusion

This Report was finalized five years following Nebraska's worst flooding event in 50 years of measurement. At the time, the FEMA Incident Period for DR-4420 was the longest on record and only overtaken by that of the covid-19 pandemic. In comparison, Hurricane Katrina – perhaps the U.S.'s most well-known flood-related disaster had an incident period of 65 days. Having occurred over a four-month period, the impacts of DR-4420 were relentless until the worst of the flooding finally subsided in mid-July 2019. Nebraska state statutes were revised after the historic flooding event to incorporate additional data gathering and analysis to support flood mitigation efforts within the state.

In the State FHMP, NeDNR includes a detailed record of where flooding has historically occurred and presents recommendations for how to reduce those flood-related vulnerabilities while acknowledging the unique conditions in Nebraska that setup at least seven distinct types of flooding: riverine flooding, flash floods, groundwater flooding, ice jam flooding, snowmelt flood, dam failure, and levee failure. Not specifically addressed within the State FHMP are the socio-economic conditions of those areas. This Report incorporates some of that missing information to facilitate a deeper understanding of potential areas of socio-economic vulnerabilities towards a more equitable approach to mitigation. Mitigation measures that are considerate of capacity constraints within communities – especially those having concentrations of vulnerable populations, which are likely to be disproportionately fiscally challenged by the cost of mitigation and recovery – are more likely to meet their intended outcomes by directing resources to the greatest need.

This Report acknowledges that further data gathering, and analysis is necessary to grasp the fuller scope of the socio-economic impact on disaster recovery and mitigation in Nebraska. Some areas for further analysis include, but are not limited to, reviewing and assessing planning and zoning-related efforts within specific jurisdictions, evaluating existing or planned coordination between natural resource districts and local governments, and establishing a community engagement framework to determine an implementation approach that considers risk and capacity, to right-size mitigation measures, and identify opportunities to tie them to other ongoing or planned community and economic development initiatives. For example, a community's flood risk may be reduced by expanding greenspace near waterways while also enhancing its available recreation areas, which can spur economic development – resulting in an increased tax base and funding to support other community needs. In all cases, it will be important for community members to be informed and engaged in the process. Given the proximity of many Nebraska communities to rivers and streams, flood risk and vulnerabilities should be accessed in all comprehensive and community planning processes as a matter of best practice, if not regulation.

More work is necessary to increase Nebraska's resiliency and preparedness for future flood-related disasters. The scale and scope of recorded damages from the 2019 disaster firmly brought into focus the need for enhanced mitigation efforts across the state. In addition to supporting the need for improvements to stormwater drainage and emergency management alert tools, this Report echoes the findings of the State FHMP to expand nonstructural mitigation alternatives, including retrofits, land preservation, and acquisitions; updates to local building, design, and zoning codes or ordinances; and expanding participation in the National Flood Insurance Program, including incentivizing the Community Rating System at the state or county level. Critical to implementing these mitigation efforts at the state, regional, and local level is increasing awareness and understanding of flood risk and vulnerability across all ages and populations, so communities integrate flood risk mitigation planning into their long-term vision and comprehensive planning processes before disaster strikes. Disaster recovery and mitigation should be viewed as community development.

Key Recommendations

- Floodplain & Stormwater Management, including ensuring up to date mapping, regulation, zoning changes, etc.
- Building Codes, including revising Base flood elevation (BFE) levels; implementing policies for retrofitting structures and utility systems, and limiting or prohibiting development in the floodway, floodplain, and other designated areas, etc.
- Community Education, Resilience & Awareness, including education campaigns, workshops, community meetings, local partnerships, and cultural and linguistic diversity of resources.
- Land Use Planning and Floodplain Restoration, including incorporation of sustainable land use principles, constructed wetlands, expanded green spaces, etc.
- Community led initiatives (local, county, state), including seeking or making available grants and incentives, centralized planning (local officials/state, police, fire, hospitals, etc.), identification of key partners for designated areas, and establishing or enhancing emergency preparedness exercises.

In addition, the above recommendations for further analysis imply a need for a more coordinated and collaborative approach to disaster recovery and mitigation – from the executive and legislative branches, federal agencies working in the disaster recovery realm, state agencies, and local jurisdictions – which begins with informed and engaged residents. And, while more coordination and analysis is needed, this Report commends and reinforces the federal- and state-level acknowledgment that mitigation is the most cost-effective means to reducing or eliminating long-term risk to people and property (Nebraska Department of Natural Resources, 2022). Furthermore, that 'blue-sky' non-structural mitigation measures (e.g., floodplain zoning ordinances, floodproofing, limiting development in flood-prone areas, flood insurance, acquisition programs) often prove most effective overall: an ounce of prevention is worth a pound of cure. The residents of Nebraska should never again endure a flood-related disaster that lasts 128 days.

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