Transportation Study
Arctic Strategic Transportation and Resources Project
North Slope, Alaska

July 2019

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REVISION HISTORY AND APPROVAL

REV	REV DATE	DESCRIPTION	PREPARED BY	CHECKED BY	APPROVED BY
0	07/2019	First Draft	PCR	ASH	PCR

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TABLE OF CONTENTS

List of Figures

List of Tables

List of Appendices

Distribution

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ACRONYMS

AADT	Annual Average Daily Traffic
ACSPI	Aleut Community of St. Paul Island
ADA	Americans with Disabilities Act
ADN	Anchorage Daily News
AES	ASRC Energy Services
AIP	Airport Improvement Program
AKLNG	Alaska Liquefied Natural Gas
ANWR	Arctic National Wildlife Refuge
AOI	Area of Influence
ARC	Airport Reference Code
ARTCC	Air Route Traffic Control Centers
ASRC	Arctic Slope Regional Corporation
ASTAR	Arctic Strategic Transportation and Resources
ATV	All-Terrain Vehicle
BARC	Barrow Arctic Research Center
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BOEM	Bureau of Ocean Energy Management
BTC	Bowhead Transport Company
BTS	Bureau of Transportation Statistics
BUILD	Better Utilizing Investments to Leverage Development
CD	Colville Delta
CMTS	Committee on the Marine Transportation System
CPAI	ConocoPhillips Alaska, Inc.
CWAT	Community Winter Access Trails
DCCED	Department of Commerce, Community, and Economic Development
DEW	Distant Early Warning
DNR	Department of Natural Resources
DOLWD	Alaska Department of Labor and Workforce Development
DOT&PF	Alaska Department of Transportation & Public Facilities
DOTRES	Department of the Treasury

FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
GIS	Geographic Information System
GMT	Greater Mooses Tooth
IATA	International Air Transport Association
IRR	Indian Reservation Roads
LGPV	Low-Ground-Pressure Vehicle
NARL	Naval Arctic Research Laboratory
NOAA	National Oceanic and Atmospheric Administration
NPIAS	National Plan of Integrated Airport Systems
NPR-A	National Petroleum Reserve-Alaska
NPS	National Park Service
NSB	North Slope Borough
NSBEP&CR	North Slope Borough Economic Profile & Census Report
OCS	Outer Continental Shelf
PAPI	Precision Approach Path Indicator
PAR	Project Analysis Report
ROW	Right-of-Way
RSA	Runway Safety Area
SOA	State of Alaska
SREB	Snow Removal Equipment Building
SSTI	State Smart Transportation Initiative
STIP	Statewide Transportation Improvement Program
TIGER	Transportation Investment Generating Economic Recovery
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USARC	Unites Stated Army Reserve Command
USCB	United States Census Bureau
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USPS	United States Postal Service

Executive Summary

This transportation study focuses on how freight and passengers are transported to and from the remote communities of the North Slope Borough (NSB), summarizes the economic value of the existing transportation network, identifies issues with the current network, and offers potential solutions and recommendations for improvements. The communities of Utqiaġvik, Atqasuk, Wainwright, Point Lay, Point Hope, Nuiqsut, Kaktovik, and Anaktuvuk Pass have unique transportation requirements due to their isolation from a contiguous road network and lack of significant marine infrastructure. Transportation to these communities is multimodal, involving a combination of marine, air, and overland methods. Air transport is the only method providing year-round service, which is costly and subject to inclement weather. Deadhorse, the oil and gas industry hub, is connected to the Alaska highway system via the Dalton Highway, which is accessible year-round, but no roads connect any of the other communities.

This study focuses on the existing infrastructure within the NSB and identifies regional opportunities that would bring benefits to each community. At nearly 95,000 square miles, the NSB is almost as big as Oregon, the 10th largest state in the United States. Because the NSB is so large – and geographic location is a key driver for potential opportunities – the borough was divided into separate regions.

In the Northern Region communities of Utqiaġvik, Atqasuk, and Wainwright, the need for improved marine infrastructure combined with a connecting road network was identified as a regional opportunity likely bringing the most benefit to the greatest number of residents. The Western Region, consisting of Point Lay and Point Hope, was unique in the fact that improvements to the Northern Region might favor a connecting road to Point Lay. Point Hope is extremely isolated, but there are opportunities to connect to a potential port at Cape Thompson or Kivalina and the Delong Mountain Terminal. Kaktovik is the only community in the Eastern Region, and a connecting road to Deadhorse was identified as bringing benefit to that community as well as providing access for oil and gas development. Opportunities for the Central Region include establishing an all-season gravel road from Deadhorse to the east bank of the Colville River, both temporary and permanent crossings for the Colville River, and a road continuing from the west bank of the Colville River to Atqasuk. The community of Anaktuvuk Pass in the Southern Region would be best served with an annual snow trail providing seasonal access for its residents to transport cargo overland.

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1.0 Introduction

1.1 Background

The Arctic Strategic Transportation and Resources (ASTAR) project is an initiative of the Alaska Department of Natural Resources (DNR) to "identify, evaluate, and advance opportunities to enhance the quality of life and economic opportunities in North Slope communities through responsible infrastructure development" (DNR, 2018). In partnership with the NSB, DNR seeks to collaborate with area communities and other stakeholders in an effort to identify community infrastructure and regional connectivity projects that offer the greatest cumulative benefits for the region.

This transportation study will leverage existing data and input from regional stakeholders provided by ASTAR stakeholder engagements to assess the existing transportation network and facilities in relation to current and future market conditions. Where gaps are identified between existing facilities and future requirements, options will be identified to address the needs. These options will be screened to provide feasible solutions to the overall planning effort.

The ASTAR project is focused on the North Slope region as defined by the boundaries of the NSB (Figure 1.1-1). This study will consider the surrounding area of influence (AOI) as it relates to the movement of freight and passengers in and out of the region. The AOI is described in Section 1.2.

This study is one component of the ASTAR planning effort. Other components of the planning effort are detailed below.

- Stakeholder Engagement Plan (Arctic Slope Regional Corporation [ASRC] Energy Services [AES], 2018) to guide stakeholder engagements
- Cumulative Benefits Analysis for potential projects in the region
- Geographic Information System (GIS) containing maps and data for the region
- Detailed geologic terrain unit mapping to assist granular material site development
- Economics/socioeconomics digital library to identify sources of funding and other types of assistance for infrastructure projects

All of these studies, reports, and project resources will inform development of the ASTAR strategic plan.

1.2 Area of Influence

The ASTAR AOI is the same AOI outlined in the NSB Comprehensive Plan 2019-2039. It includes the entire area within the NSB boundary, as well as a compilation of all the village AOIs, including areas outside the NSB boundary. This includes areas such as the Hanna Shoal, Ambler Mining District, Red Dog Mine, and offshore oil and gas leases. Activities in these areas affect, or influence, NSB residents. While the NSB may not have direct control over the activities in these areas, the borough seeks involvement in planning and development to ensure both borough and regional impacts are considered (NSB Regional Comprehensive Plan 2019-2039, 2018).

ASTAR focuses on project areas within the NSB boundary and acknowledges that activities outside the NSB boundary will affect NSB residents. Figure 1.1-1 shows the extent of the NSB boundary, communities, major infrastructure, and relation to the AOI.

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Figure 1.1-1. ASTAR AOI

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The oil and gas industry has the strongest effect on infrastructure within the AOI. Mining at Red Dog, and proposed mines in the Ambler Mining District, are likely to have a growing effect within the AOI, as well. Both of these industries will likely influence additional regional infrastructure. Private industries such as hunting and tourism will also likely have some influence on regional infrastructure, as well.

1.3 What is Connectivity?

Connectivity, as applied to passengers and freight, describes the ability to complete a desired trip using multiple transportation modes and routes. Rather than considering each mode as independent or parallel means of transport, the concept of connectivity aims to provide a unified, interconnected transportation network to enable efficient, continuous trips.

The transportation network can be considered as a group of interconnected links and nodes. For the purposes of this report:

- A node represents an origin, destination, or intermediate stopping point for a trip.
- A link represents the route connecting one or multiple nodes in a trip.

Starting from an origin point, an operator may use marine, air, or overland modes of transportation to reach a destination. The most efficient trips provide direct routes, accessibility, and seamless infrastructure and services.

In some cases, conflicts and barriers may impede the efficient function of a fully connected transportation network. Barriers may include excessive trip durations and distances, long wait times, high costs, and physical obstacles along the route, while conflicts may exist between modes and users.

This report explores study area characteristics and the nodes, links, barriers, and conflicts for transportation within the ASTAR AOI.

1.4 Study Objectives

The objectives for this study are as follows:

- Describe the existing transportation network for the region.
- Develop a market analysis that considers the current market, opportunities, and future trends.
- Identify issues or deficiencies in the current network and nodes.
- Recommend projects that provide the greatest benefits for the region and the next steps needed to improve conditions.

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2.0 Existing Regional Transportation Network

2.1 Marine

Marine transportation is responsible for the majority of goods shipped to the North Slope communities. Cargo barges deliver supplies to Point Hope, Point Lay, Wainwright, Utqiaġvik, Prudhoe Bay, and Kaktovik during ice-free months. With longer open water seasons in recent years, shipping lanes through Arctic regions are anticipated to increase. This will likely require an increased presence of the United States Coast Guard (USCG). Figure 2.1-1 shows the major Arctic marine shipping lanes as well as the smaller barge routes serving western and northern Alaska.

USCG

The USCG "Arctic Strategy" plan, published in 2013, describes the anticipated presence of the USCG in the Arctic in upcoming years (USCG, 2013). One million tons of marine cargo were transited through an Arctic route in 2012. The USCG expects maritime activity in the Arctic to continue to evolve from exploration and scientific research to resource extraction and commercial shipping. Between 2008 and 2012, traffic moving through the Bering Strait increased 118%, which spurred the USCG to prepare a Bering Strait Port Access Study. According to the USCG Arctic Strategy, "An oceanic trade route across the Arctic from the North Atlantic to the North Pacific would represent a transformational shift in maritime trade, akin to the opening of the Panama Canal in the early 20th century."

A reduction in sea ice and declining onshore oil production creates incentives for further exploration offshore. This will stretch current search and rescue capabilities. Maritime governance and USCG oversight can be expected to ramp up in response to high-risk activities. With increased oversight, the USCG plans to help protect the health of the marine environment, preserve living marine resources, and safeguard the nation's exclusive economic zone, which extends approximately 200 miles offshore. To support these goals, the USCG may forward-deploy small boats, cutters, and communication assets during the summer season to Utqiaġvik, which is expected to look similar to the 2012 Operation Arctic Shield – the largest USCG Arctic force package in history (Barrow Comprehensive Plan 2015-2035, 2015).

The USCG also calls for icebreaking capacity, noting that the U.S. will need to make a strategic investment in icebreakers to enable access to high latitudes over the long term. Currently, the USCG only has four operating icebreakers: the Polar Star (shown in Figure 2.1-2), a heavy icebreaker built in 1976 with an expected 30-year lifespan; the Healy, a medium icebreaker that entered service in 2000; the Aiviq; and the Nathaniel B. Palmer. A fifth icebreaker, the Polar Sea, has been out of commission since 2010, but it has been used for parts to keep the Polar Star running (https://insideclimatenews.org). By comparison, Russia has 41 icebreakers operating today (https://www.maritime-executive.com). Several icebreakers in Russia's current fleet are nuclear powered, allowing them to operate 100,000 to 200,000 hours without refueling. In April 2019, the USCG awarded $745.9 million for the detailed design and construction of Polar Security Cutters with the mission to ensure continued access to both polar regions and support the country's economic, commercial, maritime, and national security needs. The contract supports non-recurring engineering and detailed design, as well as procurement of long lead time materials and construction of the first ship. The contract includes options for the construction of two additional ships, which, if exercised, would bring the cumulative value to $1.9 billion (https://news.usni.org).

Figure 2.1-1. Arctic Marine Shipping Lanes

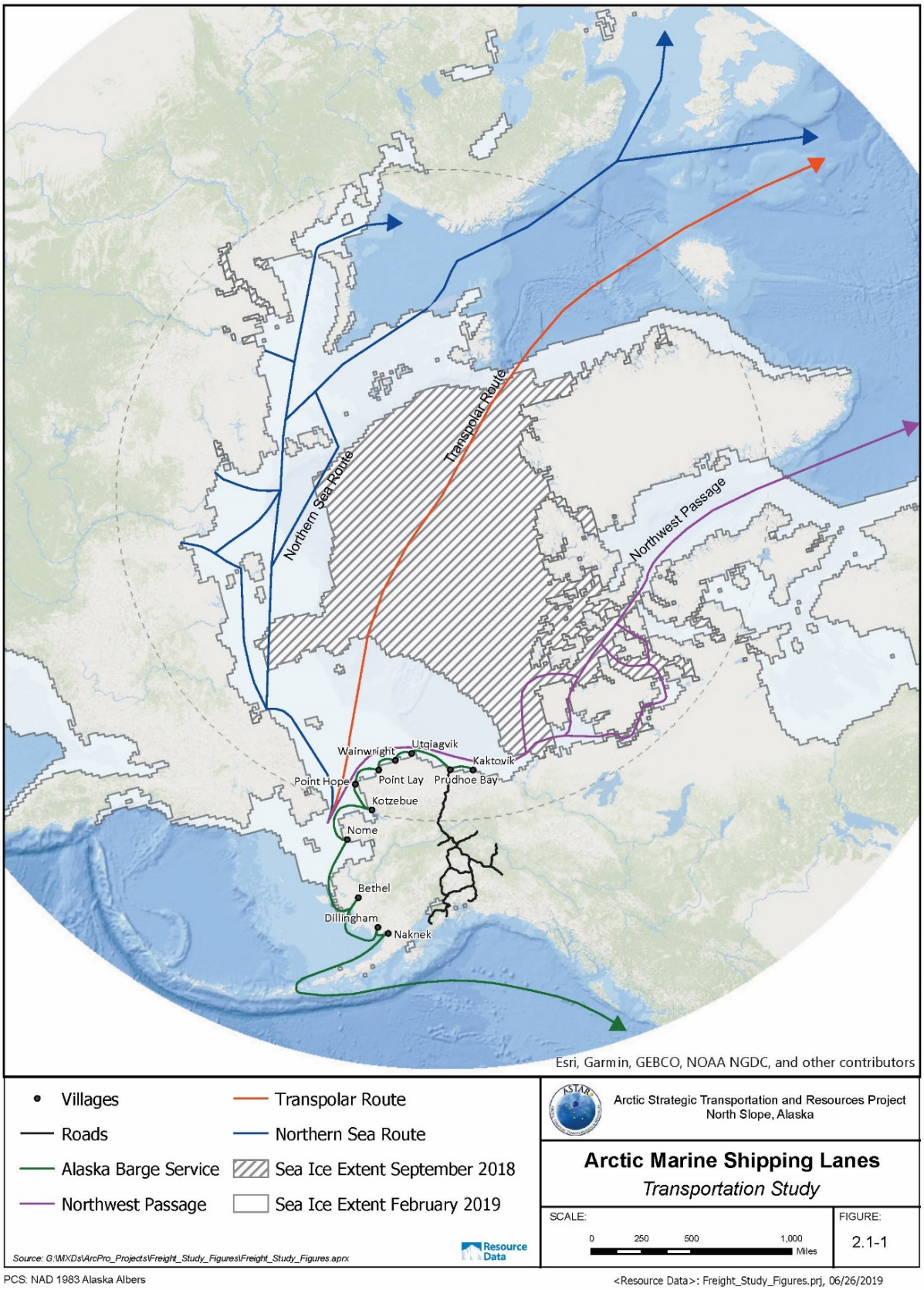

Figure 2.1-2. USCG Polar Star

(https://en.wikipedia.org)

Freight

Barges typically run from Seattle to North Slope communities transporting 3,000 to 5,000 tons of freight per trip. Barge season in the Arctic typically starts around the beginning of July and continues through September. Barges are offloaded onto the beach because none of the North Slope communities have docks or port facilities to support the incoming freight. When conditions allow, a line haul barge is put on the beach stern-first and secured with lines to heavy equipment that serve as deadheads. A landing craft is put alongside the line haul, and cargo is swung by crane to the landing craft, where it is unloaded by rubber-tired loaders. Although this is the quickest way to unload, sea and wind conditions have to be calm and consistent to unload the barge in this manner. Equipment must also be available to serve as deadheads. If conditions don't allow for direct beach offload, the freight is lightered via landing craft. The barge is anchored approximately a half-mile offshore, and the landing craft is loaded via crane. Once

the landing craft is loaded, it proceeds to the beach where it is offloaded via rubber-tired equipment (Barrow Comprehensive Plan 2015-2035, 2015).

Historically, Bowhead Transport Company (BTC), an Ukpeagvik Inupiat Corporation Marine Services, LLC member, has offered customers door-to-shore service to the Arctic for over 30 years. Beginning in 2019, BTC teamed with Alaska Marine Lines, a Lynden subsidiary, to continue to provide these same services to NSB coastal communities (https://bowheadtransport.com). Figure 2.1-3 shows a BTC barge loaded in Seattle preparing for departure to Utqiaġvik.

Figure 2.1-3. Bowhead Barge Departing Seattle for Utqiaġvik

(http://www.econodome.com)

Cook Inlet Tug & Barge, purchased by Foss Marine Holdings in 2011, a Saltchuk Resources, Inc. company, recently acquired the Crowley Vessel Sales Group's Prudhoe Bay assets on the North Slope. These assets include tug boats, barges, heavy machinery, and other vehicles and equipment and are accustomed to performing shallow draft operations; they are ideal for servicing Utqiaġvik and other North Slope communities (http://www.professionalmariner.com).

Vitus Marine typically operates shallow draft equipment throughout western Alaska, sailing as far north as Kivalina. In late 2018, Vitus Marine received licensing to operate on the North Slope and will be able to serve North Slope communities as needs arise (personal communication, Vitus Energy Director of Sales Mike Poston, 2019).

Passengers

Residents of the NSB generally do not travel to their communities via marine transit. Marine passenger transport in the Arctic is limited to tourism. In 2016, Crystal Cruises sailed the Crystal Serenity over the Arctic with more than 1,000 people on board for the first time, then repeated the voyage in 2017. After the 2017 trip, Crystal Cruises discontinued its plans for repeat arctic voyages with Crystal Serenity; however, the American cruise line may decide to sail again with a different ship more properly geared for the Arctic. Crystal's website advertises the Crystal Endeavor as a polar-class megayacht, which will be debuting in 2019.

The cruise industry poses a significant stress on Arctic resources. Passenger rescue could prove difficult as the number of passengers on the ship can be two or three times the size of residents in local communities, leaving limited space for emergency shelter. Waste disposal, oil spills, and the disruption of subsistence hunting and whaling activities are risks the cruise industry poses to Arctic communities. Some communities will stand to benefit from the sailings as passengers buy supplies and gifts. Additional benefits can be provided by the cruise lines coordinating for specific needs of the community. In the case of Pond Inlet, a Nunavut community on Baffin Bay, the Crystal Serenity delivered solar panels that would have been cost prohibitive without shipping provided by Crystal Cruises. The Crystal Serenity also dropped off donations of school supplies, benches, and clothes to communities throughout its passage (https://www.highnorthnews.com).

2.2 Air

Due to seasonal sea ice and a non-contiguous road network, North Slope communities have severely limited connectivity. Transportation from North Slope communities to other villages, or to larger cities such as Anchorage or Fairbanks, is primarily done by air. See Figures 2.2-1 and 2.2-2.

Passengers

Utqiaġvik and Deadhorse (Prudhoe Bay) are the main hubs on the North Slope, with flights to and from Anchorage and Fairbanks. Alaska Airlines (flying a Boeing 737) provides fairly frequent services to the two hubs. The other prominent air carrier on the North Slope, Ravn Alaska (flying various prop planes), provides services between Anchorage, Fairbanks, the two hubs, and other communities. See Figure 2.2-2 for connectivity by air carrier to the various communities. In addition to travel between communities, the North Slope requires transportation in support of the oil and gas industry. In addition to chartered Shared Services Aviation for ConocoPhillips Alaska, Inc. (CPAI), workers use Alaska Airlines and Ravn Alaska for transportation to and from Deadhorse/Prudhoe Bay. Service providers also connect to other private airports, such as chartered services to Point Thomson.

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Figure 2.2-1. Airstrip Overview

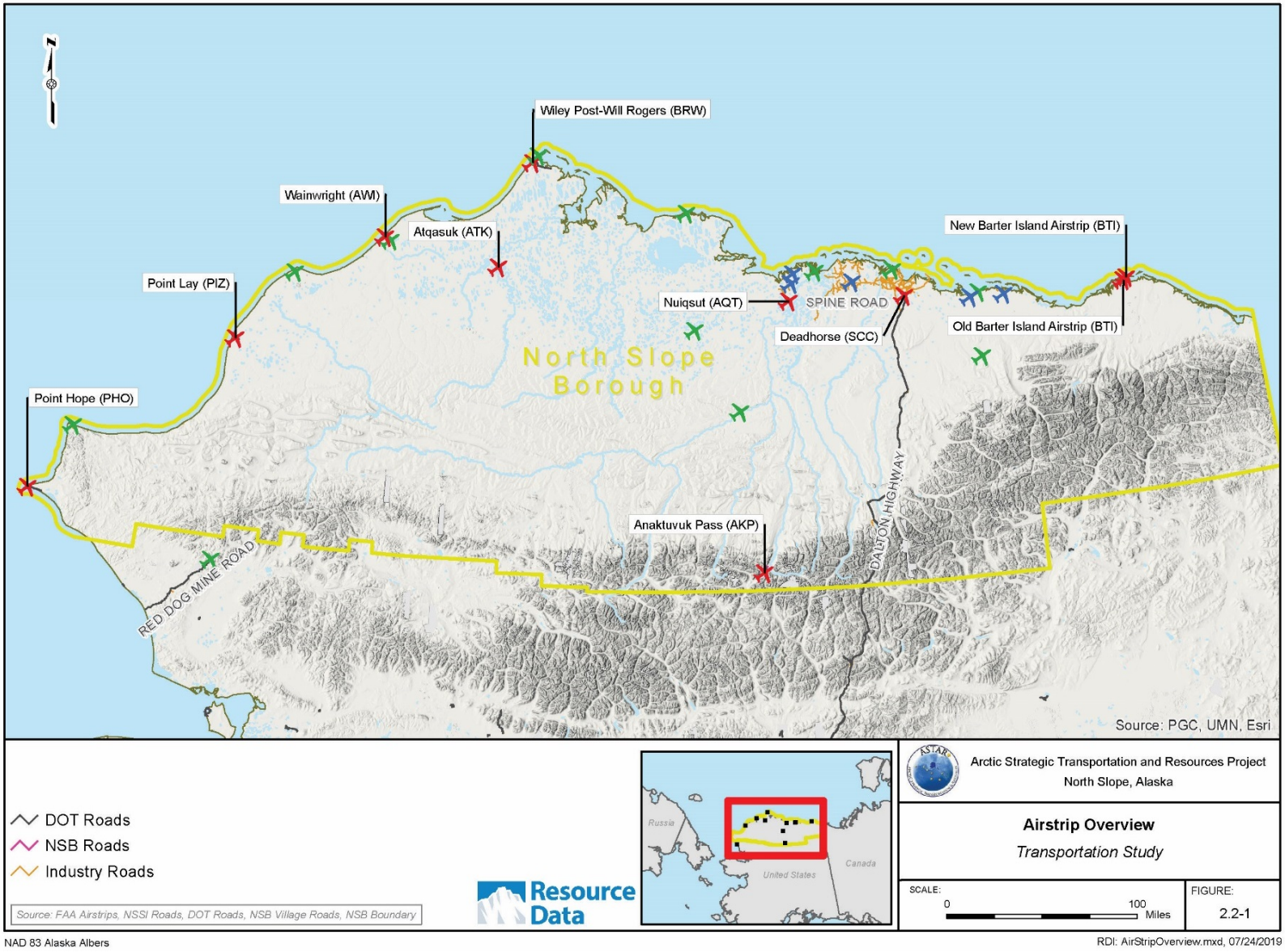
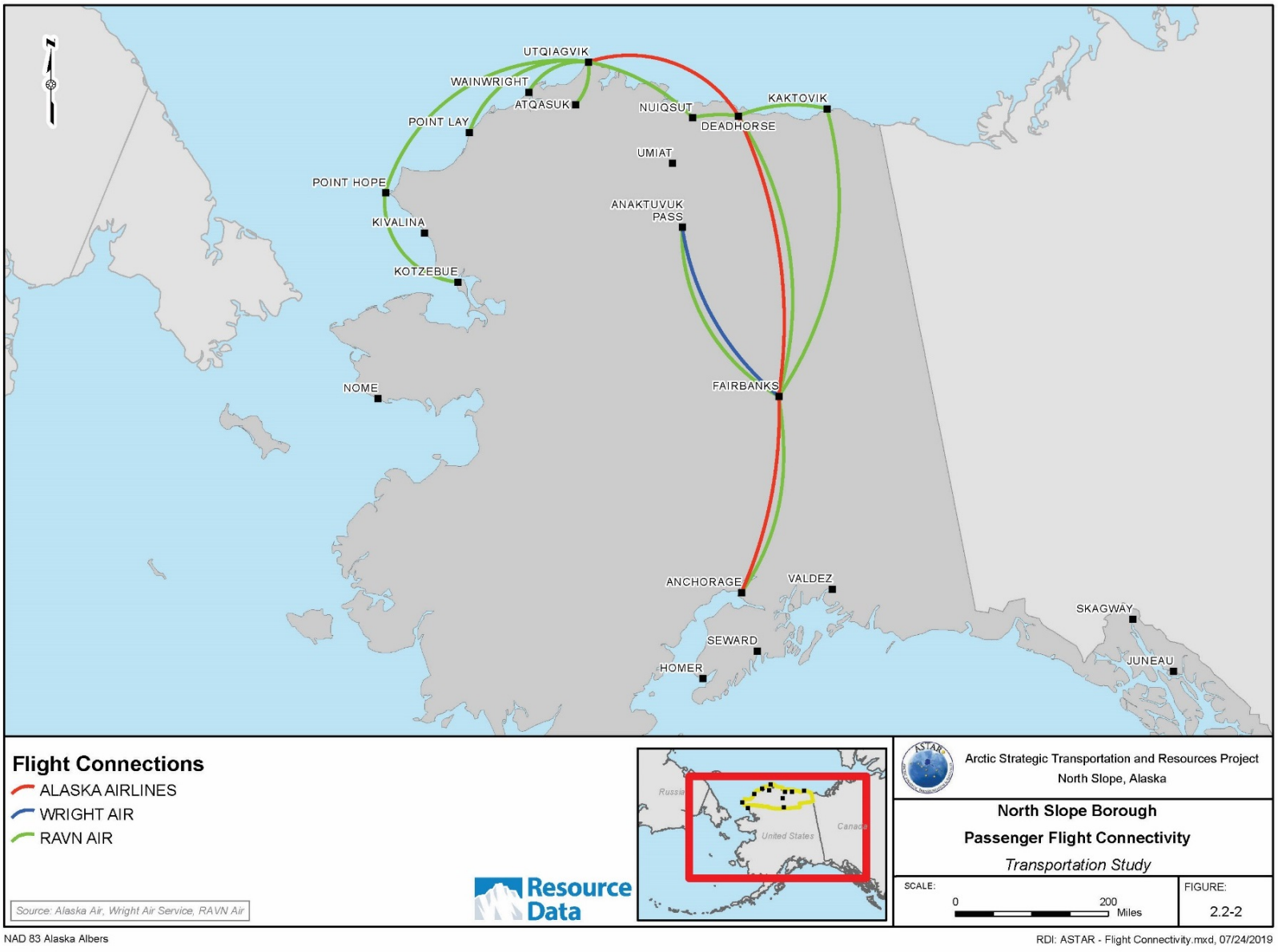


Figure 2.2-2. Flight Connectivity



Freight

In addition to passenger services, cargo is often delivered to the communities via air transportation. Main freight carriers are Alaska Airlines and Northern Air Cargo which deliver only to Deadhorse and Utqiaġvik. Ravn Alaska also provides cargo service to all locations that they fly to. A number of carriers also provide chartered cargo services from Anchorage and Fairbanks to smaller communities throughout the State of Alaska, including:

- Desert Air (from Anchorage)
- Northern Air Cargo (from Anchorage)
- Lynden Air Cargo (from Anchorage)
- Ravn Alaska (multiple locations)
- Everts Air Cargo (from Anchorage and Fairbanks)
- Wright Air Service (from Fairbanks)
- Bering Air (from Kotzebue)
- Ryan Air (from Kotzebue)

Combined, these carriers offer a wide variety of aircraft available for charter ranging from a Helio Courier with a payload capacity of 750 pounds to an L-382 Hercules with a payload of 48,000 pounds. These carriers also provide the ability to deliver to all locations discussed within this report, while the efficiency of each carrier will vary depending on a number of factors, including point of origin, destination, size and weight of shipment, aircraft used, and backhaul availability. The potential variability in cost associated with these factors necessitates that each chartered shipment has a specialized price quote. Therefore, costs and details associated with these services are not discussed further.

Because shipping freight is typically costly and slow, freight cost has a large impact on shipping everyday items to the communities; however, Amazon has recently provided a variety of affordable goods across the North Slope due to its free shipping policy with annual membership. Consequently, the paid subscription service has become an enormous entity in rural Alaska villages over the recent years due to a massive increase in usage. Residents claim that ordering from Amazon is faster, cheaper, and more efficient compared to local stores. In many cases, these rural towns have limited availability and options of goods. As a result, the local commercial companies have been trying to compete by finding better ways to ship, such as shipping via bypass mail, which is a freight service that uses commercial air carriers (Annie Zak, 2015). As the popularity of Amazon grows, local providers have reduced the availability of many goods as a result. Whether it's Amazon or other commercial companies, the price for shipping to rural Alaska remains high. As such, Amazon limits certain goods to be shipped to Alaska. In 2015, Amazon ended free shipping to certain remote Canadian locations, which indicates there is no guarantee the same might happen for rural Alaska (Kaleigh Rogers, 2017). Amazon, however, is experimenting with drone delivery and private flights in order to improve its service and save shipping expenses, so there remains a possibility its service to rural Alaska gets upgraded.

Airports and Airstrips

The community airports and other airstrips within the AOI are designed for varying aircraft which affect the passenger and freight services that can be offered at each location. These are identified on each airport layout plan as the Airport Reference Code (ARC). The ARC system is a coding technique

developed by the Federal Aviation Administration (FAA) to categorize suitable aircraft for specific airports. Generally, the reference code is a combination of a letter (A-E) and a Roman number (I-VI) that corresponds to the airplane's approach speed (measured in knots) and wingspan (measured in feet), respectively. Airports designed for smaller and single-engine airplanes would fall under A-I or B-I reference codes, while larger and commuter-style airplanes would have a B-II or B-III reference code (FAA, 2014). Also, small- to medium-sized airports accustomed to larger air carriers usually have a C-III reference code (such as a Bombardier Q400 or a Boeing 737-400), and a larger airport suited for larger air carriers is coded D-IV or D-V. The following table provides reference code categories associated with operational and physical airplane characteristics. ARCs for each airport are discussed later in the report.

Table 2.2-1. Airport Reference Code

Category	Approach Speed (knots)	Design Group	Wingspan (feet)
		I	To 48
A	<90	II	49-78
B	91-120	III	79-117
C	121-140	IV	118-170
D	141-165	V	171-213
E	166 or more	VI	214-262

(FAA, 2014)

2.3 Overland

NSB communities do not have permanent overland connectivity to each other or to the rest of Alaska. Deadhorse, the oil and gas industry hub, is the only exception, as it connects to the Alaska highway system via the Dalton Highway, aka the North Slope Haul Road. The Dalton Highway extends from Fairbanks to Deadhorse, transporting overland freight, primarily serving the oil and gas industry. During winter, an extensive network of ice roads and snow trails are established throughout the NSB, allowing temporary, seasonal connectivity for some communities. Figure 2.3-1 shows a picture of a tractor trailer hauling freight on the Dalton Highway.

Gravel Roads

Although the 414-mile Dalton Highway permanently connects the NSB to Alaska's highway system, it does not connect to any NSB villages. Between 2012 and 2017, the Dalton Highway had an annual average daily traffic (AADT) count of 184, consisting primarily of tractor trailers hauling supplies for the oil industry. A small portion of this count is attributed to tourism. To give reference to this number, the AADT counts for the Dalton Highway, Stevenson Street in Utqiaġvik, and the Muldoon Overpass in Anchorage are summarized in Table 2.3-2.

Figure 2.3-1. Tractor Trailer on Dalton Highway

www.ttnews.com

Table 2.3-2. Annual Average Daily Traffic Counts

Year	Dalton Highway	Stevenson Street, Utqiaġvik	Muldoon Overpass, Anchorage
2012	108	2,612	60,840
2013	117	3,600	61,630
2014	158	3,624	62,760
2015	228	3,231	65,270
2016	265	2,832	65,172
2017	228	2,295	63,882

www.arcgis.com

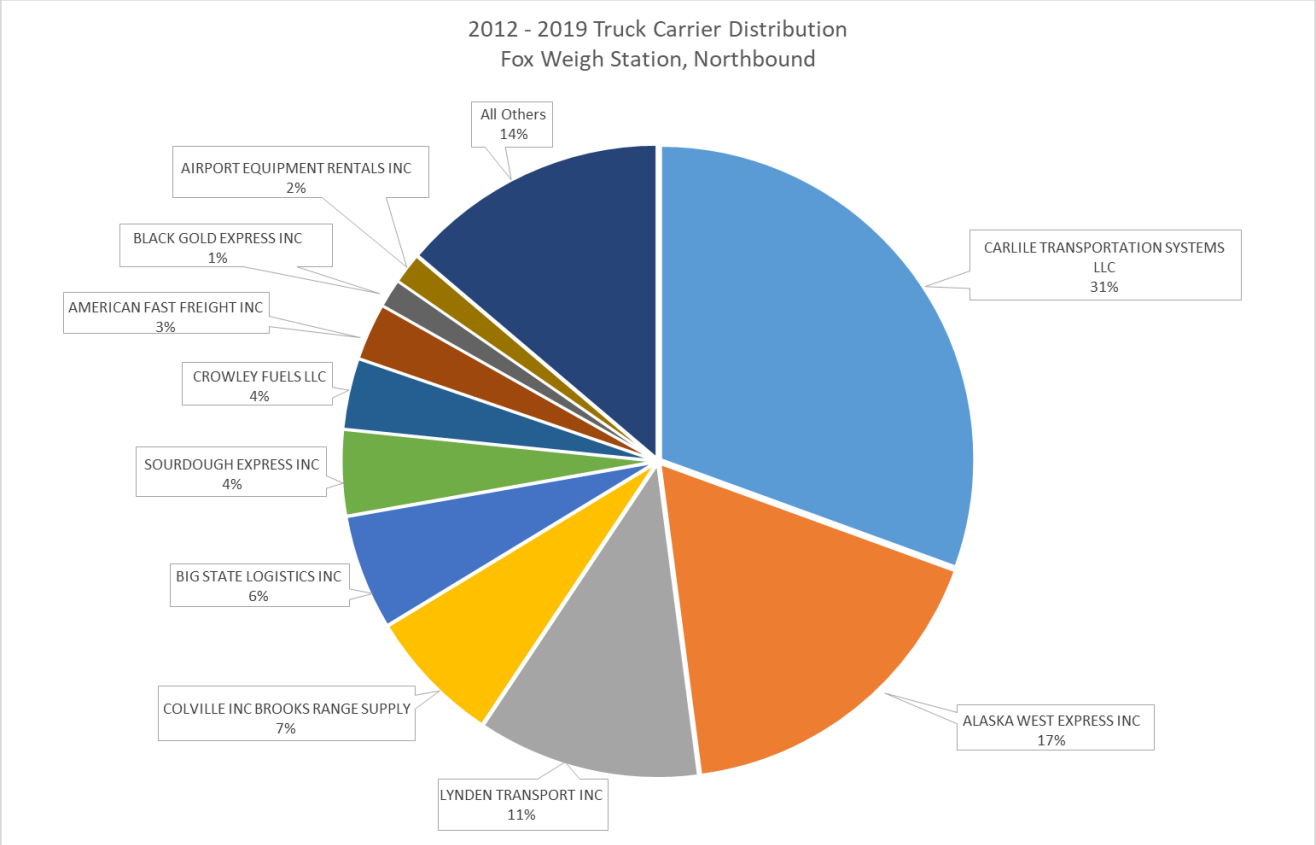
The primary carriers on the Dalton Highway include Carlile Transportation Systems and Lynden companies (Alaska West Express and Lynden Transport). Data analyzed from northbound traffic at the Fox weigh station outside of Fairbanks show the top 10 transporters plus other contingent transporters. It is assumed the majority of this traffic is bound for Deadhorse. The data are presented on a pie chart in Figure 2.3-2. From these data, gross tonnages for various cargos could also be determined and are presented in Figure 2.3-3.

Year-round overland connectivity to the villages would require permanent gravel infrastructure. Specialized construction methods, such as thicker gravel embankments or insulated embankments to preserve permafrost beneath the road segment, are required to build roads in the Arctic. Construction methods often employ geotextile fabrics and insulation in conjunction with gravel and drainage culverts. Insulation and embankment thickness for each road segment is determined based on soil type, permafrost conditions, climatic conditions, and structural requirements. The road design accounts for these specific

conditions in order to minimize subsidence of roadways due to permafrost melting. Water and sewer utilities are buried throughout many of the existing village roads. Trenching to repair utilities is generally done in the winter when the gravel is frozen and stable.

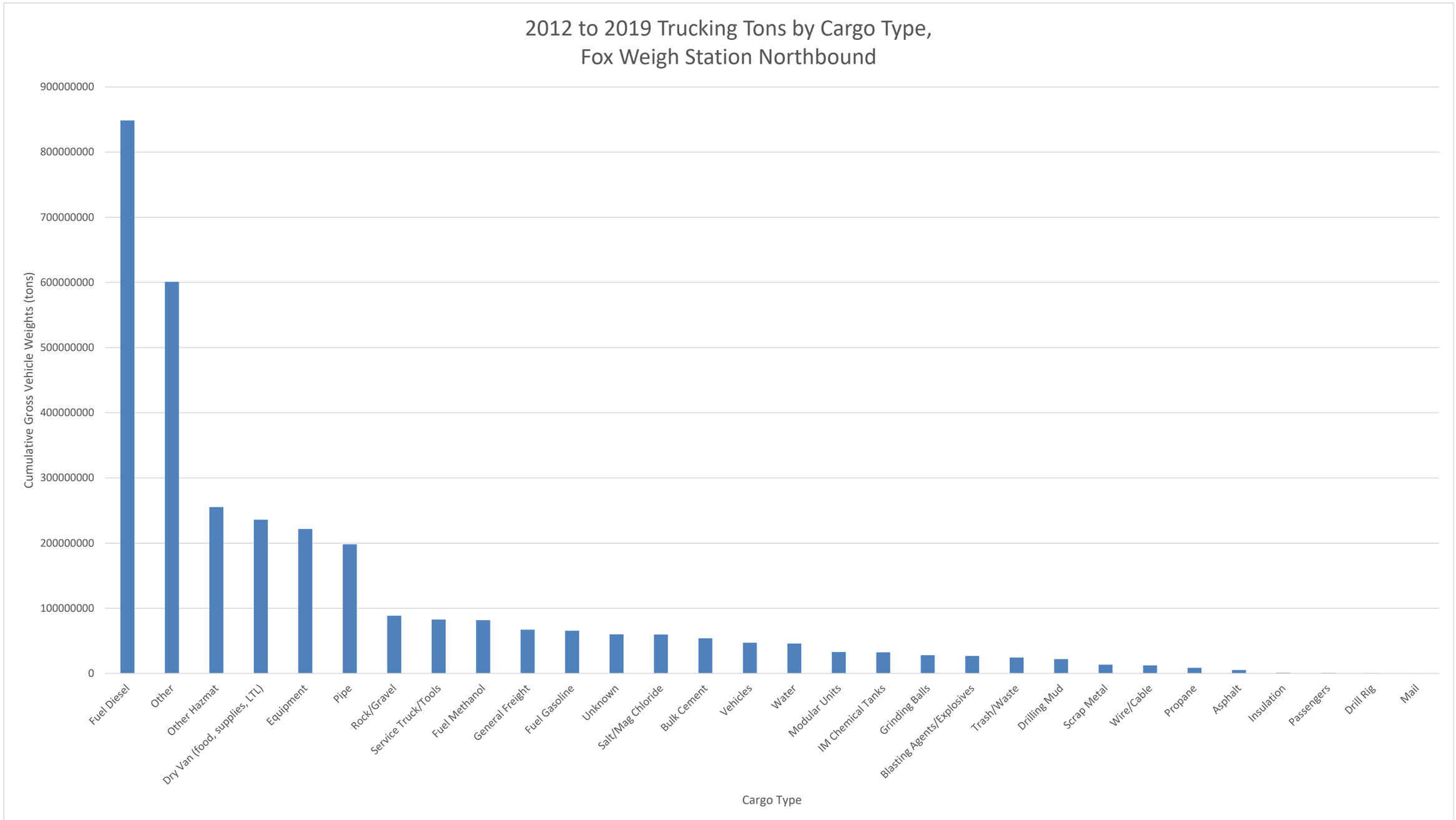
During winter, road surfaces are frozen and stable. Warmer seasons cause a variety of issues, including mud, potholes, roadway rutting or washboarding, and airborne dust. Roads are typically graded in the spring, and gravel placement may be required to repair damaged areas. During dry conditions, airborne dust is problematic, causing respiratory problems such as bronchitis, asthma, and a high incidence of sinus infection. Dust is also blown onto drying subsistence foods, at times causing them to be inedible (NSB Regional Comprehensive Plan 2019-2039, 2018). In Nuiqsut, the NSB implemented a pilot project involving a dust suppressant that reported significantly reduced dust shortly after application. The NSB Public Works Department does not currently use any additives in its dust control efforts (Nuiqsut Comprehensive Development Plan 2015-2035, 2016).

Figure 2.3-2. Carrier Distribution, Fox Weigh Station Northbound



DOT&PF

Figure 2.3-3. Gross Tonnage Cargo Distribution



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The NSB has 696 miles of roads, including over 500 miles of industry roads in the Prudhoe Bay region. There are slightly over 120 miles of roads within NSB villages, most of which are constructed from locally mined material. The roads are generally in fair condition, although there are seasonal issues of rutting, washboard surfaces, and potholes. Passenger vehicles and all-terrain vehicles (ATVs) are used year-round to the extent permitted by local road conditions. A summary of NSB roads is provided in Table 2.3-3.

Table 2.3-3. Community Road Miles

Location	Miles
Utqiaġvik[1]	61
Atqasuk[1]	7
Wainwright[1]	9
Point Lay[1]	8
Point Hope[1]	14
Nuiqsut[1]	8
Kaktovik[1]	8
Anaktuvuk Pass[1]	8
Industry Roads[2]	573
Total	696

1. North Slope Borough Regional Comprehensive Plan 2019-2039. 2018
2. Mapmakers of Alaska. Active Primary and Secondary Roads. 2019

Ice Roads and Other Winter Travel

Winter months provide a much different transportation scenario. Frozen, snow-covered tundra and rivers allow for snowmachine travel within and between villages. Also, a 17-mile ice road suitable for highway vehicles is established between the permanent gravel Spine Road (a private oil and gas industry road connecting Kuparuk and Prudhoe Bay oil fields) and Nuiqsut. Once the ice road is established, an approximately 200-mile snow trail is established from Meltwater (oil development in the Kuparuk River Unit) to Utqiaġvik so low-ground-pressure vehicles (LPGVs), such as a Rolligon, can access the fuel haul route between Utqiaġvik and Atqasuk. In 2018, the NSB initiated the Community Winter Access Trails (CWAT) program, which involved pre-packing a similar route from an ice pad at Drillsite 2P in Meltwater to Utqiaġvik and from Utqiaġvik to Atqasuk, which allowed for the transport of private goods and vehicles in guided caravans for NSB residents. Subsequent years may attempt to extend the route to Wainwright and Anaktuvuk Pass. The route to Anaktuvuk Pass was permitted for 2019, but due to lack of snow, the trail could not be used for CWAT. The last 20 miles of the trail paralleling the Anaktuvuk River was blown clear by the time the pre-packing equipment could be delivered from the Dalton Highway. Pre-packing equipment is now staged in Anaktuvuk Pass, so next year the early-season snowfall can be packed down and prevented from blowing away. CWAT trails in their entirety are shown on Figure 1.1-1.

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3.0 Community Profiles

North Slope community transportation information is summarized in the section below. A more in-depth discussion of the information can be found in Appendix A Community Profiles.

3.1 Utqiaġvik

Utqiaġvik is the northernmost community in the United States and is the largest population center in the NSB with a population of 5,256 residents in 2018. It is a primary hub in the Northern Region for the nearby communities of Wainwright and Atqasuk. Figure 3.1-1 shows the Northern Region with winter trail routes connecting Utqiaġvik to these other two communities. Figure 3.1-2 provides a more detailed map of Utqiaġvik identifying major infrastructure and several proposed projects.

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Figure 3.1-1. ASTAR Northern Region

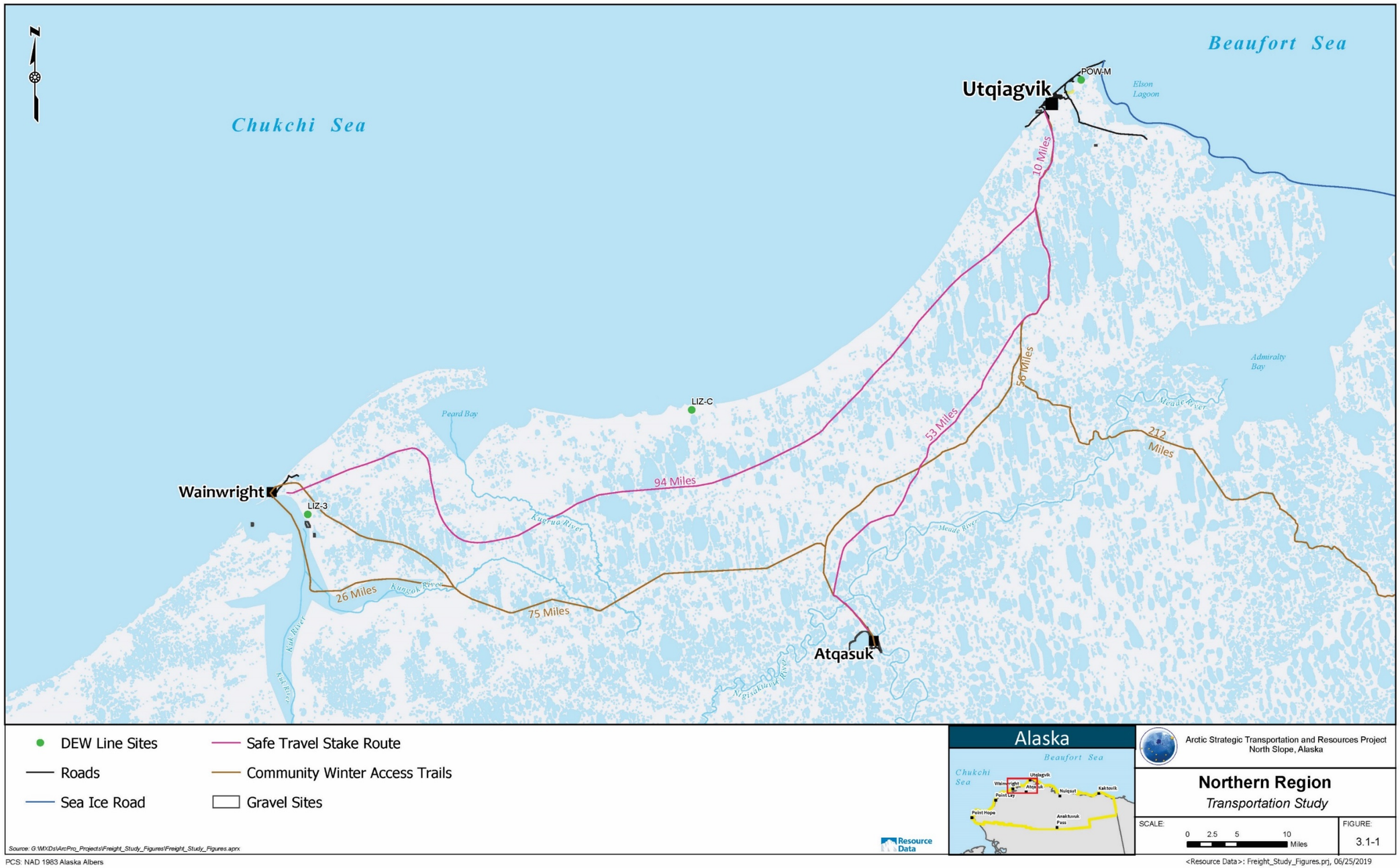

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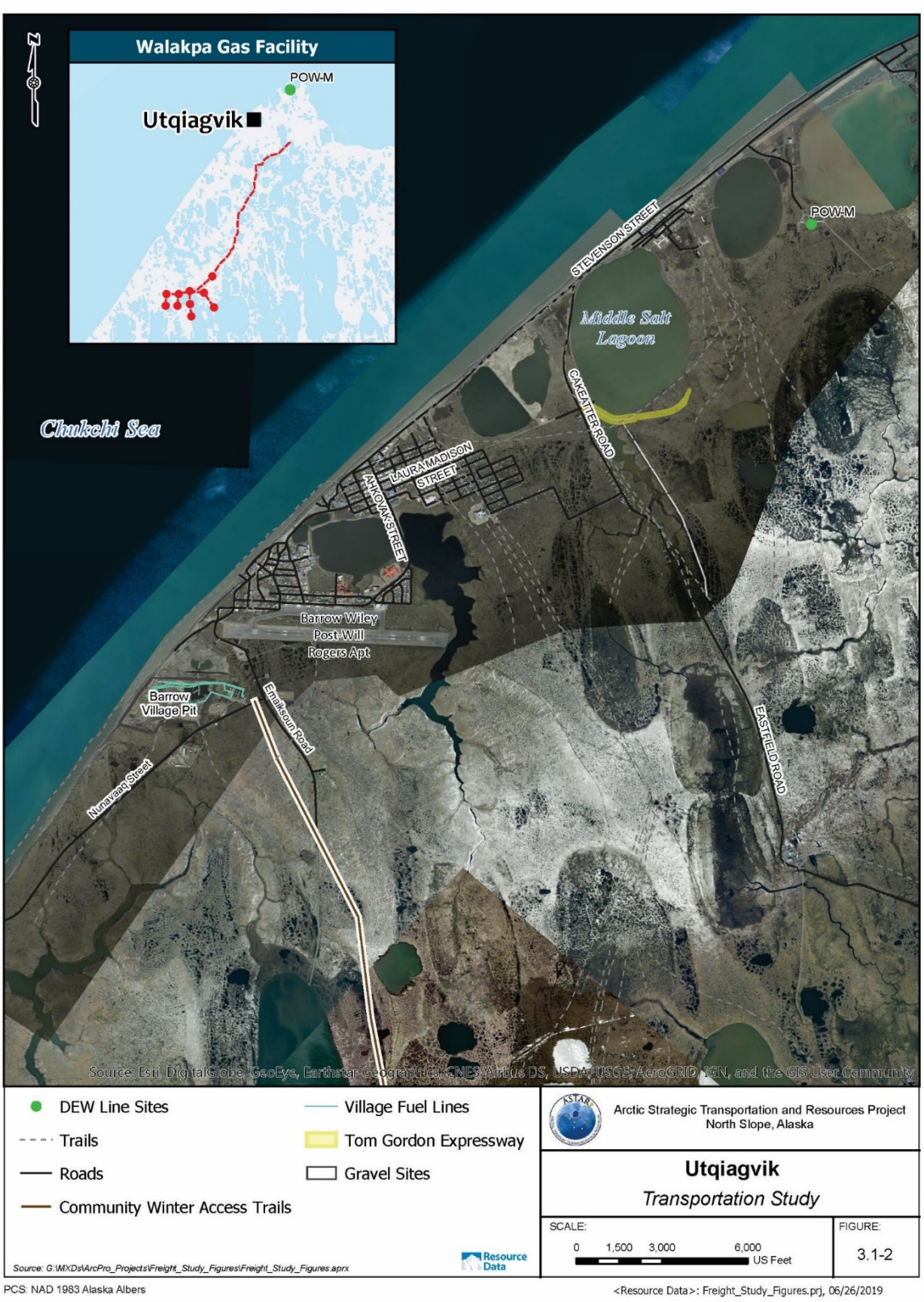
Figure 3.1-2. Utqiaġvik



3.1.1 Marine

Cargo barges deliver supplies to Utqiaġvik during ice-free months. Barges leave from Seattle on or about July 1 of each year and carry about 3,000 to 5,000 tons, which breaks down as an estimated 75% business usage and 25% individual goods. Barges offload onto a Chukchi Sea beach approximately 4 miles north of Utqiaġvik, just north of the Naval Arctic Research Laboratory (NARL) facility.

Due to lack of shore-based infrastructure, unloading the barges in Utqiaġvik can be a risky and time-consuming task. When conditions permit, the line haul barge is positioned on the beach stern-first and secured with lines to heavy pieces of equipment that serve as deadheads. A landing craft is positioned alongside the line haul, and cargo is swung by crane to the landing craft, where it is unloaded by rubber-tired loaders. Although this is the quickest way to unload, sea and wind conditions have to be calm and consistent to unload the barge in this manner, and equipment must be available to hold the barge on the beach. If the haul barge cannot be landed on the beach, a lightering operation occurs in which the line haul barge anchors approximately a half-mile offshore. The landing craft lays alongside the line haul, and cargo is swung by crane from the line haul to the landing craft. Once the landing craft is loaded, it proceeds to the beach landing site and drops a ramp on the beach. Once secured, rubber-tired loaders are used to drive onto the landing craft, pick up containers or flats, and carry them onto a beach staging area (Barrow Comprehensive Plan 2015-2035, 2015). Figure 3.1-3 shows the Greta S. Akpik landing craft being offloaded by a rubber-tired forklift onto the beach at Utqiaġvik.

Figure 3.1-3. Landing Craft Offloading at Utqiaġvik

www.workboat.com

Local municipal and native governments are acutely aware of safe harbor and staging area needs. A barge docking facility has been suggested, and a Project Analysis Report (PAR) was prepared in the early 2000s for a single launch and a floating dock along the shore channel between Elson Lagoon and North Salt Lagoon. At the time, the rough cost estimated by the NSB Public Works Department was $5 to $8 million.

Because of its strategic location as the northernmost point in the U.S., with access to the Chukchi and Beaufort Seas, as well as the Arctic Ocean, Utqiaġvik is well positioned to serve as a hub for Arctic multimodal transportation. Industry, government, and private user groups have publically stated that a

port along the Arctic Coast of Alaska is needed with increasing immediacy due to greater use of the Northwest Passage.

The NSB has recognized that the increased traffic is both an opportunity and a risk for North Slope residents. The NSB Assembly adopted ordinance 2014-01 for the creation of a port authority in July 2014. North Slope voters approved the formation of the port authority; the election was Oct. 7, 2014. The purpose of the port authority is to protect subsistence resources and enable residents, tribal corporations, and local businesses to take advantage of new economic opportunities through planning, financing, and operating and maintaining facilities and related activities (Barrow Comprehensive Plan 2015-2035, 2015).

3.1.2 Air

Utqiaġvik's Post/Will Rogers Memorial Airport (also known as the Barrow Airport, with BRW as the International Air Transport Association [IATA] code), shown in Figure 3.1-4, is a major North Slope hub that provides access to major cities, such as Anchorage and Fairbanks; many villages; and for regional oil and gas industries. The airport is owned and maintained by the Alaska Department of Transportation and Public Facilities (DOT&PF). The 7,100-foot-long by 150-foot-wide runway is paved. Additional turnaround areas are present at the runway ends, and three 75-foot-wide taxiways connect the approximately 620,000-square-foot apron to the runway. The Wiley Post/Will Rogers Memorial Airport has an ARC of C-IV, suitable for a Boeing 767-300, or similar.

Commercial passenger air carriers coming in and going out of Utqiaġvik consist of Alaska Airlines and Ravn Alaska, both using the airport as a hub to other communities on the North Slope, such as Nuiqsut, Point Lay, Atqasuk, Wainwright, and Point Hope. Direct flights from Anchorage and Fairbanks are available throughout the week with three to four flights per day. Enplanements at Utqiaġvik have remained fairly steady from 2010 to 2017, averaging approximately 45,000 enplanements (NSB, 2018).

In addition to passenger travel via Alaska Airlines and Ravn Alaska, the NSB operates two helicopters, a twin-engine airplane, and a jet-engine airplane for search and rescue services across the North Slope to and from all villages, providing medical evacuation services to Anchorage, Barrow, and Fairbanks.

Another airstrip, built in the mid-1900s to service the U.S. Navy Point Barrow Camp, has been abandoned northeast of town, north of NARL and near the North Salt Lagoon. This airstrip (IATA code NRL) is owned by the NSB; it's approximately 5,000 feet by 141 feet and is surfaced with Marston Mat. See Figure 3.1-5.

Freight air carriers providing scheduled cargo services to Utqiaġvik include Alaska Air Cargo (Alaska Airlines), Ravn Alaska, and Northern Air Cargo. Typical passenger and freight costs are presented in Table 3.1-1.

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Figure 3.1-4. Wiley Post/Will Rogers Memorial Airport

Figure 3.1-5. Naval Arctic Research Laboratory Airstrip

Table 3.1-1. Typical Passenger and Freight Costs for Utqiaġvik

Airline	City of Origin	Typical Passenger Cost	Freight Costs	Freight Cost (Backhaul)
Alaska Airlines	Anchorage (ANC)	BRW-ANC $355 RT	$50 minimum ANC/FAI-BRW $0.60/lb	$50 minimum BRW-ANC/FAI $0.30/lb
	Fairbanks (FAI)	BRW-FAI $327 RT		
Ravn Alaska	Atqasuk (ATK)	BRW-ATK $340 RT	0-32 lbs $31 (flat rate) Over 32 lbs $0.87/lb	0-32 lbs $31 (flat rate) Over 32 lbs $0.87/lb
	Fairbanks (FAI)	BRW-FAI $1342 RT	0-32 lbs $31 (flat rate) Over 32 lbs $1.28/lb	0-32 lbs $31 (flat rate) Over 32 lbs $1.28/lb
	Nuiqsut (NUI)	BRW-NUI $510 RT	0-32 lbs $31 (flat rate) Over 32 lbs $2.09/lb	0-32 lbs $31 (flat rate) Over 32 lbs $2.09/lb
	Point Lay (PIZ)	BRW-PIZ $594 RT	0-32 lbs $31 (flat rate) Over 32 lbs $1.53/lb	0-32 lbs $31 (flat rate) Over 32 lbs $1.53/lb
	Wainwright (AIN)	BRW-AIN $503 RT	0-32 lbs $31 (flat rate), Over 32 lbs $1.04/lb	0-32 lbs $31 (flat rate) Over 32 lbs $1.04/lb
Northern Air Cargo	Anchorage (ANC)	-	$50 minimum 1-499 lb $1.02/lb 500-999 lbs $1.01/lb 1000-4999 lbs $0.98/lb 5000+ lbs $0.96/lb	$30 minimum $0.35/lb
	Deadhorse (SCC)	-		

3.1.3 Overland

Utqiaġvik is isolated from the contiguous road network, except in the winter when a 200-mile overland snow trail is established to support fuel hauling equipment. In 2018, the NSB initiated the CWAT program to provide an alternative means of transportation for borough residents and their goods. The CWAT to Utqiaġvik is an approximately 200-mile long improved snow trail that travels from an ice-pad at Drillsite 2P in Meltwater to Utqiaġvik. LGPVs prepare the trail and river crossings well before the convoys of residents are able to travel with their highway vehicles. The convoys are escorted by PistenBully snow groomers or tracked pickup trucks, which can tow vehicles out of the snow if they drift off the trail. Residents are required to have extra fuel, food, warm clothes, and vehicles in well-maintained condition to ensure safe passage on the approximately 12-hour trip. Residents are highly encouraged to join the convoys, as non-conforming users are responsible for their own emergency support, which can be costly and dangerous. Numerous residents drove personal vehicles and supplies on the CWAT in March and April of 2018. The program saw increased use in 2019, with some convoys as large as 10 personal vehicles.

Utqiaġvik has approximately 61 miles of roads, none of which are paved. The largest major streets are 25 feet wide, and minor streets are less than 20 feet wide. Road right-of-ways (ROWs) are mostly 60 feet wide, but several in western Utqiaġvik are 50 feet wide. Many of Utqiaġvik's roads, including high-use roads such as Eben Hopson Street, Stevenson Street, and Ahkovak Street are listed on the Bureau of

Indian Affairs (BIA) Indian Reservation Roads (IRR) Program's inventory. All public roads are maintained by the NSB.

Most travel in Utqiaġvik is concentrated in the central business district to the north and west. Main travel routes are Eben Hopson Street from the U.S. Post Office to Kiogak Street, Stevenson Street along the coast from the Elson Lagoon boat ramp to the gravel pit just south of the airport, and Laura Madison Street, which has recently been extended to meet with Cake Eater Road. Ahkovak Street runs north-south from the airport, curving west at Ipalook School to connect with Laura Madison and Stevenson Street (Barrow Comprehensive Plan 2015-2035, 2015). Figure 3.1-2 provides a map of Utqiaġvik.

Community roads are travelled by automobiles, pickup trucks, ATVs, and snowmachines. Road-watering trucks, large waste and auto-loading trucks, gravel- and soil-hauling trucks, large forklifts, loaders, and heavy equipment all use Utqiaġvik roads.

The City of Utqiaġvik has several main community centers that determine traffic flow: the city center of Utqiaġvik, the suburb of Browerville, NARL, Barrow Arctic Research Center (BARC), and the area south of the airport.

Traffic flows through the main business district along Stevenson Street to Eben Hopson, providing connection to Browerville. Congestion along Ahkovak Street is a concern for Utqiaġvik residents, especially when flights are arriving. This road is owned by the State of Alaska (SOA) and is noted as one of the worst streets during breakup. In Browerville, traffic flow is concentrated along Laura Madison, Eben Hopson, and Stevenson streets.

Transportation priorities in Browerville include the Yugit Street Extension and Cake Eater subdivision roads. Extending Yugit Street will create a direct route from Ahkovak Street to the hospital. Design has been completed for this extension. Some Cake Eater subdivisions do not have roads constructed for access to Utqiaġvik. One is located adjacent to Cake Eater Road to the north and Qaiyaan Street to the west. The second is located in the vicinity of Nunavak Bay. Both of these subdivisions are priorities for roadway construction so landowners can access their homesites.

The Tom Gordon Expressway/Uivaqsaagiaq Road is an alternative to Stevenson Street, beginning at the Laura Madison/Cake Eater Road intersection and following the south shore of the Middle Salt Lagoon, ending at BARC. DOT&PF and the NSB have received final design drawings and are currently waiting for funding to construct the road, which has been listed as the top priority in the Native Village of Barrow Long-Range Transportation Plan.

Property directly south of the airport is primarily industrial in nature; many uses are geared toward aviation activities. There are opportunities to dedicate much of the undeveloped property to oil and gas-related activities, including man camps. There is also the possibility of a USCG presence south of the airport. Additional industrial development in this area directs transient oil and gas operations away from the local community.

There has been some interest in residential housing in this area, but access and the cost to extend infrastructure to this area make this type of development unlikely over the next 20 years. Improved ingress/egress, fire, and other public safety enhancements would need to be put into place before residences are constructed there.

3.1.4 Market Analysis

Utqiaġvik is the largest city in the NSB, with 4,933 permanent residents in 2015 (Table 3.1-2). It serves as a hub for travel and services because it has a large enough population to sustain businesses not present

in many of the outlying villages. Utqiaġvik also has the region's only hospital and Alaska State Troopers post. From 2010 to 2015, the community grew by 17%, and the trend is expected to continue in the future.

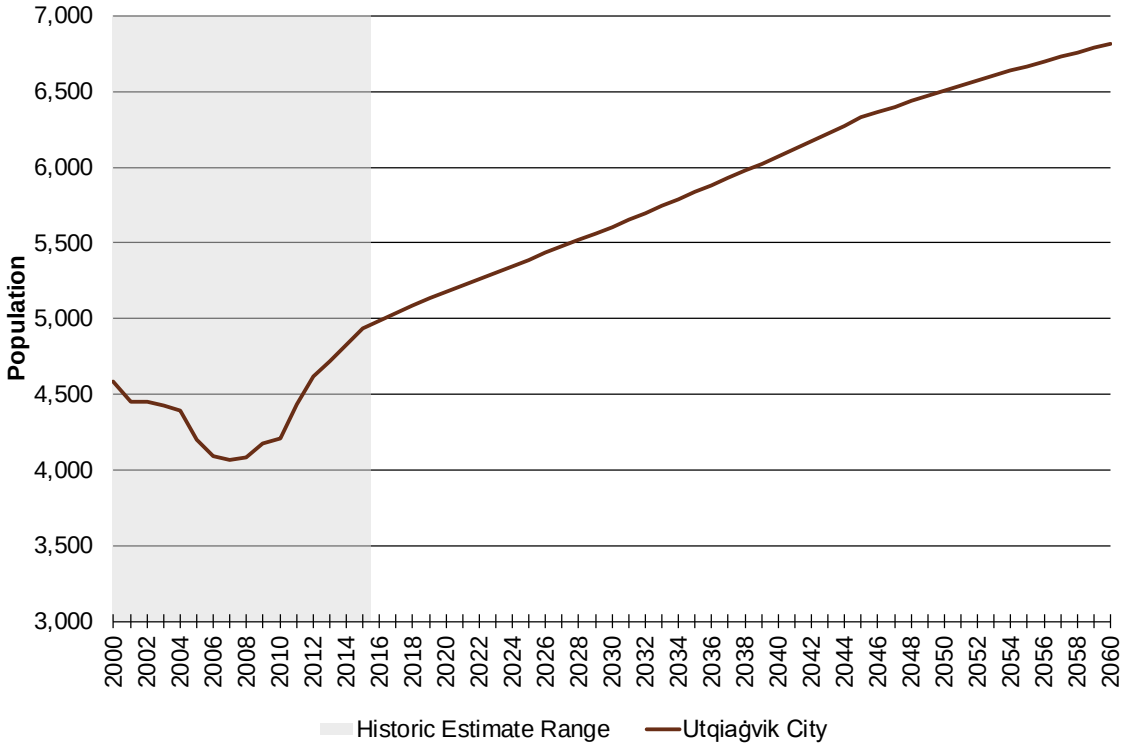
Table 3.1-2. Utqiaġvik Commissioner-Certified Population Estimates

	2010	2011	2012	2013	2014	2015
Utqiaġvik	4,212	4,437	4,617	4,717	4,825	4,933

Source: NSB Economic Profile & Census Report (NSBEP&CR), 2016

Figure 3.1-6 shows historic estimates of population (shaded in gray) in Utqiaġvik using Alaska Department of Labor and Workforce Development (DOLWD) data from 2000 to 2009 and NSB Economic Profile & Census Report (NSBEP&CR) data from 2010 to 2015. The community population is expected to increase in the future with a diminishing rate of growth and an average increase of 42 people per year.

Figure 3.1-6. Utqiagvik Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019c; NSBEP&CR, 2016; Northern Economics estimates

Average income in Utqiaġvik is the highest of all the reported communities in the study area at nearly $79,000 per household (NSBEP&CR, 2016). Utqiaġvik is the largest city within the borough and has infrastructure and amenities that do not exist in many outlying communities. There are more economic opportunities in Utqiaġvik than in smaller villages because the community has a hospital, fire department, an inn, a university, several eating establishments, and other retail stores. Residents of

smaller NSB communities may travel to Utqiaġvik to purchase goods and services, and the community serves as an economic hub for the region. As the largest city in the borough, Utqiaġvik has more passenger and freight activity than any of the other NSB communities. In 2017, passenger enplanements and freight weights were largest in August, but mail weight was largest in March (Table 3.1-3). On average, mail weights in Utqiaġvik were larger than freight weights by about 24%.

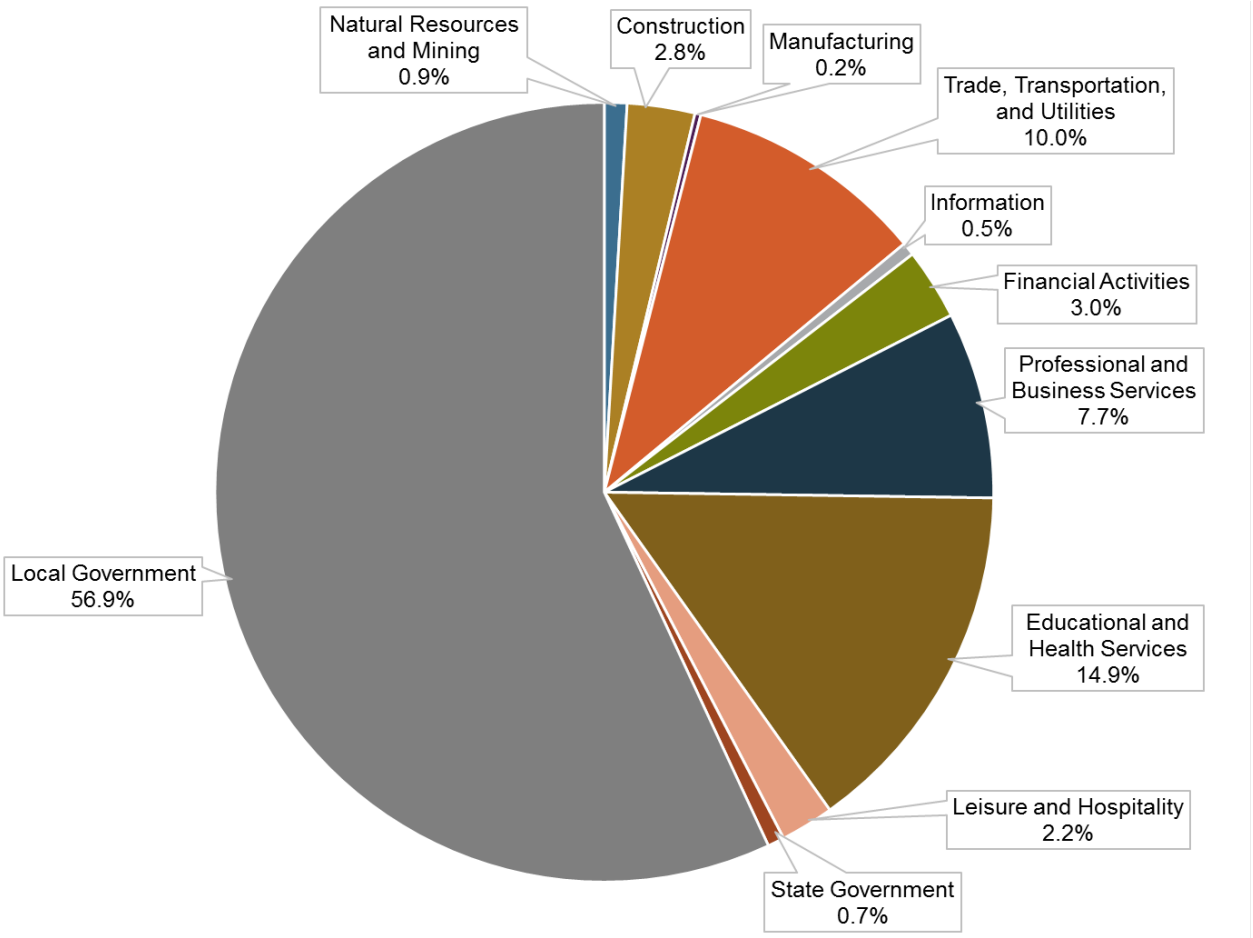
Table 3.1-3. Aviation Activity in Utqiaġvik, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVG
Passengers	3,335	3,256	3,908	3,228	3,346	4,421	4,365	4,656	3,855	4,116	3,129	3,993	3,801
Mail (1000s lb)	799.4	795.0	1,093.5	783.4	923.1	899.9	786.7	873.6	1,072.1	904.9	997.9	831.8	896.8
Freight (1000s lb)	552.1	585.7	821.5	805.5	831.8	745.9	855.1	857.7	729.3	637.1	589.6	681.2	724.4

Source: Bureau of Transportation Statistics (BTS), 2019

In 2017, about 10% of all Utqiaġvik households had income below the poverty level within the past 12 months (U.S. Census Bureau [USCB], 2017). There is also a significant proportion of households with high incomes; nearly 25 percent of households in Utqiaġvik earned more than $100,000 in 2017. Local government is the single largest employer in Utqiaġvik, providing more than half of all jobs (Figure 3.1-7). Educational and health services make up 14.9% of jobs, and trade, transportation, and utilities include 10% of jobs. As the largest city in the NSB, Utqiaġvik has employment opportunities that may not be available in other communities, leading to a more diverse economy in terms of employment industries.

Figure 3.1-7. Workers by Industry, Utqiagvik, Percentage of Total, 2016



Source: DOLWD, 2019b

3.2 Atqasuk

Typical of remote Alaska communities, the distance and climate tend to keep Atqasuk residents isolated. The primary modes of transportation in Atqasuk are regional airline flights into and out of the community, vehicles, and ATVs and snowmachines on local roads and trails, and small skiffs on the Meade River and Imaġruaq Lake. An elaborate system of trails provides ATV and snowmachine travel routes used for recreation and subsistence hunting. Additionally, there is a travel route between Utqiaġvik and Atqasuk that is used for recreation, fuel hauls, and other materials such as gravel. Future transportation systems could broaden and diversify the region's network and create economic opportunities for the community. Figure 3.2-1 provides a map of Atqasuk showing local infrastructure.

Figure 3.2-1. Atqasuk

3.2.1 Marine

When the Meade River is free of ice, residents boat up and down the river for hunting and recreational purposes. The primary type of boat used is a flat-bottomed skiff ideal for shallow river use. Atqasuk is approximately 60 miles inland from both the Chukchi and Beaufort Sea, and shallow river conditions do not allow for barge transportation into Atqasuk, although residents are able to navigate the river in smaller boats to the Beaufort Sea via the Dease Inlet. Residents have noticed that the river is becoming shallower, sometimes even making travel with kayaks difficult. No major freight travels directly to Atqasuk via marine lines; however, barge freight from Utqiaġvik is hauled by land to Atqasuk, which will be discussed in Section 3.2.3 (Atqasuk Comprehensive Plan 2017-2037, 2017).

3.2.2 Air

Atqasuk is inland along the Meade River without road access, making air transportation extremely important to the community. The Atqasuk Airport, formally called the Edward Burnell Sr. Memorial Airport (IATA code ATK), is owned and maintained by the NSB. As a small village airport, it is unattended and consists of a gravel-surfaced, 4,370-foot-long by 90-foot-wide runway with turnaround areas on both ends. Like other small village airports, it has an ARC of B-II, suitable for aircraft such as a Beechcraft 1900D (passenger) and a Douglas DC-6 (cargo). Design contingency for the runway is a Lockheed L382 (Hercules).

The only passenger air carrier traveling to and from Atqasuk is Ravn Alaska, which flies there from Utqiagvik one to three times per day throughout the week. Atqasuk averages approximately 2,200 enplanements each year, based on data from 2010 to 2016, the majority being commercial taxi flights.

Currently, the Atqasuk Airport is in a degraded condition with several upgrades in progress. The runway surface has undulations, soft spots, and a reverse crown, preventing drainage. The adjacent apron is 280 feet by 580 feet and is used for passenger and freight loading and unloading. There is no passenger shelter or building at the airstrip; however, design of a terminal building/shelter and resurfacing the runway was funded in December 2016, with construction expected to begin in 2020 or 2021. Additional funding is being sought for snow removal equipment, rehabilitation of lighting, and rehabilitation of security fencing, gates, and perimeter fencing.

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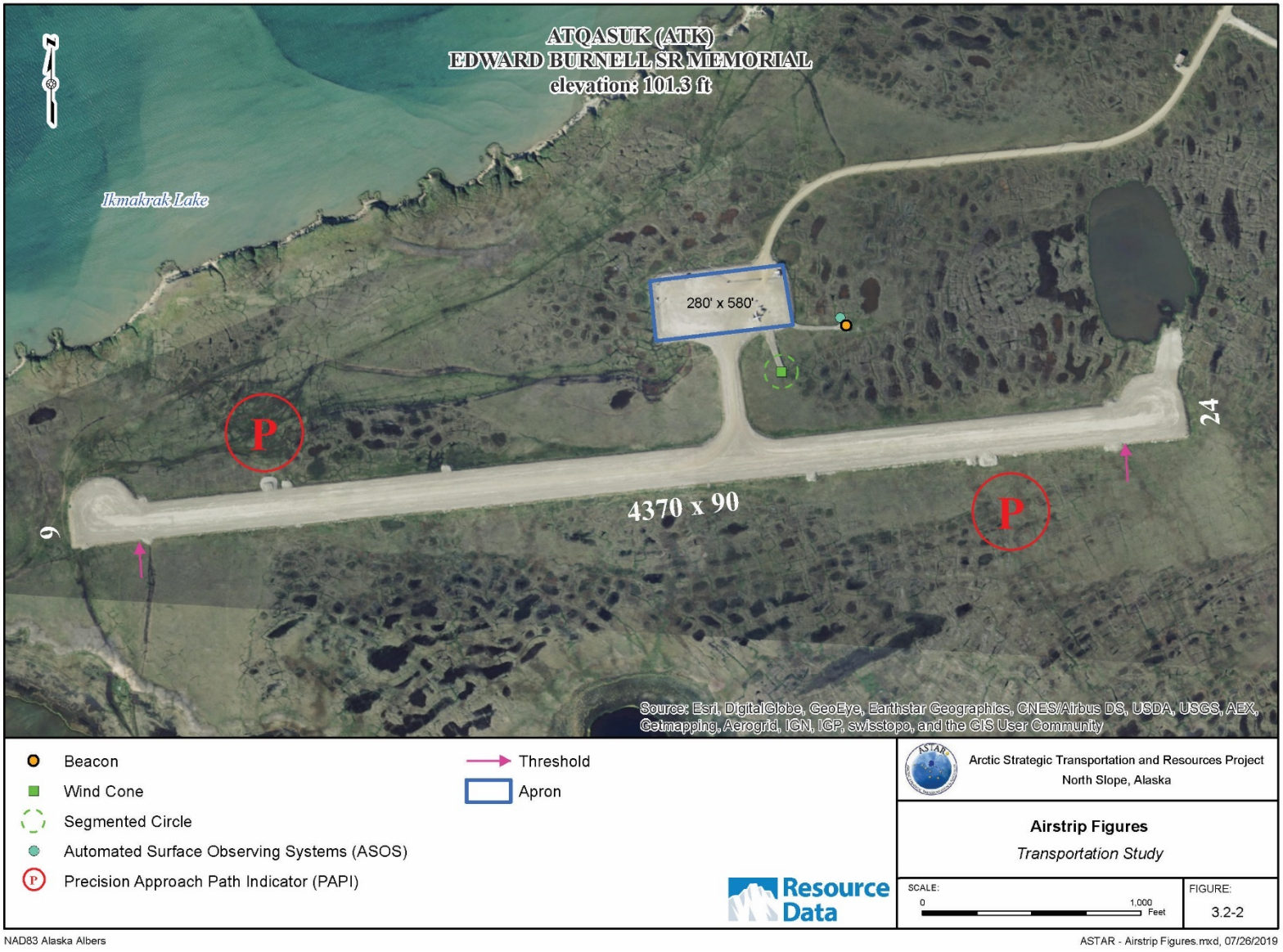
Figure 3.2-2. Atqasuk Airstrip



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The FAA and federal Airport Improvement Program (AIP) have allocated approximately $23 million in grant funding for reconstruction of the Atqasuk Airport. A significant portion of construction funds will be used to construct a temporary access road to mobilize materials and equipment to Atqasuk. This project plans to reconstruct and rehabilitate the aging existing airport infrastructure. No expansion or upgrades to runways or other existing airport facilities are planned. Construction is tentatively scheduled to occur in 2020 and 2021.

In addition to Ravn, Desert Air also flies freight to Atqasuk. Typical passenger and freight costs are presented in the following table.

Table 3.2-1. Typical Passenger and Freight Costs for Atqasuk

Airlines	City of Origin	Typical Passenger Cost	Freight Costs
Ravn Alaska	Deadhorse (SCC)	ATK-SCC $1020 RT	0-32 lbs $31 (flat rate) Over 32 lbs $0.87/lb
	Utqiaġvik (BRW)	ATK-BRW $340 RT	

3.2.3 Overland

Atqasuk has no year-round overland freight or passenger connection to any of the NSB communities or the Alaska highway system. During winter, it is connected to Utqiaġvik via an approximately 70-mile improved snow trail, which is established primarily to facilitate the annual fuel haul from Utqiaġvik. In 2017, ASRC SKW Eskimos was contracted to haul 10,000 cubic yards of gravel from the Utqiaġvik SKW gravel pit. Some residents may travel via snowmachine from Wainwright to Atqasuk to buy fuel for personal use, but there is no commercial bulk fuel transport between the two villages.

According to the Department of Commerce, Community, and Economic Development (DCCED) community profile maps, Atqasuk has approximately 6.37 miles of developed roadways within the community, all of which are gravel. The roads are primarily in town but also provide access to the NSB material site on the Meade River shore, to the landfill site 2.5 miles north of the community, to the airport 1 mile south of the community, and to the cemetery 1 mile north. Most roads and the runway are constructed from material mined from the Meade River or Imaġruaq Lake. The gravel material is sandy gravels. The roads are generally in fair condition with adequate drainage, although there are occasional problems with rutting and potholes. Trucks and ATVs are used year-round to the extent permitted by roads, and snowmachines are used primarily during the winter.

The NSB Public Works Department regularly waters down village roads to suppress dust. Residents, however, maintain that it is difficult to control dust from road traffic in the summer months and that increased dust contributes to respiratory problems and other conditions. They cite elders and youth as most affected by outdoor dust. The NSB also provides senior van services for elders. Some community members have indicated there is a need for regular public transportation.

Land transportation beyond the community of Atqasuk is limited because there are no road connections to other communities. There are winter routes between Atqasuk and Utqiaġvik used to transfer fuel and other materials to the village using Rolligon LPGVs. The trail has also been used to haul gravel material from Utqiaġvik needed for maintenance and construction needs. Figure 3.2-3 shows a convoy of Cruz Construction trucks returning to Utqiaġvik from Atqasuk on a 65-mile established snow trail.

Figure 3.2-3. Atqasuk Gravel Haul Convoy

Source: Cruz Construction

There are 17(b) trails listed in the Tribal Transportation Program inventory data for Atqasuk. The 17(b) trails are easements named after Federal Regulation, the Alaska Native Claims Settlement Act, regulation that allows reserving easements on lands conveyed to Alaska Native Village and Regional Corporations in order to allow public access to public land and water. These easements have been used to establish 25-, 50-, and 60-foot wide trails and roads. The regulation also allows 1-acre site easements for parking, temporary camping, and loading or unloading. About 300 miles of local trails provide access for subsistence hunting, fishing areas, remote cabins, and native allotments. Trails are located on both side of the Meade River and through the community itself; 17(b) trails within the community are not common in North Slope villages. Regional trails are also included in Tribal Transportation Program inventory data such as the connection trail between Atqasuk and Utqiaġvik, between Atqasuk and Wainwright, and Atqasuk and Nuiqsut. Regional transportation is shown in Figure 3.1-1.

The community has long sought a road connection to Utqiaġvik and/or Wainwright. If a transmission line/natural gas pipeline was installed along with a road to maintain it, Atqasuk residents would benefit from the connectivity with reduced prices for not just utilities but other items that are delivered by barge to Utqiaġvik and Wainwright.

A road connecting Atqasuk with Utqiaġvik could have a significant impact on Atqasuk residents, particularly for residents' access to lower prices and availability of supplies, groceries, flights, etc. Some North Slope residents who enjoy living in a village but also want the connection to a larger community might relocate to Atqasuk. However, because neither of the plans that consider a road between the two communities is planned, designed, or funded, it is difficult to consider potential impacts on the community within this comprehensive plan's timeframe. This particular plan will be reviewed every two

years; as details are available, they will be included to provide an analysis on the potential impact to the community (Atqasuk Comprehensive Plan 2017-2037, 2017).

The primary carriers serving Atqasuk include the Olgoonik Corporation, which primarily handles the fuel haul, and Cruz Construction, which primarily handles aggregate delivery. Cruz Construction was recently awarded the contract to supply Atqasuk with 25,000 tons of rock for upgrades to the airport.

3.2.4 Market Analysis

Atqasuk is an inland city of the NSB, with 248 permanent residents in 2015 (NSBEP&CR, 2016). From 2010 to 2015, the community grew by 6.5%, and the trend is expected to continue in the future. For community services, Atqasuk has a clinic, library, and water treatment facility (DCCED, 2019).

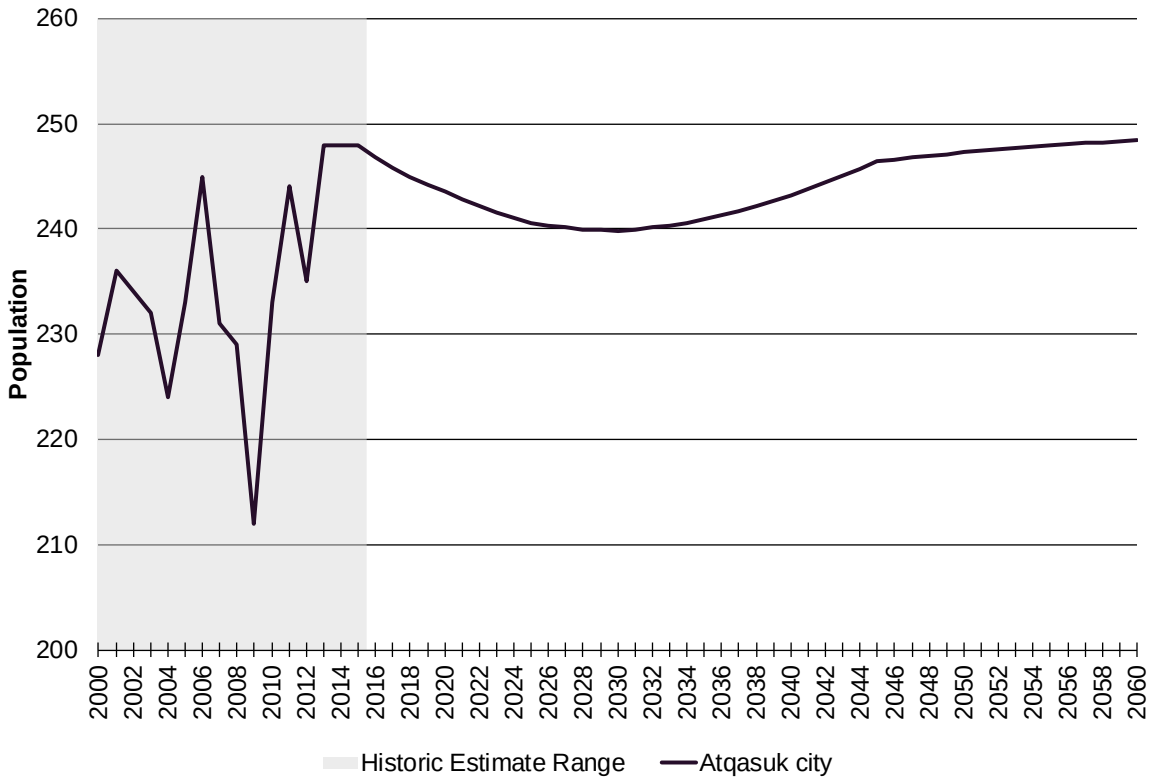
Table 3.2-2. Atqasuk Commissioner-Certified Population Estimates

	2010	2011	2012	2013	2014	2015
Atqasuk	233	244	235	248	248	248

Source: NSBEP&CR, 2016

Figure 3.2-4 shows historic estimates of population (shaded in gray) in Atqasuk using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected to remain relatively constant over time, continuing the observed trend from 2013 to 2015.

Figure 3.2-4. Atqasuk Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019c; NSBEP&CR, 2016; Northern Economics estimates

In 2017, Atqasuk enplanements were highest in October, mail weight was highest in March, and freight weight was highest in July. On average, monthly mail weights were larger than freight weights by about 77% (Table 3.2-3). Freight weights, however, seem to be more sensitive to seasonal effects.

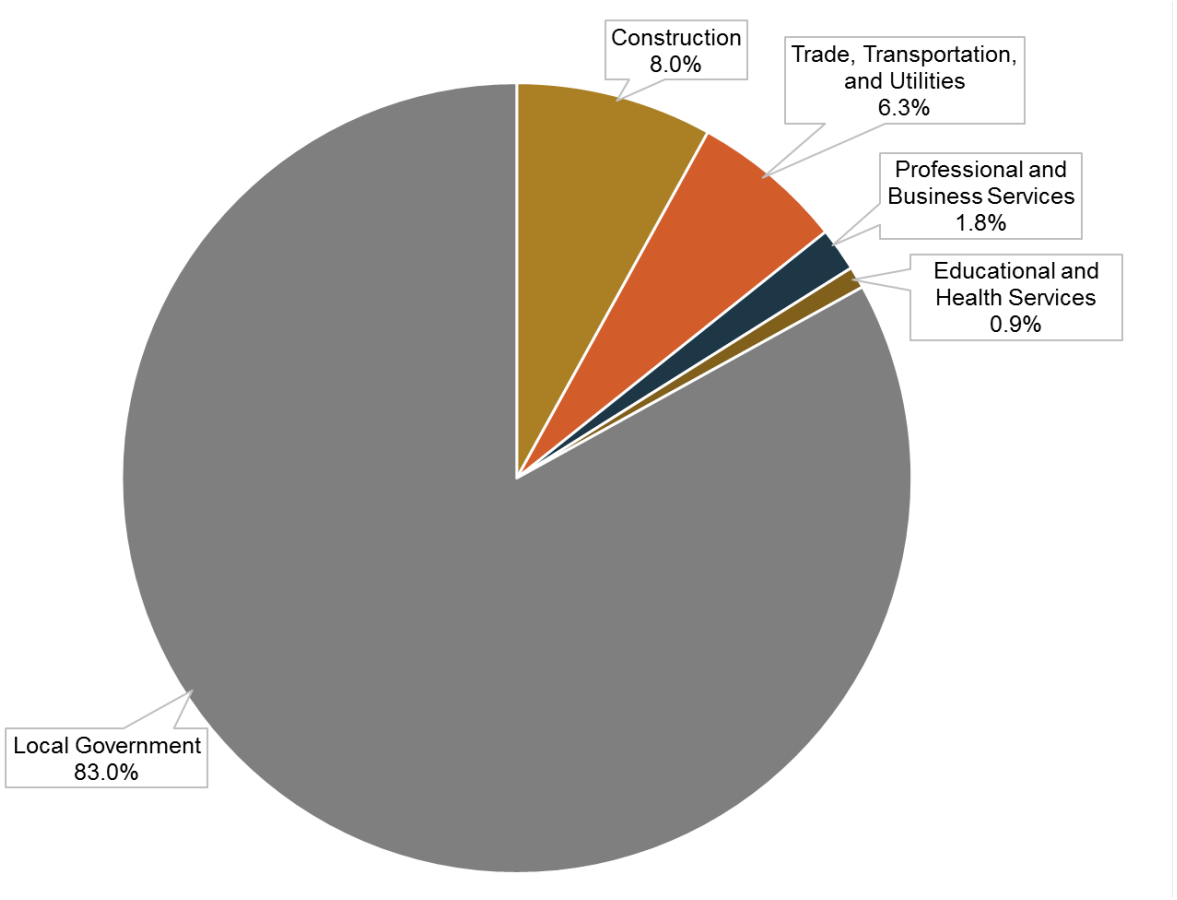
Table 3.2-3. Aviation Activity in Atqasuk, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVG
Passengers	256	185	148	187	93	221	347	261	161	350	184	217	218
Mail (1000s lb)	36.1	24.0	63.8	43.5	34.9	38.2	62.7	53.9	38.0	38.4	35.1	50.2	43.2
Freight (1000s lb)	12.0	10.7	17.5	18.0	13.3	44.7	53.5	21.9	47.2	22.7	14.6	17.2	24.4

Source: BTS, 2019

Average income in Atqasuk is $57,000 per household, which is the median value of all communities in the NSB (NSBEP&CR). In 2017, about 19% of all Atqasuk households had income below the poverty level within the past 12 months (USCB, 2017). The distribution appears to be bimodal, with 19.1% of households earning $25,000 to $35,000 and 27.7% earning between $100,000 and $150,000. Local government is the single largest employer in Atqasuk, providing 83% of all jobs (Figure 3.2-5). Construction makes up 8% of jobs, and trade, transportation, and utilities comprise 6.3% of jobs.

Figure 3.2-5. Workers by Industry, Atqasuk, Percentage of Total, 2016



Source: DOLWD, 2019b

3.3 Wainwright

Wainwright, as shown on Figure 3.3-1, is located on the Chukchi Sea approximately 85 miles southwest of Utqiaġvik. It is situated on a narrow peninsula separating the Chukchi Sea from the Wainwright Inlet. It is the third largest community in the NSB with a population of 555 residents in 2018. Wainwright saw significant industry activity during Shell's offshore drilling programs, and it became apparent a major discovery would have significant impacts on the community. Oil and gas development in the region is uncertain but remains a possibility. Wainwright is isolated from nearby communities, except in the winter where residents can travel overland via snowmachines to Utqiaġvik or Atqasuk.

3.3.1 Marine

There is currently no constructed port for Wainwright. The current boating activities are limited due to shallowness of launching areas. There is a community boat launch next to the spill response yard south of the community on Wainwright Inlet. Launching whaling boats, personal boats, and response vessels is treacherous and potentially life-threatening during stormy weather at this location. Wainwright's position on the Chukchi Sea coast is shown on Figure 3.3-1. Figure 3.3-2 shows a barge offloading equipment on the beach at Wainwright in July.

Figure 3.3-1. Wainwright

Figure 3.3-2. Brice Marine Offloading Equipment on the Beach at Wainwright, July 2013

Olgoonik has indicated a desire to construct some type of bulkhead facility north of Wainwright to provide commercial shipping providers reasonable docking. Olgoonik has also stated it would like to construct a bulkhead dock at the entrance channel to Wainwright Inlet. Community leaders and residents would like to see a docking facility built at the entrance of the inlet with an accompanying road from the community to access it. Such infrastructure would make it easier to access the ocean by boats in bad weather; this would provide a quicker response to search and rescue or potential oil spill responses. Furthermore, the Olgoonik development plans also include a boat ramp south of the old Distant Early Warning (DEW) Line site.

Wainwright is the nearest village to the Chukchi Sea Outer Continental Shelf (OCS) leases, located on Wainwright Inlet, which is capable of sheltering shallow- to medium-draft vessels. The Chukchi Sea is ice-free from mid-July through September. The close proximity of oil and gas prospects, a protected bay, and an airport with passenger and cargo services has given the City of Wainwright the capability for logistics support for industrial activities since 2007. The city is investing in equipment, infrastructure, and training programs to meet industry needs with operations at an abandoned DEW Line radar site. There is interest in developing a port authority in Wainwright to address boat launching and docking infrastructure, as well as developing a revenue stream.

3.3.2 Air

Air travel provides the only year-round access to Wainwright. The gravel runway (IATA code AWI) is owned and operated by the NSB, is 4,494 feet long and 90 feet wide, and is connected to a 280-foot by 475-foot parking apron and an 80-foot by 570-foot taxiway. The runway is an unmanned runway with no terminal. In 2013, medium intensity runway lights and medium intensity taxiway lights were replaced, and the runway was resurfaced in 2014 to repair seasonal soft spots that were limiting use during breakup and heavy rains. Currently, the airstrip is designed to accommodate B-II aircraft.

The only passenger air carrier that provides service to Wainwright is Ravn Alaska through Utqiaġvik, one to three times per day throughout the week. Enplanements have remained fairly steady between 2008 and 2017, averaging around 3,800 annually.

Typical passenger and freight costs are presented in the following table. Ravn Alaska is the only air carrier that provides scheduled freight service to the community, as well.

Table 3.3-1. Typical Passenger and Freight Costs for Wainwright

Airlines	City of Origin	Typical Passenger Cost	Freight Costs
Ravn Alaska	Deadhorse (SCC)	AIN-SCC $1096 RT	0-32 lbs $31 (flat rate) Over 32 lbs $1.04/lb
	Utqiaġvik (BRW)	AIN-BRW $416 RT	

Another airstrip is located approximately 3 miles southeast of the Wainwright Airport, previously used as the U.S. Air Force (USAF) DEW Line site. This DEW Line site was constructed in 1953 and was recently conveyed to Olgoonik, which is working with the USAF to clear the site of contamination issues. The gravel airstrip is 3,600 feet long. During scoping for comprehensive planning, community members provided a strong opinion on suggesting industry use of the DEW Line airstrip, rather than the Wainwright Airport, due to concern of increased traffic impacts and noise adjacent to the community. Another discussed – and strongly supported – option by the community was to relocate the existing public airport to the DEW Line site. The community believes the existing airport limits growth opportunities due to its close proximity.

Figure 3.3-3. Wainwright Airport

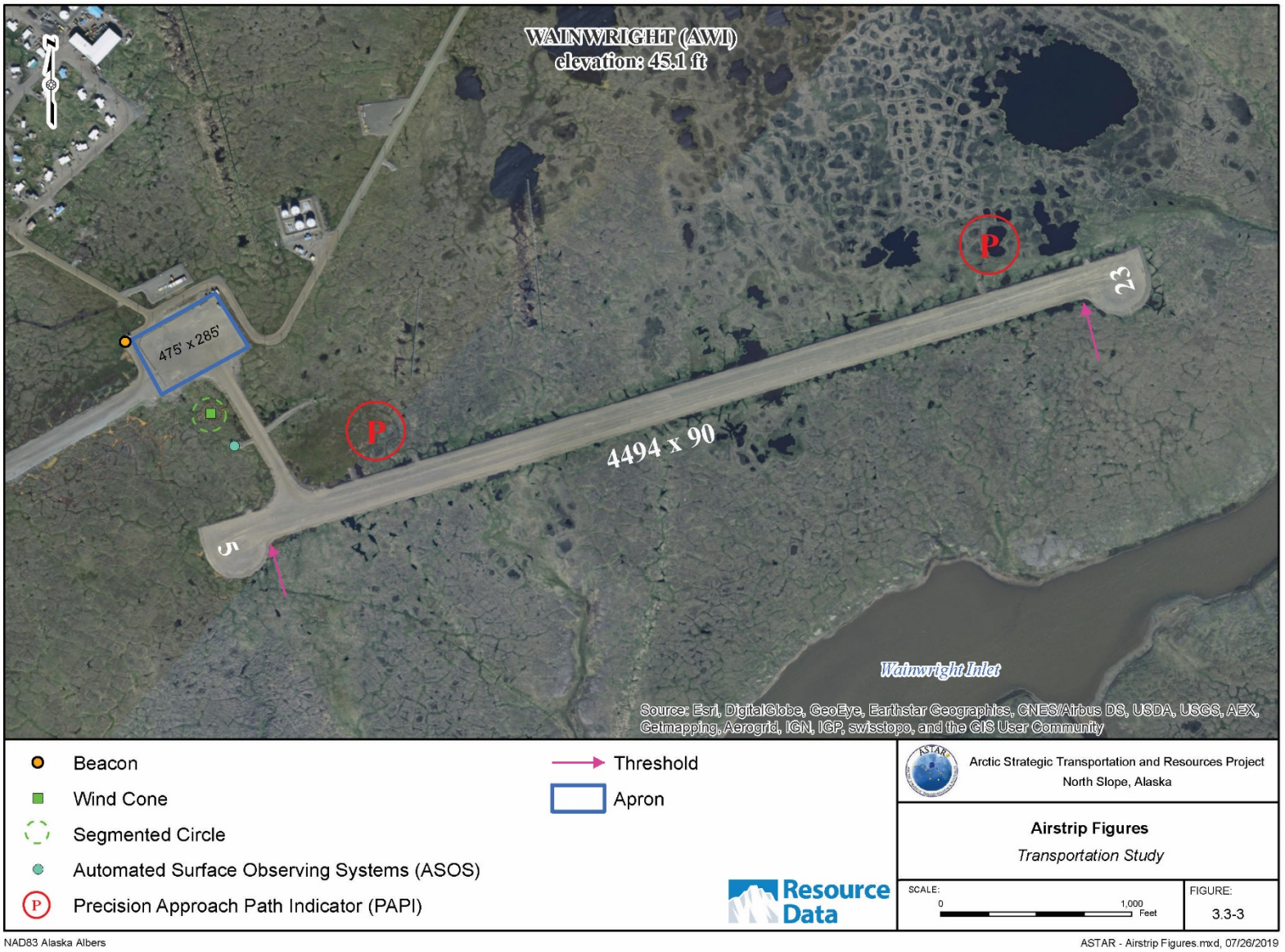


Figure 3.3-4. Wainwright DEW Line Airport

3.3.3 Overland

Wainwright has approximately 10 miles of developed gravel roads. There are no roads linking Wainwright with other NSB communities. Transportation between NSB communities is primarily by air carrier and less frequently by snowmachine or boat. A road map depicting existing Wainwright roadways is attached in Figure 3.3-1.

Prior to construction, platted ROWs are dedicated by the NSB under provisions of the NSB subdivision regulations. Although all roads are located within a platted ROW, not all platted ROWs have been developed with roads.

Most of the roads in Wainwright are maintained by the NSB. There are private roads, as well, such as the road between the boat ramp and the spill response yard on the lagoon. There are also private roads built off of Freshwater Lake roads heading toward the beach and DEW Line site. The NSB maintains Freshwater Lake Road seasonally to support the water pumping operation.

A circulation traffic pattern has developed in a fairly logical fashion in most sections of town. The circulation system serves its primary function of linking residential areas with the school, stores, airstrip, inlet, and landfill.

Historically, the NSB has been the primary road developer. In recent years, tribal governments, such as the Wainwright Traditional Council and the Inupiat Community of the Arctic Slope, have developed tribal transportation programs with funding from the Federal Highway Administration (FHWA).

Road development within existing and future platted ROWs is an essential component to solving the community housing shortage. The high ground is locally identified as areas to the north and south that are prime for subdivision development (Wainwright Comprehensive Plan, 2014).

3.3.4 Market Analysis

Wainwright is a coastal city in the NSB, with 557 permanent residents in 2015 (Table 3.3-2.), located on a thin peninsula that separates the Bering Sea from a large tidal lagoon (DCCED, 2019).

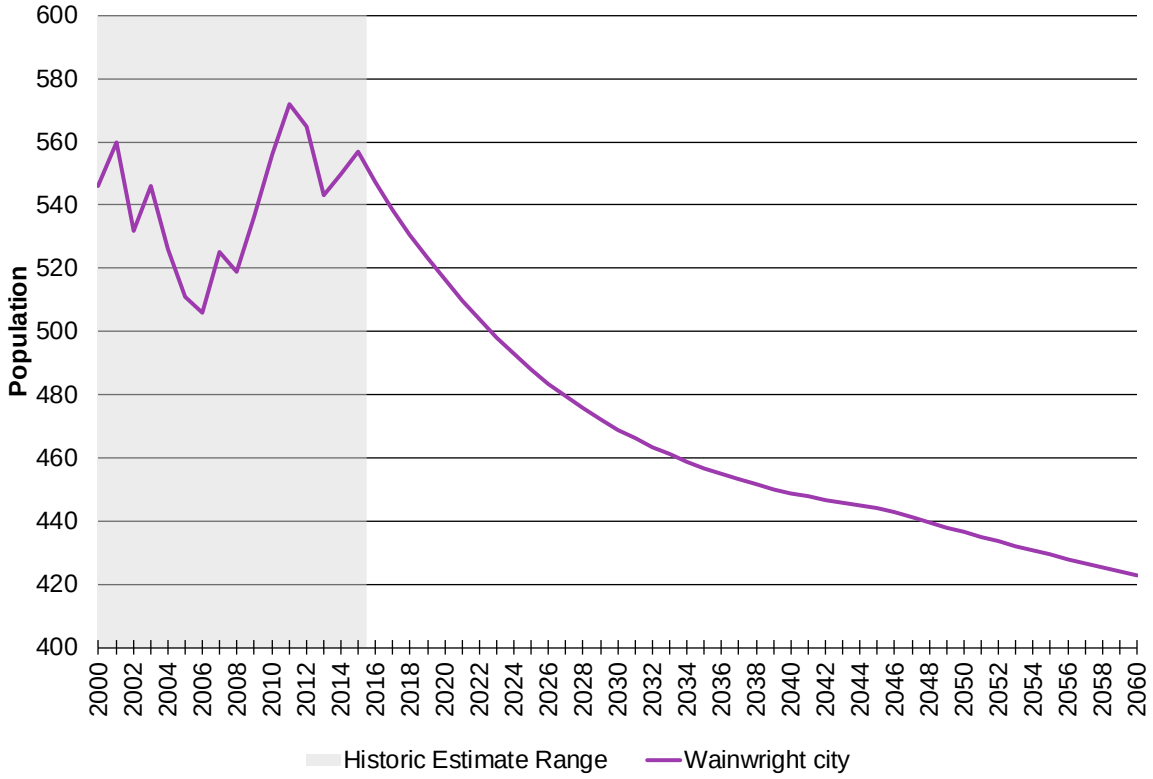
Table 3.3-2. Wainwright Commissioner-Certified Population Estimates

	2010	2011	2012	2013	2014	2015
Wainwright	556	572	565	543	550	557

Source: NSBEP&CR, 2016

From 2010 to 2015, the community experienced almost no change in population; however, the population is expected to decrease. Figure 3.3-5 shows historic estimates of population (shaded in gray) in Wainwright using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. On average, the population of Wainwright is expected to decrease by 3% each year.

Figure 3.3-5. Wainwright Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019c; NSBEP&CR, 2016; Northern Economics estimates

In 2017, Wainwright's passenger enplanements were highest in July, mail weight was highest in June, and freight weight was highest in May (Table 3.3-3). Monthly mail weight was substantially higher than freight weight in every month except May, and seasonal effects on cargo seem to be smaller for Wainwright than in other NSB communities.

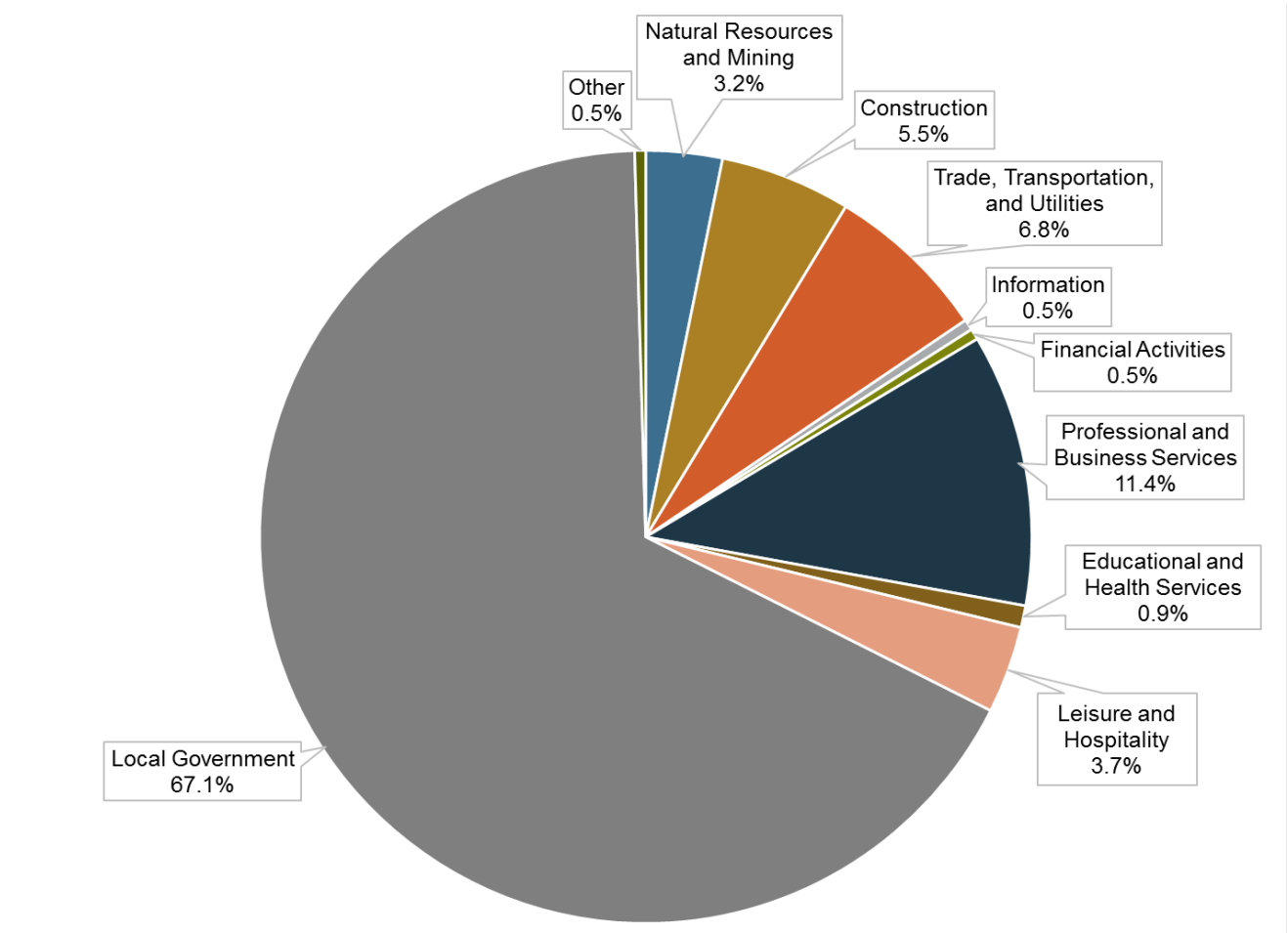
Table 3.3-3. Aviation Activity in Wainwright, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVG
Passengers	360	358	302	304	202	338	483	323	282	395	210	311	322
Mail (1000s lb)	88.2	111.4	96.4	108.8	84.6	140.1	102.8	138.4	122.1	90.4	106.3	133.5	110.2
Freight (1000s lb)	50.2	27.1	53.1	48.0	88.9	61.0	59.5	62.7	46.6	29.3	58.1	41.7	52.2

Source: BTS, 2019

Average income in Wainwright is slightly less than the NSB average at about $55,000 per household (NSBEP&CR, 2016). In 2017, about 12% of all Wainwright households had income below the poverty level within the past 12 months (USCB, 2017). Local government is the single largest employer in Wainwright, providing 67% of all jobs (Figure 3.3-6). Professional and business services are the second largest industry of employment (11.4%), followed by trade, transportation, and utilities (6.8%) and construction (5.5%).

Figure 3.3-6. Workers by Industry, Wainwright, Percentage of Total, 2016



Source: DOLWD, 2019b

3.4 Point Lay

Point Lay, as shown on Figure 3.4-1, is located on the Chukchi Sea at the southern end of Kasegaluk Lagoon, about 130 miles northeast of Point Hope and 120 miles north of Red Dog Mine. Figure 3.4-1 displays the Western Region, including Point Lay and Point Hope. Point Lay is shown in more detail on Figure 3.4-2.

The primary modes of transportation in Point Lay are regional airline flights into and out of the community, vehicles, and ATVs and snowmachines on local roads and trails, small skiffs on local rivers and ocean, and barge traffic. Typical of remote communities, the distance, climate, and geography tend to keep Point Lay residents isolated.

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Figure 3.4-1. ASTAR Western Region

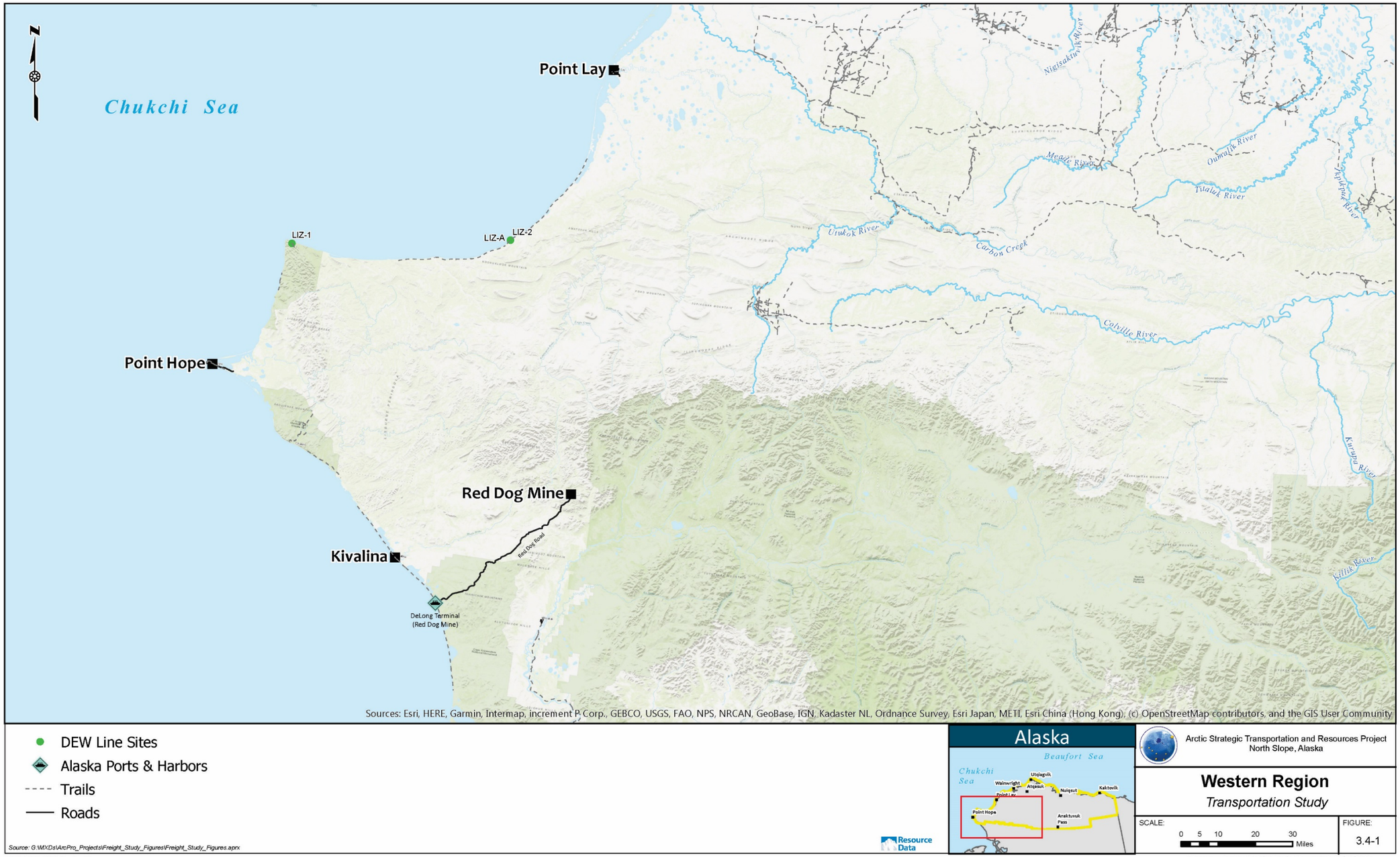

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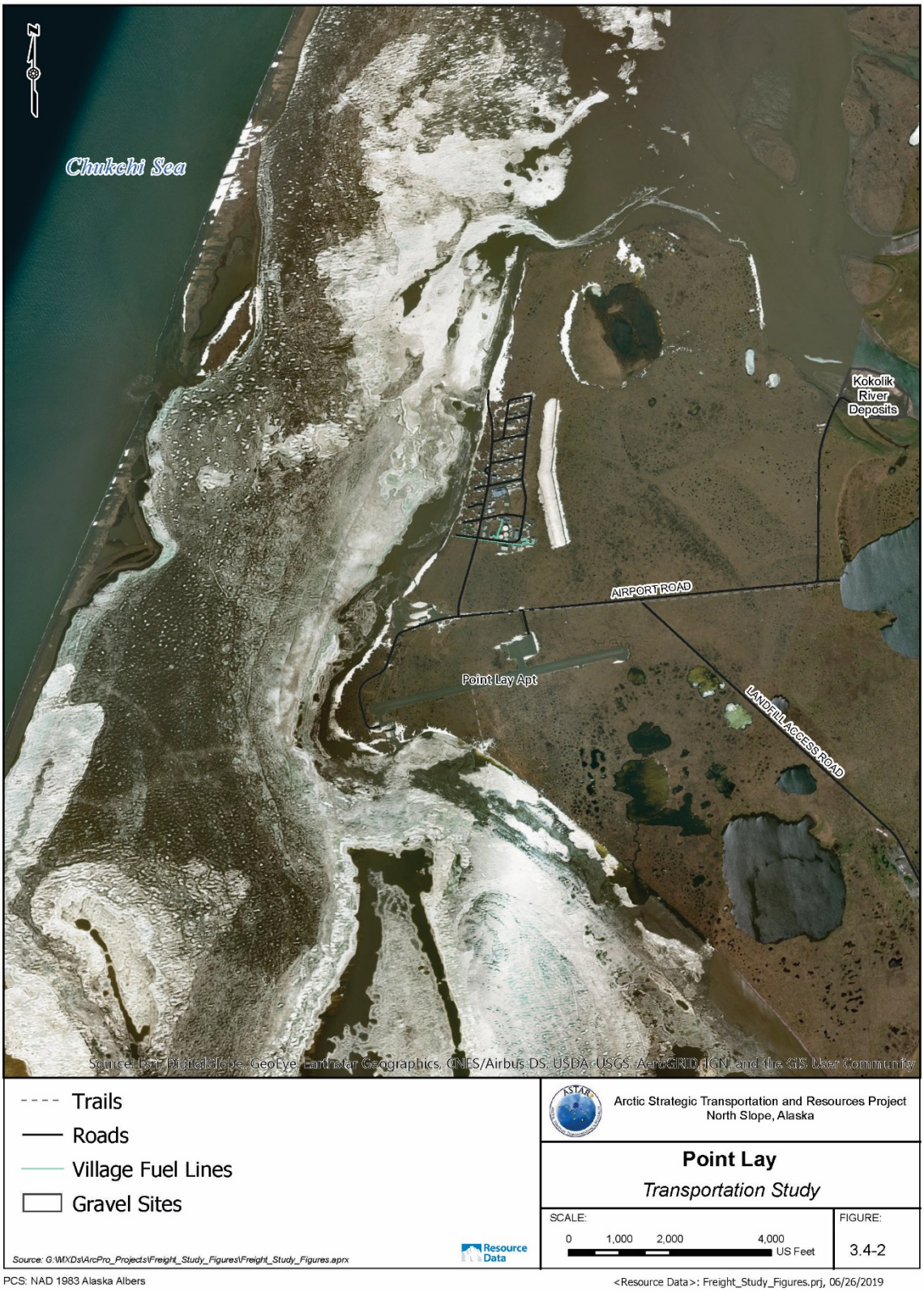
Figure 3.4-2. Point Lay



3.4.1 Marine

Because there are no year-round roads into Point Lay, residents are dependent on marine and air travel. Marine traffic has increased in recent years due to relatively ice-free seas. Elevated air and water temperatures have caused permanent ice cover to diminish to seasonally low levels, and scientists predict this trend will continue.

Barges deliver supplies including fuel and cargo during ice-free months in the summer. Unloading in Point Lay is complicated, made difficult because of the offshore barrier islands that separate the Chukchi Sea from the community. Fuel barge operators report that the offloadings are weather-dependent but that they usually gain access without too much trouble. A 4-inch floating line was used in 2016 to deliver fuel across the lagoon, replacing the fuel shuttle barge more efficiently.

The Kasegaluk Lagoon is too shallow for large barges, so unloading is done on the Chukchi Sea side of the barrier islands with the use of a small tug and barge operation. The U.S. Army Corps of Engineers (USACE) reported that because the amount of unloaded fuel is relatively small, the associated unloading cost is manageable. Residents, however, have expressed concern about the time and cost to shuttle fuel from the barge across the barrier islands and Kasegaluk Lagoon to the community.

Freight offloading is handled using a line haul barge and lightering to a landing craft. From there, the cargo is loaded onto smaller landing crafts that can navigate in shallower water. They land on the barrier island side, offload the cargo about 1 mile across the spit, and then load onto the smaller low draft barges. They ferry the cargo across the lagoon and beach to shore. The water depth in the lagoon varies with weather and sea surges, which is why weather is critical during offloading periods.

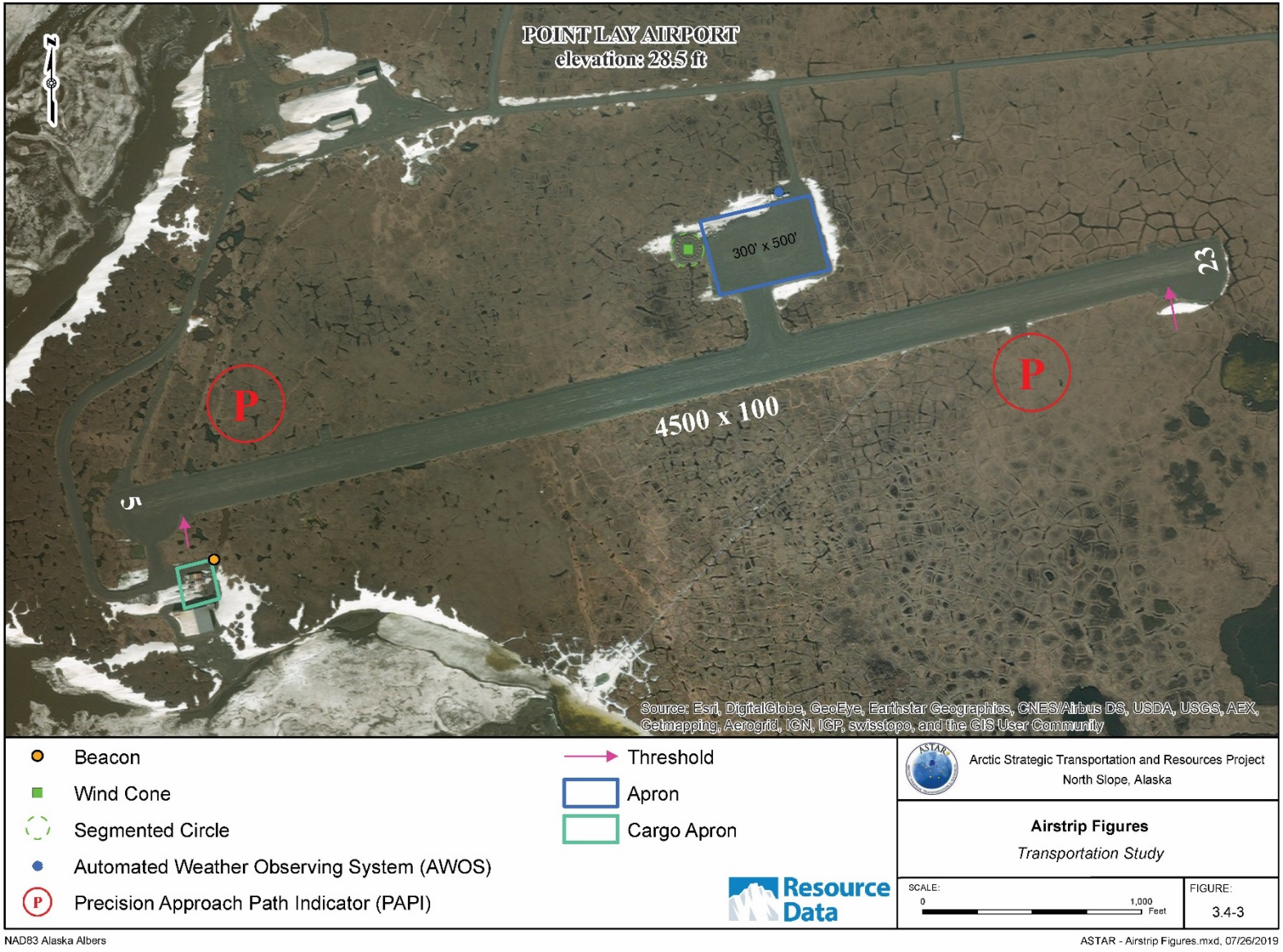
The former Cape Sabine DEW Line site is located approximately 93 miles southwest of Point Lay and was used by the USAF and U.S. Navy for national defense. More recently, 740 acres have been transferred to Cully Corporation. Based solely on water depths of 40 feet or more past the 3 nautical mile line make Cape Sabine a feasible location for a deep water port (Point Lay Comprehensive Plan 2017-2037, 2017).

3.4.2 Air

The Point Lay airport (IATA code PIZ) is the only community airport that is owned by the USAF; it is operated, however, by the NSB. The gravel airstrip 4,500 feet long and 100 feet wide, with turnarounds on each end of the runway and a 300-foot by 500-foot parking apron on the north side of the runway. Another apron exists on the southwest end of the runway that is used for cargo and contains a USAF hangar. Like many of the other communities in the AOI, this facility is designed for B-II aircraft.

Future improvements to the Point Lay airport were listed in the 2016 Capital Improvement Plan submitted by the NSB to the FAA, including: 1) construction of a passenger shelter; 2) acquiring snow removal equipment; and 3) construction of perimeter fencing to improve safety and security. The Cully Corporation is also seeking to expand the runway 2,000 linear feet in order to accommodate larger commercial aircraft.

Figure 3.4-3. Point Lay Runway



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Like many other NSB communities, Point Lay is only accessible by air year-round. Ravn Alaska is the only air carrier and provides service via Utqiaġvik one to two times per day throughout the week. Point Lay has averaged just under 2,000 enplanements since 2008.

Scheduled cargo service to Point Lay is offered through Ravn Alaska. Typical freight and passenger costs are presented in the following table.

Table 3.4-1. Typical Passenger and Freight Costs for Point Lay

Airlines	City of Origin	Typical Passenger Cost	Freight Costs
Ravn Alaska	Deadhorse (SCC)	PIZ-SCC $1274 RT	0-32 lbs $31 (flat rate) Over 32 lbs $1.53/lb
	Point Hope (PHO)	PIZ-PHO $458 RT	
	Utqiaġvik (BRW)	PIZ-BRW $594 RT	

3.4.3 Overland

According to the U.S. Department of the Interior's BIA IRR Program inventory data for fiscal year 2009, Point Lay has approximately 8 miles of developed roadways within the community, shown in Figure 3.4-2 All 8 miles of roadway are gravel. There are also roads that provide access to the NSB material site, freshwater lake, landfill, and airport. There is a road around the west end of the runway that terminates at the old USAF apron. The Native Village of Point Lay identified an additional road on the north end of town to meet the expansion of community and open new lots for future development. Community residents have also expressed a desire for an alternate road to the airport due to heavy snowdrifts next to the NSB Public Works shop running adjacent to the outfall line. This alternate airport route would also provide maintenance access to the outfall line. Most roads are constructed from material mined from the Kokolik River. The gravel material is sandy gravels. The roads are generally in fair condition with adequate drainage, although there are occasional problems with rutting and potholes. Trucks and ATVs are used year-round to the extent permitted by roads, and snowmachines are primarily used during the winter.

The NSB Public Works Department regularly waters village roads to suppress dust. Residents, however, maintain that it is difficult to control dust from road traffic in the summer months and that increased dust contributes to both respiratory conditions and contamination of drying meat and fish. Residents have expressed concern for their elders and youth, who are primarily affected by outdoor dust.

The NSB provides senior van services for elders.

Overland transportation beyond the community of Point Lay is limited since there are no road connections to neighboring communities. About 250 miles of local trails provide access to subsistence hunting, fishing areas, remote cabins, and native allotments. Search and rescue has attempted to mark common subsistence trails but have found that the markers have a tendency to fall over in extreme weather. Regional trails also exist in the Point Lay area – one between Point Lay and Point Hope (130 miles), one to Wainwright (100 miles), and two that run inland along the Kukpowruk River and Epizetka River. The NSB Planning & Community Services Department and ASRC are considering overland transportation corridors as options to better connect communities (Point Lay Comprehensive Plan 2017-2037, 2017).

3.4.4 Market Analysis

Point Lay is a coastal community in the NSB, with 269 permanent residents in 2015 (Table 3.4-2). From 2010 to 2015, the community grew by 42 percent, and the trend is expected to continue in the future. Point Lay is also one of the youngest NSB communities, settled in the 1930s. The area is subject to coastal erosion, and the village has been relocated twice (NSBSD, 2019).

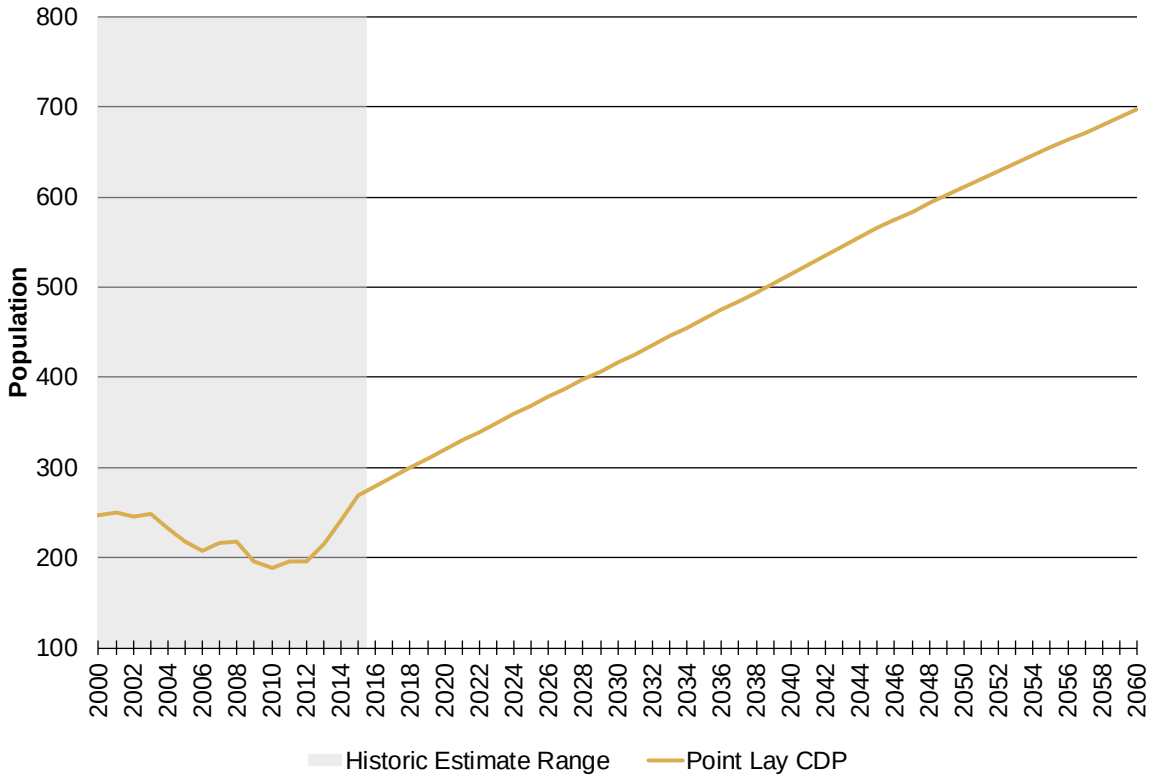
Table 3.4-2. Point Lay Commissioner-Certified Population Estimates

	2010	2011	2012	2013	2014	2015
Point Lay	189	196	196	215	242	269

Source: NSBEP&CR, 2016

Figure 3.4-4 shows historic estimates of population (shaded in gray) in Point Lay using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. Based on recent increases in population, Point Lay is expected to grow by about nine residents per year. It has one of the highest expected rates of growth in the NSB.

Figure 3.4-4. Point Lay Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019c; NSBEP&CR, 2016; Northern Economics estimates

Point Lay has a gravel airstrip owned by the USAF which is used for passenger and cargo transportation (DCCED, 2019). In 2017, Point Lay's passenger enplanements were highest in January, which is unusual compared to the other NSB communities where passenger aviation activity peaks in the summer or fall

(Table 3.4-3). Monthly mail weight appears to be seasonal with a peak in the fall, but April was also a significant month for mail in 2017. Freight weights on average were substantially smaller than mail weights and also exhibit some seasonal influence.

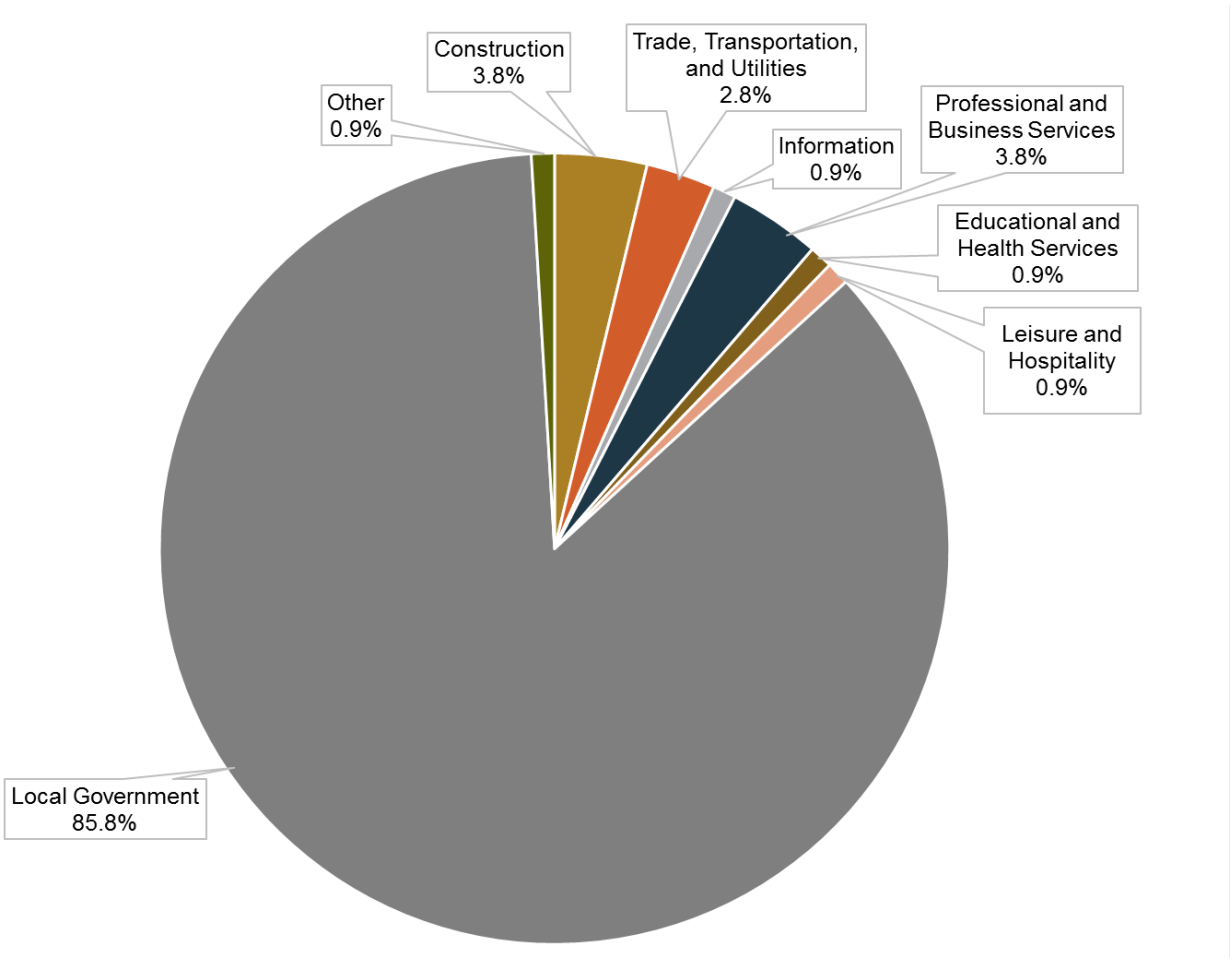
Table 3.4-3. Aviation Activity in Point Lay, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVG
Passengers	263	199	153	105	107	137	139	211	171	199	170	117	164
Mail (1,000s lb)	30.1	39.9	38.4	58.0	40.9	46.3	38.4	52.1	56.3	67.1	24.5	41.3	44.4
Freight (1,000s lb)	8.6	9.2	59.4	15.2	19.9	18.3	18.6	14.6	11.1	24.3	10.6	12.2	18.5

Source: BTS, 2019

Average income in Point Lay is the second lowest of all the reported communities in the study area at about $36,000 per household (NSBEP&CR, 2016). In 2017, about 22.5% of all Point Lay households had income below the poverty level within the past 12 months, which is the highest rate of poverty among NSB communities (USCB, 2017). Local government is the single largest employer in Point Lay, providing more than 85% of all jobs, as seen in Figure 3.4-5. While there are some jobs in construction and other industries, Point Lay is heavily dependent upon local government for employment opportunities.

Figure 3.4-5. Workers by Industry, Point Lay, Percentage of Total, 2016



Source: DOLWD, 2019b

3.5 Point Hope

The primary modes of transportation in Point Hope are regional airline flights into and out of the community, vehicles, and ATVs and snowmachines on local roads and trails, small skiffs on local rivers and ocean, and barge traffic in open waters. Typical of remote communities, the distance, climate, and geography tend to keep Point Hope residents isolated, but visions of future transportations systems could broaden and diversify the region's network and create economic opportunities for the community (Point Hope Comprehensive Plan 2017-2037, 2017). See Figure 3.5-1 for an overview of Point Hope.

Figure 3.5-1. Point Hope

3.5.1 Marine

Because there are no year-round roads into Point Hope, residents are dependent on marine and air travel. Marine traffic has increased in recent years due to a relatively ice-free Arctic. Higher air and water temperatures have caused permanent ice cover to diminish to seasonally low levels, and scientists predict this trend will continue.

Cargo barges deliver supplies to Point Hope during ice-free months in the summer. Barges leave from Seattle on or about July 1 of each year and carry about 3,000 to 5,000 tons of cargo, which breaks down to an estimated 75% business usage and 25% individual goods. Barges offload onto the beach located on the south side of the spit. The beach is gravelly sand with very gradual grades that can accommodate beach docking for barges. Natural water depths at the Point Hope beach drop to 30 to 40 feet within 150 feet of the shore. Cargo unloading is more difficult because of the pea gravel consistency of the beach rock, which provides low traction.

Fuel and cargo deliveries are made by barge during the ice-free summer season. The landing and unloading is weather-dependent. Barges nose up to the beach and hold position by pushing in and onto the beach. Fuel is offloaded by pulling hose a short distance over to the marine header that connects into the tank farm. Cargo unloading is more difficult because of the low traction of the beach gravel; 50-foot platforms are used as ramps to allow loaders to travel on the gently sloping beach to hard ground upland.

Due to undeveloped shore-based infrastructure, unloading the barges in Point Hope can be a risky and time-consuming task. According to the USACE barge landing final report, barge operators have stated that a permanent barge unloading facility would not be desirable because it restricts unloading to a specific location. Currently, they have options to move up and down the beach to best work with current sea and weather conditions, which changes due to the level of swell present when making the stop. Additionally, if permanently placed, the ramps used would not remain in place during periods of landfast ice and erosion.

Arctic tourism is increasing rapidly; it is estimated that 1 million adventure tourists visited the Arctic in 2013. Higher-risk activities such as adventure and ecotourism often involve transportation via passenger vessel. In past years, small inflatable boats have been used to bring passengers ashore to Point Hope from cruise ships. The cruise industry schedules tours through the Northwest Passage and into the U.S. Arctic. Some community members have expressed interest in creating a port authority for Point Hope to regulate all marine traffic in the area and the need for greater coordination at the local level (Point Hope Comprehensive Plan 2017-2037, 2017).

3.5.2 Air

The SOA owns and maintains the airport at Point Hope (IATA code PHO). The airstrip is paved, 3,992 feet long by 75 feet wide, and in fair condition is designed to accommodate B-II aircraft. A 480-foot by 250-foot parking apron is located on the southeast side of the runway for passenger and freight loading and unloading. The airstrip and community of Point Hope are located on a sand spit prone to coastal storms, flooding, and erosion. Currently, DOT&PF, in cooperation with the FAA, are pursuing realignment and the eventual relocation of the Point Hope runway due to the continued threat of erosion (Point Hope Comprehensive Plan 2017-2037, 2017). DOT&PF has expressed concern that continued coastal erosion will eventually lead to the runway length falling below 4,000 feet, thereby limiting the runway to smaller aircraft.

Figure 3.5-2. Point Hope Airport

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A realignment of the runway by approximately 15 degrees would provide the necessary runway safety area (RSA) for a 50-year design life. The eventual relocation of the airport inland to a location protected from coastal erosion is considered to be the long-term goal and desire of DOT&PF and residents of the Point Hope community.

Point Hope is typically accessed from either Utqiaġvik or Kotzebue. Access to Kotzebue is available daily from Anchorage by Alaska Airlines and Ravn Alaska at a typical cost of $300 per round trip. Passenger flights to Point Hope are provided by Bering Air from Kotzebue twice per day Monday through Saturday and once on Sundays. Ravn Alaska also provides passenger air service to Point Hope twice daily from Kotzebue or twice per week from Utqiaġvik. Point Hope has no connectivity via air to any other communities on the North Slope. Enplanements at Point Hope have varied since 2010, ranging from approximately 4,300 to 5,300.

Scheduled cargo services are provided by Ryan Air, Ravn Alaska, and Bering Air to Point Hope. Typical passenger and freight costs are presented in the following table.

Table 3.5-1. Typical Passenger and Freight Costs for Point Hope

Airlines	City of Origin	Typical Passenger Cost	Freight Costs
Ravn Alaska	Utqiaġvik (BRW)	PHO-BRW $856 RT	0-32 lbs $31 (flat rate) Over 32 lbs $3.20/lb
	Kotzebue (OTZ)	PHO-OTZ $530 RT	
	Point Lay (PIZ)	PHO-PIZ $458 RT	
Bering Air	Kotzebue (OTZ)	PHO-OTZ $531 RT	0-100 lbs $1.55/lb 101-500 lbs $1.50/lb 501-1000 lbs $1.45/lb 1001-5000 lbs $1.40/lb Over 5000 lbs $1.35/lb
Ryan Air	Kotzebue (OTZ)	N/A (Cargo Only)	$30 Minimum 1-499 lbs $1.39/lb 500-900 lbs $1.33/lb 1000-4999 lbs $1.28/lb Over 5000 lbs $1.22/lb

3.5.3 Overland

Point Hope's future road transportation priorities focus on improving both pedestrian and driver safety along with improved access within the community and subsistence areas outside of city limits. The community has long expressed interest in roadway upgrades, new road construction, and trail marking. The Native Village of Point Hope submitted for and received a Transportation Investment Generating Economic Recovery (TIGER) grant—now the program is referred to the Better Utilizing Investments to Leverage Development (BUILD) Transportation Discretionary Grant program—that will be used for improvements to redesign and construct five critical roads and sidewalks, with Americans with Disabilities Act (ADA) improvements. These projects will provide safer options and better access for vehicles, pedestrians, and bicyclists.

According to the U.S. Department of the Interior BIA IRR Program inventory data for fiscal year 2009, Point Hope has approximately 14 miles of developed roadways within the community. The Native Village of Point Hope identified an additional 7 miles of road to meet the expansion of the community

and to develop a permanent access road that travels inland. Most roads are constructed from rounded sea gravel which is predominant on the spit. The gravel is high quality but must be crushed in order to provide an adequate ratio of fine- to course-grained that will help bind the material. The local roads are constructed using 2 feet of gravel and silt embankments, topped with crushed gravel. The roads are generally in fair condition with adequate drainage, although there are occasional problems with rutting and potholes. Trucks and ATVs are used year-round to the extent permitted for seasonal road conditions, and snowmachines are primarily used during the winter.

Land transportation beyond the community of Point Hope is limited since there are no road links to other communities. There are 30 miles of local trails listed in the IRR inventory data for Point Hope which provide access to subsistence hunting and fishing areas, as well as to remote cabins and native allotments. Regional trails are also included in IRR inventory data, one between Point Hope and Kivalina and a second between Point Hope and Point Lay.

Because Point Hope is presently located at an elevation of 13 to 18 feet, it is susceptible to flooding either from ocean storm surges or from the Marryat Inlet as it fills with winter snowmelt from nearby foothills. Flood events occurred in 2006 and 2007 during spring breakups that caused concerns from the community about safety, both in the short-term and long-term. An existing 6-mile roadway from the community to the water source also serves as an evacuation route inland to higher grounds. Portions of the road reach elevations of 40 to 46 feet. However, lower-elevation sections of this roadway are susceptible to flood damage, as proven by the 2006 and 2007 flood events. As a result, the community has heightened its concern about its exposure to floods and the potential of being isolated with no reliable escape route to the foothills. This concern led to the execution of a Memorandum of Understanding between DOT&PF and NSB. The April 3, 2007, Memorandum of Understanding states that the flooded section of the existing evacuation road will be repaired and the evacuation road will be extended to a terminus above the flood stage elevation. Approximately $5 million was identified from two FHWA funding sources.

A portion of the Kuukpik Road was repaired in 2009 using one of the two FHWA funding sources. The repair work included restructuring 3,400 feet of the roadway section immediately south of Marryat Inlet. The repairs included raising the roadtop elevation a foot above the 100-year storm surge flood elevation, which was established at +7.3 feet, with potential wave run-up to +10 ± 12 feet. As time advances, the repair will be further susceptible to future flooding because of subsidence into the tundra of the roadbed.

The foremost road concern in Point Hope is the need for an evacuation road that would allow for access to higher ground during storm and flooding events. The second federal funding source, allocated for an extension of the evacuation road, was partially used to begin field reconnaissance to investigate possible routes for the new road. A roadway corridor was established, beginning from the existing Kuukpik Road. The three alignments that were considered were: 1) the City Route suggested by the City of Point Hope; 2) PAR Route, which was the road looked at in the 2003 CH2M Hill PAR; 3) Jakie Koonuk's Route, as submitted by the Native Village of Point Hope. The proposed road corridors are known locally as the "7-Mile Road" and generally follow the route of a well-established 17(b) trail into the foothills. The evacuation road studies were halted by the NSB until funding could be generated for construction of the new road.

The NSB Public Works Department regularly waters down village roads to suppress dust. Residents, however, maintain that it is difficult to control dust from road traffic in the summer months and that increased dust contributes to respiratory problems and other conditions. They cite their elders and youth as most affected by outdoor dust. The NSB also provides senior van services for elders (Point Hope Comprehensive Plan 2017-2037, 2017).

3.5.4 Market Analysis

Point Hope is a coastal city in the NSB, with 711 permanent residents in 2015 (Table 3.5-2). Its geography is favorable for a subsistence lifestyle that depends on marine mammals such as whales and seals for food (Maniilaq Association, 2019).

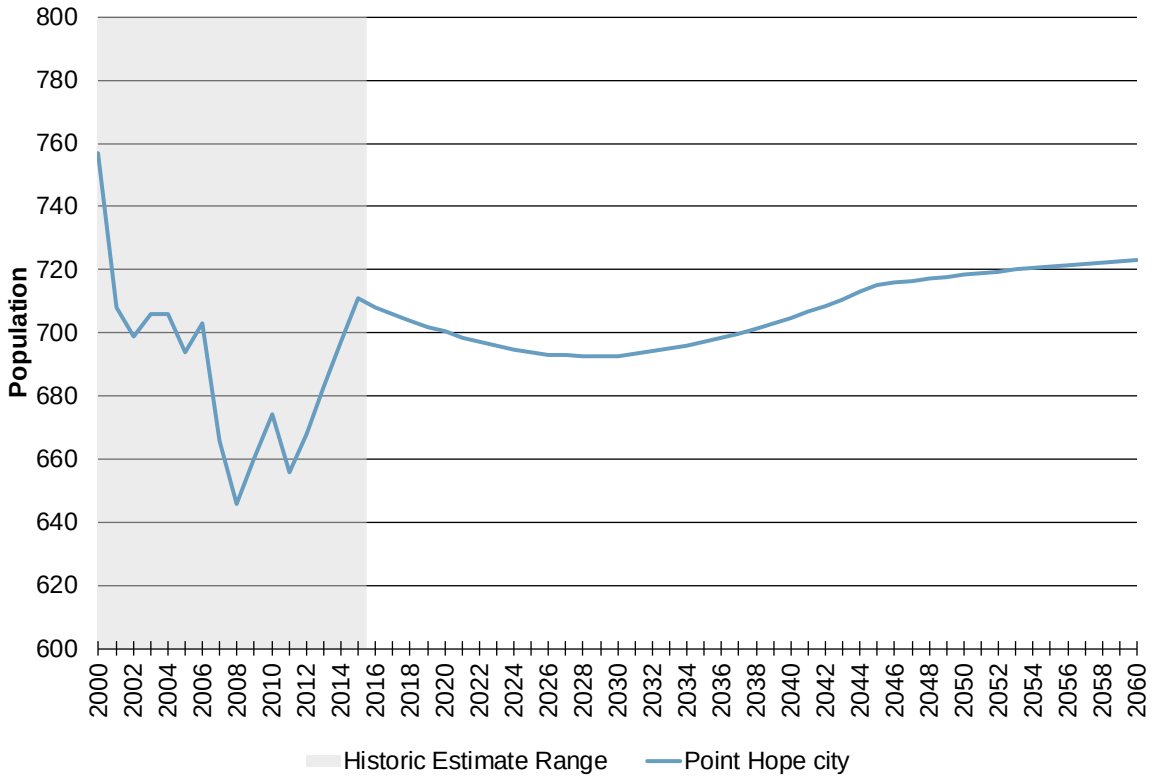
Table 3.5-2. Point Hope Commissioner-Certified Population Estimates

	2010	2011	2012	2013	2014	2015
Point Hope	674	656	668	683	697	711

Source: NSBEP&CR, 2016

From 2010 to 2015, the community grew by 5%, though the population is expected to remain relatively constant in the future. Figure 3.5-3 shows historic estimates of population (shaded in gray) in Point Hope using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected to remain relatively constant over time, and the average population change each year is less than 1%.

Figure 3.5-3. Point Hope Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019c; NSBEP&CR, 2016; Northern Economics estimates

Point Hope has a paved airstrip that is owned by the state, and the community also receives freight deliveries by barge during the ice-free season that is generally from June through September (DCCED, 2019). In 2017, passenger enplanements were highest in August, mail weight was highest in March, and

freight weight was highest in May. However, Point Hope's aviation activity is varied from month to month, especially compared to other NSB communities, and it is more difficult to discern trends.

Table 3.5-3. Aviation Activity in Point Hope, 2017

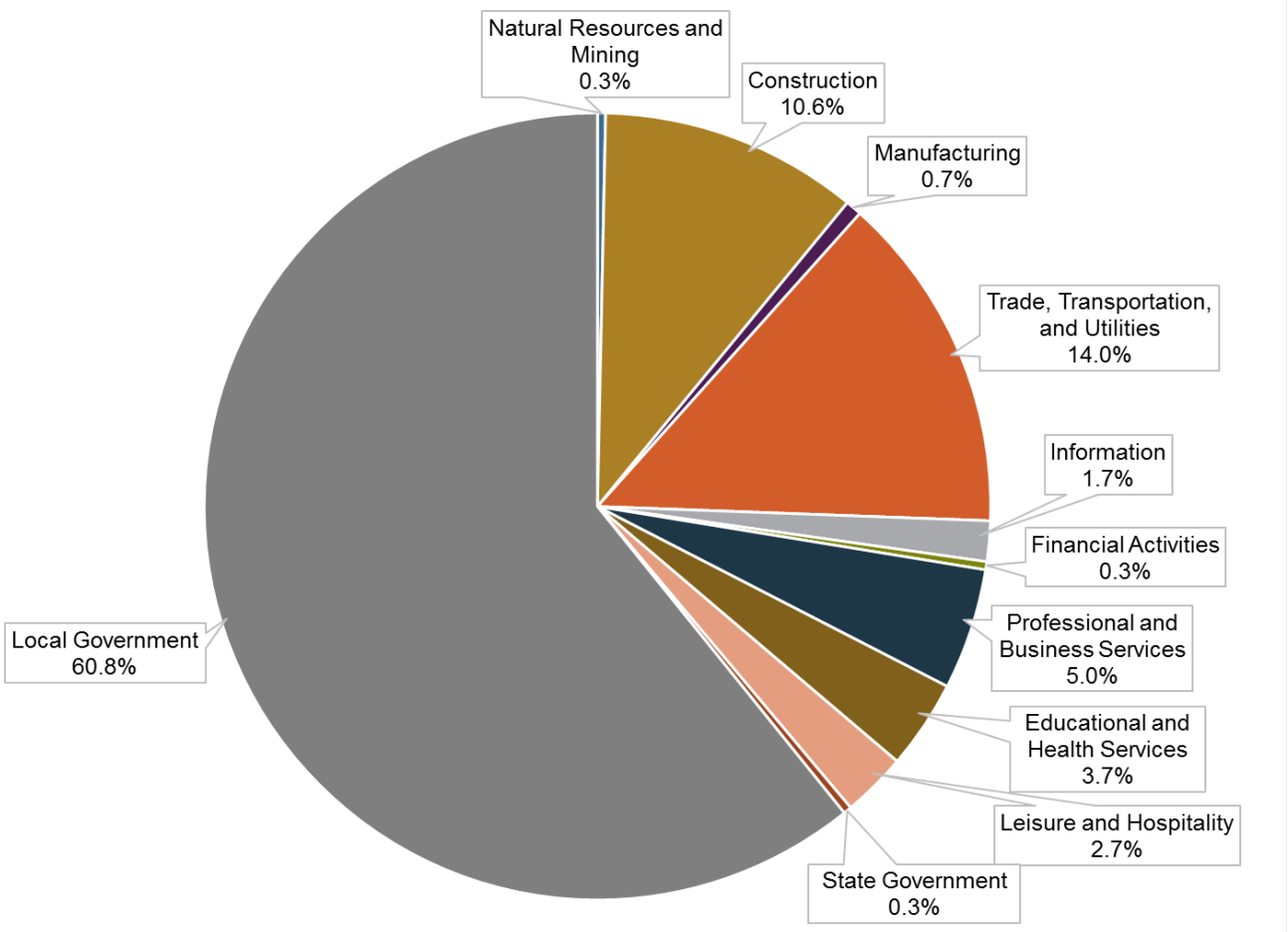
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVG
Passengers	489	412	548	395	403	488	403	564	408	475	273	496	446
Mail (1,000s lb)	138.3	125.5	188.3	143.0	137.5	170.7	142.0	164.0	164.7	176.8	137.7	121.9	150.9
Freight (1,000s lb)	35.2	34.0	55.4	46.4	223.2	107.8	89.5	67.0	36.9	34.7	33.2	42.3	67.1

Source: BTS, 2019

Average income in Point Hope is the second highest of the reported communities in the study area at nearly $65,000 per household (NSBEP&CR, 2016). In 2017, about 15% of all Point Hope households had income below the poverty level within the past 12 months (USCB, 2017).

Local government is the single largest employer in Point Hope, providing about 61% of all jobs, as seen in Figure 3.5-4. Trade, transportation, and utilities comprise 14% of jobs, followed by construction (10.6%) and professional and business services (5%). Point Hope is one of the more economically diverse communities in the borough in terms of employment industries.

Figure 3.5-4. Workers by Industry, Point Hope, Percentage of Total, 2016



Source: DOLWD, 2019b

3.6 Nuiqsut

Nuiqsut, shown on Figure 3.6-1, is located in the Central Region in the middle of the Prudhoe Bay oil development. Figure 3.6-2 shows the village in more detail. Due to its location, Nuiqsut is affected by industry development more than any other community in the NSB. This comes with benefits of access to infrastructure and free natural gas but requires close management to maintain the community's cultural heritage.

3.6.1 Marine

After spring breakup, residents travel from Nuiqsut through the Colville River Delta to the Beaufort Sea. Nuiqsut is inland several miles west of the main channel of the Colville River and 10 miles south of the head of the Colville River Delta at Harrison Bay. The Nigliq Channel runs by the eastern edge of the village and provides limited access to the Colville River. During the July 2010 community meeting for this plan, some residents commented that the channel often becomes clogged with silt, restricting boat traffic. The partially funded extension to the aforementioned Freshwater Lake Road would provide direct access to the river

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Figure 3.6-1. ASTAR Central Region

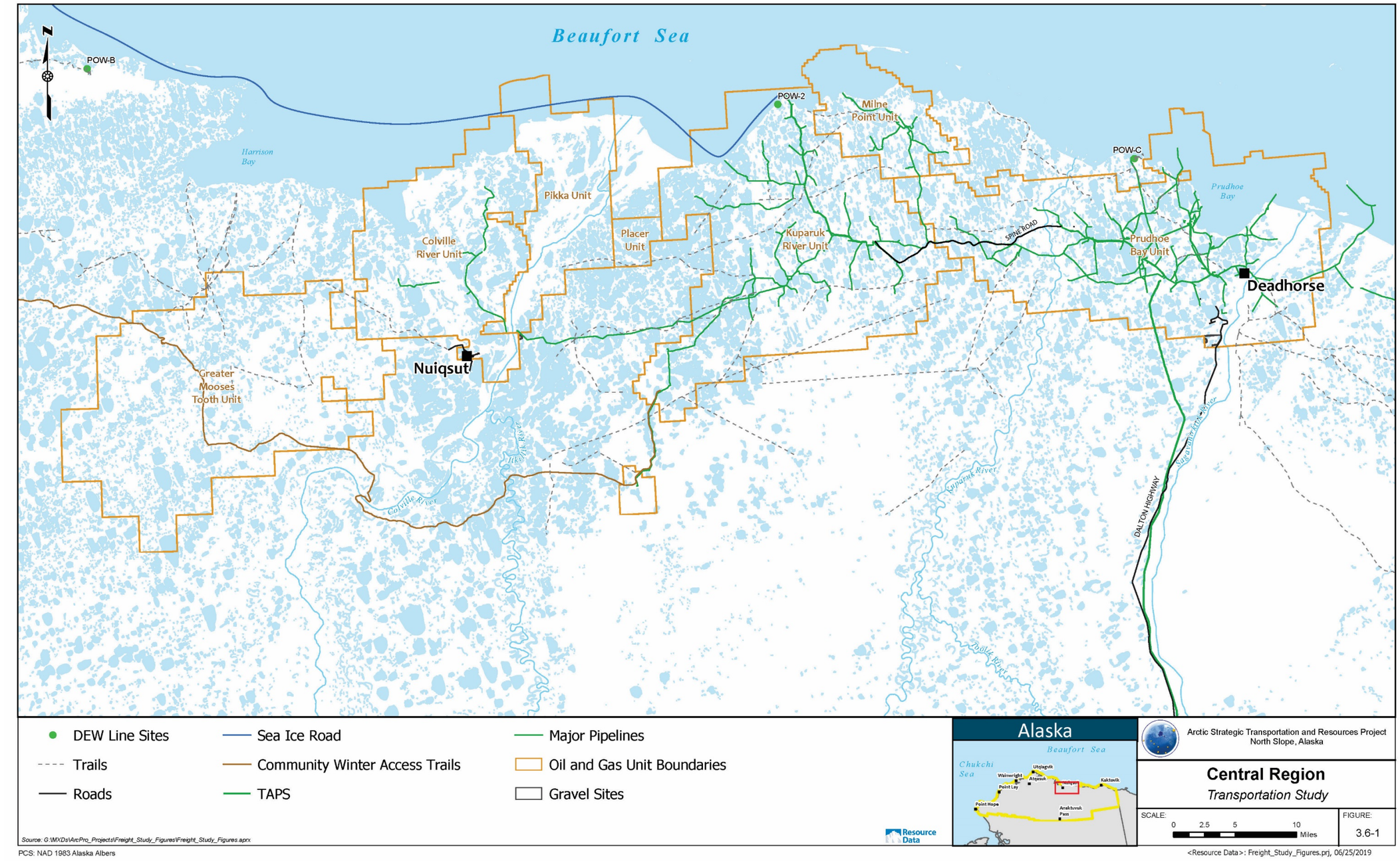

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Figure 3.6-2. Nuiqsut

The National Petroleum Reserve-Alaska (NPR-A) Impact Mitigation Program funded a new boat ramp for the Nigliq Channel in 2010 and was constructed in 2015; there is an undeveloped sand bank area, however, from which residents launch their boats. A roll-down boat ramp has been completed using funds from the NPR-A Impact Mitigation Program.

Nuiqsut does not have barge traffic or other marine shipping service from the coast through the Colville River because the Nigliq Channel is too shallow. Instead, residents wait for annual construction of the winter ice road spur that provides access to the Dalton Highway in order to bring in vehicles and other large goods. Residents often arrange to have goods delivered to Prudhoe Bay by truck, or less often, by barge, and then transported by truck in winter via the Spine Road and winter ice road (Nuiqsut Comprehensive Plan 2015-2035, 2016).

3.6.2 Air

The village of Nuiqsut has a 4,589-foot by 100-foot gravel runway adjacent to the village (airport IATA code AQT), owned and operated by the NSB. The runway has turnarounds on each end and an apron to the north of the strip (Figure 3.6-3). A passenger terminal building is located on the apron, which allows shelter for passengers and luggage, as well as a restroom facility. The airport is equipped with a rotating beacon, approach lights, high-intensity runway lights, and visual-approach slope indicator systems. The airport has a current ARC of B-II but has targeted an ARC of C-III, which could accommodate aircraft similar to a Boeing 737-400 or Gulfstream G550.

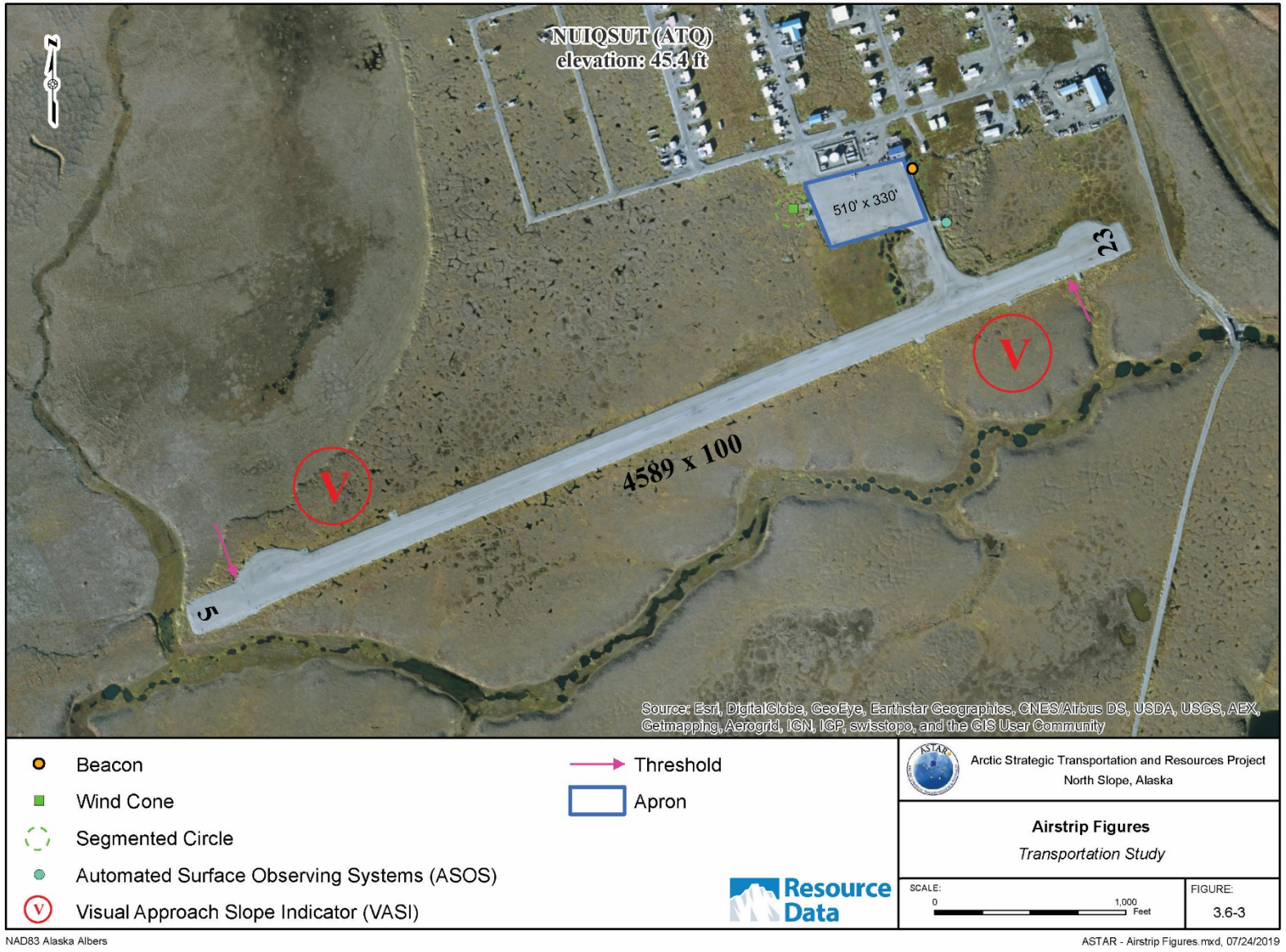
Airport lighting system power and controls – including power supply and standby power generation – for the airport terminal building were replaced in 2017, along with the lighted wind cone, segmented circle, rotating beacon, and apron area lighting. In 2018, crushed aggregate surface course was procured and stockpiled to be placed on the runway, taxiway, and apron for use in airport surfacing upgrades. These upgrades will also include replacing the airport edge lighting system, reestablishing runway crown and grade, and installing the new crushed aggregate surface course.

Some residents have expressed interest in expanding and paving the Nuiqsut runway to serve as a regional hub to minimize air traffic around the tundra at various drill sites, creating the ability to accommodate medical evacuation traffic. Other residents, however, expressed concern that expanding the airport to serve as a regional hub for oil companies would increase the number of visitors to the village and reduce livability in the community.

Nuiqsut is served by Ravn Alaska, with one to two flights daily to Utqiaġvik and Deadhorse. Enplanements for Nuiqsut ranges from year to year, with less than 2,000 in 2012, almost 3,000 in 2015, and averaging approximately 2,400 between 2010 and 2015.

The community is also connected via gravel roadway to the CPAI Alpine facilities, which allows village residents access to another runway. (See Section 4.1 for more discussion on the oil and gas industry's runway facilities on the North Slope.)

Figure 3.6-3. Nuiqsut Airport



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Typical freight and passenger costs are presented in the following table.

Table 3.6-1. Typical Passenger and Freight Costs for Nuiqsut

Airlines	City of Origin	Typical Passenger Cost	Freight Costs
Ravn Alaska	Deadhorse (SCC)	NUI-SCC $458 RT	0-32 lbs $31 (flat rate) Over 32 lbs $2.09/lb
	Utqiaġvik (BRW)	NUI-BRW $510 RT	

3.6.3 Overland

The village has about 8 miles of gravel roads, which are generally 24 feet wide within 100-foot ROWs. A few roadways have 60-foot ROWs. Roads lead north to the landfill, south to Freshwater Lake, and east to the boat ramp. The majority of community travel patterns are between residences or to the post office, Kuukpik Store, airport, health center, landfill, and school.

Transportation modes within the village include foot traffic, bicycles, cars, trucks, ATVs, and snowmachines. Sidewalks have not been constructed in the village. The NSB provides trucks, labor, and water for dust suppression during the summer months. The NSB Health Clinic provides a van and driver for elders' travel around town, and the NSB School District provides school bus service for students.

There are two bridges in the village – one at a creek along the road to the Nigliq Channel boat launch, one over a creek along the road to Freshwater Lake. The culverts and roadbeds at these crossings often wash out during spring breakup from ice and meltwater. A metal bridge across these creeks would solve these problems, and design is in progress.

In March 2014, USACE approved permits for a 5.8-mile road connecting the community to the CD-5 Access Road. The Kuukpik Corporation constructed the road, which begins at the Nuiqsut landfill access road. The Kuukpik Corporation owns the 24-foot-wide privately owned and maintained road and a 10-acre gravel pad at the CD-5 road junction. The road provides villagers access to the Alpine Development Project for training and job opportunities and access to subsistence areas. It also improves health and safety by providing a secondary connection between the Nuiqsut and Alpine airports in the event someone requires immediate evacuation. Kuukpik provides access to permanent Nuiqsut residents for use of the spur road, which connects to CPAI's gravel service roads for Alpine, some of its satellites in the Colville River Delta and NPR-A, and to winter ice roads connecting to Spine Road.

In 2011, after long delays in obtaining approvals, CPAI received a key permit from USACE for the Colville Delta 5 (CD-5) project, including a road to its satellite drill site that also connects with the Alpine Development Project on the west side of the Colville River Delta about 6 miles from CD-4. During 2014, CPAI installed four bridges and completed the gravel footprint. Other than winter ice roads, there is not a road connection to other North Slope oil developments. Figure 3.6-1 shows the CD-5 access road within the Colville River Unit.

New roads near the community are in planning stages. One road would connect the community to the Colville River so boats are able to launch directly into the river. An USACE permit for the 4-mile road obtained in 1996 has since expired. The Native Village of Nuiqsut has applied for an additional USACE permit, but it has yet to be issued. Only partial funding for the Colville River Road has been obtained. The potential Colville River Road would solve existing access problems to the Colville River caused by

siltation of the Nigliq Channel. The road would extend the existing Freshwater Lake Road to the Colville River.

Additional roads are needed to provide access to lots within a new subdivision located just off the road to Freshwater Lake. The Nuiqsut City Council has identified extension of roads to the new subdivision southeast of the village as a priority for the Capital Improvement Program.

There have been discussions about constructing a year-round road to connect the community with a proposed road between Umiat and the Dalton Highway. This would facilitate transport of goods and vehicles to the village and would also provide a more economical means of getting whaling equipment and supplies to Cross Island and for transporting whale harvests back to the village.

While DOT&PF considered a road connecting Umiat to the Dalton Highway under its Roads to Resources Program, the SOA discontinued its plans for the road in October 2014. Linc Energy was exploring the possibility of constructing a road from Umiat to the Kuparuk River Unit that conceivably could be connected to Nuiqsut. Some Nuiqsut residents have expressed concern about negative impacts to subsistence resources if the public – in particular sport and trophy hunters – were allowed access to a road connecting the community to the Dalton Highway (Nuiqsut Comprehensive Development Plan 2015-2035, 2016).

3.6.4 Market Analysis

Nuiqsut is one of the few cities in the NSB where most homes have running water, natural gas, and electricity (Kuukpik, 2019). Located near the Alpine oil and gas field, the community negotiated free natural gas for use in homes and community buildings, and its energy costs are low relative to other NSB cities (COPA, 2015). From 2010 to 2015, the community grew from 402 to 446 permanent residents, or an increase of 11%, and the trend is expected to continue in the future (Table 3.6-2).

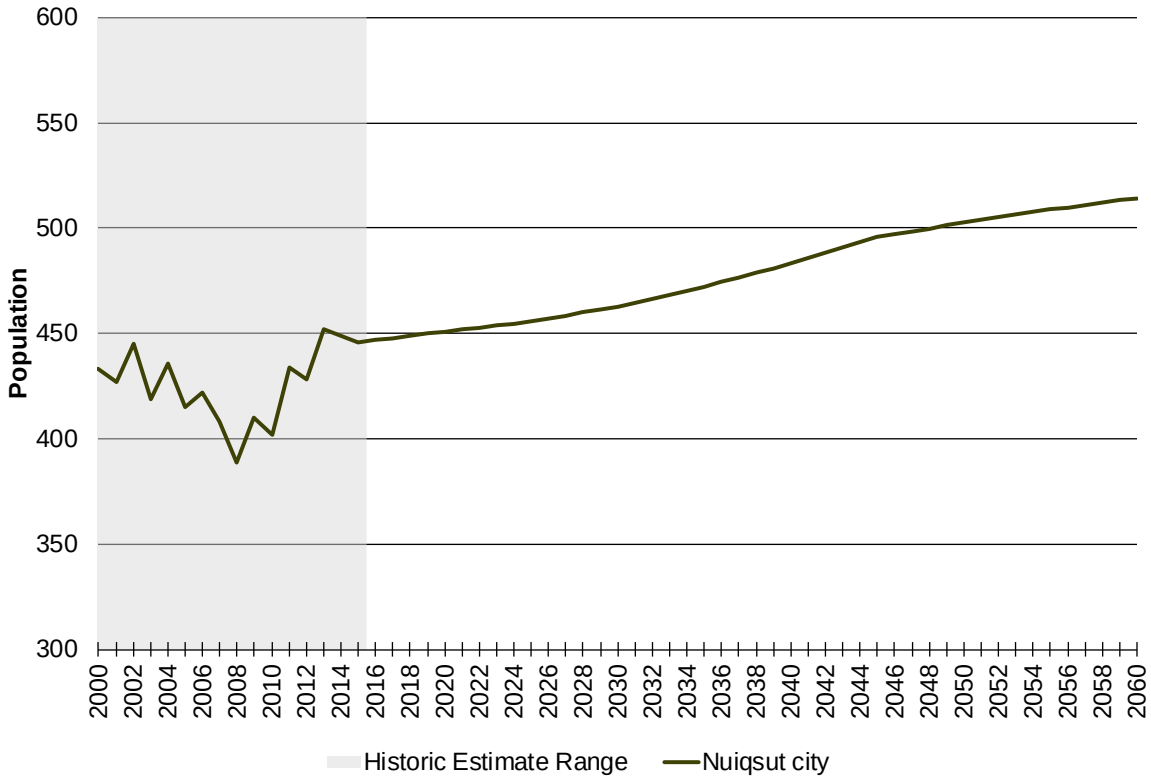
Table 3.6-2. Nuiqsut Commissioner-Certified Population Estimates

	2010	2011	2012	2013	2014	2015
Nuiqsut	402	434	428	452	449	446

Source: NSBEP&CR, 2016

Figure 3.6-4 shows historic estimates of population (shaded in gray) in Nuiqsut using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected to increase in the future with a diminishing rate of growth and an average increase of two people per year.

Figure 3.6-4. Nuiqsut Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019c; NSBEP&CR, 2016; Northern Economics estimates

A gravel airstrip is operated in Nuiqsut by the NSB and is the only year-round means for passenger and cargo transportation. During winter, an ice road from Deadhorse provides temporary access to the Dalton Highway (DCCED, 2019). DOT&PF, as well as private oil and gas companies, introduced plans to build a permanent road (Colville River Road) which would connect Nuiqsut to the Dalton Highway, but funding has not been secured and there is no current schedule for the work (ASRC, 2016). On average, there were 281 passengers, 43,000 pounds of mail, and 35,000 pounds of freight delivered by air each month in Nuiqsut (Table 3.6-3). Air mail and freight deliveries seem to be seasonal, with larger volumes in the summer and fall. Mail volumes were smallest in February, March, and April, while freight volumes were more varied. Passenger enplanements in Nuiqsut were largest in July during 2017, when other modes of transportation were not available.

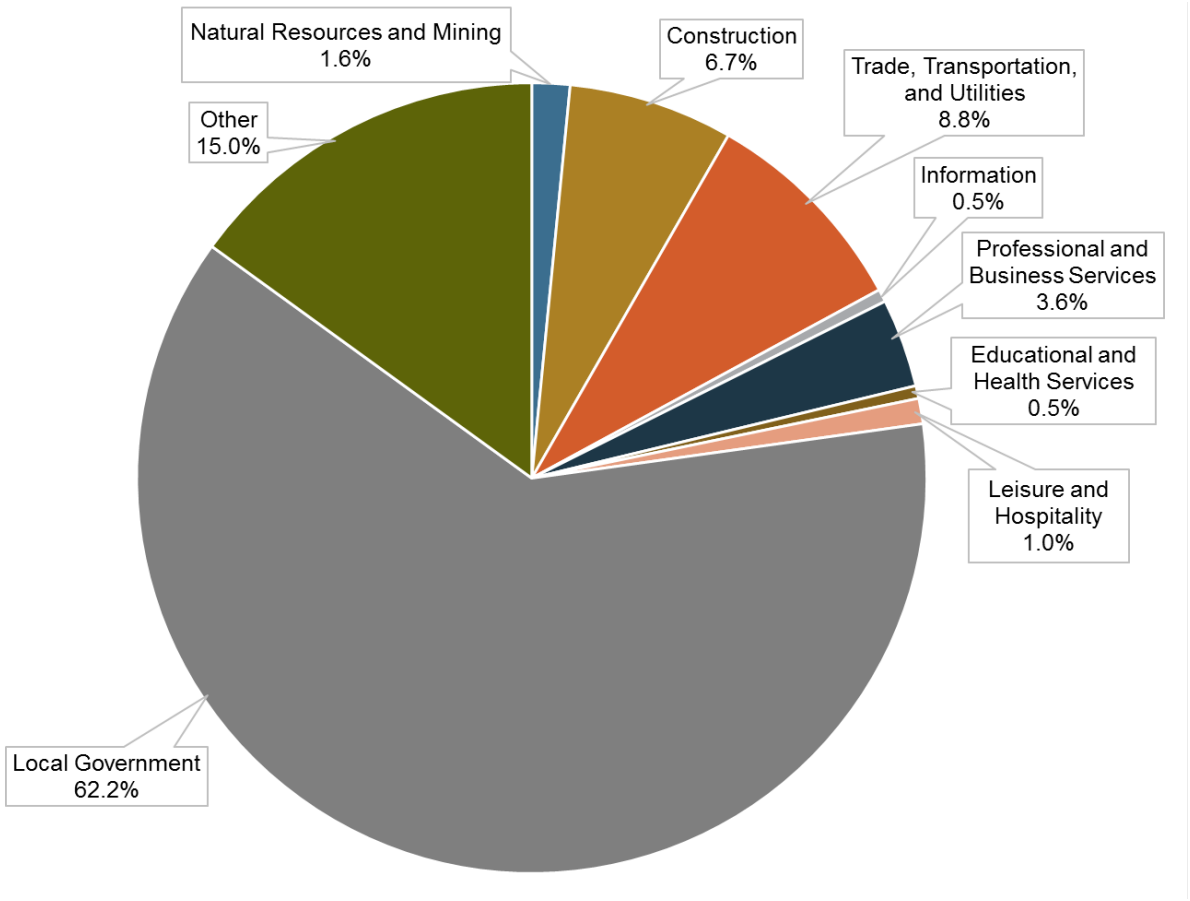
Table 3.6-3. Aviation Activity in Nuiqsut, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVG
Passengers	227	258	224	184	175	313	436	318	250	390	283	312	281
Mail (1000s lb)	53.6	14.6	20.1	15.3	36.3	70.7	49.8	46.7	43.3	87.8	44.1	33.5	43.0
Freight (1000s lb)	14.0	15.1	29.6	20.1	19.3	37.5	34.3	55.7	114.6	33.0	25.1	25.7	35.3

Source: BTS, 2019

Average income in Nuiqsut is about $47,000 per household, which is less than the NSB average but higher than the household average in several other communities (NSBEP&CR, 2016). In 2017, about 10% of all Nuiqsut households had income below the poverty level within the past 12 months, which is the second lowest rate of poverty among the NSB communities (USCB, 2017). Local government is the single largest employer in Nuiqsut, providing 62.2% of all jobs (Figure 3.6-5). Trade, transportation, and utilities includes 8.8% of jobs, followed by construction with 6.7%.

Figure 3.6-5. Workers by Industry, Nuiqsut, Percentage of Total, 2016



Source: DOLWD, 2019b

3.7 Kaktovik

Located on an island, Kaktovik has a limited road system with no connection to the mainland. See Figure 3.7-1 for an overview of the Eastern Region, and Figure 3.7-2 for a more detailed view of the community. Residents rely on aircraft for transportation of goods and people and on a yearly barge for fuel and supplies. Cost for flights and air freight are extremely high, and residents stated their concerns during a July 2014 meeting that it costs more to fly from Kaktovik to Utqiaġvik than it does from Kaktovik to Anchorage. As of 2015, Kaktovik's most recent IRR Long Range Transportation Plan from 2009 was currently under revision. The plan describes the local surface transportation system and presents community transportation needs.

Figure 3.7-1. ASTAR Eastern Region

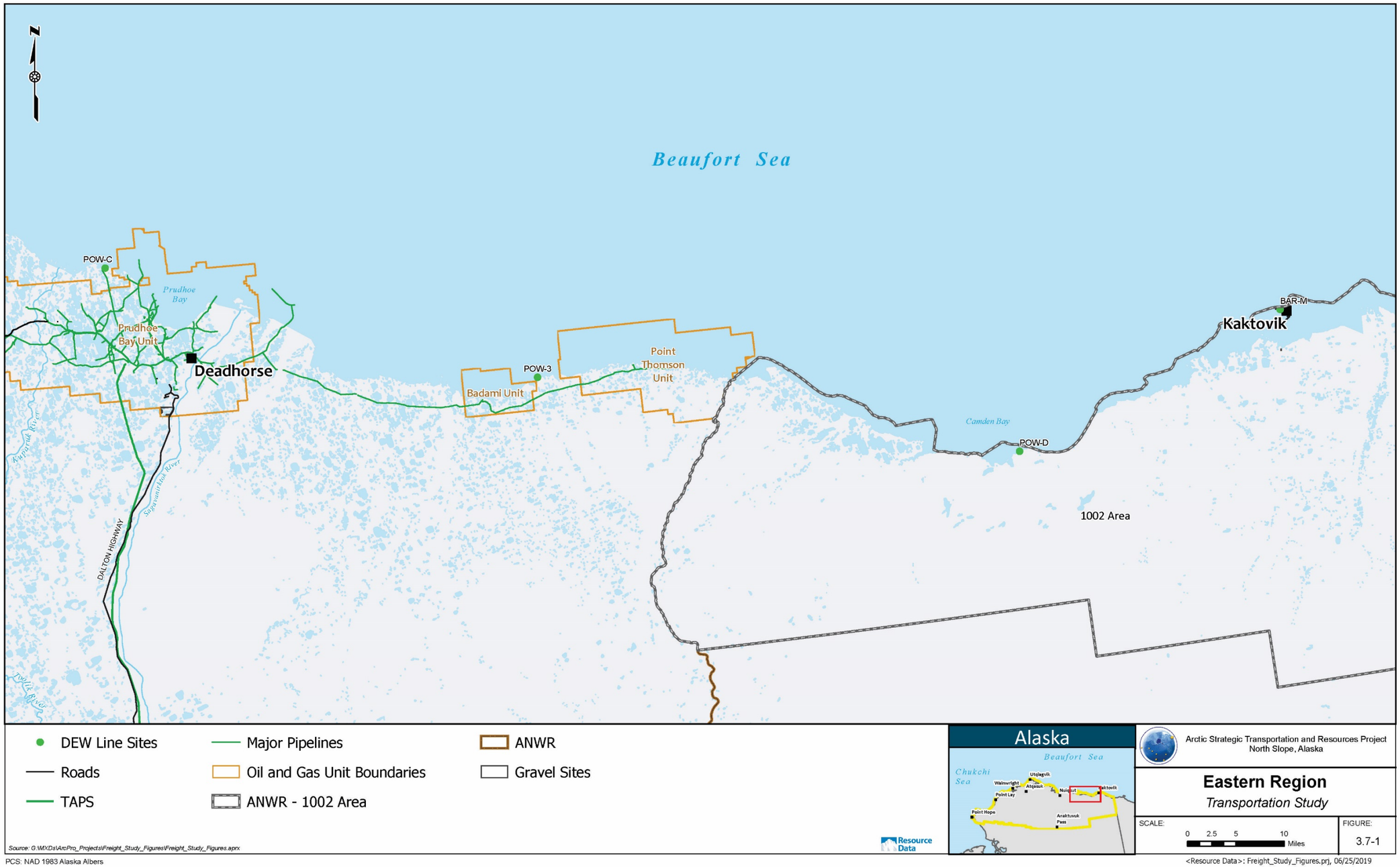


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Figure 3.7-2. Kaktovik

3.7.1 Marine

Kaktovik is located on the Beaufort Sea, but there is no public boat ramp available. During strong east winds, boats stored at the Kaktovik Lagoon beach are often pushed upland and damaged. Kaktovik residents use waterways to fish and hunt whales and seals. Due to the bowhead whale migration timing and specific routes followed by the whales, Kaktovik residents hunt whales only in the fall. Some Kaktovik residents travel by boat to Canada to see relatives. Kaktovik receives late summer or early fall shipments via barge, which is beached at a location near the community in front of the existing tank farm. Materials are offloaded on the beach and transported by land to their final locations in the community.

The current whale haul-out area has a shack used to shelter residents and supplies for butchering activities. It also houses visitors watching these activities. A nearby toilet facility would be a welcome amenity for whale crews and visitors.

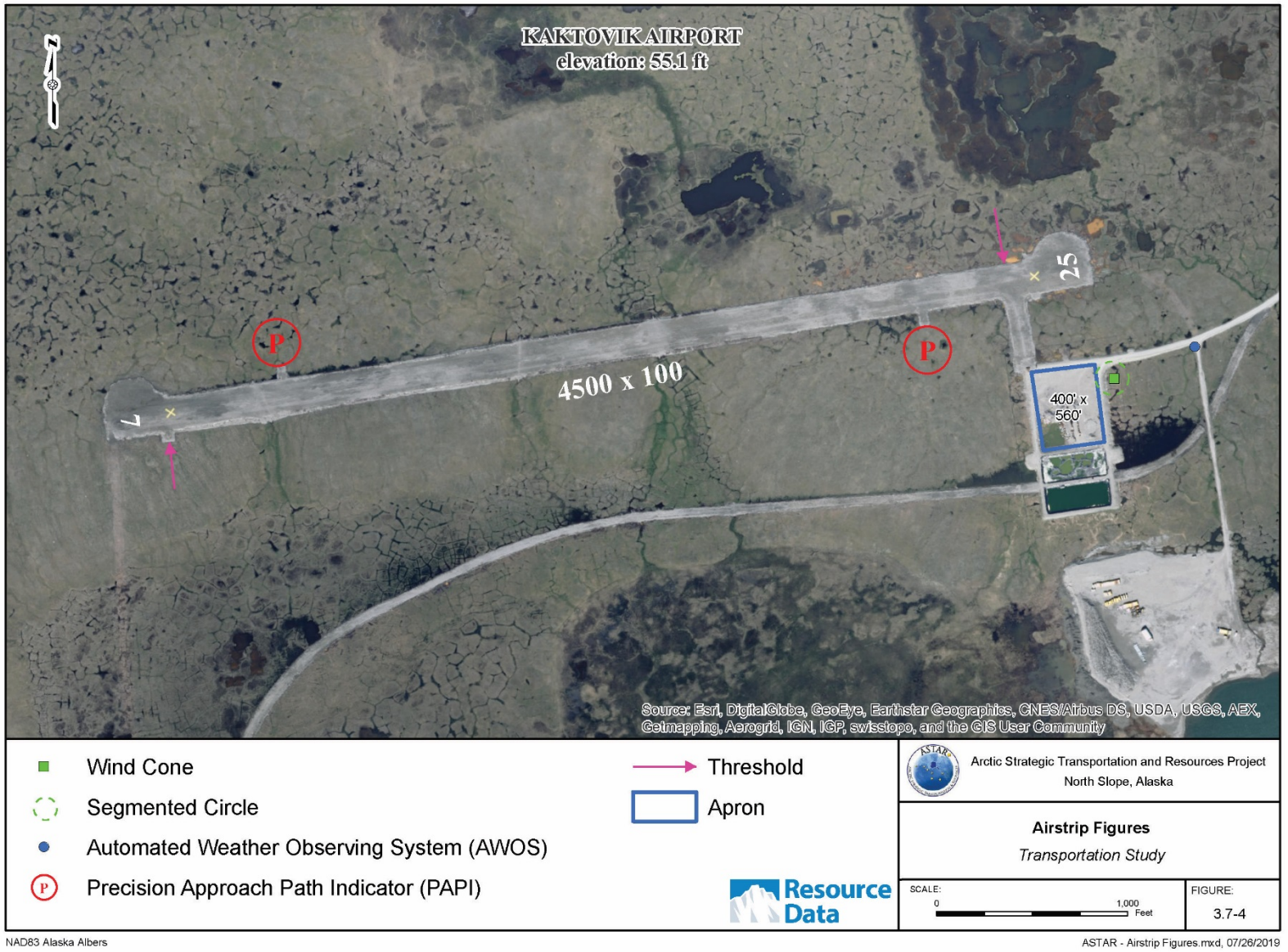
The village does not have a formal boat ramp or dock; locals launch boats into Kaktovik Lagoon from a spot abutting the landing strip. Residents report that the current launching location is too shallow and should be relocated (ASCG, 2005). The community would like to secure ownership of a boat launch site or a long-term lease from USAF to build a formal boat launch and docking facility with parking for trucks and trailers and bathroom facilities (Kaktovik Comprehensive Development Plan, 2015).

3.7.2 Air

Kaktovik's airport – Barter Island Airport (IATA code BTI) – is located on Barter Island, along with the village of Kaktovik. Until recently, the Barter Island Airport was located on the sand spit to the east of the village between 2 and 4 feet above mean sea level (see Figure 3.7-3). Its location left the airport prone to erosion and flooding from Beaufort Sea storms, with the entire runway being below the 100-year flood elevation. A section of the apron and the access road was also within the 100-year flood elevation. The airport's proximity to the ocean and continued flooding (approximately every two years the past two decades, according to community members) left electrical components in the airport lighting system with significant corrosion problems. Continued damage to airport facilities resulted in limitations in air service, which affected community access and freight.

Figure 3.7-3. Old Barter Island Airport

Figure 3.7-4. New Barter Island Airport



Construction was completed for the new Barter Island Airport in 2017 at the southern end of the island near the landfill and sewage lagoon, as shown in Figure 3.7-4. The new airport is NSB-owned and operated and consists of a 4,500-foot by 100-foot gravel runway, turnaround areas on both ends, and a 35-foot by 430-foot taxiway connecting to a 400-foot by 560-foot apron. Both the old and the new airport have an ARC B-II.

Ravn Alaska provides passenger air service to Kaktovik from Fairbanks once per day Monday through Friday and once or twice per day Monday through Friday between Kaktovik and Utqiaġvik. Enplanements took a severe dip in 2012 but otherwise have been rising, with approximately 3,200 enplanements in 2017.

Typical freight and passenger costs are presented in the following table.

Table 3.7-1. Typical Passenger and Freight Costs for Kaktovik

Airlines	City of Origin	Typical Passenger Cost	Freight Costs
Ravn Alaska	Deadhorse (SCC)	BTI-SCC $386 RT	0-32 lbs $31 (flat rate) Over 32 lbs $2.12/lb
	Fairbanks (FAI)	BTI-FAI $634 RT	
	Utqiaġvik (BRW)	BTI-BRW $1066 RT	

3.7.3 Overland

There are about 10 miles of gravel roadways in Kaktovik ranging in width from 10 to 20 feet. Kaktovik residents travel on these roads between their homes, public facilities, the airport, and landfill. The current airstrip is located on USAF property. The 2005 AADT measured three main community roads, ranging from 214 to 598.

Kaktovik's future road transportation priorities include new roads, existing community road upgrades, improved ocean access, and erosion control. The community has expressed a need for three small connections between existing roadways totaling 0.26 miles: an extension of 5th Street between Barter Avenue and Kaktovik; an L-shaped link between Hula and the road opposite the Presbyterian Church; and a route that extends Hula through Freshwater Lake Road and north to Barter Avenue. Approximately 2 miles of roadway upgrades are necessary to raise the level of eroding roadways on the south side of town. A BIA project built 1.7 miles of new subdivision roads in 2012.

Water at the western end of Bernard Harbor, where whalers typically hauled their whales, has silted up. Whalers now have to haul their catch a greater distance around the spits to the traditional haul-out spot near the airport. It is possible that a new haul-out area located near deeper water further west of the northern coast will be needed in the future. A new haul-out area would require a gravel road along the coastline to haul the butchered meat and muktuk to the village. The new haul-out area and boneyard would need to be a sufficient distance from the village core to avoid bear-human conflicts.

There is also some local interest in constructing a bridge to the mainland to provide year-round subsistence access. In the long term, a bridge could provide a link to a potential road to the Dalton Highway. If this scenario were supported by the community, construction of a road approximately 7 miles long on Barter Island and a bridge approximately 785 feet long would be needed to access the mainland. An alternative in the Airport Master Plan Environmental Impact Statement included a bridge

to the mainland, but the FAA rejected this option because of cost and environmental impacts to the high-value wetlands.

New roads have been constructed to provide access to the new airport and landfill relocation sites. A new 0.4-mile road was constructed to connect the new airport to the current landfill access road, and the existing road to the current landfill was extended 1.1 miles south to reach the new landfill site.

The Bureau of Land Management (BLM) designated a trail from the townsite on the island to the mainland; portions of this trail also pass through USAF land. This trail will have to be relocated in conjunction with the airport relocation. A road to the northwestern portion of the island is desired to access subsistence resources there, but the road would have to pass through USAF lands.

Kaktovik residents travel great distances with established routes between the community and Prudhoe Bay, the Mackenzie Delta, and the rivers inside the Arctic National Wildlife Refuge (ANWR). It is possible these routes provide a basis for BLM RS2477 to access ROW claim (Kaktovik Comprehensive Development Plan, 2015).

3.7.4 Market Analysis

Kaktovik is a coastal city in the NSB east of Utqiaġvik with 262 permanent residents in 2015 (Table 3.7-2). The community lies within the ANWR near calving grounds for the porcupine caribou herd, which is an important source of food for Kaktovik residents (DCCED, 2019).

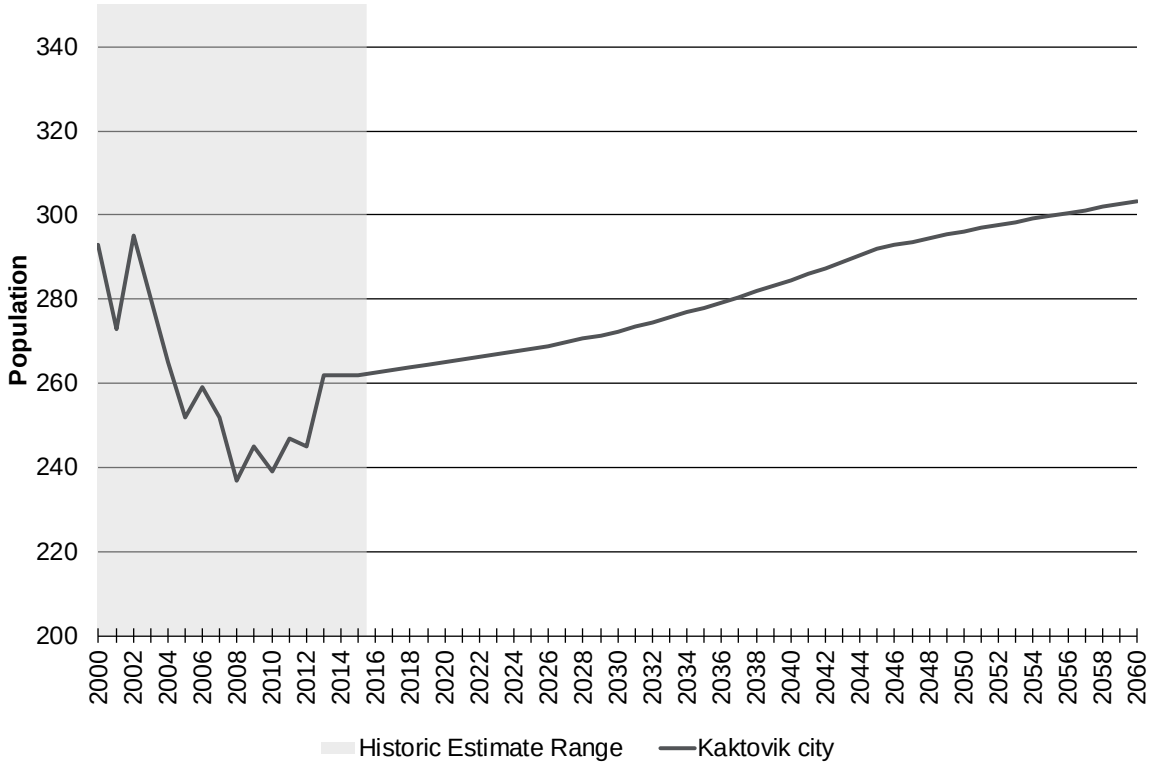
Table 3.7-2. Kaktovik Commissioner-Certified Population Estimates

	2010	2011	2012	2013	2014	2015
Kaktovik	239	247	245	262	262	262

Source: NSBEP&CR, 2016

From 2010 to 2015, the community grew by 10%, and a trend of gradual growth is expected in the future. Figure 3.7-5 shows historic estimates of population (shaded in gray) in Kaktovik using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. On average, the population of Kaktovik is expected to grow by about one resident per year.

Figure 3.7-5. Kaktovik Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019c; NSBEP&CR, 2016; Northern Economics estimates

Kaktovik originally received cargo and passenger flights at the Barter Island Long Range Radar Service Airport, but a relocation project in 2013 involved construction of a new runway and facilities further inland from the radar facility site, which was subject to seasonal flooding and coastal erosion. In addition to regularly scheduled service, chartered flights to Kaktovik have become increasingly more common with the emergence of a polar bear-viewing tourism industry. In 2017, more than 2,000 visitors traveled to Kaktovik to see the endangered species in person, with most visiting in the fall (Alaska Public Media, 2018).

In 2017, Kaktovik's passenger enplanements were highest in September, mail weight was highest in August, and freight weight was highest in March (Table 3.7-3). Freight weights were widely varied each month but on average were higher than mail weights. Passenger activity is steady during most of the year except in August and September, which is likely due to the aforementioned wildlife tourism.

Table 3.7-3. Aviation Activity in Kaktovik, 2017

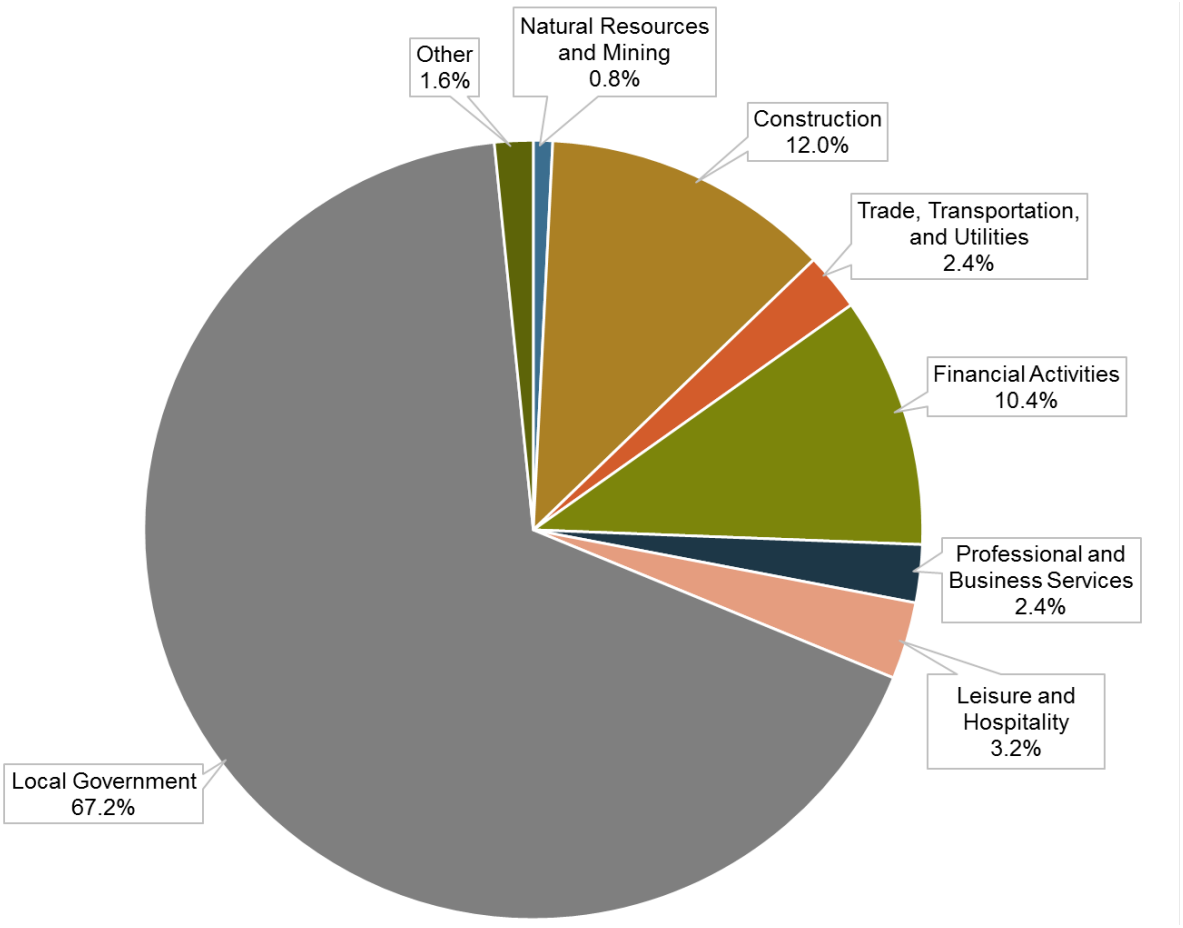
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVG
Passengers	285	219	288	207	176	188	226	462	630	295	243	174	283
Mail (1000s lb)	45.9	41.8	57.7	33.0	41.1	31.8	35.7	71.1	47.1	31.4	51.0	30.8	43.2
Freight (1000s lb)	95.0	54.4	103.8	47.4	67.8	63.7	49.6	95.4	46.7	32.3	37.5	25.4	59.9

Source: BTS, 2019

Average income in Kaktovik is the lowest of all the reported communities in the study area at about $33,000 per household (NSBEP&CR, 2016). In 2017, about 9% of all Kaktovik households had income below the poverty level within the past 12 months, which is the lowest rate of poverty in the NSB communities (USCB, 2017). Household income of Kaktovik residents is widely and evenly distributed compared to other NSB communities, and less than 1% of the households reported an income less than $10,000.

Local government is the single largest employer in Kaktovik, providing 67.2% of all jobs (Figure 3.7-6). Construction is the second largest employment industry, making up 12% of jobs, followed by financial activities with 10.4%.

Figure 3.7-6. Workers by Industry, Kaktovik, Percentage of Total, 2016



Source: DOLWD, 2019b

3.8 Anaktuvuk Pass

Anaktuvuk Pass is located in the Endicott Mountains of the Brooks Range, approximately 250 miles northwest of Fairbanks (Figure 3.8-1). It is located on a divide between Anaktuvuk River, which flows north to the Colville River and the Beaufort Sea, and John River, which flows south toward the Yukon River and the Bearing Sea. Anaktuvuk Pass is within the Gates of the Arctic National Park and Preserve along an historic caribou migration route, which serves as the basis for their economy and subsistence lifestyle. See Figure 3.8-2 for a detailed overview of the community.

Figure 3.8-1. ASTAR Southern Region

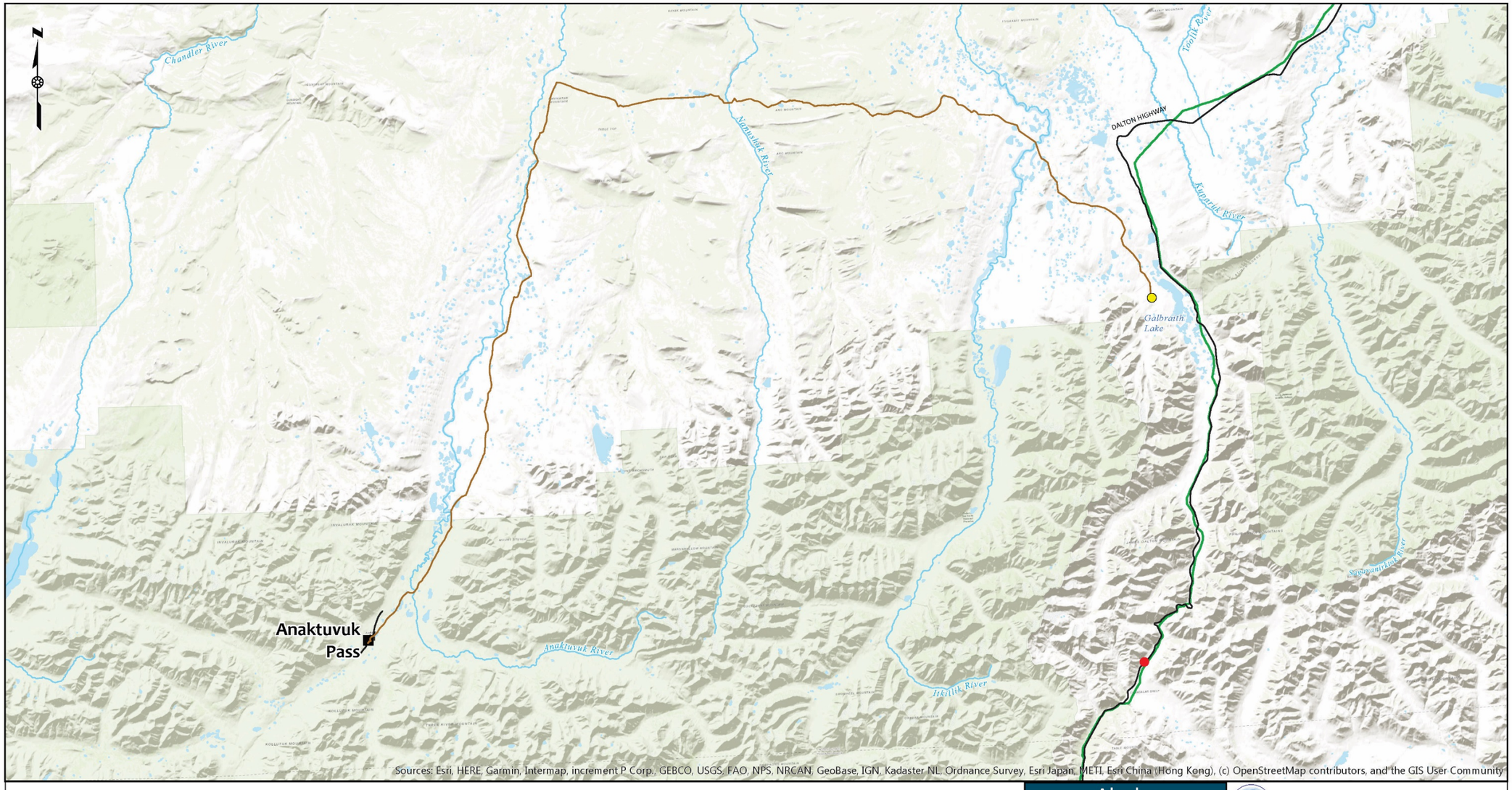


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Figure 3.8-2. Anaktuvuk Pass

3.8.1 Marine

Marine transportation does not apply as Anaktuvuk Pass is located in the Brooks Range, over 150 miles south of Harrison Bay, the nearest coastal waters.

3.8.2 Air

The only access to Anaktuvuk Pass year-round is via air. The runway (IATA code AKP), owned by the NSB, is gravel and 4,760 feet long by 100 feet wide, with a parking apron on the northwest side of the runway for loading and unloading freight and passengers, and an apron near the fuel tank farm used for fuel unloading. The design aircraft for the airport is a B-II aircraft, with an ultimate design targeted for a B-III aircraft (e.g., ATR42-200/300 or a Fokker F27 Friendship).

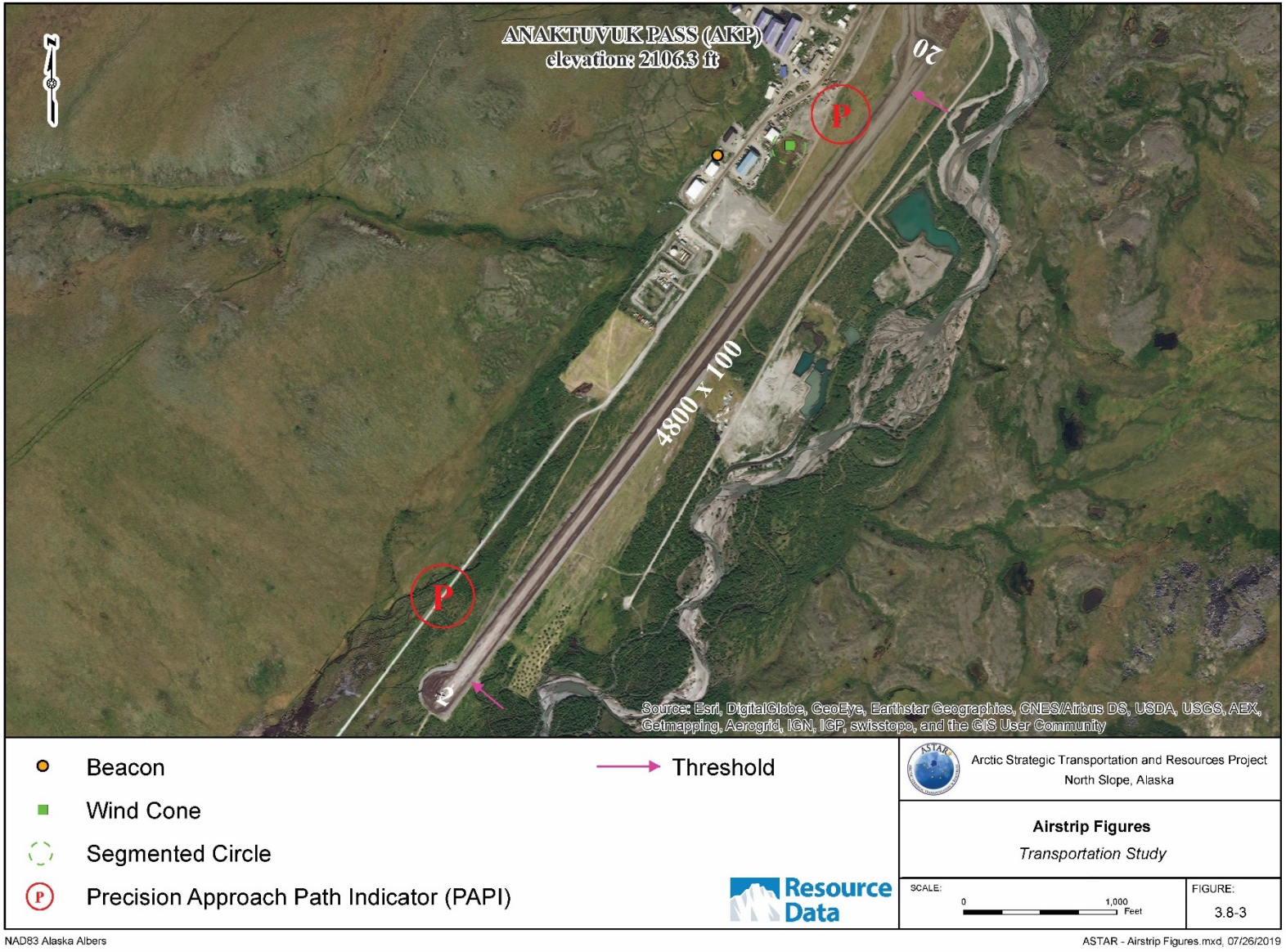
Wright Air Service is the only air carrier that provides passenger air service to Anaktuvuk Pass. All travel is to and from Fairbanks with no connectivity to other NSB communities. Flights are available twice per day Monday through Friday and once per day on the weekends. Anaktuvuk Pass has averaged between 3,500 and 4,000 enplanements from 2010 to 2017.

Wright Air also provides scheduled cargo service to Anaktuvuk Pass. Typical freight and passenger costs are presented in the following table.

Table 3.8-1. Typical Passenger and Freight Costs for Anaktuvuk Pass

Airlines	City of Origin	Typical Passenger Cost	Freight Costs
Wright Air	Allakaket (AET)	AKP-AET $300 RT	-
	Fairbanks (FAI)	AKP-FAI $380 RT	FAI-AKP 0-2 lbs $20 (flat rate) 3-10 lbs $35 (flat rate) Over 35 lbs $0.98/lb
	Bettles (BTT)	AKP-BTT $300 RT	BTT-AKP 0-2 lbs $20 (flat rate) 3-10 lbs $35 (flat rate) Over 36 lbs $0.96/lb
	Coldfoot (CXF)	AKP-CXF $400 RT	CXP-AKP 0-2 lbs $20 (flat rate) 3-10 lbs $35 (flat rate) Over 47 lbs $0.74/lb

Figure 3.8-3. Anaktuvuk Pass Airport



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3.8.3 Overland

Anaktuvuk Pass consists of approximately 8 miles of developed, gravel roads. There are approximately 3 miles of trail leading to the subsistence and recreation area north of the village. The major thoroughfare, Main Street, is a route leading from the school across Contact Creek Bridge and past the cemetery to the landfill. A winter trail extends beyond the townsite and runs the length of the pass. Most roads are constructed on gravelly soils, built up with 2 to 4 feet of fill and topped with finer gravel. The roads are generally in fair condition with adequate drainage, although there are occasional problems with rutting and potholes. Unlike most other NSB villages, there is an adequate gravel resource of construction grade gravel to meet the needs in the village. Figure 3.8-1 shows the regional transportation network, and Figure 3.8-2 shows the local roads with more detail around Anaktuvuk Pass.

There are no permanent roads leading to Anaktuvuk Pass. Cat trains, one or more supply sleds hauled by a continuous track vehicle, have historically transported cargo from the Dalton Highway during the winter along the Hickel Highway ice road. A PAR completed for the NSB in February 2014 investigated the possibility of constructing and maintaining a seasonal snow road to Anaktuvuk Pass. The objective of such a road would provide a less expensive means of transporting fuel and freight into the community. The road would also provide a means of personal access for residents to connect to other supporting road systems in Alaska. The PAR researched several routes, including Bettles to Anaktuvuk Pass, Galbraith Lake to Anaktuvuk Pass, and Umiat to Anaktuvuk Pass, assuming that DOT&PF constructs the road from the Dalton Highway to Umiat. After the report was finished, the recommendation was constructing and maintaining a road in the Brooks Range would be cost-prohibitive, not to mention the safety and environmental risks. In 2019, ASRC was investigating a seasonal road to Anaktuvuk Pass through Galbraith Lake, but further study for the project has been postponed until 2020. The need for cheaper transportation costs always provides incentive to make an overland route project desirable. During winter months, hunters travel through the Anaktuvuk Valley by snowmachine as far as Itkillik Lake, about 15 miles from the Dalton Highway. This route is also used by backpackers in summer. Snowmachines, trucks, and ATVs are used for local transportation. A school bus provides transportation for school children.

Future road transportation priorities at Anaktuvuk Pass focus on improving both pedestrian and driver safety along with improved access within the community and subsistence areas outside city limits. The community has long expressed interest in roadway upgrades, new road construction, trail marking, and safety shelters along routes to fishing and hunting camps. The bridge over Contact Creek was replaced in 2013, marking a major improvement. The new bridge includes separation of vehicle and pedestrian traffic, which has increased over the years since the original bridge was constructed. The community has also expressed interest in developing a new residential subdivision. The 2004 Anaktuvuk Pass Transportation Plan, completed by the Native Village of Anaktuvuk Pass and amended in 2005, also indicates a desire for an additional bridge over Contact Creek along Caribou Street for improved access between existing residential areas and as a secondary crossing of Contact Creek.

The NSB Public Works Department regularly waters down village roads to suppress dust. Residents, however, maintain it's difficult to control dust from road traffic in the summer months and that increased dust contributes to respiratory problems and other conditions. They cite their elders and youth as most affected by outdoor dust. The NSB also provides van services for elders (Anaktuvuk Pass 2016-2036 Comprehensive Plan, 2016).

3.8.4 Market Analysis

Anaktuvuk Pass is an interior city of the NSB within the Brooks Range and had 393 permanent residents in 2015 (Table 3.8-2). The community can be accessed year-round by plane, and ATVs and snowmachines are used for local travel (DCCED, 2019). From 2010 to 2015, the community grew by 21%, and the trend is expected to continue in the future.

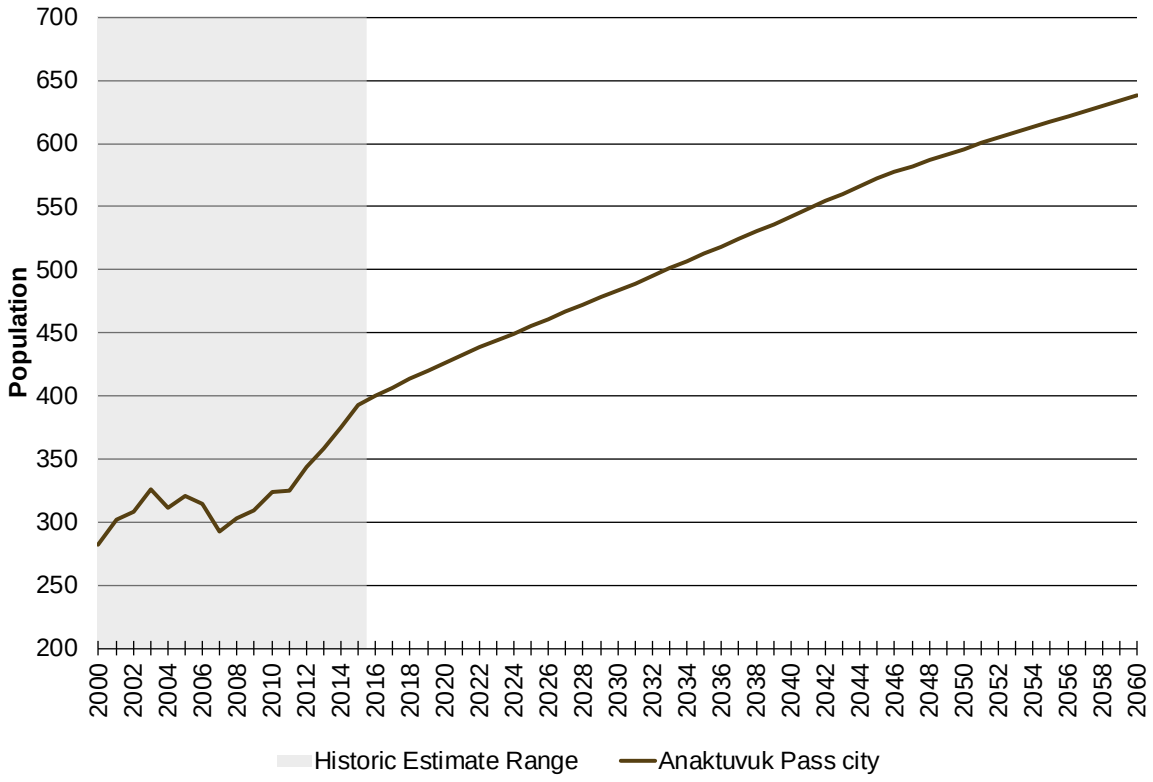
Table 3.8-2. Anaktuvuk Pass Commissioner-Certified Population Estimates

	2010	2011	2012	2013	2014	2015
Anaktuvuk Pass	324	325	344	358	375	393

Source: NSBEP&CR, 2016

Figure 3.8-4 shows historic estimates of population (shaded in gray) in Anaktuvuk Pass using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected to increase in the future with a diminishing rate of growth and an average increase of five people per year.

Figure 3.8-4. Anaktuvuk Pass Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019c; NSBEP&CR, 2016; Northern Economics estimates

Average income in Anaktuvuk Pass, at nearly $64,000 per household, is higher than the study area average and median incomes (NSBEP&CR, 2016). However, Anaktuvuk Pass is one of the most isolated cities within the NSB. Without access to the ocean or a large river, all freight and passengers must be transported by air, which could disproportionately affect the residents' ability to pay for transportation services as compared to other communities. In 2017, Anaktuvuk Pass passenger enplanements were highest in August, while mail and freight weights were highest in July (Table 3.8-3). On average, monthly freight weights were larger than mail weights by about 12%. However, the seasonal fluctuation in cargo deliveries is much greater for freight than for mail.

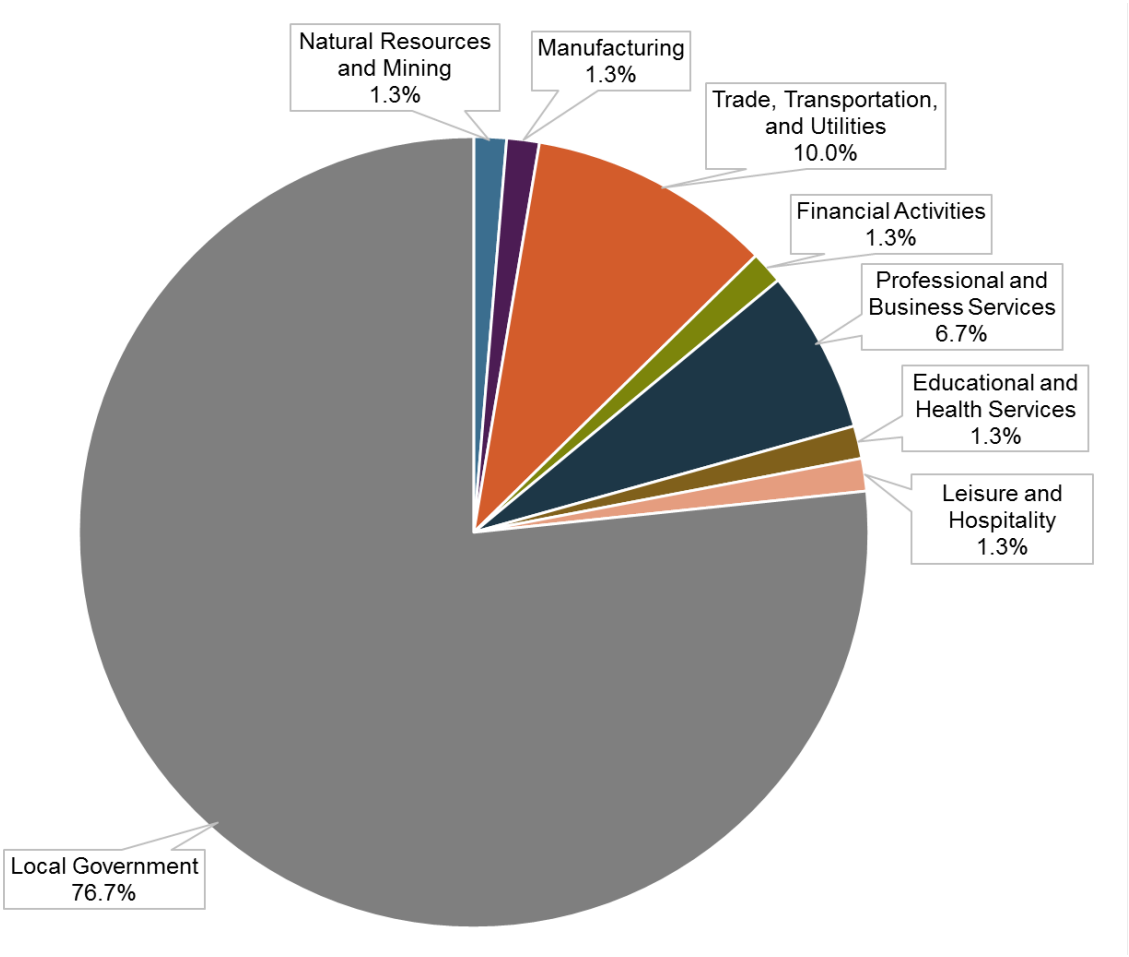
Table 3.8-3. Aviation Activity in Anaktuvuk Pass, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVG
Passengers	307	298	356	252	302	479	352	480	287	317	256	376	339
Mail (1000s lb)	45.3	46.6	59.4	32.8	40.2	45.0	77.3	66.9	32.0	53.9	58.9	35.1	49.4
Freight (1000s lb)	20.8	17.2	20.5	20.4	61.0	32.5	162.0	125.0	89.8	51.4	25.6	40.2	55.5

Source: BTS, 2019

In 2017, about 22% of all Anaktuvuk Pass households had income below the poverty level within the past 12 months, which is the second highest rate of unemployment among NSB communities (USCB, 2017). There were no residents with income above $200,000, and more than one-fifth had household incomes between $75,000 and $100,000. Local government is the single largest employer in Anaktuvuk Pass, providing about 77% of all jobs (Figure 3.8-5). Trade, transportation, and utilities is the second largest employment industry (10%), followed by professional and business services (6.7%).

Figure 3.8-5. Workers by Industry, Anaktuvuk Pass, Percentage of Total, 2016



Source: DOLWD, 2019b

4.0 Industry Profiles

4.1 Oil and Gas Industry

The oil and gas industry hub of Deadhorse is accessible by air and land year-round. Marine access is available during the ice-free months, typically late June through early October. Figure 4.1-1 shows oil and gas industry docks, airstrips, and major roads.

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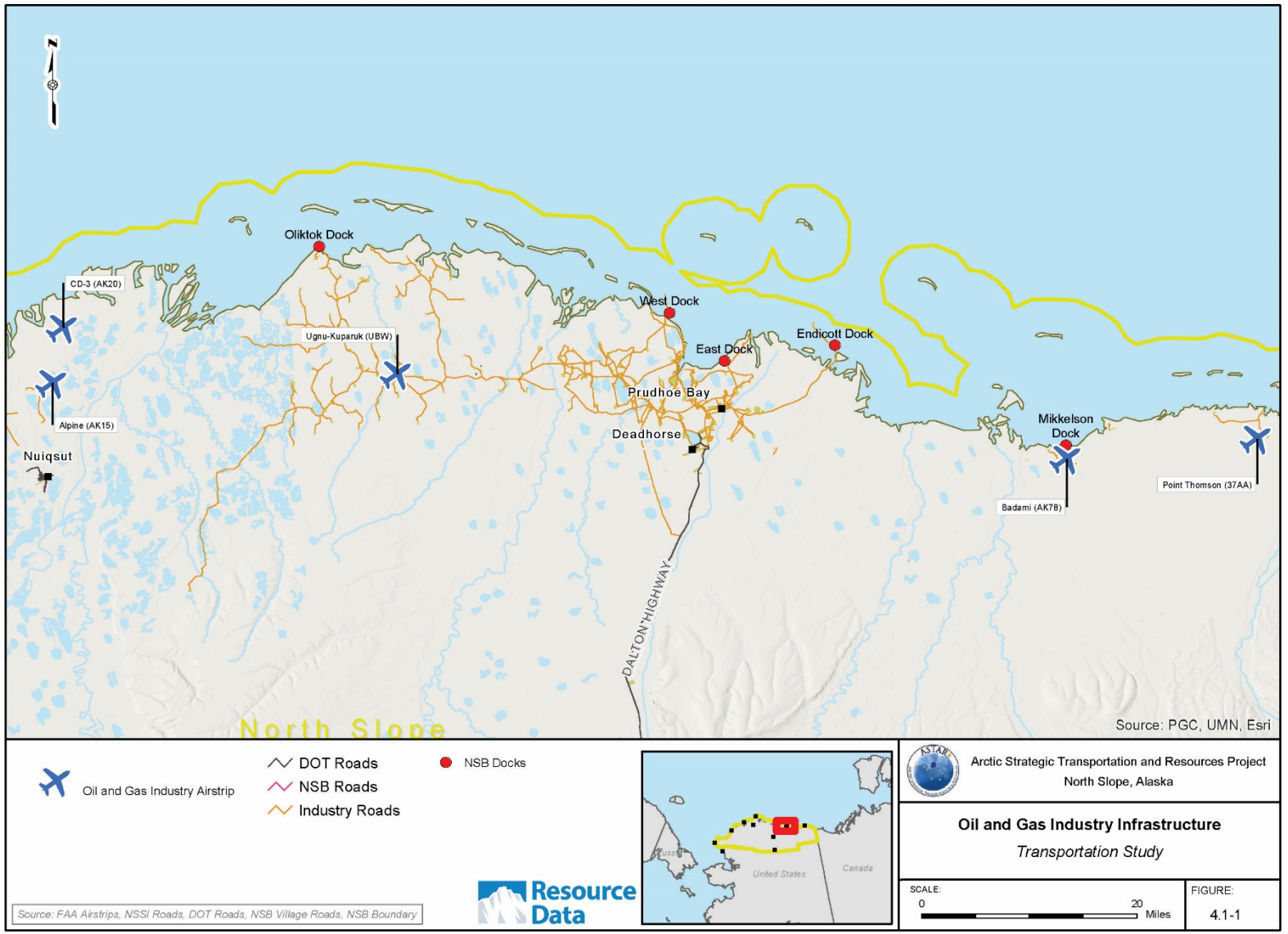
Figure 4.1-1. Oil and Gas Industry Airstrips



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4.1.1 Marine

Most major construction projects on the North Slope involve sealifts to transport large modules, freight, and construction items from origins ranging from Asia to Louisiana. Prefabricated modules weighing as much as 5,000 tons and measuring up to 10 stories have been offloaded from shallow draft barges at Prudhoe Bay. Point Thomson has received similar sealifts, with size constraints of 90 feet wide by 200 feet long with weights up to 4,000 tons (Point Thomson, 2010). Proposed plans for the Alaska Liquefied Natural Gas (AKLNG) Project require modules as heavy as 9,000 tons and will require additional dredging and dock improvements to support the offloading of these immense structures. Figure 4.1-2 shows one of Parker Drilling's Arctic Alaska Drilling Units being offloaded at West Dock 2 in Prudhoe Bay. Northstar Island and Oliktok Point have also been sites of notable sealifts accomplished without major shore-based infrastructure.

Figure 4.1-2. Parker Drill Rig Offloading at West Dock 2, Prudhoe Bay

www.crowley.com

Colville, Inc. says it delivered the first bulk fuel delivery by barge to Prudhoe Bay in 2018, delivering 2 million gallons of fuel in a single trip. The fuel offload was reported to last 70 hours before it was moved to a tank farm in Deadhorse. Colville, Inc. attributed the operation to changing sea ice conditions in the area. Conventional fuel delivery is typically achieved with 53-foot tanker trucks making 2,000 trips each with 10,000 gallons (www.ktuu.com).

Foss Maritime/Cook Inlet Tug & Barge and Alaska Marine Lines/Bowhead are the two primary tug and barge operations servicing the oil industry.

4.1.2 Air

Air transportation is key in the oil and gas industry for both passenger and freight, with air being the primary means of transportation for workers. The main hubs on the North Slope are Deadhorse (IATA

code SCC) and Kuparuk (UBW), while main air carriers Alaska Airlines and Ravn Alaska fly into Deadhorse only and Shared Services Aviation into both Deadhorse and Kuparuk. See Figure 4.1-1 for an overview of the industry airstrips.

Shared Services Aviation is operated by CPAI and provides air transportation to and from the North Slope for employees and contract workers of participating oil and gas companies. Shared Services, formerly a co-venture between BP and CPAI, will no longer provide service to BP beginning September 2019. Shared Services operates Boeing 737 aircraft out of Ted Stevens Anchorage International Airport and smaller Twin Otter and CASA C-212 aircraft out of CPAI's Alpine Airstrip in Deadhorse. Shared Services' 737s currently operate flights to and from the North Slope with daily service between Anchorage-Kuparuk and Anchorage-Deadhorse, as well as weekly flights from Anchorage to Fairbanks; later this year, however, the Anchorage to Deadhorse flights will be eliminated. Daily flights are operated from the Alpine Airstrip to Kuparuk, with flights to Deadhorse three days a week.

In 2018, BP signed a long-term contract with Alaska Airlines to provide charter air service to the North Slope for BP personnel. BP plans to use Alaska Airlines flights for personnel traveling between Fairbanks and Deadhorse.

4.1.2.1 Deadhorse Airport

Deadhorse Airport, commonly referred to as Prudhoe Airport, is a public airport facility owned by DOT&PF. Deadhorse Airport serves as a primary hub for both NSB communities and the oil and gas industry on the North Slope. Deadhorse receives the majority of enplanements in the NSB, with 78,629 in 2016. Primary passenger air carriers include Alaska Airlines, Horizon Airlines (an Alaska Airlines partner), Ravn Alaska, Ravn Connect, and Shared Services Aviation. Connecting public passenger flight destinations out of Deadhorse include Utqiaġvik, Nuiqsut, and Barter Island/Kaktovik. Daily direct flights to and from Fairbanks and Anchorage are also available. The largest passenger aircraft routinely used for flights between Anchorage/Fairbanks and Deadhorse Airport is the Boeing 737-700.

Several smaller commercial air and helicopter operations provide connecting passenger services from Deadhorse to other regional oil and gas production sites which have limited or no overland access. The U.S. military also occasionally uses the airport.

The Deadhorse Airport is controlled by the FAA Air Route Traffic Control Center (ARTCC) in Anchorage. No on-site tower control infrastructure exists. Air access is available 24 hours per day year-round. The runway is an asphalt grooved surface 6,500 feet long by 150 feet wide. Runways are oriented in a 06/24 direction. The airport is equipped with an instrument landing system and distance measuring equipment services to assist pilots landing in conditions when visual contact cannot be established. The runway is currently equipped with high-intensity runway edge lighting. Approach lighting includes 1,400 feet of medium intensity lighting, runway alignment indicators, and runway centerline alignment lights. The airport is also equipped with an airport beacon, segmented circle, and windsock.

The last major improvements to the Deadhorse Airport were the addition of an Aircraft Rescue and Firefighting equipment bay and upgrades to security screen services, completed in 2015 and 2016, respectively.

Both Alaska/Horizon Airlines and Ravn Alaska operate passenger ticketing counters, waiting areas with seating and bathrooms, baggage claim, and security screening within separate heated indoor buildings on the Deadhorse Airport property. Passengers must plane/deplane outside via the tarmac and mobile access ramp.

Shared Services and the U.S. military use the Deadhorse Aviation Center, also located on the Deadhorse Airport property. The Deadhorse Aviation Center passenger terminal area includes waiting areas with seating and bathrooms, baggage claim, and security screening within a heated indoor building.

4.1.2.2 Kuparuk Airport

Ugnu-Kuparuk Airport (UBW), 28 miles northwest of Deadhorse, is a private-use airport facility owned by CPAI, which leases and operates the Kuparuk oil field. The primary passenger air carrier is Shared Services. The largest passenger aircraft routinely used for flights between Anchorage/Fairbanks and Kuparuk Airport is the Boeing 737-700. Smaller aircraft, such as Shared Service's CASA C-212, fly into Kuparuk from the Alpine Airstrip.

The Kuparuk Airport is controlled by the FAA ARTCC in Anchorage. No on-site tower control infrastructure exists. Air access is available 24 hours per day year-round but is restricted, and prior authorization is needed prior to landing. The runway is an asphalt grooved surface 6,551 feet long by 150 feet wide. Runways are oriented in a 06/24 direction. The airport is equipped with an instrument landing system and distance measuring equipment services to assist pilots landing in conditions when visual contact cannot be established. The runway is currently equipped with high-intensity runway edge lighting. Approach lighting includes 1,400 feet of medium-intensity lighting, runway alignment indicators, and runway centerline alignment lights. The airport is also equipped with an airport beacon, segmented circle, and windsock. The airport has an ARC of C-III, which accommodates an aircraft such as a Boeing 737-400.

Kuparuk's runway is adjacent to the Kuparuk camp. Passengers are picked up by a bus and transported back to the camp. The camp includes passenger screening and a waiting area for people traveling from Kuparuk.

4.1.2.3 Alpine Airstrip

The Alpine Airstrip (AK15) is 53 miles west of Deadhorse. It is a private-use airport facility owned by CPAI, which leases and operates the Alpine oil field. The primary passenger air carrier is Shared Services. A 15-passenger Twin Otter and an 18-passenger CASA C-212 are based at the Alpine facility.

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Figure 4.1-3. Deadhorse Airport

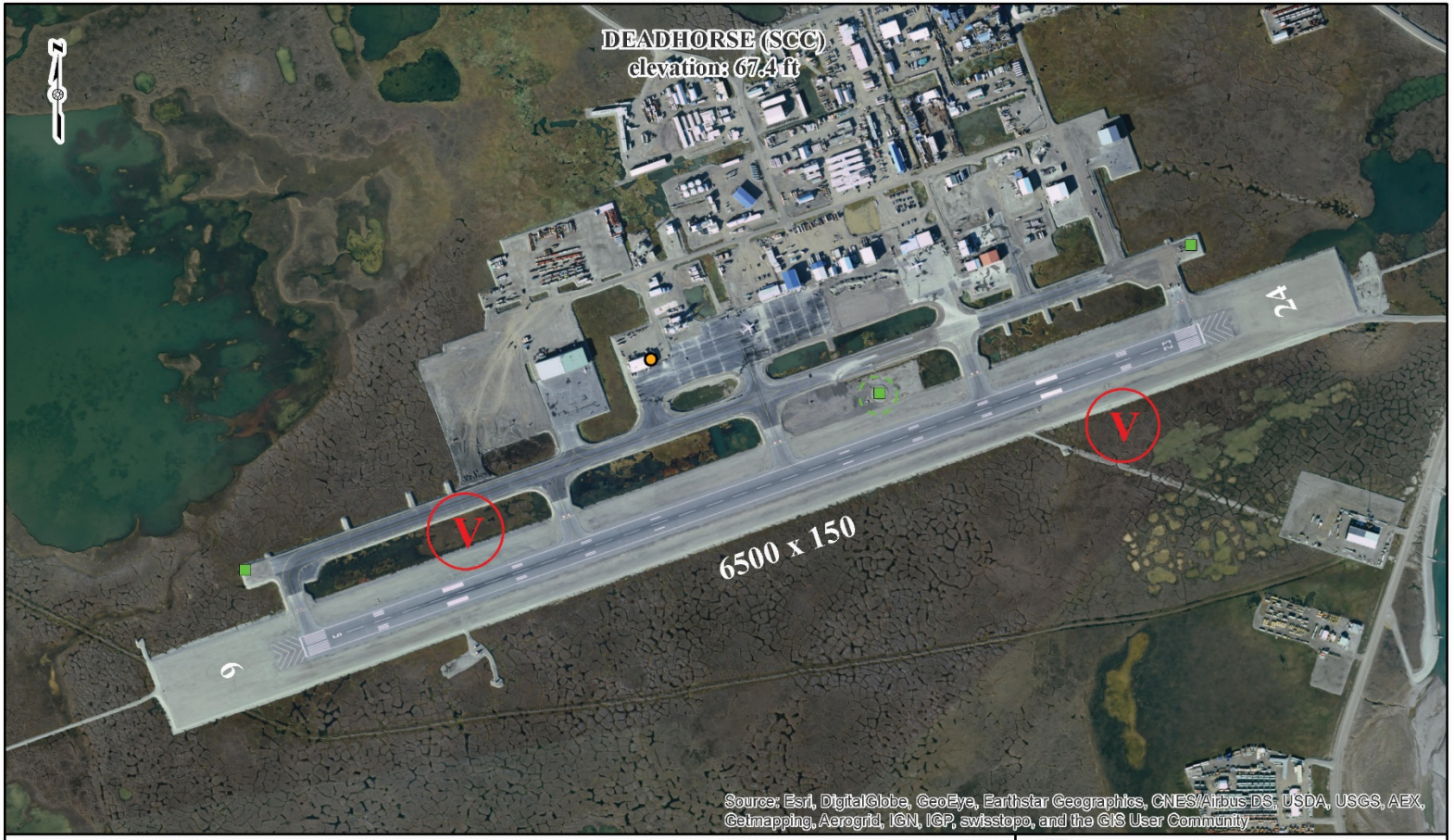

Figure 4.1-4. Kuparuk Airstrip

The airport is controlled by the FAA ARTCC in Anchorage. No on-site tower control infrastructure exists. Air access is available 24 hours per day year-round but is restricted, and prior authorization is needed prior to landing. The runway is a gravel surface 5,005 feet long by 100 feet wide. Runways are oriented in a 03/21 direction. The runway is currently equipped with medium-intensity runway edge lighting, omnidirectional approach lighting system, visual slope indicators, and runway end-identifier lights.

Similar to Kuparuk, the runway is adjacent to the Alpine camp. Passengers are transported from the apron to the camp via van. The Alpine camp's main entry provides areas for check-in and baggage claim.

4.1.2.4 CD-3 Airstrip

CD-3 Airstrip (AK20), 13 miles north of Nuiqsut, is a private-use airport facility owned by CPAI, which leases and operates the Fiord (CD-3) oil field. CD-3 is a satellite development of the Alpine oil field and is approximately 3 miles north of the main Alpine facility.

The airstrip is controlled by the FAA ARTCC in Anchorage. No on-site control tower infrastructure currently exists. The airstrip is generally unattended outside of active flight times. Air access is restricted for private use, and prior authorization is needed before landing.

The runway is a gravel surface 3,500 feet long by 170 feet wide. Runways are oriented in a 04/22 direction. The runway is currently equipped with medium-intensity runway edge lighting. No approach lighting currently exists at the airstrip. The airstrip is also equipped with an unlit wind indicator.

4.1.2.5 Badami Airport

Badami Airport (PABP), 29 miles east of Deadhorse, is a private-use airport facility owned by Savant Alaska, which leases and operates the Badami oil field.

The airport is controlled by the FAA ARTCC in Anchorage. No on-site control tower infrastructure currently exists. The airstrip is generally unattended outside of active flight times. Air access is restricted for private use, and prior authorization is needed before landing.

The runway is a gravel surface 5,100 feet long by 75 feet wide. Runways are oriented in a 03/21 direction. The runway is currently equipped with medium-intensity runway edge lighting. Approach lighting includes pulsating/steady burning visual approach slope indicators. The airstrip is also equipped with a wind indicator.

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Figure 4.1-5. Alpine Airstrip

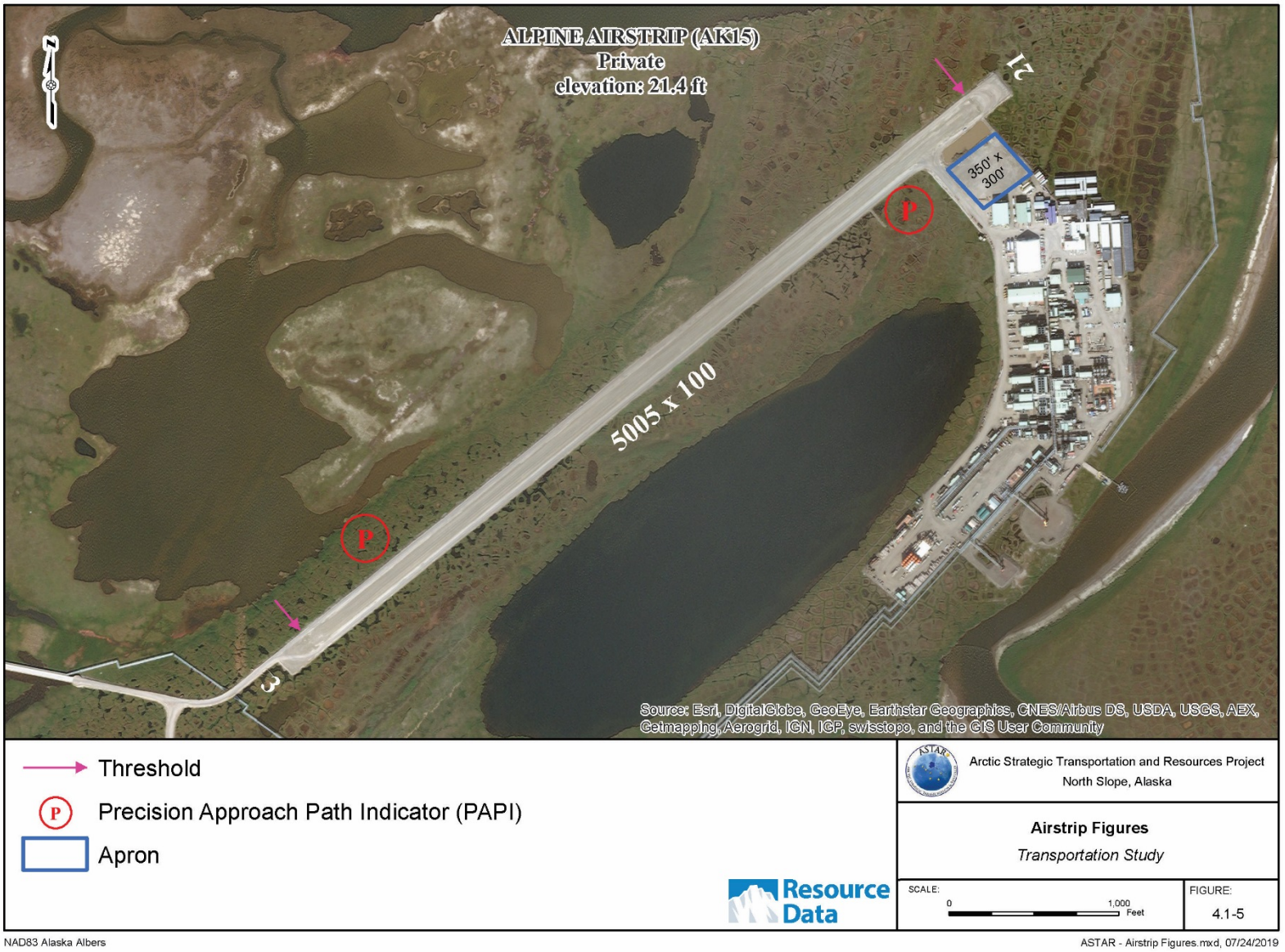


Figure 4.1-6. CD-3 Airstrip

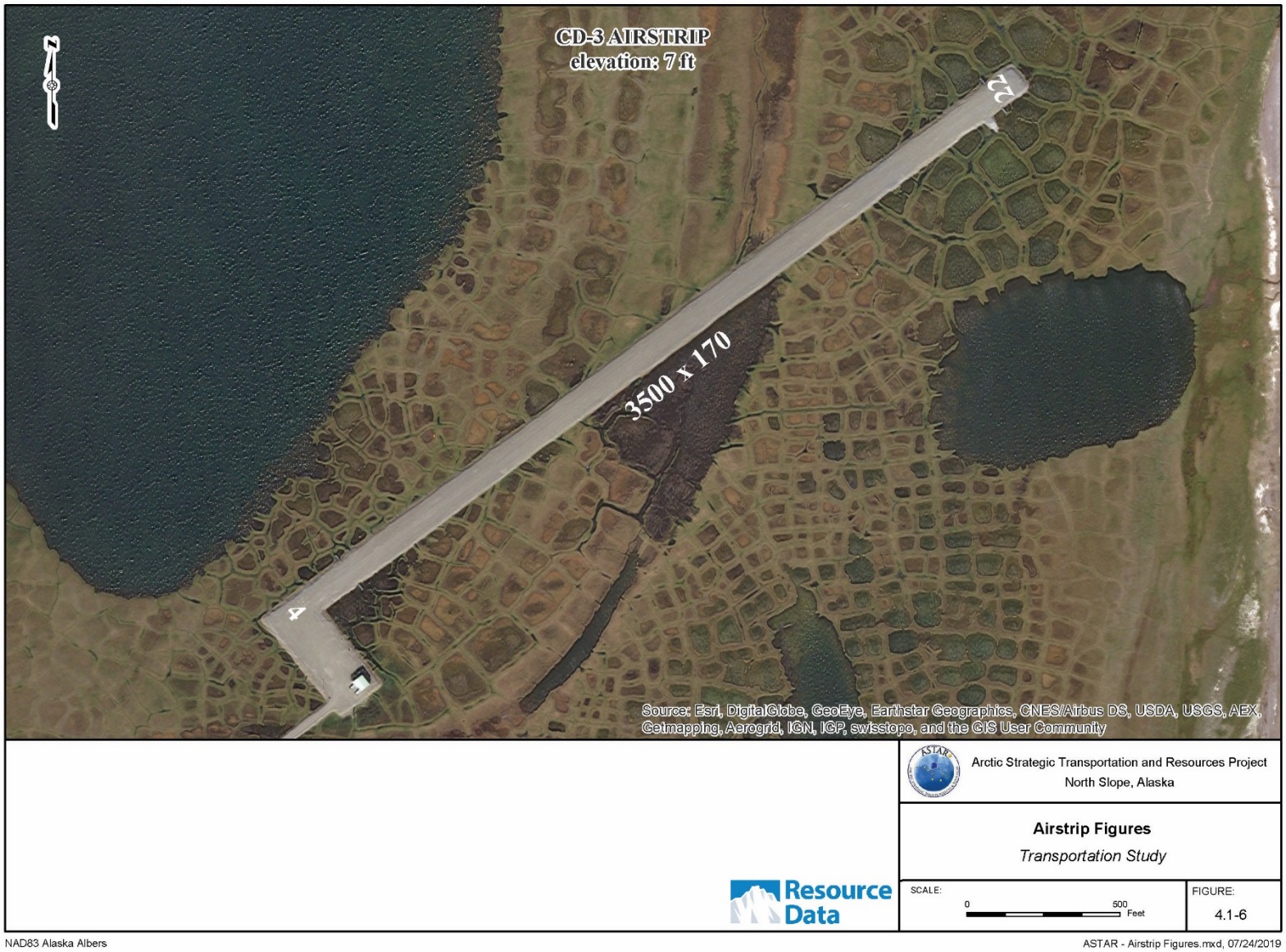
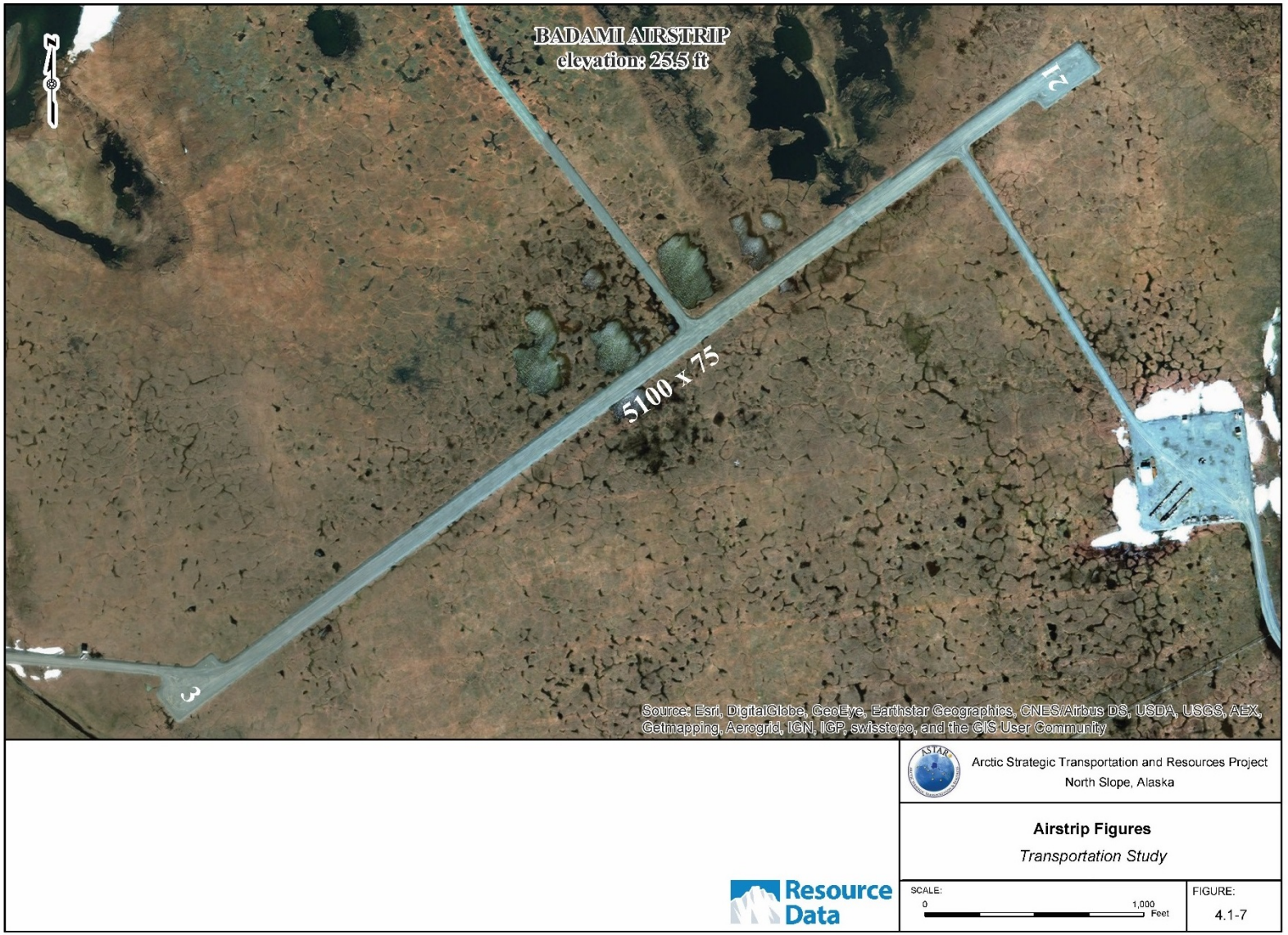


Figure 4.1-7. Badami Airport



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4.1.2.6 Point Thomson Airstrip

Point Thomson Airstrip (37AA), 44 miles east of Deadhorse, is a private-use airport facility owned by Exxon Mobil, which leases and operates the Point Thomson gas field. The primary passenger air carrier is Bald Mountain Air Service, which operates a heated maintenance hangar facility at the Deadhorse Airport. A 15-passenger Twin Otter routinely shuttles Exxon employees between Point Thomson and Deadhorse three to four days per week or as needed. Occasionally, Exxon will charter flights directly to Anchorage via Ravn Alaska if weather does not permit flight service to or from Deadhorse Airport.

The airstrip is controlled by the FAA ARTCC in Anchorage. An on-site tower control building also exists to aid landing and takeoff and provide weather updates for the airstrip area; the airstrip is equipped with an automated airport weather station. The airstrip is generally unattended outside of active flight times. Air access is restricted, and prior authorization is needed prior to landing. The runway is a gravel surface 5,000 feet long by 150 feet wide. Runways are oriented in a 05/23 direction. The runway is currently equipped with high-intensity runway edge lighting. Approach lighting includes 1,400 feet of medium-intensity lighting, runway alignment indicators, omnidirectional approach lighting system, and visual slope indicators. The airstrip is also equipped with a lit wind indicator and segmented circle.

The airstrip includes a heated passenger waiting area. Passengers must plane/deplane via the tarmac. Baggage is transported to the Point Thomson operations center for security screening and baggage claim.

4.1.2.7 Utqiagvik and Wainwright Airports

Although previously discussed under community profiles in Section 3, the Utqiaġvik and Wainwright communities have received significant interest from oil and gas exploration and drilling corporations due to their proximity to Chukchi Sea drilling lease areas. Royal Dutch Shell has chartered 737-400s to transfer crews between Anchorage and Utqiaġvik to offshore exploratory drilling platforms (staged helicopters in Utqiaġvik). CPAI and Equinor, another petroleum industry company, have previously indicated Wainwright could be used as a base of operations for the Chukchi Sea lease area.

Due to a combination of the high risks and high costs associated with drilling in Arctic water, along with an uncertain regulatory environment, many companies have decided not to drill while oil prices remain low. Many oil companies, including Shell, CPAI, Equinor, Iona Energy, and Eni, relinquished their previously held leases in the Chukchi Sea area in 2016. However, renewed interest in the Chukchi Sea area and use of these NSB communities remains a viable possibility if the price of oil and Arctic offshore drilling regulations become favorable in the future.

See Section 3.1.2 for air passenger and current airport infrastructure related to Utqiaġvik. See Section 3.3.2 for air passenger and current airport infrastructure related to Wainwright.

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Figure 4.1-8. Point Thomson Airstrip

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4.1.2.8 Umiat Airport

Another substantial runway in the AOI is the Umiat Airport (PAUM), 140 miles southwest of Deadhorse. It is a DOT&PF-owned public-use airport alongside the Colville River. The town is currently only accessible by aircraft. The airstrip and facilities were originally constructed in 1944 by the U.S. Department of Defense, which later became the Umiat Air Force Base, to support the Naval Petroleum Reserves, now known as the NPR-A.

Umiat is now used as a base of operations and camp for both oil and gas exploration ventures in the NPR-A and climate research by the BLM and the U.S. Geological Survey (USGS). Ukpeaġvik Iñupiat Corporation-UMIAQ operates a privately owned camp to support these industry and research activities. The airfield is also often used as a base for hunting in the region. The Umiat airstrip and camp facilities do not house any year-round residents, and the area is generally annually inhabited from mid-May to mid-September.

PAUM is controlled by the FAA ARTCC in Anchorage. No on-site control tower infrastructure currently exists. The airstrip is generally unattended outside of active flight times. Air access is open for public use, and tie-downs for aircraft parking are available.

The runway is a gravel surface, noted to be in poor condition (per DOT&PF), and is 5,583 feet long by 100 feet wide. Runways are oriented in a 06/24 direction. Grass and weeds have been noted as growing through the runway surface, with ruts up to 4 inches present. The runway surface has been noted as soft when wet.

The runway is not currently equipped with runway edge or approach lighting. An airport beacon is present. The airport does not currently have precision approach path indicator (PAPI) equipment or weather-reporting and camera equipment. The airport is equipped with a wind indicator. No winter maintenance is performed at this airport due to lack of equipment and maintenance infrastructure.

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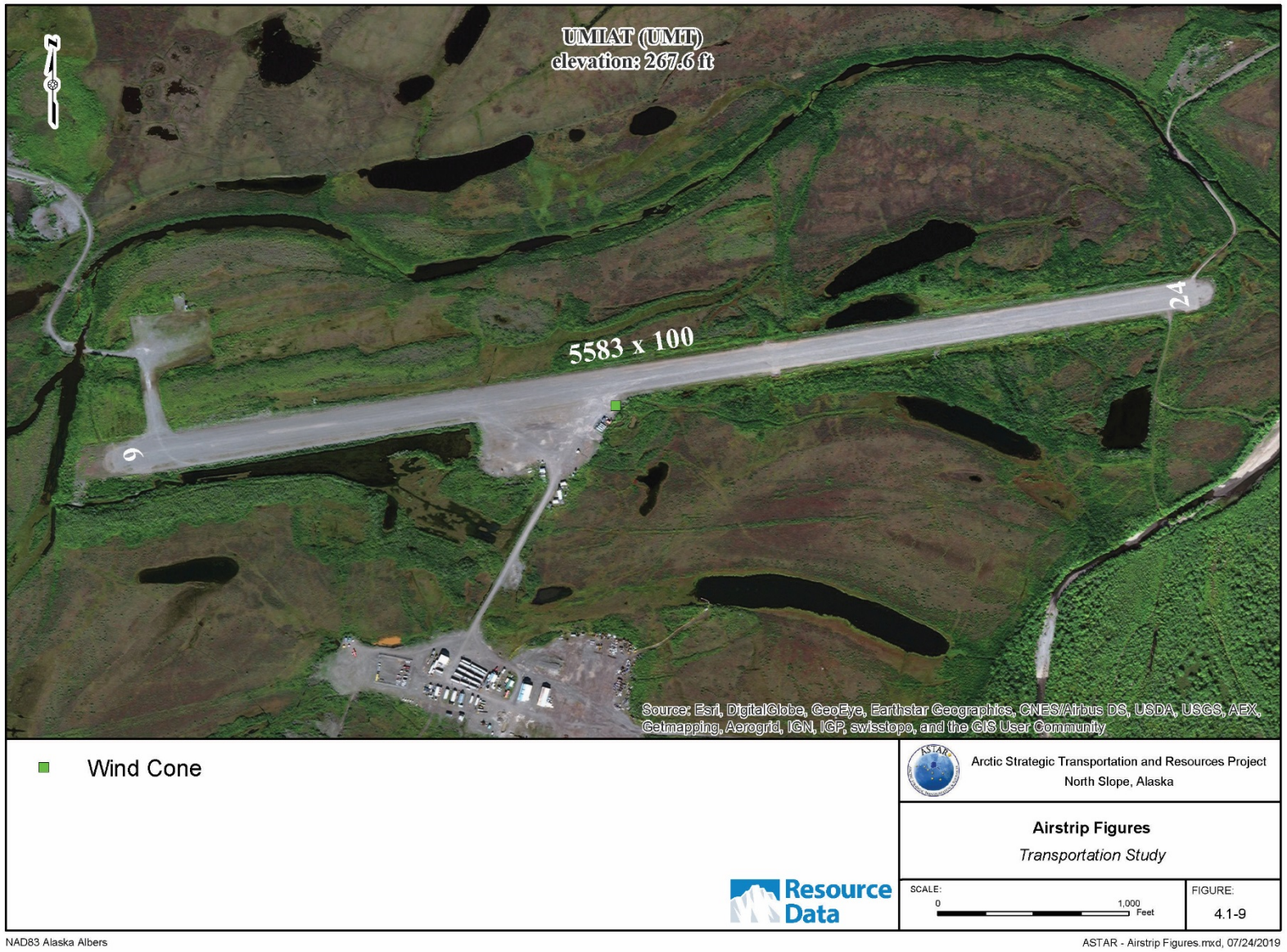
Figure 4.1-9. Umiat Airport



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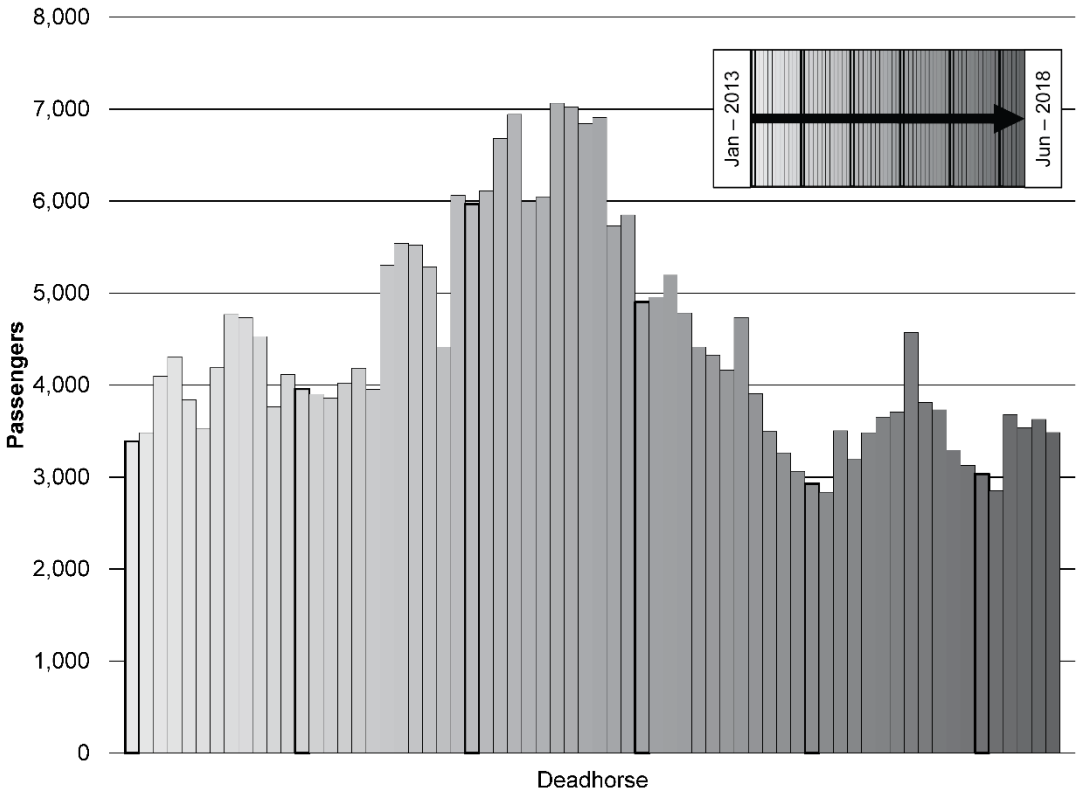
4.1.2.9 Airport Market Analysis

There is a significant amount of aviation activity at private airports within the NSB based on the oil and gas companies' needs for operating on the North Slope. Shared Services operates a fleet of Boeing 737, CASA, and Otter planes to transport oil field employees. Each week there are 22 scheduled Boeing flights and 60 to 80 flights on smaller aircraft (COPA, 2019). Primary flights are between Anchorage, Fairbanks, Deadhorse, and Kuparuk, but some of the planes also operate at smaller airports and seasonal ice strips.

Deadhorse Airport is a public-use airport near Prudhoe Bay. Though it is state-owned and operated by DOT&PF, the airport's primary function is to provide passenger service for oil industry workers in the NSB. It also serves as a hub with connections to other communities. Passenger activity at Deadhorse was notably higher in 2015, with enplanements reaching a maximum of 7,062 in July (Figure 4.1-10). That peak in 2015 was followed by a decreasing trend that subsided in early 2017. Since then, passenger enplanements at Deadhorse have been relatively constant with an average of 3,448 per month from January 2017 to June 2018. It is especially difficult to predict trends in aviation activity at Deadhorse because oil and gas industry employees are the primary users of facilities.

Figure 4.1-10. Monthly Passenger Enplanements at Deadhorse Airport, 2013-2018



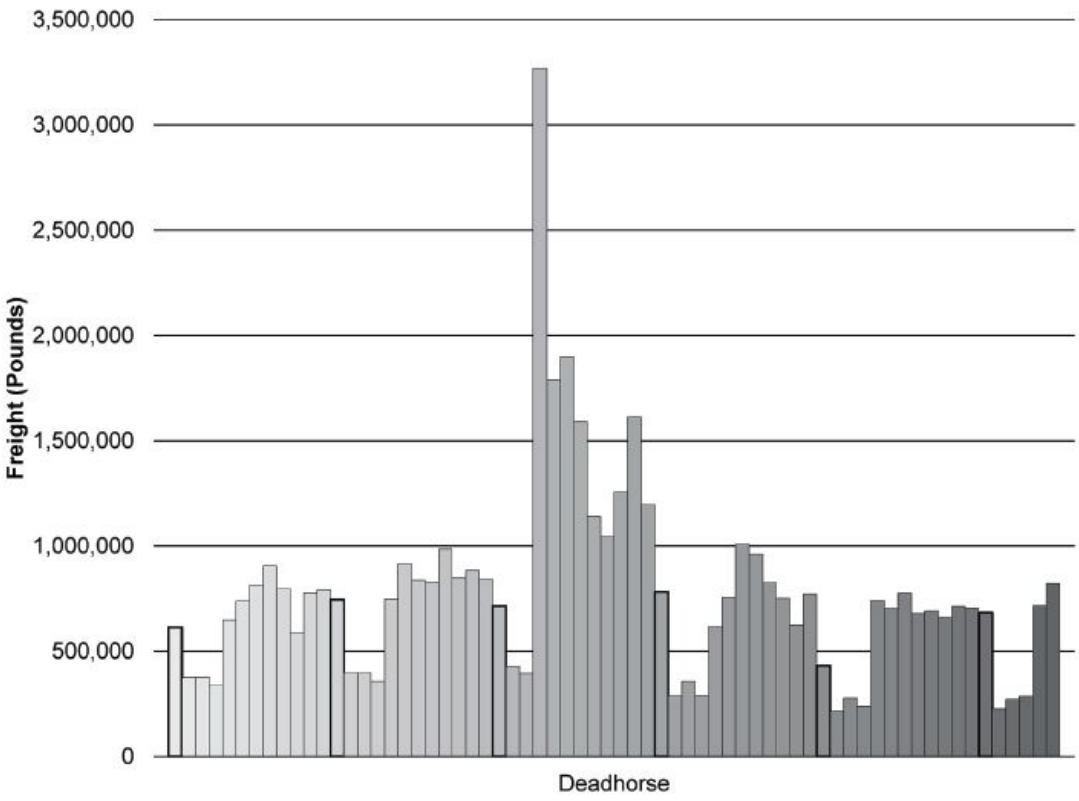
Source: BTS, 2019

Deadhorse Airport, also known as Prudhoe Bay Airport, is also important for the movement of freight to the NSB. Freight shipments to Deadhorse appear to be seasonal, with a low in February, March, and

April of every year. On average, Deadhorse Airport received nearly 770,000 pounds of cargo each month during the study period (Figure 4.1-11).

The unusually high freight volume in early 2015 is likely due to a temporary closure of the Dalton Highway. In May 2015, spring flooding of the Sagavanirktok River washed over portions of the highway, forcing trucks to stop until the water subsided (DOT&PF, 2015). It is likely that some critical and time-sensitive freight for North Slope oil fields was shipped by air during the highway closure.

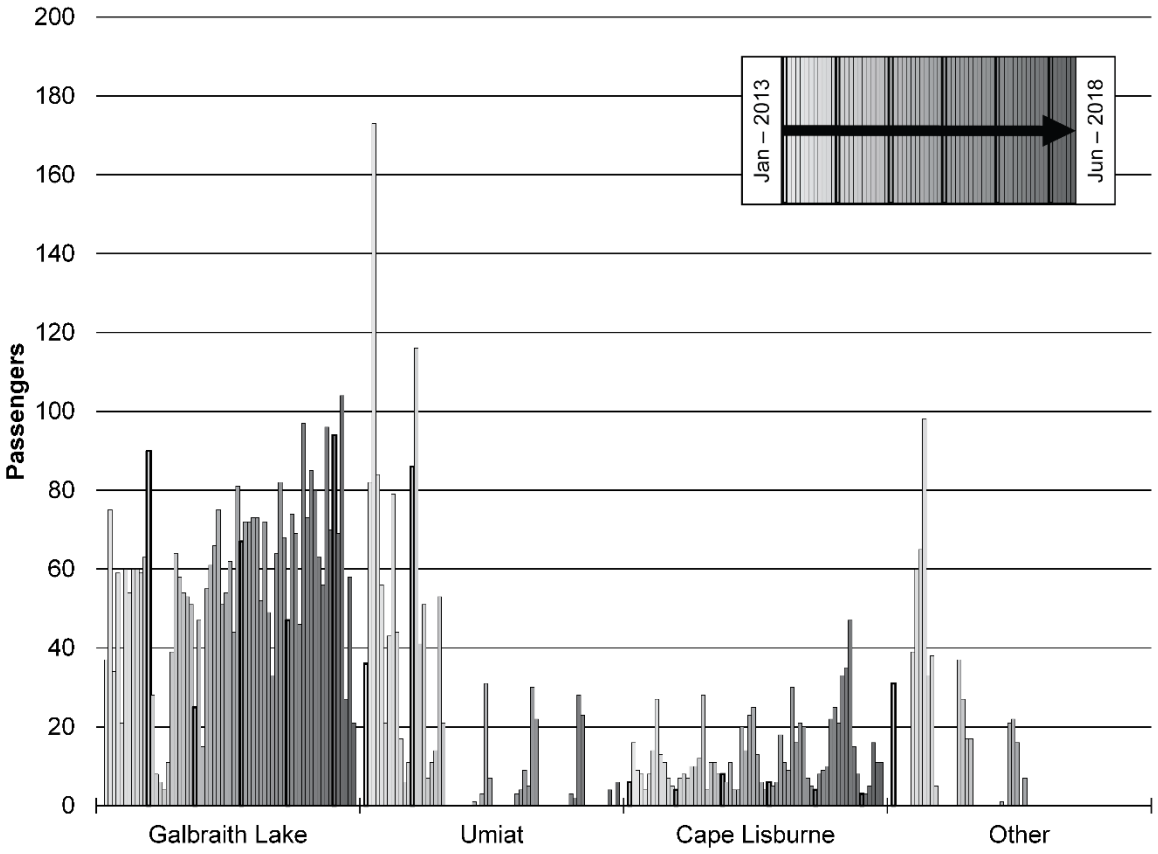
Figure 4.1-11. Monthly Freight Volume at Deadhorse Airport, 2013-2018



Source: BTS, 2019

The Umiat oil and gas fields, west of the Dalton Highway, are accessible only by air or ice road. Exploration of the fields is based on an access corridor starting at Galbraith Lake and extending 90 miles west (DOT&PF, 2011). Passenger enplanements at both Umiat Airport and Galbraith Lake Airport could both be related to oil and gas exploration in the area. Enplanements at Galbraith Lake Airport have generally increased since 2014 (Figure 4.1-12). Enplanements at Umiat Airport are highest during summer months when the airport provides service for drilling crews and climate researchers (ADN, 2013). There is also some passenger activity at Cape Lisburne, Alaska. The radar station is still active (Dragoo, Thomson, and Romano, 2017), and flights are likely used to provide transportation for USAF personnel.

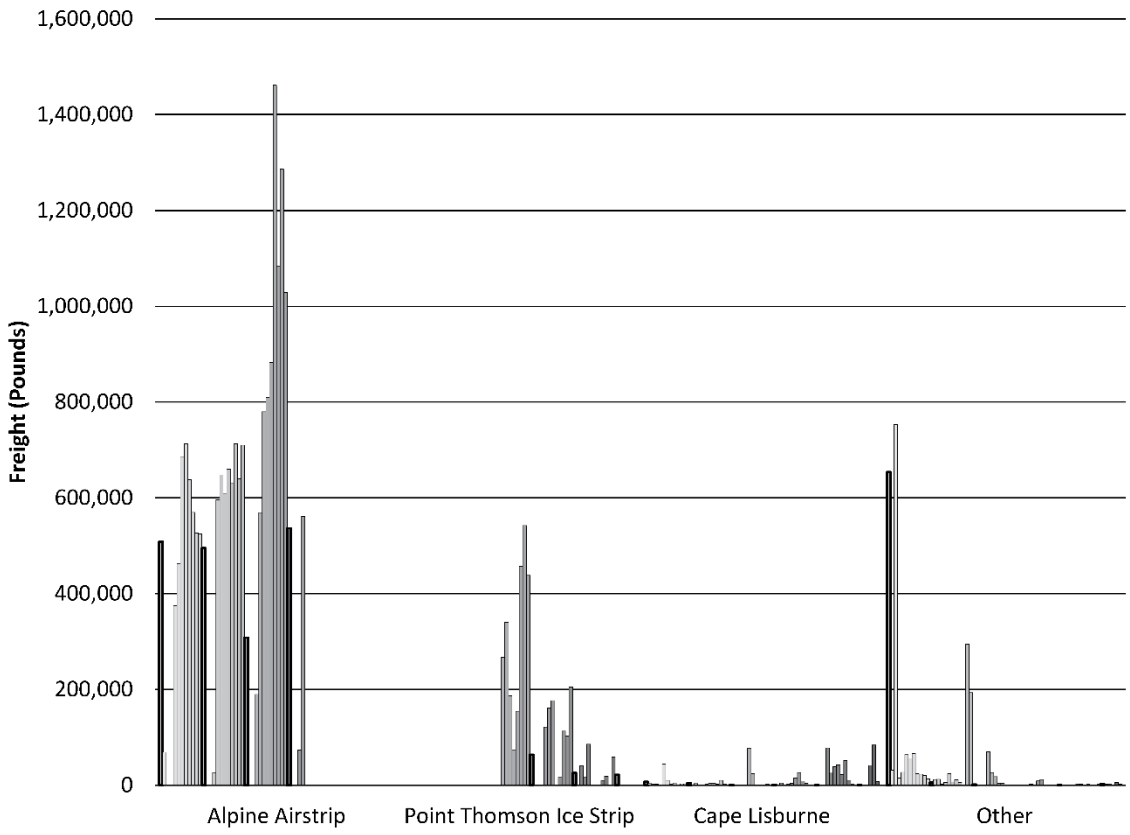
Figure 4.1-12. Monthly Passenger Enplanements at Other NSB Airports, 2013-2018



Source: BTS, 2019

Through May 2016, most airfreight shipments for the oil industry were bound for Deadhorse, though there were some shipments to CPAI's Alpine Airstrip (Figure 4.1-5). The Point Thomson Sea Ice Airstrip was uniquely operated as a public airport on the Bering Sea ice near Point Thomson, though its primary function was to deliver freight for the gas condensate production facility. Those shipments began in the spring of 2015 and decreased significantly in 2017 and 2018. A gravel airstrip at Point Thomson now exists that allows for freight transport year-round. To date, most freight is moved by truck on the Dalton Highway or by air to Deadhorse when necessary.

Figure 4.1-13. Monthly Freight Volume at Other NSB Airports, 2013-2018



Source: BTS, 2019

4.1.3 Overland

Overland transport in the oil and gas industry is constantly evolving as new fields are discovered and developed. The bulk of freight bound for the oil and gas industry is transported up the Dalton Highway as described in Section 2.3. This section will describe infield gravel roads, bridges, and ice roads.

Ideally, gravel roads built to Arctic specifications typically take two seasons to construct. Gravel is typically mined in the winter, because freezing conditions minimize water infiltration and allow the finer grained soils to withstand the trucks. Gravel is placed in nominal 5- to 6-foot thick embankments. The following summer, the gravel is reworked, allowing additional water to drain or evaporate. Culverts are placed to promote drainage and fish passage across smaller streams. They are typically placed in the winter to be in place to allow conveyance of breakup flows. Larger diameter culverts are typically smooth steel pipe pile which support large loads such as drill rigs. Sometimes multiplate structures are used for larger diameters and are constructed in summer in order to achieve adequate compaction. The final embankment is then graded and topped with a surface course. Bridges can be constructed in summer or winter, with larger bridges taking multiple seasons to complete. Typical oil field service roads have a 30-foot top with 2:1 side slopes. A list of established roads in each oil field unit and their respective length is provided in Table 4.1-1.

Table 4.1-1. Oil Field Service Roads

Oil Field Unit	Road Type	Road Length[2] (miles)
Prudhoe Bay	Primary	161
	Secondary	129
Kuparuk	Primary	126
	Secondary	17
Colville River	Primary	27
	Secondary	1
Point Thomson	Primary	12
	Secondary	0
Greater Mooses Tooth	Primary	11
	Secondary	0
Badami	Primary	2
	Secondary	2
Southern Miluveach	Primary	1
	Secondary	1
Primary Connecting Roads	To KRU-2P	6
	PBU to Duck Island	6
Pikka	Primary	0
	Secondary	10 (proposed)
Total	**(Excluding Pikka)**	**502**

1. Source data provided by Mapmakers Alaska
2. Mileage is approximate

CPAI has been advancing west into NPR-A since the discovery of Greater Mooses Tooth (GMT). GMT-1 has been connected to the Alpine field via the 8-mile GMT-1 and 8-mile CD-7 gravel access roads. Proposed new road development to Willow and Tinmiaq require approximately 36 miles of new roads. This construction is anticipated to commence during the winter of 2019-2020 and use newly located gravel sources near Judy and Fish creeks.

Oil Search Alaska is planning 25 miles of new gravel roads to develop its Pikka project. These roads are within the Pikka Unit, with a road connecting to the Mustang Road in the Southern Miluveach Unit. Construction for these projects is planned to start in the winter of 2019-2020.

Ice road construction has been very active the past couple of years. Nearly 200 miles of major ice roads, not including shorter infield access roads less than 3 miles, were constructed in 2019. This included 107 miles in NPR-A supporting CPAI's exploration program. A seismic survey was planned for 2019 but deferred near the end of 2018 in part due to the government shutdown and the inability of regulatory agencies to process the permit applications. If approved, the seismic survey will require significant ice road or snow trail construction in the winter of 2019/2020.

4.2 Other Industries

4.2.1 Hunting and Fishing

Resident, non-resident, and subsistence big-game hunting occurs across the entire NSB. Species commonly hunted include caribou, moose, Dall sheep, and predators such as brown bear, black bear, and wolves. The NSB is home to four separate caribou herds: the Western Arctic Herd, the Central Arctic Herd, the Porcupine Caribou Herd, and the Teshekpuk Caribou Herd, which together comprise the largest component of subsistence big-game harvest. Although the mode of transport for local hunters varies across the North Slope, the Nuiqsut area reported primarily using boats and snowmachines for caribou hunting, with relatively minimal ATV and pickup usage. Some subsistence hunters reported that air traffic disturbed migrating caribou, resulting in hunters having to make additional hunting trips, lengthen their hunting trips, or hunt in different areas in order to successfully harvest animals.

Although the majority of harvested animals are the result of subsistence hunting, hundreds of hunters travel annually to the North Slope from other parts of Alaska and out-of-state for non-subsistence hunting. Many non-local hunters use licensed outfitters, transporters, and chartered boat and air services to access remote hunting and fishing areas from local transportation hubs.

Non-local hunters primarily hunt during the fall and early winter months, although in many areas certain species of game may be harvested throughout the year. A study of the Teshekpuk Caribou Herd indicates that most local residents harvested caribou between the months of July and October, while more than 95% of the non-local and non-resident caribou harvest occurs in August and September.

Some sport fishing occurs in the NSB, but slow population growth limits the number of fish that may be harvested. Although many lakes on the North Slope are too shallow to support fish, large populations of fish can be found in lakes such as Galbraith, Toolik, and Teshekpuk. River fishing is popular during the summer up until freeze-up.

Subsistence fishing by local residents is common in the NSB on rivers, lakes, and the ocean. Primary modes of transport for subsistence fishermen include boats during the late spring, summer, and early fall (between breakup and freeze-up) and snowmachines during the winter months. Various methods of harvest are used based on the fishery and the species, including jigs, nets, traps, and spears.

4.2.2 Ecotourism

The North Slope's unique climate and environment offers a wide range of sightseeing opportunities for wildlife and outdoor enthusiasts.

Birding is a popular activity for tourists visiting the NSB. Many species of birds migrate from Asia, Africa, and the Americas to the North Slope during the spring and summer months in order to nest and molt, making birding a popular activity for tourists. Teshekpuk Lake and its surrounding wetlands alone are the seasonal home to hundreds of thousands of migratory birds. Guided bird watching tours are commonly conducted out of Utqiagvik.

Annual community whaling harvests and prey attract many polar bears to Barter Island, resulting in consistent bear sightings near the community of Kaktovik. Several companies conduct polar bear viewing and photography tours by boat out of Kaktovik.

Gates of the Arctic National Park and ANWR attract visitors for a variety of activities such as hiking, backpacking, rafting, and canoeing.

4.2.3 Government Agencies

In addition to private industries, many government agencies operate in the Arctic, manage land on the North Slope, or conduct research. Specifically, as climates warm, the Arctic continues to get more attention from the government, from multiple perspectives. Focus ranges from environmental concerns, commerce and economics, and community well-being. Federal agencies connected to the Arctic include, but are not limited to, National Oceanic and Atmospheric Administration (NOAA), BLM, National Park Service (NPS), USGS, U.S. Fish and Wildlife Service (USFWS), Bureau of Safety and Environmental Enforcement, Bureau of Ocean Energy Management (BOEM), U.S. Army Reserve Command (USARC), USCG, and the U.S. Postal Service (USPS).

Some are large land managers and include, but are not limited to, the following. The BLM manages the NPR-A. The NPS manages Gates of the Arctic National Park and Preserve, Noatak National Preserve, and Cape Krusenstern National Monument. The USFWS manages the ANWR. Additionally, several Department of Interior agencies manage the OCS, where oil and gas explorations have taken place.

NOAA focuses primarily on weather and climate, providing weather and water forecasts and warnings, sea ice extents, and operating the Barrow Atmospheric Baseline Observatory. The USGS has the most diverse scope of priorities, ranging from improving science for coastal communities and ecosystems, sea floor mapping for environmental information and energy development, understanding potential invasive species and changing fire regimes, assessing mineral and energy resources present in the Arctic, and assuring sustainability of Arctic communities. The USFWS focuses primarily on fish and wildlife management and monitoring, including migratory birds and polar bears. The USARC focuses on nearly everything Arctic-related, including engineering research and design guidance, assessing natural resources, improving community health and well-being, and enhancing international scientific cooperation in the Arctic. The USCG also has a presence in the Arctic, which is expected to increase, as noted in section 2.2.

The USPS operates the Alaska Bypass program, which was implemented in 1972 as a way to save the USPS money and improve service to isolated villages throughout Alaska. This program allows mail delivery to bypass USPS infrastructure and is run and managed by private air carriers throughout the state. It has evolved over the last several decades as the most widely used way to ship food and commodities to the rural areas of the state. Minimum orders of 1,000 pounds are fulfilled in Anchorage or Fairbanks where they are palletized, grouped together, and handed off to private air carriers. The DOT sets the rates, which results in the USPS being unable to control costs and contract more efficient service providers. With little power to control costs, the Alaska Bypass program only recuperates 30% of its costs. It was reported to have operated at a $76 million loss in 2013, which is a subsidized cost. Research suggests Alaskans buying goods through the Alaska Bypass program do not appear to benefit from this transportation subsidy. Examples include a tube of toothpaste costing $1.10 more in villages than in Anchorage, but the shipping rates were as low as $0.14, and a bag of chips that costs $4.29 in Anchorage more than doubles in price in Bethel, but the shipping rate is only $0.35. This leads some to argue the Alaska Bypass program is broken and barriers to competition need to be removed (Alaska Bypass Mail Delivery: A Broken System, 2014).

4.2.4 Cruise Lines

There is limited infrastructure in the Alaska Arctic to support private industry. Despite this, in 2016, the Crystal Serenity, operated by Crystal Cruises, became the first luxury cruise line to transit the Northwest Passage. The trip was 32 days and covered over 7,000 nautical miles from Seward, Alaska, to New York

City, New York, with over 1,000 passengers and 600 crew members. There was a second voyage in 2017, but the Crystal Serenity hasn't returned since. Other operators are offering Arctic cruises exploring the Bering Strait, Northwest Passage, and Russian Arctic. Eight voyages in the Alaska Arctic are planned for the 2019 summer and are summarized in Table 4.2-1 below.

Table 4.2-1. Arctic Sailings, 2019

Alaska = Canada = Russia = Norway = Greenland =

Arctic Sailings			2019 Activities			
Operator	**Ship Name**	**Start - End Date**	**July**	**August**	**September**	**October**
Silversea Cruises[1,2]	Silver Explorer	July 25-Sept. 10 / Aug. 10-Sept. 5				
Silversea Cruises[3]	Silver Cloud Expedition **OR** Silver Explorer	Aug. 21-Sept. 14				
Ponant[4]	Le Boreal	Sept. 18-Oct. 2				
Ponant[5]	L'Austral	Aug. 24-Sept. 15				
Ponant[6]	L'Austral	Sept. 15-Sept. 29				
Polar Cruises[7]	Le Boreal	Aug. 26-Sept. 18				
National Geographic[8]	Luxury Expedition	July 21-Aug. 11				
National Geographic[9]	Luxury Expedition	July 9-21				
Swoop Arctic[10]	Ocean Endeavor	Sept. 2-Sept. 17				
Swoop Arctic[11]	Resolute	Aug. 20-31				
Polar Cruises[12]	Khlebnikov	Aug. 5-19				

1. https://www.silversea.com/destinations/cruises-arctic-greenland/nome-to-tromso-7916.html
2. https://www.polarcruises.com/arctic/ships/luxury-expedition-ships/silver-explorer-arctic/alaskan-peninsula-and-bering-sea
3. Silversea Cruises. "Kangerlussuaq to Nome." https://www.cruisespecialists.com/cruise-promotion-detail.aspx?packageId=18572
4. Ponant. "Fire and Ice in the Arctic." https://en.ponant.com/cruises/the-arctic-fire-and-ice-in-the-arctic-b180919-ns0545-2
5. Ponant. "Northwest Passage." https://en.ponant.com/cruises/the-arctic-the-northwest-passage-a240819-kn0845-2
6. Ponant/National Geographic. "In the Wake of Pioneers." https://en.ponant.com/cruises/the-arctic-in-the-wake-of-pioneers-with-national-geographic-a150919-nv444-2
7. Polar Cruises. "The Northwest Passage." https://www.polarcruises.com/arctic/ships/luxury-expedition-ships/le-boreal-%E2%80%94-arctic/northwest-passage-greenland-bering-sea
8. National Geographic. "Across the Bering Sea." https://www.polarcruises.com/arctic/ships/luxury-expedition-ships/national-geographic-orion-arctic/across-bering-sea-katmai
9. National Geographic. "Bering Sea Wilderness." https://www.polarcruises.com/arctic/ships/luxury-expedition-ships/national-geographic-orion-arctic/life-legend-bering-sea
10. Swoop Arctic. "Northwest Passage, Baffin, & West Greenland." https://www.swoop-arctic.com/cruises/northwest-passage/baffin-greenland
11. Swoop Arctic. "Northwest Passage Abridged." https://www.swoop-arctic.com/cruises/northwest-passage/abridged
12. Polar Cruises. "Wrangell Island". https://www.polarcruises.com/arctic/ships/icebreaker/khlebnikov-arctic/wrangel-island-across-top-world

4.2.5 Air

Numerous private and other public airstrips exist within the AOI, many of which are unattended and made of gravel without surfacing. They consist of airstrips used for recreational activity, research, natural resource exploration, etc. Some activities rely on small aircraft equipped with floats and tundra tires, which can land on lakes, gravel bars, and ridges. See Figure 4.2-1 for an overview of these airstrips in relation to the communities.

Given the broad scope of activities related to private industries and public agencies, it is difficult to detail specific needs and desires of these industries. Like any form of commerce, reliable and maintained infrastructure is required to facilitate these industries.

4.2.6 Overland Cargo Transport

Several private overland cargo transporters offer services between Deadhorse and Barrow in the winter months. Arnie's Northern Outfit & Cargo was one of the first companies, beginning around 2010. Arnie Arey converted a highway pickup truck to an off-road cargo transporter by changing tires out for tracks and building a custom 22-foot-long sled. Arctic Transportation and Logistics is another company recently created to meet the increasing demand. It is unclear how the CWATs have affected these businesses.

Cargos consisting of fuel and gravel are commonly transported from Utqiaġvik to Atqasuk. Cruz Construction, SKW Eskimos, Peak Oilfield Services, and Olgoonik Corporation are common operators on this route.

Lynden Transport has also hauled construction materials from Deadhorse to Utqiaġvik. Recently, the USPS partnered with Lynden Transport to conduct a pilot project to haul non-priority Alaska Bypass mail overland on snow trails in the winter, via marine landing craft in the summer, and aircraft only during shoulder seasons in an attempt to reduce costs while at the same time providing as good or better on-time service. The pilot project was set to start Jan. 15 and run for one year, but the USPS canceled it without giving reason.

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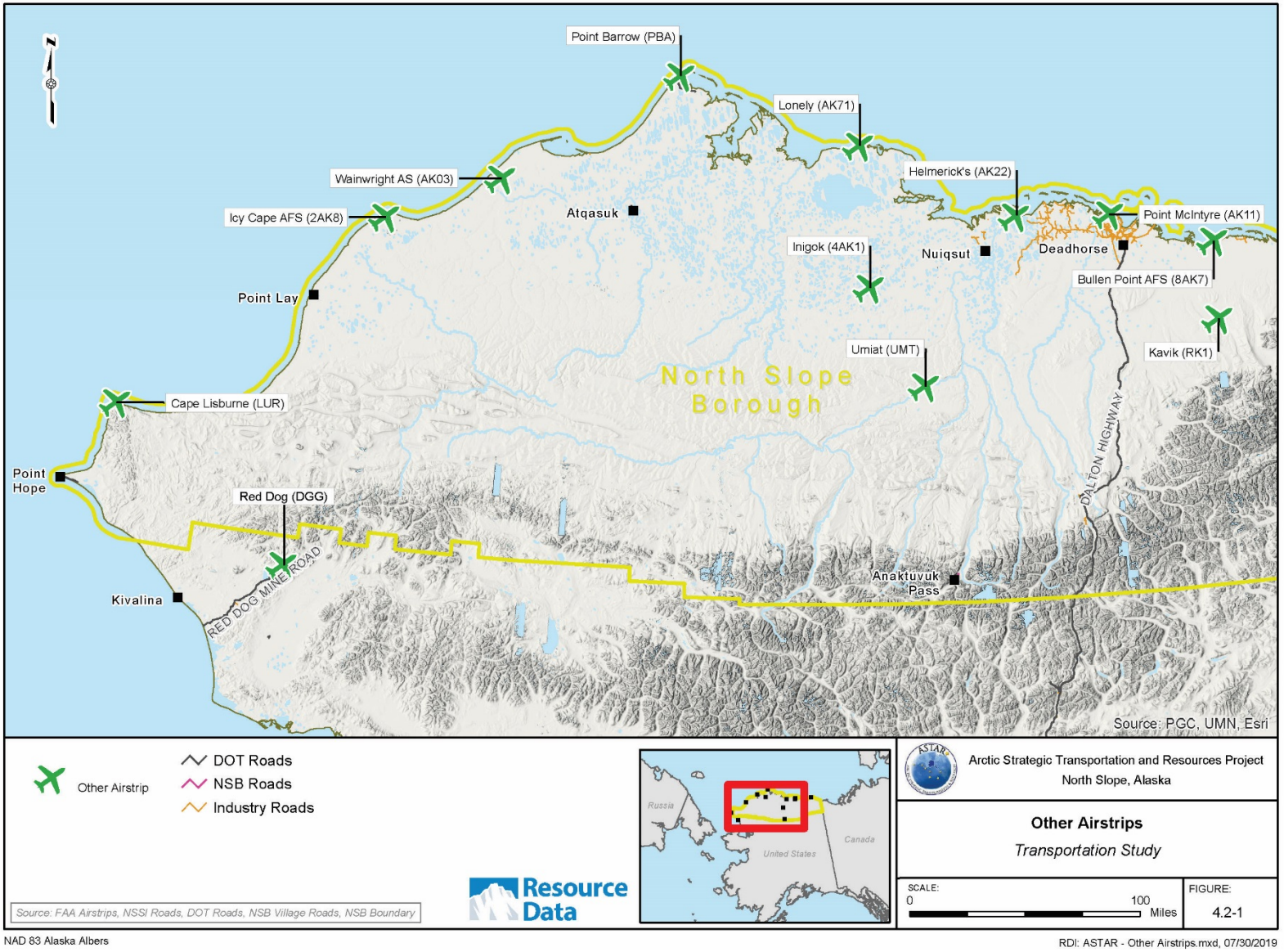
Figure 4.2-1. Other Airstrips



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4.3 Market Analysis

Several tour companies operate in the NSB, moving passengers along the highway on tour buses or passenger vans. Dalton Highway Express is a small seasonal operator that provides freight and passenger service between Fairbanks and Prudhoe Bay in the summer. It also offers reduced rates for drop-offs at a number of communities along the Dalton Highway and provides rates for both accompanied and unaccompanied freight (Dalton Highway Express, 2019).

During winter, a vast network of trails connects many of Alaska's northernmost communities which can be traveled by snowmachine or track vehicles. NSB residents prefer to ship goods by land because air and barge shipping can cost 10 times more (ADN, 2018a). In 2015, two small companies began operating as off-road freight shippers, moving cargo from Deadhorse and Nuiqsut to Barrow with track vehicles. One of the drivers uses a homemade sled to transport highway vehicles for clients and noted that business was very good. The lucrative nature of these enterprises is a testament to the disparity between overland and marine or air shipping costs.

Recently, the NSB implemented a new program to construct ice roads and provide pilot car service to caravans of residents. In 2018, the CWAT project involved construction of about 300 miles of seasonal roads that connected Atqasuk to Utqiaġvik and Utqiaġvik to Alaska's main road system near Deadhorse (ADN, 2018a). Residents claimed that the ice road saved them money in marine freight costs, as several used the road to bring new cars to their village from either Anchorage or Fairbanks. Ice roads are also cost-effective infrastructure for the NSB to build, with costs of about $5,000 per mile compared to an estimate of $2 million per mile for a gravel road (ADN, 2018b). The program continued in 2019 for a second year, allowing guided caravans of NSB residents to safely reach the Dalton Highway. Driving over the tundra in winter is not a new idea, but the CWAT network of ice roads could save the NSB money by avoiding safety issues and costly search and rescue operations (Alaska Public Media, 2019). Before CWAT, residents would drive across the tundra alone, sometimes getting stuck or breaking down. Now the NSB conducts the expedition in groups on maintained roads, which are usable from March until the end of April or early May (Alaska Public Media, 2019).

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5.0 What are the Issues?

5.1 Community Transportation Issues

The regional and village comprehensive plans were referenced for transportation issues specific to each community and the region as a whole. Ongoing consultation should continue at the community level to ensure issues captured are current and relevant. These transportation issues are summarized in Table 5.1-1 and described in the following subsections.

5.1.1 Marine

Increased vessel traffic due to diminishing sea ice is the primary concern in the marine realm. In its most plausible scenario, the U.S. Committee on the Marine Transportation System (CMTS) anticipates over 100 additional vessels transiting Alaska Arctic waters annually by the year 2030. This is attributed to growth in natural resource development, infrastructure development, expansion of the arctic fleet, and seasonally reassigned shipping (CMTS, 2019). This increase in vessel traffic will likely lead to disruptions to the marine mammal harvest, increase the need to establish ports and bays of refuge, increase the demand for oil spill response, and increase the need for emergency search and rescue. At the community level, a lack of suitable shore-based infrastructure is a common issue.

5.1.2 Air

In nearly every community in the AOI, transportation for passengers and many freight items are primarily provided by air transport, making air the primary form of year-round connectivity in the AOI. With air transport, the necessary infrastructure is already available. Therefore, the current issues can primarily be categorized into infrastructure improvements and the need for increased service routes and schedules. The secondary issue is the cost of services, and the tertiary issue being impacts to subsistence resources.

The remote nature of NSB communities, nearly all of which are off the state highway system, often makes capital improvements to infrastructure cost-prohibitive, which generally results in infrequent allocation of project funding. Examples of infrastructure improvements are resurfacing at the Atqasuk Airport, estimated at $22 million to complete, and realigning the Point Hope Airport, estimated at $20 to $30 million to complete construction. Many of these high-cost capital improvement projects only address the deteriorating conditions of the facilities. Often, no significant upgrades or increases to overall level of service are incorporated in the project scope. Therefore, major capital improvement projects to airports generally do little to address overall connectivity within the NSB.

Additionally, most airports in NSB communities lack the necessary equipment to land during times of poor visibility or maintain runway facilities during heavy winter snowstorms, affecting schedules. Nearly all airports within the AOI rely on visual approach procedures for landing aircraft as they lack the necessary instrument landing system equipment to perform guided approaches. Lack of instrument landing system equipment makes landing aircraft within the NSB dependent on approach visibility in a region which is typically susceptible to frequent and sudden advection fog or ice fog events. This results in frequent delays or flight cancellations, sometimes for multiday periods, to both passenger and freight air transportation services.

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Table 5.1-1. Community Transportation Issues

Transportation Mode	Regional	Utqiaġvik	Atqasuk	Wainwright	Point Lay	Point Hope	Nuiqsut	Kaktovik	Anaktuvuk Pass
Marine	Increased vessel traffic with longer open water season Disruptions to marine mammal harvest Need to establish ports and bays of refuge Emergency evacuation Oil spill response	No port No barge docking facility	n/a	No port No bulkhead Shallow and dangerous launching areas	Time and cost issues with shuttling across Kasegaluk Lagoon Conflict avoidance with increased vessel traffic Goods delivered on backhaul from Wainwright after the lagoon depth decreases; goods dropped in water	No port Barge offloading is risky and time-consuming Marine traffic needs regulation More coordination at the local level	Need better access to main channel of the Colville River Nigliq Channel too shallow for barge traffic, and sometimes too shallow for smaller boats	No public boat ramp Boats stored at Kaktovik Lagoon are often damaged by storms Current boat launch is too shallow No restroom at beach	n/a
Air	State maintains AK Aviation Systems Plan for DOT assets only Existing infrastructure needs improvements Many communities have limited routes and schedules to other communities Service costs are high Potential negative impacts to subsistence resources	(BRW) $104,470,184 (2019-2023 National Plan of Integrated Airport Systems [NPIAS] Development Estimate) More leasing space needed Need to improve passenger terminal, baggage claim, vehicle access, and cold storage building for sand and urea	(ATK) $29,138,677 (2019-2023 NPIAS Development Estimate) Rehabilitation project (need resurfacing, replacing lighting, etc.) Snow Removal Equipment Building (SREB) Need to acquire snow removal equipment Runway surface has undulations, soft spots, and a reverse crown No passenger shelter Need reconstruction of the runway, taxiway, apron, and safety area surfaces to properly crown and grade the surfaces	(AWI) $9,493,333 (2019-2023 NPIAS Development Estimate) Need to acquire snow removal equipment SREB or a bay in the new Public Works shop Rehab security fencing needed Seasonal soft spots and rutting Erosion occurring on the apron side slopes, PAPI pads, and to a lesser extent the edge of the RSA The runway needs to be resurfaced Acquisition, platting of the new airport land Land transfer agreement revision for existing airport FAA coordination and planning (Airport Master Plan) Resolution with FAA of grant obligations at old airport Relocation costs and project funding. NSB ownership and maintenance Transference/coordination with Olgoonik Conclusion of any contamination issues	(PIZ) $0 (2019-2023 NPIAS Development Estimate) Construct fencing needed Need to construct a passenger shelter that is skid mounted, insulated, heated, lighted, and located on the airport apron Need to expand runway 2,000 linear feet to accommodate larger commercial aircraft	(PHO) $19,994,742 (2019-2023 NPIAS Development Estimate) No access road No passenger shelter No tie-downs No toilet facilities Cracked sealing of existing asphalt surfaces Poor pavement maintenance and marking repairs Old pavement markings Limited taxiway safety area (TSA) Need float rehabilitation Poor fuel tank Need to increase RSA Point Hope Airport Runway Realignment project Need to lengthen runway Need to replace segmented circle Need to replace threshold markers SREB maintenance Need to widen taxiway Need to update Airport Layout Plan (Realignment Project)	(AQT) $0 (2019-2023 NPIAS Development Estimate) SREB Need to acquire snow removal equipment Perimeter fencing needed Extension to the runway needed Building for snow removal equipment needed Roller and gravel stockpile needed Paved runway needed	(BTI) $0 (2019-2023 NPIAS Development Estimate) Need to add thaw cable to under runway culverts Need to develop lease lots (likely will require gravel pit development) Old airport: Erosion and frequent flooding from storm surges, runway in poor condition, coastal fog	(AKP) $2,666,667 (2019-2023 NPIAS Development Estimate) Need to replace AKP airport property to fit existing ROW alignment better (likely to involve some swapping of land) SREB at location of USDW building (destroyed by fire in early 2018) Need to acquire snow removal equipment Total lighting replacement needed ALP update needed Need to construct a passenger terminal at the airport Need to install security fencing around the airport property No passenger shelter

Transportation Mode	Regional	Utqiaġvik	Atqasuk	Wainwright	Point Lay	Point Hope	Nuiqsut	Kaktovik	Anaktuvuk Pass
Overland	No year-round access across the Colville River Dust control inadequate and contributes to respiratory problems	No road to Nuiqsut Traffic congestion on Ahkovak Street Some Cake Eater subdivisions don't have road access Need alternative access to BARC Limited gravel resources	Cost of goods are expensive Availability of supplies is limited Diminishing gravel resources	Housing shortage		Existing roads need repairs Evacuation route is subject to flooding Road bed is subsiding into tundra	Culverts and road beds wash out at creek crossings No year-round access	Ocean access inadequate Roadways eroding Proposed whale haul-out area doesn't have gravel road access No year-round access to mainland Airport and landfill connectivity ROWs and land status limits connectivity	Fuel and freight deliveries are expensive Need better access within community and to subsistence areas Lack of water sources and snow for CWAT

Statewide, the cost of airport maintenance has increased dramatically, nearly tripled, from 1981 to 2013 for regional and community airports. Average maintenance and operations costs have grown from $332,000 in 1981 to $905,000 per airport in 2013. This includes cost of personnel, commodities, building maintenance, utilities, and snow and ice removal. NSB airport maintenance and operations costs are significantly affected by snow and ice removal efforts. A majority of NSB airports also lack critical snow removal equipment infrastructure for keeping runways and facilities clear for takeoff and landings. Although individual NSB communities may possess snow removal equipment (in varying conditions), such as graders and plows, most do not have equipment dedicated for airport use. Most communities do not have a snow removal equipment building (SREB) to properly stage and maintain equipment or a sand and chemical (urea) storage building to keep thawed materials during winter runway maintenance. Lack of this type of infrastructure makes these airports much more susceptible to heavy snow events, also resulting in delays or flight cancellations for passenger and freight air services.

Adding flight routes from Anaktuvuk Pass to other NSB communities, rather than just connecting to Fairbanks and adjacent communities, is one example for increasing service options. Unfortunately, airport improvements do little to alleviate the service costs themselves, i.e. the secondary issue. Commercial passenger and freight transporters incur large overhead expenditures to operate, causing high rates. Few options are available to reduce these costs; however, Amazon has looked into drone delivery and private flights to reduce freight transportation costs.

Lastly, several communities voiced concerns about impacts to subsistence resources, such as caribou herds. With current and/or increased flights, subsistence users have voiced concerns that air transport has negative impacts on caribou movements, oftentimes making them more difficult to harvest.

5.1.3 Overland

There is a regional lack of infrastructure across the NSB. Besides the Dalton Highway, there are no permanent overland connections. Common barriers to infrastructure development in the region include high construction costs, limited material sources, and the logistics of operating in these remote environments. One physical barrier that poses a significant challenge is the Colville River. It is an exceptionally large river with main channel widths ranging up to nearly 4,000 feet. Wide floodplains and significant ice damning are also big concerns when considering crossing methodology. West of the Colville River, material sources are sparse, as the Colville River captures the detrital material eroding off the Brooks Range. Besides small local street and bridge projects, a common issue with all communities is fugitive dust control from the gravel roads.

River flooding is a common issue on the North Slope, particularly during breakup. In 2015, the Dalton Highway flooded as a result of a rapid spring melt on the Sagavanirktok River. The road was shut down for 28 days as crews worked to mitigate the disaster. This resulted in a $43 million improvement project from mileposts 397 to 414 and involved raising the grade of the roadbed, installing culverts, and resurfacing. An additional reconstruction contract was issued in 2016 for $31 million, extending south of milepost 397 to milepost 379 (http://www.dot.alaska.gov/nreg/dalton-updates/2015response.shtml).

5.2 Oil and Gas Industry Transportation Issues

The oil and gas industry on the North Slope is widespread and continues to expand to the west and east with future development. Although the industry does have a wide road transportation network, branching west from the Dalton Highway, many sites are remote and virtually “roadless” due to many factors (e.g., permitting constraints to lower impacts to wetlands and large rivers between sites, such as the Colville

River or the Sagavanirktok River). Due to a high demand, and sometimes large size of freight, the oil and gas industry must use all forms of transportation to get material to site.

5.2.4 Marine

Marine transport is the only form of transportation available for certain large freight, such as modules or rigs that cannot travel up the Dalton Highway, as well as larger items that cannot travel by air to roadless fields, such as Alpine or Point Thomson. Similar to the issues with community marine transport, the oil and gas industry also deals with issues, such as:

- Docks are not ice-free year-round;
- Shallow water docking facilities require significant dredging and do not accommodate deep-draft vessels.

5.2.5 Air

The Deadhorse Airport, Kuparuk Airport, Alpine Airstrip, and Point Thomson Airstrip all provide fairly reliable access to the major airfields, with Alpine and Point Thomson only accessible by air during summer months (and ice road during winter months). Ability to fly in and out of these fields is imperative for workers and freight (whether it be groceries for the camp or an emergency tool or piece of equipment). With a premium placed on their importance, airstrip improvements are often prioritized and completed in a timely manner, but some issues still exist, such as:

- Unpredictable weather (i.e., fog can reduce visibility significantly and ground flights for weeks on end);
- Gravel runways require frequent grading, and they all require frequent snow removal to maintain a useable runway surface and meet FAA guidelines;
- If flights get backed up due to extended grounding, flight availability is reduced for passengers and lower priority freight;
- Wildlife and waterfowl often reside near the runways.

5.2.6 Overland

The oil and gas industry has expanded both west and east of the Dalton Highway; however, multiple large rivers currently prevent further road extension (the Colville River to the west, and the Sagavanirktok River's east channel to the east). Additionally, the Kuparuk River runs through the central portion of the field and floods every breakup, restricting road traffic. Other issues, specific to overland travel, include:

- The Sagavanirktok River's west channel is crossed by a small bridge and causeway, with the causeway washing out during breakup floods;
- Limited gravel resources for road construction west of the Colville River;
- Winter weather conditions can create whiteout conditions and halt travel.

6.0 Regional Opportunities

While many of the issues presented in Section 5 are intrinsic to individual communities, the goal of this study is to identify projects that could bring the most cumulative benefits to the region. As stated in Section 1, the ASTAR project is an initiative of DNR to identify, evaluate, and advance opportunities to enhance the quality of life and economic opportunities in North Slope communities through responsible infrastructure development (DNR, 2018). In partnership with the NSB, DNR seeks to collaborate with area communities and other stakeholders in an effort to identify community infrastructure and regional connectivity projects that offer the greatest cumulative benefits for the region.

Projects that best meet the needs, goals, and objectives; have local support; and demonstrate that they will provide benefits to a wide spectrum of stakeholders will be advanced. This study has been conducted to identify potential gaps in North Slope infrastructure development. This report discusses specific issues associated with each mode of transportation; however, it is the improvement of multimodal infrastructure that would bring the greatest benefits to the North Slope. For example, a dock at an isolated community would benefit that specific community by providing better marine access, but without roads connecting to other communities, that benefit would be limited. Alternatively, a port may be located away from communities because of proximity to deep water or the presence of protective shorelines, thus allowing larger, deeper-draft vessels. If this isolated, deep-draft port were connected to several communities via roads, it would likely produce the greatest benefit to the region.

All of the coastal communities, including Nuiqsut, have identified needs for improved shore-based infrastructure. While these needs are important to each community, they are somewhat marginal when compared to introducing a deep-water port to the region. A deep-water port in the Arctic is not a novel idea, and has been studied by numerous groups in the past, particularly USACE. However, these studies focused more on what a deep-water port could provide to the marine realm than what it could provide to the communities of the North Slope.

A deep-water port would serve to meet the needs of providing local and regional economic development opportunities from resource extraction, tourism, research, and improved subsistence access for marine mammal harvest. It would decrease operating costs in the Arctic, provide for efficient delivery of bulk goods (fuel, building materials, dry goods, etc.), provide protected moorage to support offshore oil and gas endeavors, mineral resource extraction vessels, and cruise ships, and provide for vessel repair and maintenance support.

The Alaska Deep-Draft Arctic Port System Study (USACE, 2013) identified eight locations within the AOI, including Kotzebue, Delong Mountain Terminal (Red Dog Mine), Cape Thompson, Wainwright, Point Franklin, Utqiaġvik, Prudhoe Bay, and Mary Sachs Entrance. Other potential sites not included in the study are Point Hope, Cape Lisburne, Point Belcher, Harrison Bay, Foggy Island Bay, and Bullen Point. The study favored deep-draft port locations at Nome and Port Clarence, which would offer limited benefit to NSB communities. Kotzebue and the Delong Mountain Terminal would also provide limited benefit to NSB communities. Table 6.0-1 provides an abbreviated summary of USACE's evaluation of candidate sites within the ASTAR AOI, excluding Kotzebue and the Delong Mountain Terminal.

The potential sites were evaluated on five primary criteria:

- Port proximity to mission (oil and gas and mining as key drivers)
- Intermodal connections
- Upland support
- Natural water depth

- Navigation accessibility

Port proximity was measured in distance from oil and gas endeavors, mining operations and potential, existing oil spill response equipment, community resupply, and shipping lanes. Intermodal connections considered proximity to FAA airstrips and potential road and rail connections. Upland support was measured by whether the community is considered a hub supporting other communities in the area. Water depth was measured as a function of natural water depth from shore. Navigation accessibility considered ice conditions, where most of the areas within the AOI scored poorly. Cost was not considered but was thought to be directly linked to distance to deep water which was weighted high in their assessment (Alaska Deep-Draft Arctic Port System Study – Draft, 2013). This study was suspended in 2015.

Table 6.0-1. USACE's Summary Evaluation of Candidate Sites

Criteria	Mission Proximity	Intermodal Connections	Upland Support	Water Depth	Navigation Accessibility
Cape Thompson (Point Hope)	OCS: Good Mining: Low Existing OSR: Very good Community Resupply: None/potential Shipping Lanes: Medium	Air Service: Scheduled air taxi/charter Road: None/potential Existing Marine: None/potential	Community	Distance to -35 feet: >1 and <=2 miles Distance to -45 feet: >2 and <=5 miles	Ice Conditions: Low Operational Considerations: Medium
Wainwright	OCS: Good Mining: Very low Existing OSR: Medium Community Resupply: None/potential Shipping Lanes: Low	Air Service: Scheduled turbo prop Road: None/potential Existing Marine: None/potential	Community	Distance to -35 feet: >1/2 and <=1 mile Distance to -45 feet: >1 and <=2 miles	Ice Conditions: Low Operational Considerations: Medium
Point Franklin	OCS: Good Mining: None/potential Existing OSR: None/potential Community Resupply: None/potential Shipping Lanes: Low	Air Service: Scheduled air taxi/charter Road: None/potential Existing Marine: None/potential	Community	Distance to -35 feet: >1 and <=2 miles Distance to -45 feet: >2 and <=5 miles	Ice Conditions: Medium Operational Considerations: Medium
Utqiaġvik (formerly Barrow)	OCS: Medium Mining: Very low Existing OSR: Very good Community Resupply: Good Shipping Lanes: Very low	Air Service: Scheduled jet Road: None/potential Existing Marine: None/potential	Regional hub	Distance to -35 feet: >1/2 and <=1 mile Distance to -45 feet: >1 and <=2 miles	Ice Conditions: Very Low Operational Considerations: Good
Prudhoe Bay	OCS: Low Mining: Very low Existing OSR: Good Community Resupply: Medium Shipping Lanes: Very low	Air Service: Scheduled jet Road: Existing road Existing Marine: Limited harbor	Major hub	Distance to -35 feet: <=10 miles Distance to -45 feet: <=10 miles	Ice Conditions: Very Low Operational Considerations: Good
Mary Sachs Entrance	OCS: Low Mining: Very low Existing OSR: Medium Community Resupply: None/potential Shipping Lanes: None/potential	Air Service: None/potential Road: None/potential Existing Marine: None/potential	None/potential	Distance to -35 feet: >2 and <=5 miles Distance to -45 feet: >5 and <=10 miles	Ice Conditions: Very Low Operational Considerations: Good

OCS: Outer Continental Shelf
OSR: Oil Spill Response

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The subsequent sections highlight how improvements to multimodal transportation provide the greatest cumulative benefit. Benefits are assessed on the ability to:

- Support cultural connectivity
- Lower cost of goods and services
- Preserve or enhance subsistence traditions
- Improve health and safety conditions
- Improve access to education opportunities
- Enhance workforce development
- Promote natural resource development

Ultimately, a network of roads and the addition of at least one major port would bring the most benefit to the NSB. The sections below describe roads and ports presented in Figure 6.0-1.

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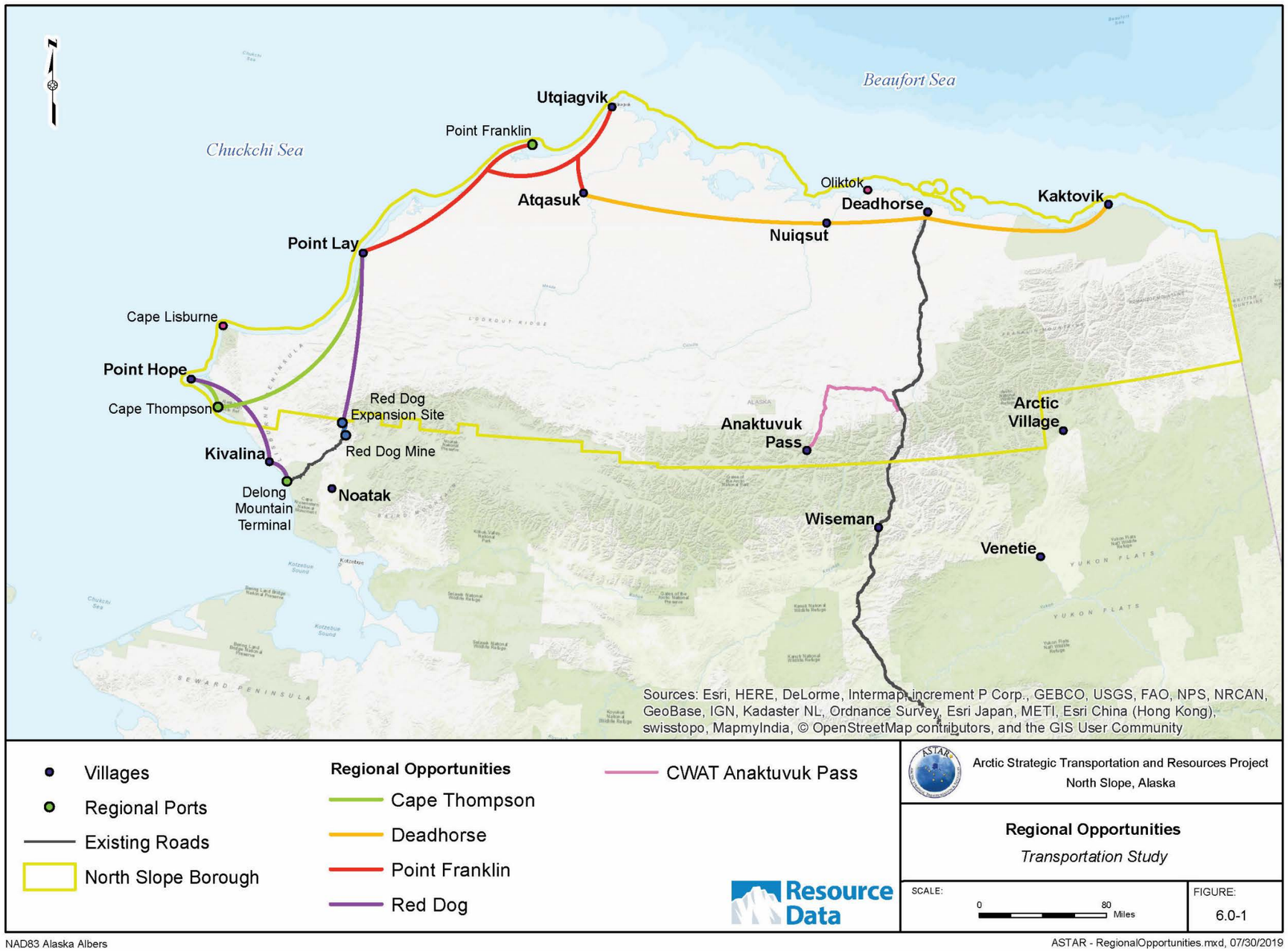
Figure 6.0-1. Regional Opportunities



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6.1 Northern Region

The Northern Region communities of Utqiaġvik, Atqasuk, and Wainwright would benefit from three primary projects:

- A road network connecting Utqiaġvik, Atqasuk, and Wainwright
- A regional port
- A road connecting the Northern Region network to Nuiqsut

A road network connecting Atqasuk, Utqiaġvik, and Wainwright, combined with a deep-water port in the area would provide the greatest cumulative benefits to the largest number of residents in the NSB. A port location at Wainwright, Point Franklin, or Utqiaġvik all have the opportunity to provide benefits to multiple communities when combined with overland infrastructure developments.

An approximately 100-mile road connecting Wainwright to Utqiaġvik with an approximately 30-mile connection to Atqasuk would likely bring the most benefit to the most communities out of all projects considered. Table 6.1-1 provides a summary of the perceived benefits of a road network connecting Atqasuk, Utqiaġvik, and Wainwright.

Table 6.1-1. Benefits of Proposed Atqasuk, Utqiaġvik, and Wainwright Road Network

Benefit Category	Representative Examples of Specific Benefits of an All-Season Road
Supports cultural connectivity	Allows more frequent travel between communities, enabling additional cross-community connections, increasing the quality of links or bonds among community members, and creating or enhancing the capability to join together in various cultural activities, events, and celebrations. Examples include Inupiaq language workshops, whaling seasons, Kivgiq Festival, Nalukataq, and art workshops (dance, music, and art).
Lowers costs of goods and services	Allows transport of bulk goods shipped by barge or larger aircraft to Utqiaġvik to be distributed to smaller communities via road network. Facilitates trucking of gravel for expansion or improvements to airports and community roads. Allows routine transport of bulk fuel from Utqiaġvik. Facilitates potential installation of gas line from Barrow Gas Fields to Atqasuk and Wainwright, lowering the cost of power generation and home heating. Alternatively, road facilitates installation of power lines. Facilitates potential installation of fiber-optic line, allowing high-speed internet connection to schools, facilities, and residences. Lowers the capital cost of infrastructure development such as construction of homes, schools, public buildings, commercial buildings, utilities, etc. Improves accessibility to a greater range of recreational, leisure, entertainment, and consumer opportunities such as restaurants, bowling alley, roller rink, hotels, grocery stores, etc. Allows residents access to NSB government offices. Improves access and lowers cost for basic services provided by maintenance technicians, repairmen, skilled labor, etc.

Benefit Category	Representative Examples of Specific Benefits of an All-Season Road
	Allows NSB to lower costs of providing and maintaining public services in Atqasuk and Wainwright.
Preserves or enhances subsistence traditions	Allows access to a wider range of subsistence areas for fishing, hunting, and gathering. Allows residents of Atqasuk to more readily participate in whaling or other marine mammal harvest. Allows more access and options for small engine repair, boat repair, snowmachine sales and service, gunsmithing, etc. Allows more access and options to enhance subsistence economy (e.g., bartering).
Improves health and safety conditions	Provides an evacuation route from each community in case of natural disaster or emergency. Allows Atqasuk and Wainwright residents to access Samuel Simmonds Memorial Hospital, other healthcare and social service providers, and veterinary services. Provides airport options for air ambulance medevac when inclement weather closes one airport. Allows consolidation of waste streams for recycling or disposal. Helps facilitate cleanup of NPR-A legacy wells.
Improves access to education opportunities	Allows residents to attend educational events or presentations at other schools. Provides Atqasuk and Wainwright residents access to Ilisaġvik College. Allows greater access to cultural centers/activities, Simon Paneak Memorial Museum, the Inupiat Heritage Center, and the Residential Learning Center. Allows residents to exchange indigenous knowledge (elders/youth; subsistence areas).
Enhances workforce development	Improves access to more job opportunities for all communities. Improves access to more skills training and apprenticeship opportunities for both communities. Provides direct jobs for road construction and maintenance. Could provide the catalyst for new business opportunities. Allows opportunities for workers to fill needed local service gaps.
Promotes natural resource development	Improves logistical supply chain to base of operations. Improves accessibility of granular material sources. Provides ROW for natural gas pipelines.

A regional port would support a variety of users, ensure safe access and harbor, support efficient shipment of goods, and provide the infrastructure necessary to promote traditional pursuits and industries such as tourism, research, oil exploration and development. Table 6.1-2 provides a summary of the perceived benefits of establishing a port in the Northern Region.

Table 6.1-2. Benefits of Proposed Northern Region Port and Docking Facility

Benefit Category	Representative Examples of Specific Benefits of a Regional Port
Supports cultural connectivity	Enhances access to subsistence hunting and fishing.
Lowers costs of goods and services	Allows increased transport of bulk goods shipped by larger barges. Allows for larger and more routine transport of bulk fuel. Lowers the capital cost of infrastructure development such as construction of homes, schools, public buildings, commercial buildings, utilities, etc. More efficient offloading.
Preserves or enhances subsistence traditions	Allows residents to more readily participate in whaling or other marine mammal harvests. Allows more access and options to enhance subsistence economy (e.g., bartering).
Improves health and safety conditions	Provides improved offshore emergency response and oil spill cleanup. Provides safe harbor for ocean-going vessels. Provides safer and more efficient offloading of vessels. Allows consolidation of waste streams for recycling or disposal.
Enhances workforce development	Creates direct job opportunities for all communities. May indirectly create jobs in other sectors such as oil and gas and mining industries. Could provide the catalyst for new business opportunities. Allows opportunities for workers to fill needed local service gaps.
Promotes natural resource development	Provides opportunities for export of natural resources including coal, natural gas, and oil. Provides base of operations for offshore oil and gas exploration and development.

If there is a coherent desire for connection to Alaska's existing highway system, this network could be connected via an approximately 200-mile road through NPR-A to the existing North Slope oil field road system. This option will be addressed in the next section.

An additional project opportunity in the northern region would be to relocate Wainwright's airport. Located on the eastern shore of the Chukchi Sea, Wainwright is strategically located to provide support for future offshore drilling operations and other potential offshore industry activities in the Arctic. The Chukchi Sea represents a massive source of potential crude oil and natural gas. The 2016 Assessment of Oil and Gas Resources: Alaska Outer Continental Shelf Region report, issued by the U.S. Department of the Interior BOEM, estimates the undiscovered technically recoverable oil and gas resources contained within the Chukchi Sea Planning Area to be between 18 and 43 billion barrels of oil equivalent. The estimated undiscovered technically recoverable oil and gas resources volumes of the Chukchi Sea Planning Area account for approximately 60% of the entire undiscovered technically recoverable oil and gas resources volume for the entire Alaska OCS Region.

In 2015 and 2016, offshore drilling and exploration in nearly all Arctic Ocean, Beaufort Sea, and Chukchi Sea lease areas were indefinitely banned by former President Barack Obama under the Outer Continental Shelf Lands Act of 1953. This decision to effectively shut down the Arctic to offshore drilling was based on concerns of potential impacts to the environment due to oil spills and lack of proven spill response technologies for sea ice environments. In 2017, President Donald Trump issued an executive order to overturn this act and reverse the moratorium on drilling in large parts of the Beaufort and Chukchi Seas. The BOEM subsequently released plans to put Beaufort Sea lease areas up for sale as part of the 2019 OCS Oil and Gas Lease Sale plan. President Trump's executive order to reverse the former president's permanent offshore drilling moratorium was deemed illegal by the U.S. District Court in March 2019. President Trump has already stated it is the intent of BOEM to appeal this ruling. Although offshore exploration and drilling in Arctic waters are currently banned, the region may once again become a viable source of oil and natural gas. As the winter sea ice extent decreases overtime, oil demand and prices increase, Arctic shipping lanes remain open for longer periods, and offshore drilling and response technologies continue to improve, it is likely the offshore petroleum industry will return to the area in the future.

Royal Dutch Shell, which previously held leases for the Chukchi Sea Planning Area, unsuccessfully attempted to develop the area, citing difficult conditions due to sea ice extents, regulatory environment, and poor results from its one exploratory well. During its exploration and development efforts for its Chukchi Sea leases, Shell used Wainwright as its strategic onshore base for operations due to its strategic location.

Relocation of the Wainwright Airport from its current location to the existing Wainwright DEW Line airport site has long been desired by the community. At its current location, the Wainwright Airport is viewed as confining and limiting new growth of the community to the south along the shores of the Wainwright Inlet. Community members have also voiced concerns of the noise and industry activity stemming from increased air traffic at the current airport.

If offshore exploration and drilling operations return to the Chukchi Sea, lease lands and an industry center will be needed to support operations. Relocation of the airport to the DEW Line site, approximately 3 miles south of the village, would provide a buffer between air traffic and industrial activities mitigating the noise from increased air traffic impacts. A 3-mile-long road, likely along the existing trail connecting the village to the DEW Line site, will be required. Moving the airport to the DEW Line site will also increase the opportunity for additional leasable lands outside the main village, which could be used and developed by private industry to support offshore drilling operations, spill response resources, and environmental research endeavors. The added distance between the village and industry activity is a common desire among community members. Increased helicopter traffic between operations centers and offshore facilities is also expected should offshore drilling operations return to the area. The DEW Line site would allow helicopter traffic to use flight patterns which bypass the airspace directly above the village to further mitigate noise inundation. The DEW Line airport site is located along the eastern shore of the sheltered Wainwright Inlet and could also include the development of a boat launch and dock to further support multimodal industry users.

Additionally, moving the airport further from the village allows for future expansion or relocation of community utilities and resources toward the south, further away from the ongoing effects of coastal erosion.

The DEW Line airport facility will require significant upgrades, including runway lengthening and reconstruction, equipment upgrades, and construction of general airport infrastructure buildings. The current Wainwright Airport is owned by the NSB, and the land was acquired in 1983 from the SOA as

part of a land transfer agreement. The terms of this agreement state the land must be used as an airport, otherwise ownership would revert back to the SOA. It is likely the terms of this agreement would need to be renegotiated and addressed to allow for the NSB to retain ownership of the land after airport relocation.

6.2 Central Region

The Central Region, comprised of Nuiqsut and the oil and gas industry, can benefit from three primary projects:

- A road connecting the Dalton Highway to the east bank of the Colville River and a road connecting the west bank of the Colville River to the Northern Region road network
- A permanent Colville River crossing
- A North Slope railroad connecting Nenana to Deadhorse

The Central Region has the most extensive infrastructure within the NSB. The Colville River is the largest obstacle when considering overland access for Nuiqsut and the oil and gas industry. Roads are currently planned to both the east bank and the west bank of the Colville River and will likely be constructed in the near future. The road on the east side of the Colville River is an industry road currently proposed by OSA. The plans include a boat launch for local residents. The road on the west side of the Colville River is currently proposed by the Kuukpik Village Corporation and heads south from Nuiqsut, adjacent to its water source, and down to the west bank, where the residents will have improved access to the main channel of the Colville River.

Several alignment alternatives for a gravel road and a permanent Colville River crossing are currently being studied. The optimal road alignment will likely rely on the most favorable crossing location. The roads may be constructed prior to the permanent crossing and a cable ferry implemented as a temporary solution during the open-water season, with an ice bridge during the winter months. This could serve to provide Nuiqsut and the oil and gas industry with year-round overland access to the existing road network, but it would remain a bottleneck until a permanent crossing is established. Should other communities of the NSB desire permanent overland access, an approximately 200-mile gravel road could be constructed from existing infrastructure to Atqasuk or Utqiaġvik, connecting to the network established in the Northern Region. This road would likely gain industry support as it aids westward development into NPR-A. In addition to establishing the Colville River crossing, delineating sufficient amounts of gravel is a concern, as known, high-quality gravel resources are extremely limited west of the Colville River.

Table 6.2-1 provides a summary of perceived benefits of establishing road segments east and west of a permanent Colville River crossing.

Table 6.2-1. Benefits of Road Segments East and West of Colville River

Benefit Category	Representative Examples of Specific Benefits of an All-Season Road
Supports cultural connectivity	Allows more frequent travel between the Dalton Highway and Utqiaġvik, enabling additional cross-community connections, increasing the quality of links or bonds among community members, and creating or enhancing the capability to join together in various cultural activities, events, and celebrations.
Lowers costs of goods and services	Allows residents to ship bulk goods overland. Facilitates trucking of gravel to communities for expansion or improvements to the airport and community roads. Lowers the capital cost of infrastructure development such as construction of homes, schools, public buildings, commercial buildings, utilities, etc. Improves accessibility to a greater range of recreational, leisure, entertainment and consumer opportunities.
Preserves or enhances subsistence traditions	Allows access to a wider range of subsistence areas for fishing, hunting, and berry picking. Allows more access and options to enhance subsistence economy (e.g., bartering).
Improves health and safety conditions	Helps facilitate cleanup of NPR-A legacy wells.
Improves access to education opportunities	Provides Nuiqsut residents access to Ilisaġvik College. Allows greater access to cultural centers/activities. Allows residents of all communities to exchange indigenous knowledge (elders/youth; subsistence areas).
Enhances workforce development	Provides direct jobs for road construction and maintenance. Could provide the catalyst for new business opportunities. Allows opportunities for workers to fill needed local service gaps.
Promotes natural resource development	Provides access to oil and gas resources within NPR-A. Provides access to gravel resources within NPR-A.

The construction of the road segments east and west of the Colville River could proceed years before a bridge is ever built across the river. The route should be aligned with the best potential crossing location, and temporary ice bridges and cable ferries could be used in the interim. The Colville River bridge is an important link, but can be constructed when funding is available. The bridge would improve on the same benefits offered by the road segments but would also eliminate a bottleneck by removing the logistical complexity of constructing an ice bridge, operating a cable ferry, and shut-down periods during breakup and freeze-up.

A railroad from Nenana to Deadhorse has been proposed and studied extensively by the University of Alaska Fairbanks. With increased oil and gas activity, hundreds of hydraulically fractured wells may be proposed requiring hundreds of millions of pounds of proppant and equal aggregate tonnages of drilling

steel, drilling fluids, cement, diesel fuel, and equipment. The proposed rail is estimated to reduce shipping rates from $1.00/ton-mile to $0.11/ton-mile, while at the same time reducing the distance traveled from Nenana by 100 miles. Benefits of this rail would be realized beyond the extent of the NSB, from the northern flanks of the Brooks Range south to Livengood, such as critical and strategic mineral development (Metz, Brooks, and Billmire, 2018). Representative benefits of a North Slope Rail are presented in Table 6.2-2.

Table 6.2-2. Benefits of a North Slope Rail

Benefit Category	Representative Examples of Specific Benefits of a North Slope Rail
Lowers costs of goods and services	Reduces freight costs by a factor of 10.
Preserves or enhances subsistence traditions	Reducing truck traffic would serve to minimize fugitive dust, thus providing better grazing for caribou.
Improves health and safety conditions	Rail transport is inherently safer than trucking, particularly in the mountainous, snowy, and dark regions.
Enhances workforce development	Provides direct jobs for rail construction, operation, and maintenance. Could provide the catalyst for new business opportunities. Allows opportunities for workers to fill needed local service gaps.
Promotes natural resource development	Significantly reduces the cost of shipping materials such as diesel, steel, proppant, drilling fluids, and drill rigs. Reduces cost of exporting strategic and critical minerals such as copper, cobalt, lead, molybdenum, tungsten, and zinc, which are found from Livengood through the northern flanks of the Brooks Range.

6.3 Western Region

Point Lay and Point Hope are the two communities in the Western Region. Due to their geographic location, they each have unique opportunities. Point Lay is closer to Wainwright, and if a deep-water port and road network are established in the Northern Region, it would make sense to connect Point Lay to that network via an approximately 100-mile-long gravel road. This road would bring similar benefits to Point Lay as the Northern Region road network brings to Atqasuk, Utqiaġvik, and Wainwright.

A primary concern at Point Lay is the delivery of goods via barge. Goods are often delivered after the barge has already made its runs to Utqiaġvik and Wainwright. The depth of the Kasegaluk Lagoon has generally decreased by this time, and Point Lay's goods have been dropped in the water. A floating causeway from the barrier islands to the mainland could be a good temporary solution prior to connecting Point Lay to a more established port in the Northern Region. To extend from the barrier islands to the mainland, Point Lay would require a 1-mile-long floating causeway. A floating causeway is shown in Figure 6.3-1. A shallow-draft ferry or hover barge could also provide a temporary means for crossing the lagoon.

Figure 6.3-1. U.S. Navy Floating Causeway Constructed by Attaching Non-Powered Lighterage Together

https://commons.wikimedia.org/wiki/

Cape Thompson, 30 miles south of Point Hope, is another potential port site. If a port is established closer to Point Hope, overland connections from Point Lay would have more merit.

Point Hope is an extremely isolated community, but recent road construction at Kivalina and proposed road construction at the Red Dog Mine could lead to a potential overland connection. Point Hope is approximately 75 miles from Kivalina, which is approximately 20 miles from the Delong Mountain Terminal. The Red Dog Mine is connected to the Delong Mountain Terminal via a 52-mile gravel road. The terminal has a shallow water dock and a conveyor for offloading concentrate to lightering vessels. With the absence of a port in the Northern Region, connecting Point Lay and Point Hope to the Delong Mountain Terminal could provide similar benefits.

6.4 Eastern Region

Kaktovik is the only community in the Eastern Region, located approximately 115 miles east of Deadhorse and 65 miles east of Point Thomson. Kaktovik is located just north of the ANWR. The CWAT program could be extended to Kaktovik to provide snow trails for overland transport of vehicles, construction materials, and other bulk freight. If Section 1002 of ANWR is slated for development, it is possible a gravel road will connect ANWR to the Dalton Highway. A gravel road to Kaktovik could provide an impetus for development in 1002, while providing Kaktovik with similar benefits provided by the other regional road networks.

6.5 Southern Region

Anaktuvuk Pass is the only community in the Southern Region. Anaktuvuk Pass has the desire to reduce costs of goods and services but has expressed minimal interest in a permanent road to the Dalton Highway for fear of increased tourism and hunting in their subsistence hunting grounds. The CWAT program has included Anaktuvuk Pass, but permitting delays and failure to capture adequate snow has

prevented them from being able to establish the trail. In 2019, trail-packing crews were able to reach Anaktuvuk Pass from Galbraith Lake on LGPVs, but there was not enough snow along a 15-mile stretch of the Anaktuvuk River to establish a proper snow trail. LGPVs are currently staged in Anaktuvuk Pass in an attempt to pack early-season snowfall that might otherwise be blown clear later in the season. There could be need for snow fences installed in some areas subject to extreme wind events. If a more substantial ice road is needed, a lake study survey should be conducted to locate adequate water sources.

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7.0 Next Steps

7.1 Community and Stakeholder Engagement

This study introduces several high-level regional infrastructure opportunities within the NSB, but stakeholder and community input hasn't yet been solicited. The community comprehensive plans were referenced extensively, but a dialogue needs to continue with each community to determine their current and foreseeable needs are being addressed. This report also speculates that the oil and gas industry will continue to branch west across NPR-A and east in ANWR and that infrastructure development in these regions will improve the accessibility to undiscovered natural resources. It will be just as important to continue dialogue with the industry so infrastructure development will support its interests, as well.

7.2 Data Gaps

7.2.1 Marine

Potential port and dock locations will require bathymetric data because water depth is one of the biggest drivers in site selection. A more detailed analysis of the seabed would provide knowledge on the amount and difficulty of any dredging that may be required. Meteorological data, including wind, wave heights and periods, and annual sea ice behavior will also be required.

7.2.2 Air

As previously mentioned and discussed in section 2.2 and 5.1.2, air transportation is costly, which could potentially be solved with freight by use of unmanned aircraft (aka drones). Unmanned aircraft for commercial markets have seen minimal success; however, a recent partnership with an Alaska tribal group has been a significant step in the right direction. Early 2019, Sabrewing Aircraft Company partnered with Alaska's Aleut Community of St. Paul Island (ACSPI) to provide equipment and training so ACSPI can operate within an FAA-designated experimental test range complex. To begin, the FAA will need to approve an initial certificate of authorization and the aircraft will need to be built. The aircraft could be assembled in Anchorage, Alaska, as soon as 2020. The goal is to transport freight between Anchorage, St. Paul, and St. George with the unmanned aircraft. Although this test area is out of this project's AOI, a similar approach could be adopted in North Slope communities. The remoteness of the North Slope provides an ideal testing area with a potential for significant savings if successful and fully incorporated.

7.2.3 Overland

Any potential overland routes will be contingent on the 2019 BLM Integrated Action Plan/Environmental Impact Statement Record of Decision to avoid any special areas and to consider new areas which may be delisted as special. Gravel scarcity is a primary concern in NPR-A, and a thorough materials site investigation program will be required to delineate sufficient quantities of gravel to construct the proposed roads. Comprehensive, detailed route analyses will need to be conducted considering key drivers including, but not limited to:

- civil engineering
- cultural and paleontological resources

- existing infrastructure
- geology
- hydrology
- land status
- subsistence
- wetlands
- wildlife

7.3 Acquiring Funding

Investments in transportation infrastructure are generally recognized for their contribution to broader economic development on a national and regional scale. A publication from the State Smart Transportation Initiative (SSTI, 2012) provided insight on state Department of Transportation project selection processes and methods. Traditional economic evaluations for transportation projects generally rely on benefit cost analyses with focus on direct user benefits. However, this approach is no longer sufficient, and "such a limited focus will ignore many potential benefits" (SSTI, 2012). There are obvious economic benefits in the construction sector and to individuals and businesses using new infrastructure, but there are wider implications such as improved medical services, access to educational facilities and retail businesses, and access to housing that can come from transportation investments (SSTI, 2012). Empirical analyses have confirmed that spending on infrastructure generates jobs in a variety of industry sectors. A U.S. Department of the Treasury (DOTRES) report used Bureau of Economic Analysis data to measure the contribution of transportation investment to employment and found that only 61% of jobs were in construction (DOTRES, 2010). Spending on transportation projects also supported jobs in the retail trade, manufacturing, and professional services sectors, which are created when companies purchase goods such as tools and construction materials or engineering and accounting services. DOTRES concluded that carefully selected infrastructure projects will benefit daily users as well as residents of broader geographies and create the potential to "raise the nation's productivity and economic potential in the future."

7.3.1 Port Funding

Maritime facilities do not have a federal agency under the Department of Transportation like the FAA or FHWA, nor do they have a maritime analogue of the Airport and Airway Trust Fund or the Highway Trust Fund. The only significant source of federal support that maritime facilities receive is through the USACE navigation program, which supports dredging, breakwaters, and navigation improvements (USACE, 2019). For ports, this is primarily limited to maintenance dredging, however, and only to the depth that is determined to be of national interest. Qualifying for federal navigation funds requires a detailed and time-consuming process.

While ports historically did not join together to support development of a federal maritime trust fund, there have been recent calls to use multimodal funding to support commerce not only on land but at the ports that link roads and rail lines to ocean-going vessels (Hugh Morley, 2018). Without supporting land infrastructure, and the multimodal commerce to support it, it is unlikely that new port facilities developed in the ASTAR region by state and local government would receive federal aid. However, with the involvement of a local tribal entity, it is possible the tribe could leverage funding from the BIA to develop basic infrastructure to support the tribe's well-being.

7.3.2 Airport Funding

The primary source for federal grants related to airports is through the AIP, which is based on legislation contained under Title 49 in United States Code. The AIP Handbook, provided by the FAA (FAA, 2019), thoroughly details the program for use by the FAA and the public. The AIP Handbook provides requirements and procedures for receiving funds, which ultimately come from the Airport and Airway Trust Fund.

For a sponsor (an AIP grant recipient, such as a state, borough, or city) to receive available funds, several project requirements need to be met. First, the airport must be part of the "national transportation system" or more specifically, the "national airport system," meaning it must be a public-use airport listed in the NPIAS biennial report. Second, project ROM estimates (subject to basic requirements) need to be submitted to the FAA via a report or spreadsheet, which will be included into the NPIAS biennial report. In regards to the AIP specifically, 16 general requirements must be met, such as: Is the project eligible and justified?

Funds available to sponsors are based on different fund categories and types. The two main categories are entitlement funds and discretionary funds. Entitlement funds "guarantee" an amount of funding that a sponsor receives. Entitlement fund types include Passenger Entitlement, Cargo Entitlement, Non-primary Entitlement, State Apportionment (including Insular), Alaska Supplemental, and Small Airport Fund (note: calculation only, not a set-aside fund). Discretionary funds are funds remaining within the obligation limitation after the entitlements are calculated. These funds, subject to certain restrictions in legislation, are available for distribution at the discretion of the FAA. Discretionary fund types include Noise and Environmental Set Aside, MAP Set Aside, Reliever Set Aside, Pure Discretionary, Discretionary from Converted Entitlements/Apportionments, and Capacity/Safety/Security/Noise.

Further clarification and details on airport funding can be found in the AIP Handbook.

7.3.3 Road Funding

Much of the state's capital spending on highways takes advantage of federal funds administered by the U.S. Department of Transportation's FHWA. To be eligible for this funding, the state must approve a multiyear Statewide Transportation Improvement Program (STIP) that includes advanced construction projects. There are several funding programs available based on the type of improvement, with varying levels of federal match that are in many cases in the 80-90% range. For information about the broad range of FHWA's federal-aid programs, see FHWA (2019a). Federal funding for highways, mostly through the series of these federal-aid grant programs, comes from the Highway Trust Fund, which is in turn funded by federal taxes on motor fuels, primarily gasoline and diesel fuel (FHWA 2019b, GAO, 2011).

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Appendix A: Community Profiles

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Community Profiles for the Arctic Strategic Transportation and Resources Project

Draft

Prepared for

Arctic Slope Regional Corporation Energy Services and Office of Project Management and Permitting, Alaska Department of Natural Resources

May 2019

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Please cite as: Northern Economics, Inc. *Community Profiles for the Arctic Strategic Transportation and Resources Project*. Prepared for Arctic Slope Regional Corporation Energy Services and Office of Project Management and Permitting, Alaska Department of Natural Resources. May 2019.

Contents

Table	Page

Figure **Page**

Abbreviations

ADN	Anchorage Daily News
AEA	Alaska Energy Authority
AHFC	Alaska Housing Finance Corporation
AS	Alaska Statute
ASRC	Arctic Slope Regional Corporation
BTS	Bureau of Transportation Statistics
COPA	ConocoPhillips of Alaska
CWAT	Community Winter Access Trails
DCCED	Alaska Department of Commerce, Community, and Economic Development
DHSS	Alaska Department of Health and Social Services
DOLWD	Alaska Department of Labor and Workforce Development
DOT&PF	Alaska Department of Transportation and Public Facilities
kWh	Kilowatt Hour
NSB	North Slope Borough
NSBEP&CR	North Slope Borough Economic Profile and Census Report
NSBSD	North Slope Borough School District
PCE	Power Cost Equalization
USCB	U.S. Census Bureau

1 North Slope Borough Overview

1.1 Population

There is some ambiguity in demographic and population estimates for the North Slope Borough (NSB) since thousands of primary oil company employees work in Prudhoe Bay and other remote camp facilities on the North Slope. Most of these workers are not full-time residents, and work in long-term shifts of two to three weeks while maintaining a residence in Southcentral Alaska, the Lower 48, or even in other countries. For this reason, the following sections provide demographic information from two primary sources: The Alaska Department of Workforce Development (DOLWD) and the North Slope Borough Economic Profile and Census Report (NSBEP&CR). Population estimates are further complicated by the economic downturn of 2008 and decreases in oil prices, which led to significant layoffs in the oil production industry (NSBEP&CR 2016). DOLWD provides estimates for Prudhoe Bay Census Designated Place; however, this report includes analysis for only the NSB local communities, which include Anaktuvuk Pass, Atqasuk, Utqiaġvik, Kaktovik, Nuiqsut, Point Hope, Point Lay, and Wainwright.

The NSB local communities had 8,246 permanent residents in 2015, most of whom are Native Alaskan Iñupiat (NSBEP&CR 2016). In 2018, that number increased by about four percent to 8,638 (NSB Staff 2019). DOLWD population estimates tend to be lower than NSBEP&CR estimates, with a difference of more than 500 people for the NSB local communities in 2014 and 2015 (Table 1).

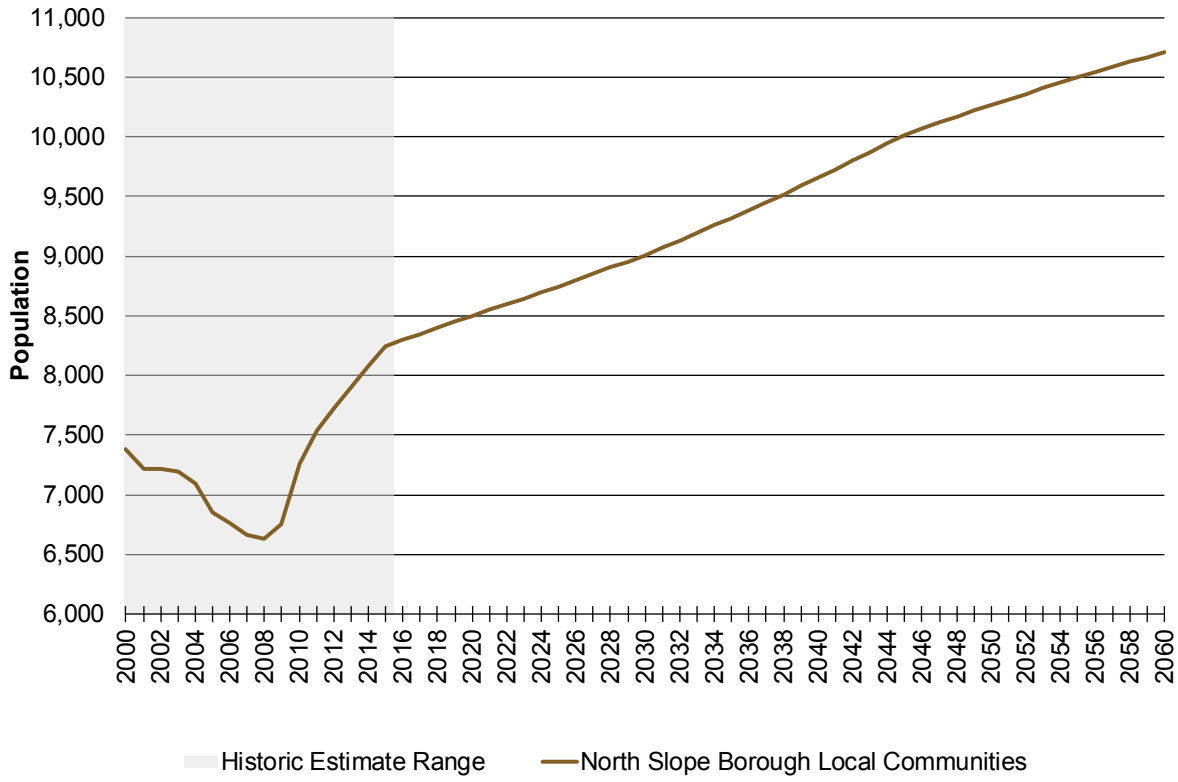
Table 1. Comparison of North Slope Population Estimates by Data Source

Source	Area	2010	2011	2012	2013	2014	2015
DOLWD estimates	Prudhoe Bay CDP*	2,174	2,174	2,174	2,174	2,174	2,174
	NSB Local Communities	7,256	7,410	7,541	7,702	7,565	7,721
NSBEP&CR estimates	Prudhoe Bay Workforce	10,278	10,672	10,711	10,935	11,563	12,707
	NSB Local Communities	7,256	7,538	7,725	7,905	8,075	8,246
Difference (DOLWD-NSBEP&CR)		**0**	**-128**	**-184**	**-203**	**-510**	**-525**

Sources: North Slope Borough Economic Profile and Census Report (NSBEP&CR), 2016
* CDP = Census Designated Place

Figure 1 shows historic estimates (shaded in gray) and forecasts of population in the NSB using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The forecasts presented here and for the individual communities within the NSB are constructed by using historic data from 2010 to 2015 and applying DOLWD 5-year projection trends from 2020 to 2045. After 2045, the forecasts are based on logarithmically diminishing growth over time.

Figure 1. Historic Estimates and Forecast of North Slope Borough Local Area Population

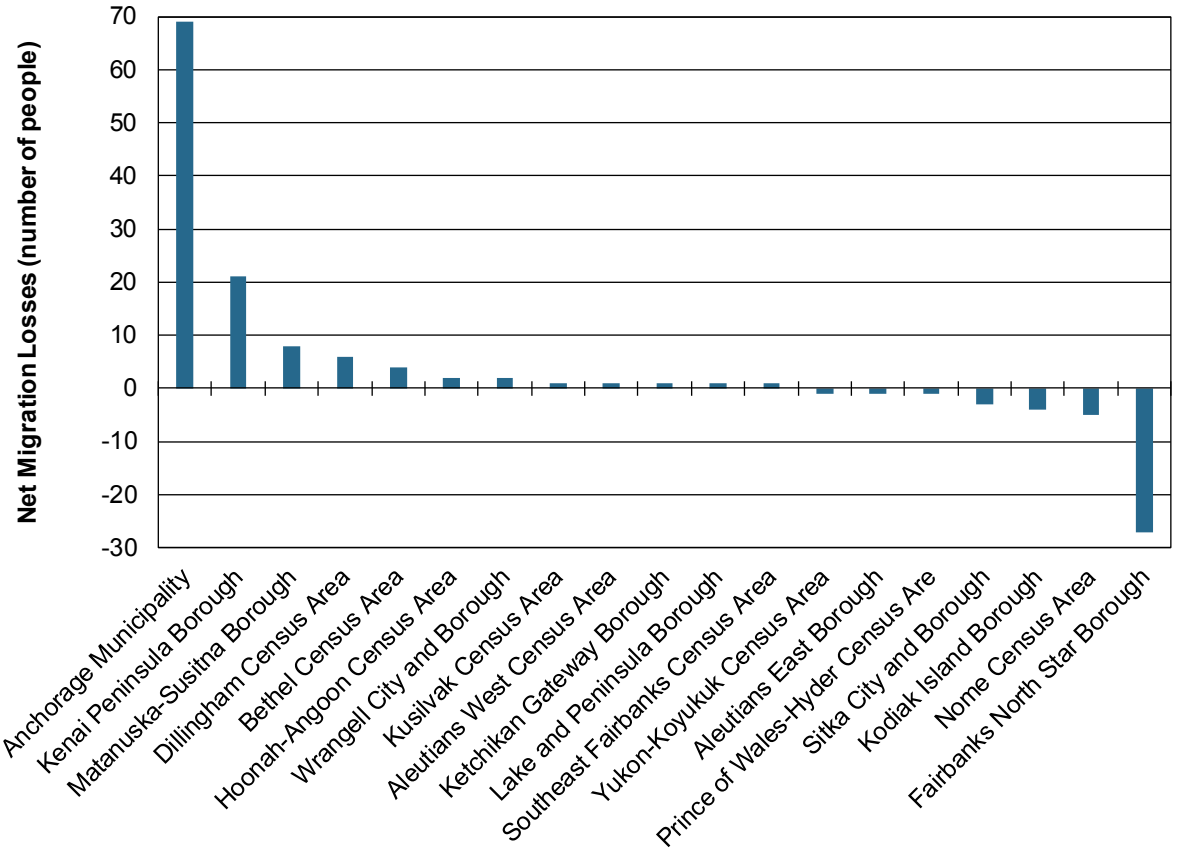


Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

DOLWD projections are based on demographic factors, including births, deaths, and net migration. They do not account for changes in the local economy such as the availability of jobs, cost of living, or other factors. Combined population of the NSB communities is expected to increase by 40 to 70 residents in most years, with most of the growth in Utqiaġvik and relatively little change in the other communities.

Migration to other places within Alaska is a significant source of population change for the NSB. In 2018, migration effects caused the NSB population to decrease by 75 residents with Anchorage as the largest source of net migration losses (Figure 2). There seems to be some transiency in residents moving between rural communities of the NSB and Alaska's urban hubs, with movement to and away from big cities like Anchorage and Fairbanks each year. For example, 89 Anchorage residents moved to the NSB and 158 NSB residents moved to Anchorage in 2018, for a net loss of 69 residents to the NSB.

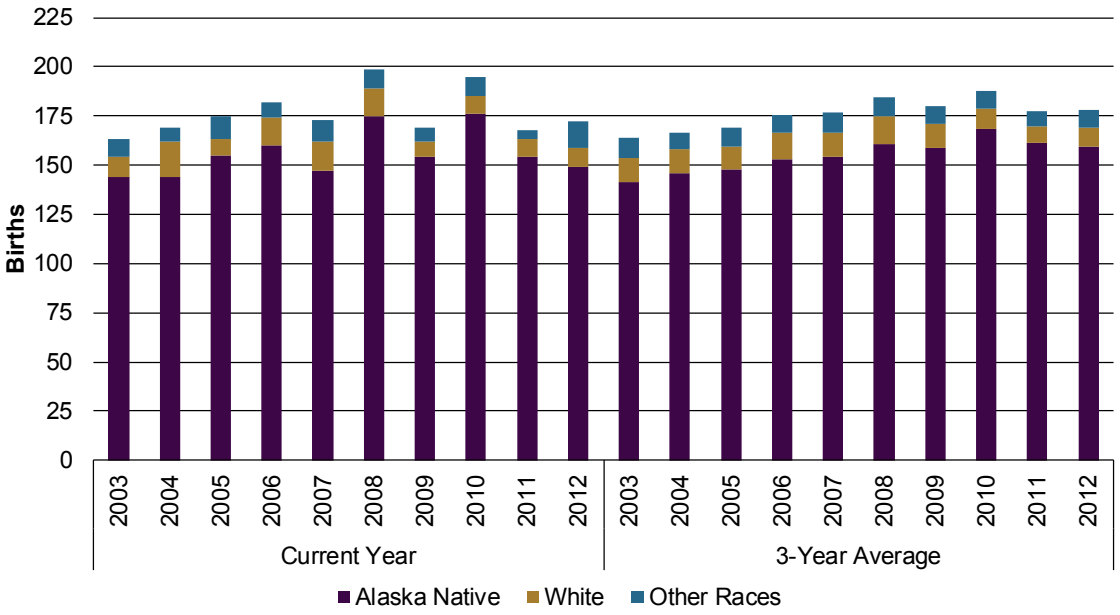
Figure 2. North Slope Borough Net Migration Losses to Other Alaska Regions, 2018



Source: DOLWD, 2019b

Residents of NSB communities are predominantly Iñupiat, and Alaska Native births typically make up 85 to 90 percent of births in the borough (Figure 3). From 2003 to 2012, the average number of births was 177 and DOLWD predicts that the annual number of births will continue to grow.

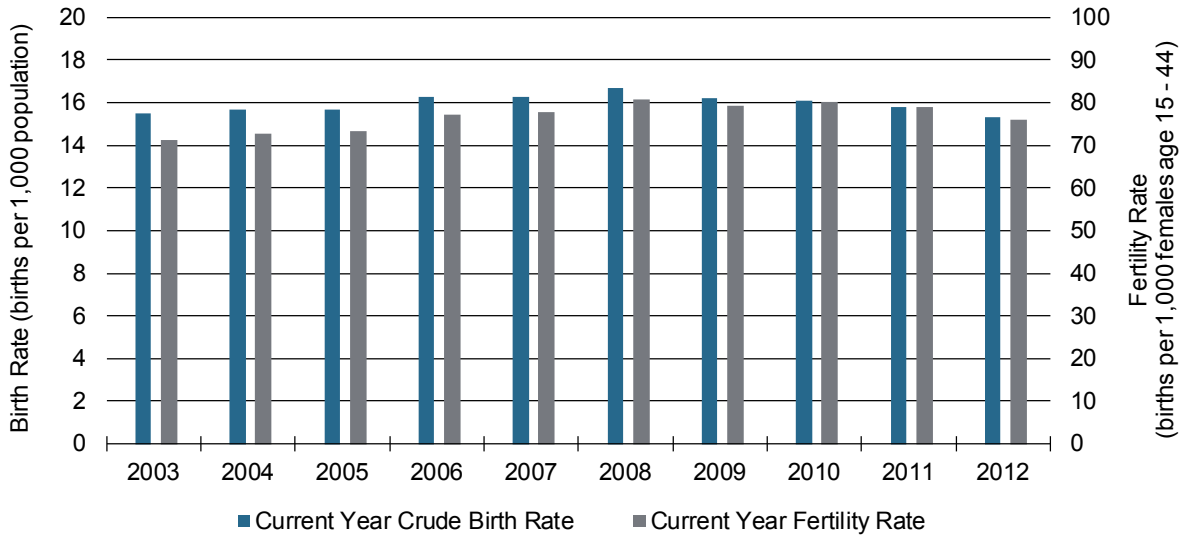
Figure 3. North Slope Borough Births by Race, 2003–2012



Source: Alaska Department of Health and Social Services (DHSS), 2019b

The growing number of births in the borough is a factor of a relatively high fertility rate among Alaska Native peoples. In 2016, the average fertility rate for white Alaskans was 70.2 compared to 93.0 for Alaska Natives (DHSS 2017). Birth rates and fertility rates in the NSB are shown in Figure 4.

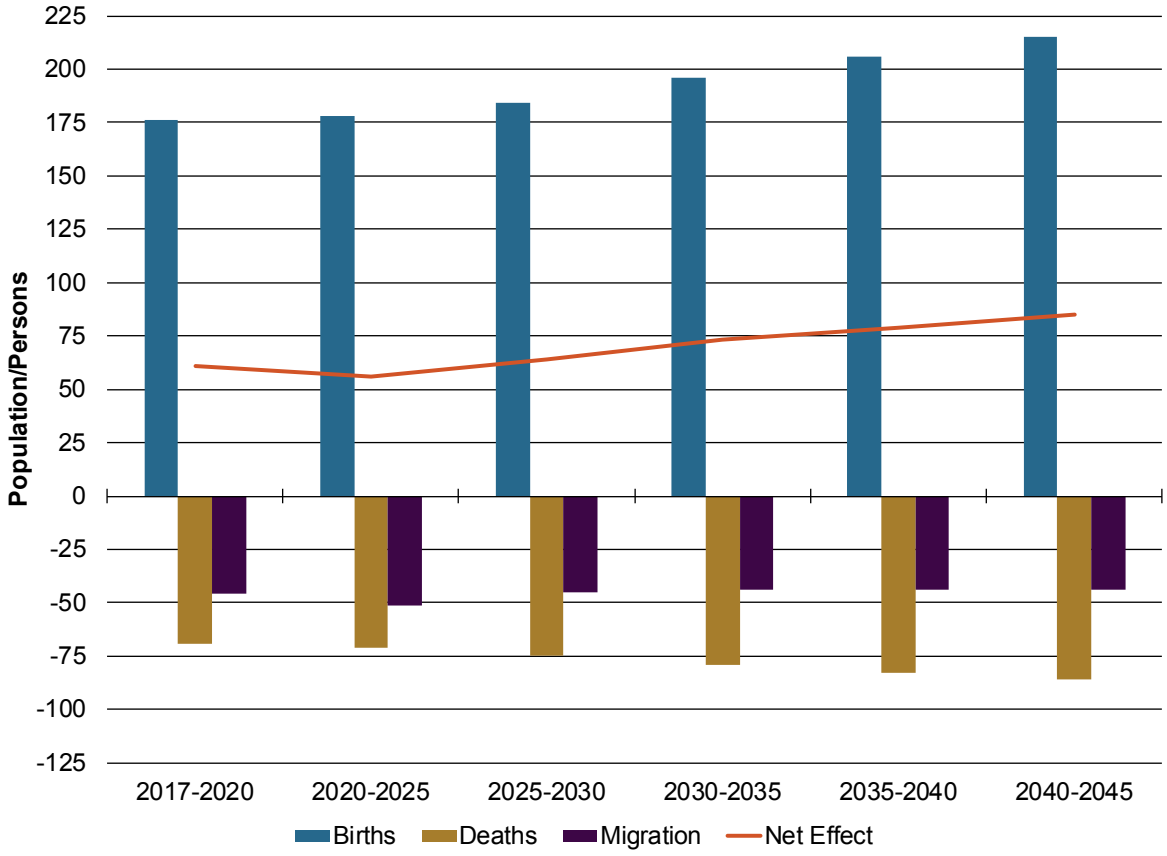
Figure 4. North Slope Borough Birth and Fertility Rates, 2003–2012



Source: DHSS, 2019a

The primary driver of population growth within the NSB is the high number of births and fertility rate of NSB residents, overwhelming the effect of mortality and migration. NSB population is expected to grow by 0.6 to 0.7 percent each year after 2025. This amounts to an increase of 60 to 80 residents each year, many of whom will be newborns. As a factor of this population growth, NSB median and average age will likely decrease over time and demand for public services like education could increase.

Figure 5. North Slope Borough Population Projection Components



Source: DOLWD, 2019a

1.2 Housing Stock

In the Arctic Slope Regional Corporation (ASRC) region there were 2,587 housing units as of 2017, with 2,036 classified as occupied and the remainder representing units that are for sale, seasonal use, or vacant (AHFC 2017). Insufficient housing stock is a significant concern in the ASRC region, with 15 percent of occupied units overcrowded and an additional 12 percent severely overcrowded (AHFC 2017). The current housing stock is also aging and lacks basic infrastructure in some communities. For example, Point Hope residents lack indoor plumbing and must haul fresh water to their homes and dispose of waste with "honey buckets" (Maniilaq 2019). Within the ASRC region, about 11 percent of homes lack complete bathrooms, 7 percent lack complete kitchens, and nearly 4 percent were considered dilapidated or in poor condition (AHFC 2017).

Table 2. NSB Community Housing Stock by Type

	2003	2010	2015
Home Type		**%**	
Mobile	3.5	9	0.8
Single Family	72.4	68.8	74.9
Two Family	6.9	7.6	9
Multi Family	15.7	12.9	14.6
Other	1.5	1.8	0.8

Source: NSBEP&CR, 2016

1.3 Public Services

The NSB provides most basic services to residents including trash pickup, wastewater service, local law enforcement, and primary education. The only Alaska State Troopers Post within the borough is in Utqiaġvik, although a post in Kotzebue (Northwest Arctic Borough) is technically closer to Point Hope. The only hospital in the borough is also in Utqiaġvik, but each community has a clinic that can provide services for non-life-threatening medical needs (DCCED 2019).

Educational and employment opportunities tend to be the driving factor of migration to and from the NSB. Lowe (2010) described the movement of rural Alaska residents in the context of Anchorage School District enrollment, noting that residents may choose to return to rural Alaska if their financial circumstances improve. Additionally, Lowe notes that students who move to Anchorage for educational opportunities may find that culture shock and differences in academic curriculum are difficult to overcome, leading students to return to their home villages.

In 2017, the NSB School District (NSBSD) implemented new requirements for high school students to study local history. Traditional curriculum in Alaska's urban centers often does not include "Native corporations, land claims and natural resource development" (NSBSD 2019). Additionally, there has been growth in post-secondary education within the borough, with Illisaġvik College in Utqiaġvik receiving accreditation in 2003. In the spring of 2018, Illisaġvik College saw its highest enrollment to date with 781 students.

Electricity in many Alaska communities is subsidized through the state-funded Power Cost Equalization (PCE) Program, Eligible utilities must generate at least 75 percent of their electricity through consumption of diesel fuel, as determined by the Alaska Regulatory Commission, along with other various criteria defined in Alaska Statute (AS) 42.45.110. The purpose of the program is to equalize

rural Alaska energy costs "based on the weighted average retail residential rate in Anchorage, Fairbanks, and Juneau" (AS 42.45.110, 2018).

All the NSB local communities, except for Utqiaġvik, receive PCE subsidies, although the subsidies are relatively low and range from one to three cents per kilowatt hour (kWh) (Table 3). At $4,090 per year, single-family home energy costs in the ASRC region are slightly less than the state average and the second lowest of any Alaska Native Claims Settlement Act region (AHFC 2017).

Table 3. Effective Residential Electricity Rates

City	PCE Eligible	Effective Residential Rate (¢/kWh)	PCE Payment per Eligible kWh (¢/kWh)	Rate Year
Utqiaġvik	No	*12.3	N/A	2019
Anaktuvuk Pass	Yes	15	1	2018
Atqasuk	Yes	25	3	2018
Nuiqsut	Yes	8	2	2018
Point Hope	Yes	18	1	2018
Wainwright	Yes	18	1	2018
Kaktovik	Yes	21	3	2018
Point Lay	Yes	19	1	2018
Anchorage (Chugach Electric)	No	19.1	N/A	2019
Fairbanks (Golden Valley Electric)	No	22.3	N/A	2019

Note: Rates do not account for monthly fixed fees or access charges
*Represents proposed rates for 2019
Sources: Barrow Utilities and Electric Cooperative, Inc., 2018; Chugach Electric, 2019; Alaska Energy Data Gateway, 2019; Golden Valley Electric Association, 2019; Alaska Energy Authority, 2019

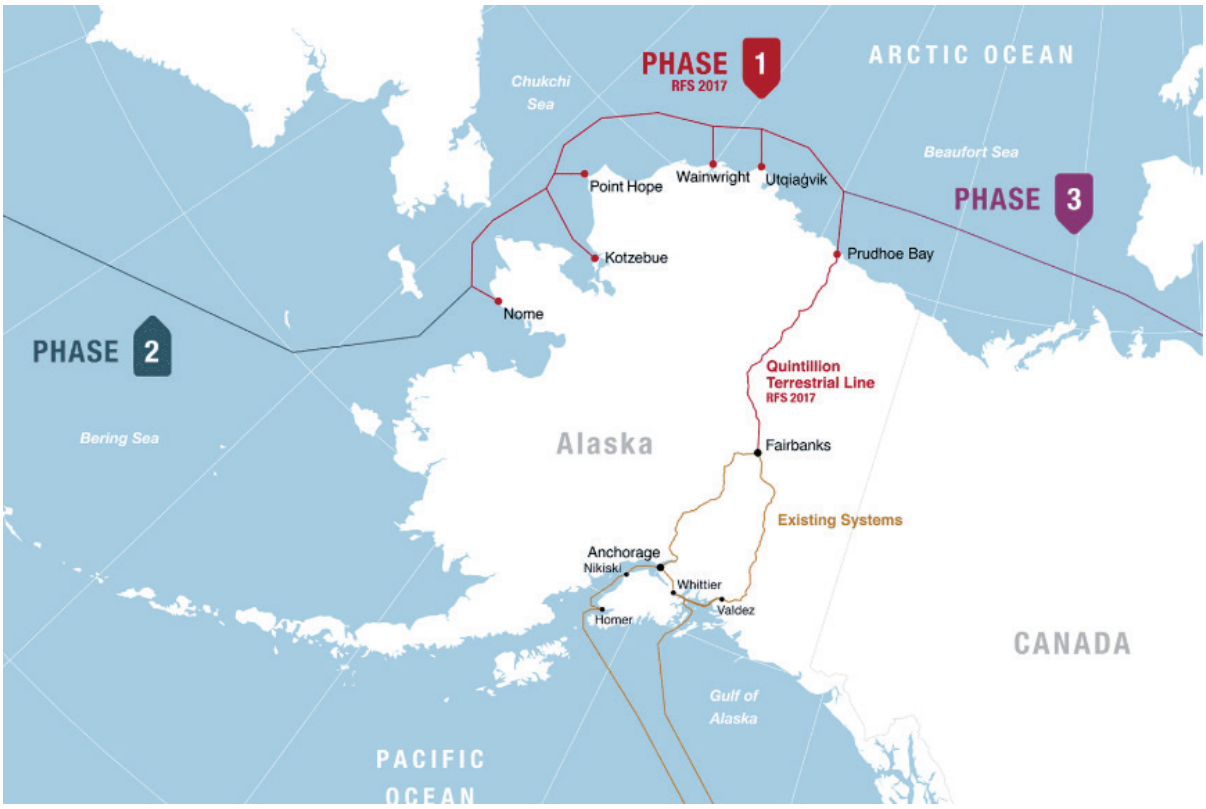
Nuiqsut is located near the Alpine oil and gas facility, operated by ConocoPhillips Alaska (COPA). As part of their lease agreement, COPA provides free natural gas to the city of Nuiqsut, which is used to heat most of the homes and other buildings (COPA 2015). The NSB assisted with the project by constructing a gas line from the field and purchasing equipment to process gas diverted from Alpine. As a result, Nuiqsut has annual energy costs which are significantly lower than many of the surrounding communities.

1.4 Telecommunications Services

A subsea fiber optic line, constructed by Quintillion, provides telecommunications opportunities to several NSB communities and to the oil and gas industry (Figure 6). The new infrastructure has dramatically increased internet speeds and bandwidth for companies and residents in the borough. Quintillion acts as a wholesaler, selling capacity to local service providers like GCI, who then provide internet access to residents (KUAC 2016). The subsea line was costly to construct and is part of a multi-phase project that could ultimately connect Asia to Alaska and Europe. As an additional benefit, spur lines were constructed for Point Hope, Wainwright, and Utqiaġvik.

Improved telecommunications in the NSB could contribute to economic growth in the region by providing additional opportunities to residents. For example, educational institutions in Alaska and throughout the world now offer courses on the internet. Students can participate in real time via webcam, submit assignments online, and work collaboratively with their peers via email and web-based thread discussions. Over time, human capital in the NSB could improve through education and access to other online resources. It also provides faster and more reliable monitoring for oil and gas companies.

Figure 6. Alaska Communities Connected to Quintillion Fiber Optic Transmission Line



Source: Quintillion, 2019

2 Transportation Infrastructure

Communities of the NSB are heavily dependent on aviation for the transport of passengers and cargo, but some communities do have additional transportation opportunities including marine freight, winter trails, and ice roads. This section summarizes the transportation infrastructure for each community and provides analysis on the use of these modes of transportation.

2.1 Community Aviation Activity

Passenger and freight figures are derived from a record of international and domestic flights for all carriers using market data from the Bureau of Transportation (BTS). Market data report air trips with multiple stops as separate observations, and report passenger and freight measurements only between the original departure point and the destination. Passenger enplanements are measured for each market flight segment originating in an NSB airport, while freight weight is measured for each market segment landing at an NSB airport. Figure 7 shows the relative location of major public and private airports in the NSB.

Figure 7. Primary Airports in the North Slope Borough

Sources: Google Earth, 2019; Northern Economics, 2019

2.1.1 Air Passenger Activity

Community airports in the North Slope Borough have 5.4 to 10.9 enplanements per person per year (Table 4). These communities typically rely on air travel to obtain medical care as well as food, fuel, and equipment. Some NSB communities have clinics, but the nearest hospital is in Utqiaġvik. Similarly, Utqiaġvik is often the nearest and most inexpensive source for groceries and other supplies. It is likely

that population growth in any outlying city will contribute to growth in aviation activity at the local airport, as well as the airport in Utqiaġvik.

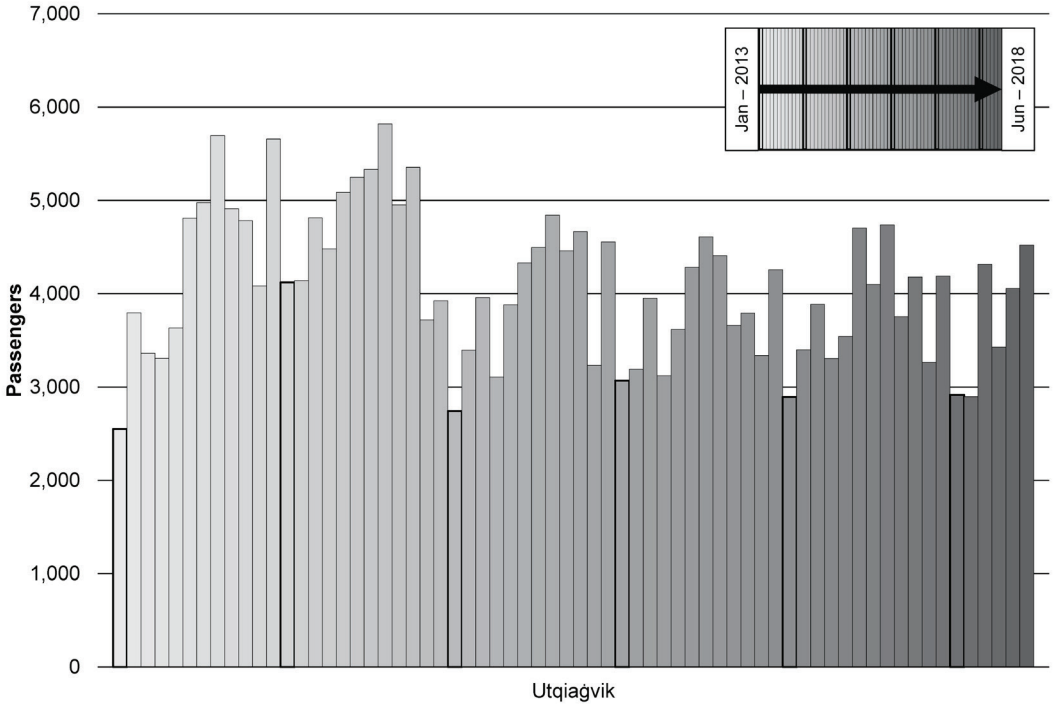
Table 4. Per Capita Enplanements at North Slope Borough Community Airports

City	Average Monthly Passengers (2013–June 2018 Average)	2018 Population	Monthly Per Capita Passengers	Annual Per Capita Passengers
Nuiqsut	200	446	0.4	5.4
Point Hope	406	711	0.6	6.8
Point Lay	156	269	0.6	7.0
Wainwright	323	557	0.6	7.0
Atqasuk	185	248	0.7	8.9
Anaktuvuk Pass	302	393	0.8	9.2
Utqiaġvik	4,085	5,256	0.8	9.3
Kaktovik	238	262	0.9	10.9

Sources: Bureau of Transportation Statistics (BTS), 2019; NSBEP&CR, 2016; NSB Staff, 2019

Utqiaġvik is the largest city in the NSB, and typically has the highest level of passenger air traffic in the region. Enplanements at Utqiaġvik's Wiley Post-Will Rogers Memorial Airport are seasonal, with a low in the winter months of January, February, and March. The seasonal high is typically in August, but it varies from year to year. On average there were 4,085 enplaned passengers per month from January of 2013 to June of 2018 (Figure 8). During that time period the monthly maximum number of passengers was 5,819 and the minimum was 2,552.

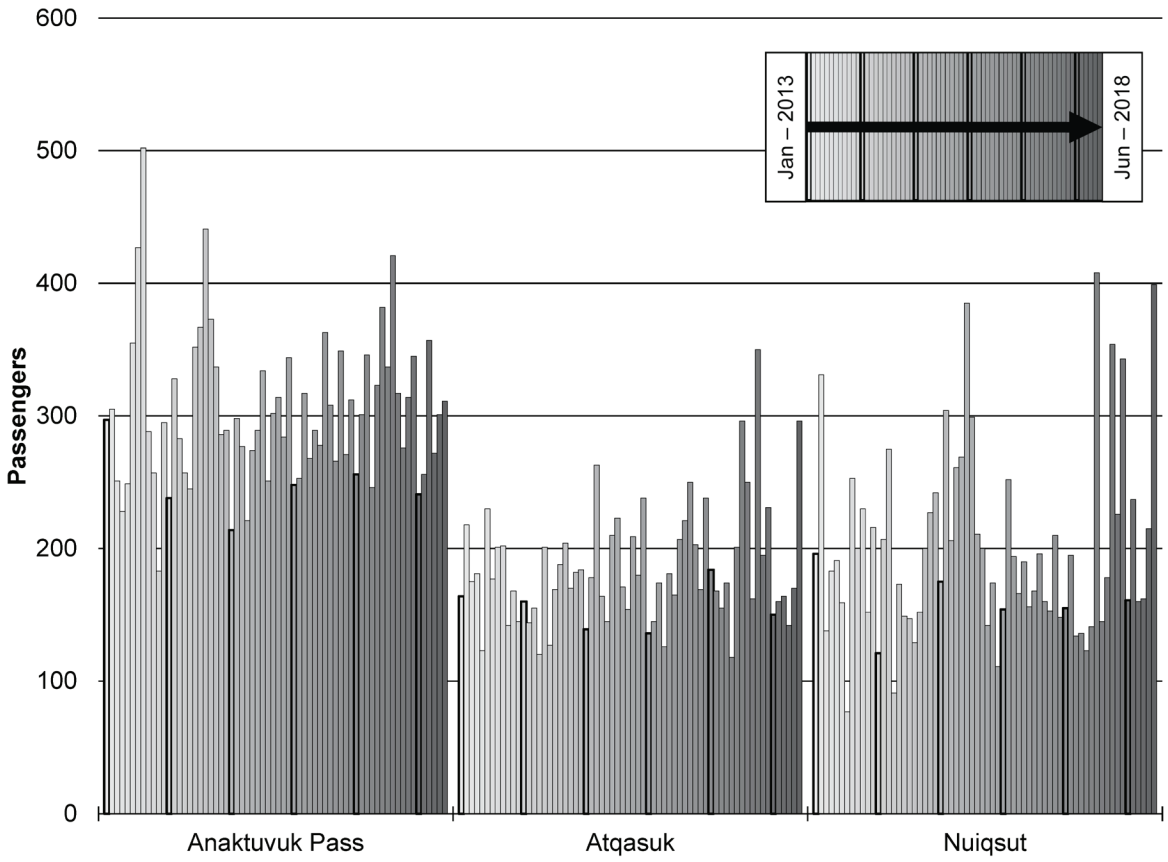
Figure 8. Monthly Enplaned Passengers at Utqiaġvik, 2013–2018



Source: BTS, 2019

Inland cities of the NSB Include Atqasuk, Nuiqsut, and Anaktuvuk Pass. Atqasuk's Edward Burnell Sr. Memorial Airport and Nuiqsut Airport typically have about the same number of passengers in any given month, with average enplanements of 185 and 200 respectively (Figure 9). Anaktuvuk Pass Airport had more passenger enplanements than either of the other inland cities in nearly every month, with an average of 302 per month. The passenger demand for airport facilities at these NSB cities is relatively constant over time.

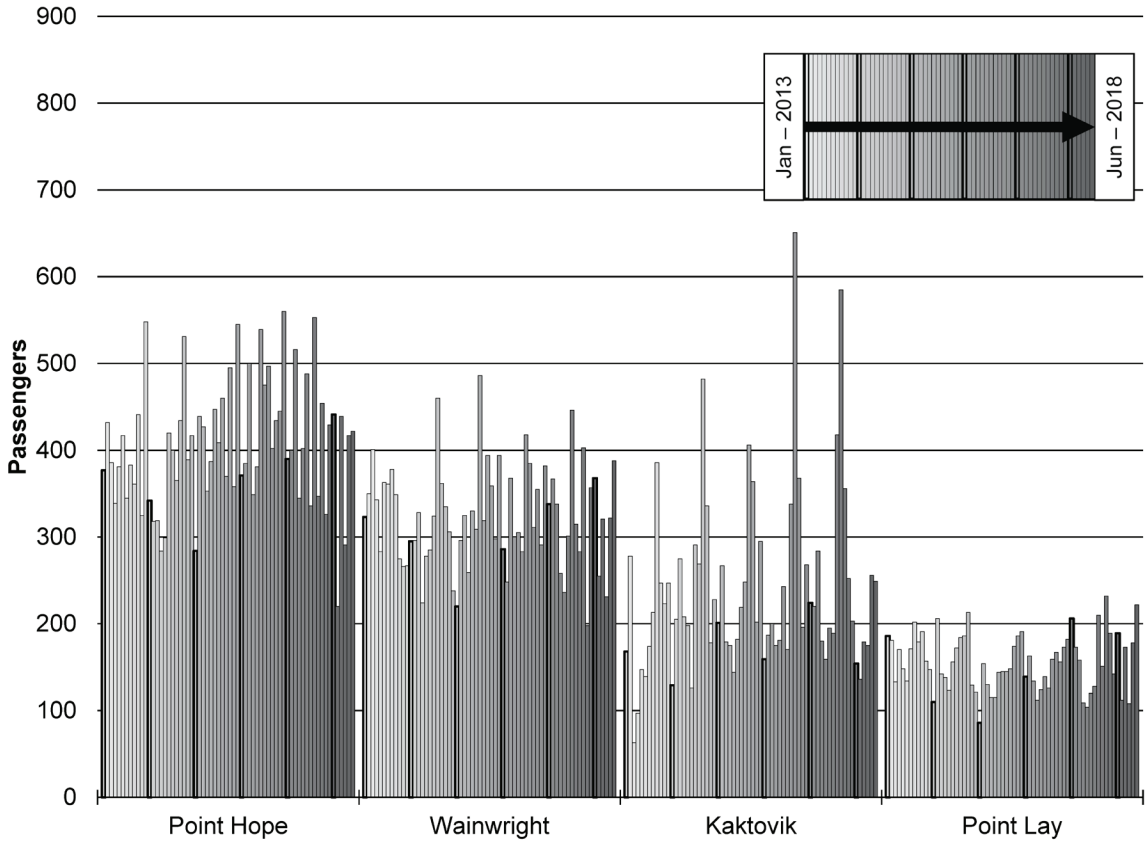
Figure 9. Monthly Enplaned Passengers at Inland North Slope Borough Cities, 2013–2018



Source: BTS, 2019

Coastal cities of the NSB include Point Lay, Kaktovik, Wainwright, and Point Hope. Of these cities, Point Lay Airport had the fewest enplaned passengers during the study period with an average of 156 enplanements per month (Figure 10). Kaktovik (Barter Island LRRS, Barter Island Airport) has an average of 238 enplanements per month, with some seasonal increases. September is the busiest month for passengers at Kaktovik, with as many as 651 enplanements. Passenger travel at Point Hope and Wainwright has greater demand and less variation during the year compared to Kaktovik and Point Lay. On average, the Point Hope and Wainwright Airports have 406 and 323 passenger enplanements per month.

Figure 10. Monthly Enplaned Passengers at Coastal North Slope Borough Cities, 2013–2018



Source: BTS, 2019

2.1.2 Air Cargo Activity

Community airports in the NSB receive between 1,200 and 3,200 pounds of freight per resident each year (Table 4). Of the NSB local communities, Nuiqsut has the least per capita freight weight at 1,226 pounds, and Kaktovik has the most at 3,183 pounds. Some of these community airports may receive passenger and freight traffic that is related to oil and gas activity, but there are many other private and public airports that are used specifically for the oil and gas industry. It is likely that all of the local NSB communities are dependent upon air travel, at least part of the year, for shipments of household goods and general supplies. Communities participating in the Alaska Bypass Service program can receive subsidized shipments of palletized food and household goods by air. Shipments of home heating oil are sometimes transported by air as well, since coastal communities can only receive barges for a limited window in the summer months.

Table 5. Per Capita Freight at North Slope Borough Communities

City	Average Monthly Freight (Pounds) (2013–June 2018 Average)	2018 Population	Monthly Per Capita Freight Pounds	Annual Per Capita Freight Pounds
Nuiqsut	45,578	446	102	1,226
Point Hope	77,327	711	109	1,305
Wainwright	67,762	557	122	1,460
Utqiaġvik	701,941	5,256	134	1,603
Anaktuvuk Pass	56,410	393	144	1,722
Atqasuk	37,403	248	151	1,810
Point Lay	47,782	269	178	2,132
Kaktovik	69,491	262	265	3,183

Sources: BTS, 2019; NSBEP&CR, 2016; NSB Staff, 2019

Utqiaġvik is the largest NSB city and therefore receives the most air freight of any community in the borough. Air freight volumes are typically larger during spring and summer. In the late winter, isolated communities of the NSB are sometimes connected to the Dalton Highway by ice roads. In March of 2018, ice roads to Utqiaġvik and Atqasuk were built to allow residents to leave with their vehicles for a few short months (ADN 2018). Residents can also travel by snowmachine trails between some NSB villages. These factors can reduce the need for air freight shipments during the winter. From 2013 to June of 2018, air freight to Utqiaġvik averaged more than 700,000 pounds per month (Figure 11).

Figure 11. Monthly Cargo at Utqiaġvik, 2013–2018

Source: BTS, 2019

Air freight shipments at NSB communities are unpredictable with unusually large deliveries or landings of large cargo planes in some months. With the exception of Deadhorse, NSB communities are not connected to the contiguous road system and marine freight shipments are limited to a narrow window of opportunity in the summer. This means that construction projects may require materials to be flown in by air. Sometimes it is also necessary to fly in emergency shipments of heating oil or other supplies. On average, inland cities of the NSB had 37,000–56,000 pounds of freight landing at their airports each month (Figure 12).

Figure 12. Monthly Freight at Inland North Slope Borough Cities, 2013–2018

Source: BTS, 2019

Several large freight shipments to Atqasuk in 2016 could be related to capital improvement projects such as the Atqasuk transmission line project, which planned to construct an electrical transmission line

between Utqiaġvik and Atqasuk as well as convert homes and buildings in the community from oil furnaces to electrical space heating (AEA 2014).

Air freight activity at Point Hope, Wainwright, and Kaktovik is reasonably steady over time with monthly average freight weights of 77,000, 69,000, and 68,000 pounds respectively (Figure 13). As noted previously, there are occasionally large freight shipments associated with projects in the community, or possibly related to oil and gas exploration. A single flight to Point Hope in May of 2015 resulted in the apparent delivery of about 440,000 pounds of freight. This unique instance could be related to a $2.89 million TIGER Grant award received by the community earlier in that year, intended for the improvement of Point Hope roads and sidewalks (Arctic Sounder 2015).

Figure 13. Monthly Freight at Coastal North Slope Borough Cities, 2013–2018

Source: BTS, 2019

2.2 Industry Aviation Activity

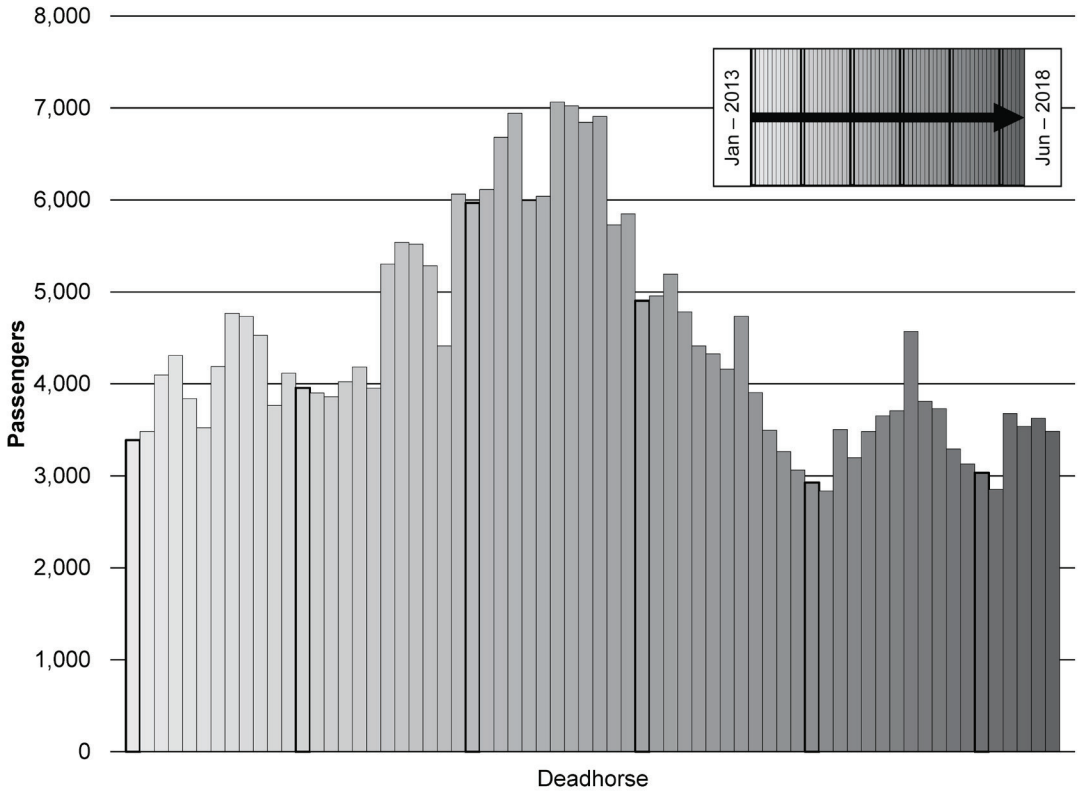
There is a significant amount of aviation activity at private airports within the NSB, due to the needs of oil and gas companies operating on the North Slope. Shared Services, a co-venture between ConocoPhillips and BP, operates a fleet of Boeing 737, CASA, and Otter planes to transport oilfield employees. Each week there are 22 scheduled Boeing flights, and 60 to 80 flights on smaller aircraft (COPA 2019). Primary flights are between Anchorage, Fairbanks, Deadhorse, and Kuparuk, but some of the planes also operate at smaller airports and seasonal ice strips.

The following report sections describe industry specific aviation activity at public airports in the NSB.

2.2.1 Deadhorse

Deadhorse Airport is a public use airport near Prudhoe Bay. Though it is state-owned and operated by the Alaska Department of Transportation and Public Facilities (DOT&PF), the airport's primary function is to provide passenger service for oil industry workers in the NSB. It also serves as a hub with connections to other communities. Passenger activity at Deadhorse was notably higher in 2015, with enplanements reaching a maximum of 7,062 in July (Figure 14). That peak in 2015 was followed by a decreasing trend that subsided in early 2017. Since then, passenger enplanements at Deadhorse have been relatively constant with an average of 3,448 per month from January 2017 to June 2018. It is especially difficult to predict trends in aviation activity at Deadhorse because oil and gas industry employees are the primary users of facilities.

Figure 14. Monthly, Passenger Enplanements at Deadhorse Airport, 2013–2018

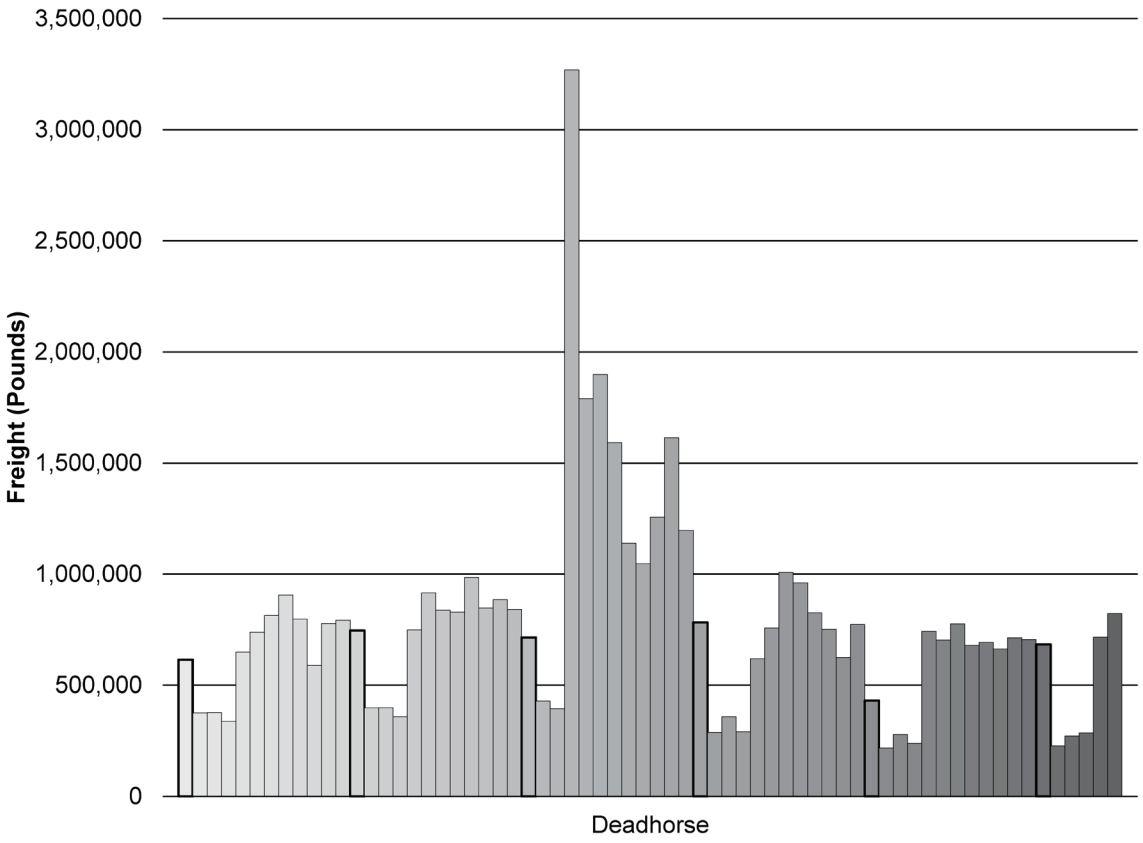


Source: BTS, 2019

Deadhorse Airport, sometimes referred to as Prudhoe Bay Airport, is also important for the movement of freight to the NSB. Freight shipments to Deadhorse appear to be seasonal, with a low in February, March, and April of every year. On average, Deadhorse Airport received nearly 770,000 pounds of cargo each month during the study period (Figure 15).

The unusually high freight volume in early 2015 is likely due to a temporary closure of the Dalton Highway. In May of 2015, spring flooding of the Sag River washed over portions of the highway, forcing trucks to stop until the water subsided (DOT&PF 2015). It is likely that some critical and time sensitive freight for North Slope oil fields was shipped by air during the highway closure.

Figure 15. Monthly, Freight Volumes at Deadhorse Airport, 2013–2018

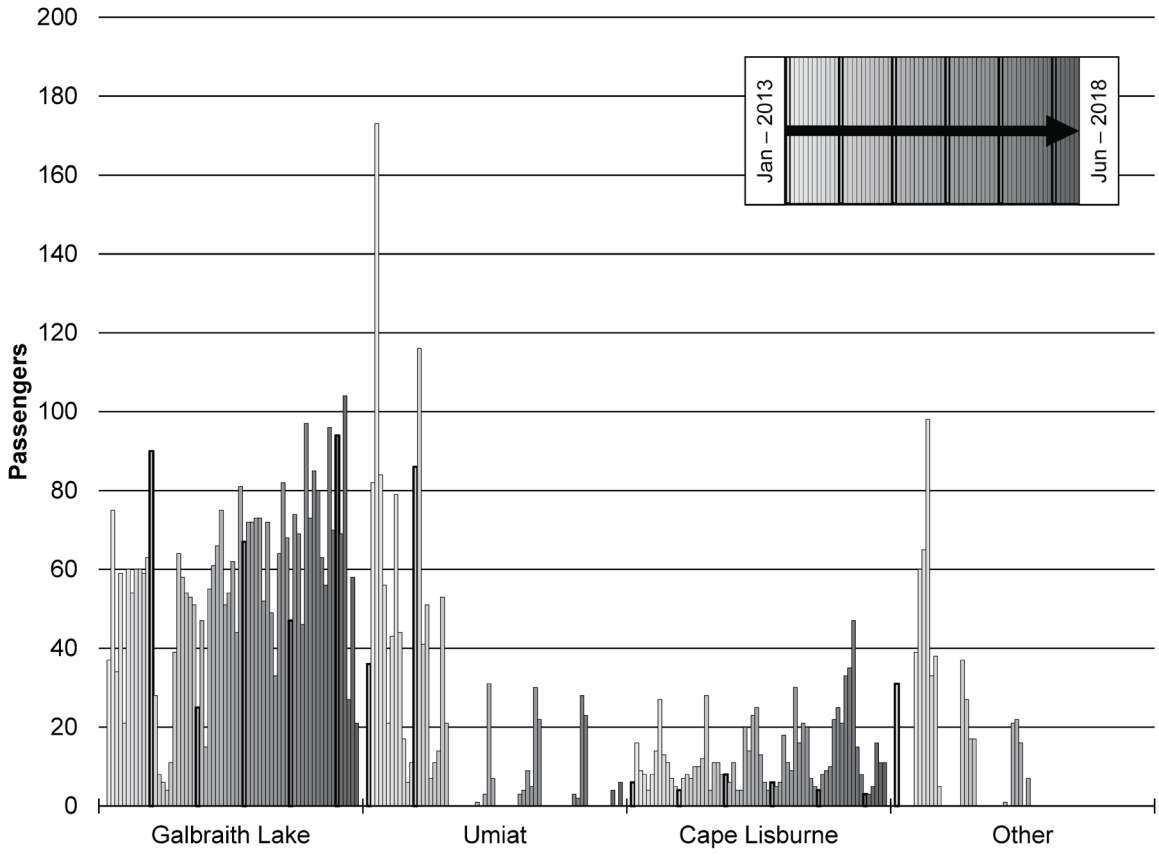


Source: BTS, 2019

2.2.2 Other Industry Airports

The Umiat oil and gas fields, located west of the Dalton Highway, are accessible only by air or ice road. Exploration of the fields is based on an access corridor starting at Galbraith Lake and extending 90 miles to the west (DOT&PF 2011). Passenger enplanements at both Umiat Airport and Galbraith Lake Airport could both be related to oil and gas exploration in the area. Enplanements at Galbraith Lake Airport have generally increased since 2014 (Figure 16). Enplanements at Umiat Airport are highest during the summer months when the airport is operated to provide service for drilling crews and climate researchers (ADN 2013). There is also some passenger activity at Cape Lisburne LSSR. The radar station is still active (Dragoo, Thomson, and Romano 2017), and flights are likely used to provide transportation for air force personnel.

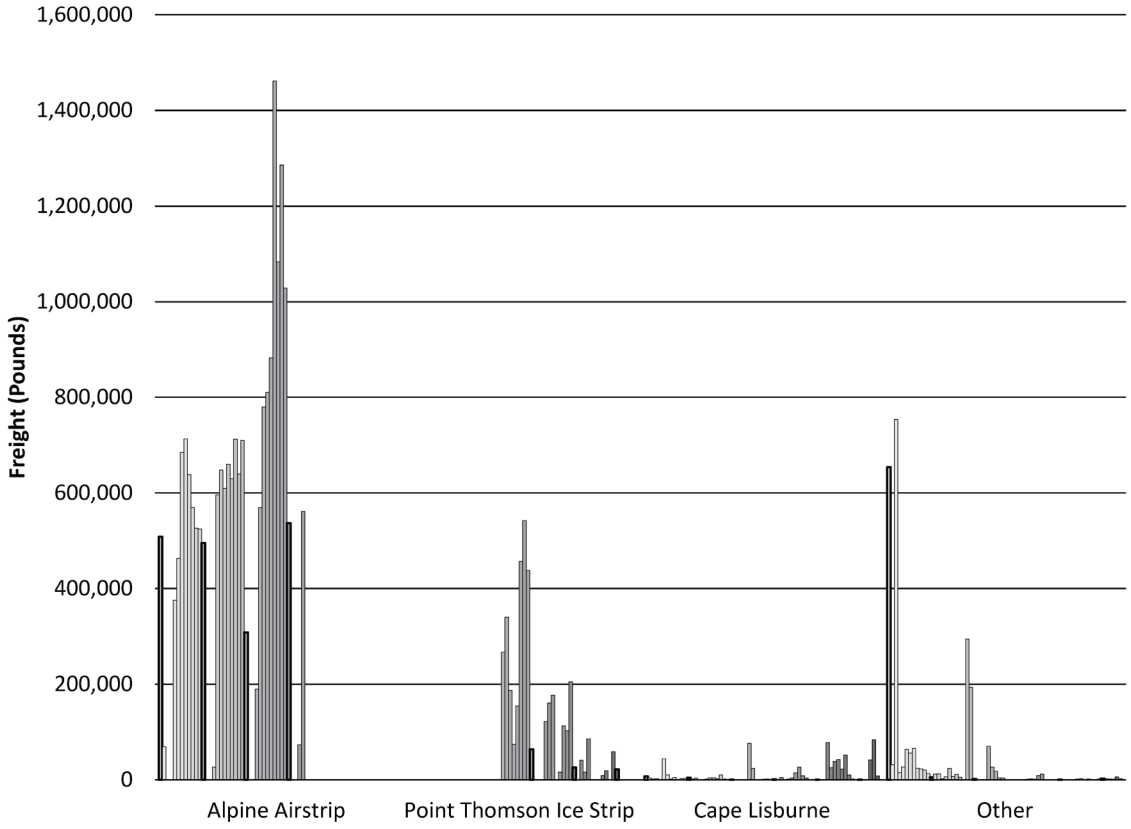
Figure 16. Monthly Passenger Enplanements at Other North Slope Borough Airports, 2013–2018



Source: BTS, 2019

Most air freight shipments for the oil industry are bound for Deadhorse, though there were some shipments to Alpine Airstrip, a private strip owned by Conoco Phillips, until May of 2016 (Figure 17). The Point Thomson Sea Ice Airstrip is uniquely operated as a public airport on the Bering Sea Ice near Point Thomson, though its primary function is to deliver freight for the gas condensate production facility. Those shipments began in the spring of 2015 and decreased significantly in 2017 and 2018. To date, most freight is moved by truck on the Dalton Highway or by air to Deadhorse, AK when necessary.

Figure 17. Monthly Freight Volume at Other North Slope Borough Airports, 2013–2018



Source: BTS, 2019

2.3 Dalton Highway

Transportation within the NSB relies heavily on aviation for movement of both passengers and cargo; however, there are seasonal modes of travel that play an important role in the NSB. The Dalton Highway is a critical piece of infrastructure for oil companies, who move freight from Fairbanks or Anchorage by truck to Deadhorse and Prudhoe Bay. From there, much of the freight is then moved by air to remote camps along the coast. Similarly, much of the mail and freight bound for the remote villages of the NSB travels first to Prudhoe Bay before being loaded onto a plane.

Several tour companies operate in the NSB, moving passengers along the highway on tour buses or passenger vans. Dalton Highway Express is a small seasonal operator that provides freight and passenger service between Fairbanks and Prudhoe Bay in the summer. It also offers reduced rates for drop-offs at a number of communities along the Dalton Highway, and provides rates for both accompanied and unaccompanied freight (Dalton Highway Express 2019).

2.4 Community Winter Access Trails

In the winter, a vast network of trails connects many of Alaska's northernmost communities which can be traveled by snowmachines or track vehicles. NSB residents prefer to ship goods by land because air and barge shipping can be cost ten times more expensive (ADN 2018a). In 2015, two small companies began operating as off-road freight shippers, moving cargo from Deadhorse and Nuiqsut to Barrow with track vehicles. One of the drivers used a homemade sled to transport highway vehicles for clients and noted that business was very good (ADN 2016). The lucrative nature of these enterprises is a testament to the disparity between overland and marine or air shipping costs.

More recently, the borough implemented a new program to construct ice roads and provide pilot car service to caravans of NSB residents. In 2018, the Community Winter Access Trails (CWAT) project involved construction of about 300 miles of seasonal roads that connected Atqasuk to Utqiaġvik, and Utqiaġvik to Alaska's main road system, near Deadhorse (ADN 2018a). Residents claimed that the ice road saved them money in marine freight costs, as several used the road to bring new cars to their village from either Anchorage or Fairbanks. Ice roads might be a cost-effective infrastructure for the borough to build, with costs of about $5,000 per mile compared to an estimate of $2,000,000 per mile for a gravel road (ADN 2018b).

The CWAT program continued in 2019 for a second year with guided caravans conducted from March through May. In addition to connections between Atqasuk and Utqiaġvik to Deadhorse, the CWAT also extended a new route to Wainwright. Equipment used to construct, maintain, and guide on the trails include snow grooming PistenBullys, Tucker Sno-Cats, and highway vehicles. Staff members who guide the caravans perform inspections on passenger vehicles, verify insurance and drivers' licenses, and ask drivers to sign a waiver before starting on the expedition. They also report when caravanners had food, a VHF radio, and the amount of fuel they carried (when known). The guide's tracked vehicles pull sleds which can be used to tow passenger vehicles in the case of a breakdown or when conditions were severe, neither of which were uncommon occurrences (ASRC 2019a).

According to weekly CWAT trail reports, there are a number of users who travel the trails without an escort, and in some cases the guides helped to free vehicles that were stuck. Non-conforming users are asked to sign a waiver and sometimes join the guided caravans. Additionally, there are many NSB residents who travel the trails with snowmachines. For these reasons it is difficult to know how exactly many people use the maintained trails. From March 2nd to April 11th there were 18 caravans which guided a total of 68 vehicles, including assistance that was rendered to five non-conforming trail users. Additional caravans conducted in late April and early May would have increased utilization of the trails. Most participants in the caravans had only passengers, but there were also residents who towed boats and four-wheelers (ASRC 2019a). It is likely that enabling NSB residents to travel in the winter reduces their use of other modes of transportation, like marine or aviation.

2.5 Demand Analyses

The demand for aviation services in the NSB is difficult to analyze given the lack of data for substitute transportation services. For example, coastal communities in the NSB may receive shipments of bulk and fuel cargo during the ice-free months of late summer, but activity is limited based on water depth and a limited number of companies provide service. There is no publicly available source of data for these deliveries. Shipping companies are usually not willing to share this information because the information is proprietary, and the marine freight industry is competitive. Other known modes of transportation include snowmachine trails, overland freight service companies (tracked vehicles), ice road caravans, and riverboats or skiffs. However, the lack of data on personal travel and paid transportation services precludes an analysis of changes in aviation activity in individual communities.

Instead, monthly changes in passenger, freight, and mail quantity are modeled as a function of basic socioeconomic measures and seasonal trends from January 2013 through June 2018. The models shown in Table 6 are constructed using ordinary least-squares regression techniques to estimate the individual effect of independent variables on the variables of interest. The independent variables in the models include combined population of the NSB local communities, income effects, and an indicator variable for each month except January, which acts as the baseline for comparison to the other months.

Population values in the regression are based on DOLWD estimates for 2013–2017, and Northern Economics Inc. forecast values are used for 2018. NSBEP&CR estimates are not used because data are not available for 2016–2018, and a continuous series must be used to capture changes in population over time. Dividend income includes average ASRC shareholder and Alaska Permanent Fund Dividend payments, which represent a significant source of income for many residents. Dividend income lagged by one month is also used to capture effects of spending during the month prior, since passenger and freight services are commonly paid in advance. Additionally, some dividend payments are made at or near the end of a month, so spending and increases in aviation activity are more likely to occur in the following month. Lastly, the models include an indicator variable for every month except January, which is often the month with the least passenger and cargo activity. By January, NSB residents are usually able to use the winter trail systems, and travel for the holiday season is largely over. Coefficient estimates for each month therefore represent the additional amount of activity over the January average.

Table 6. NSB Monthly Aviation Activity Regression Models

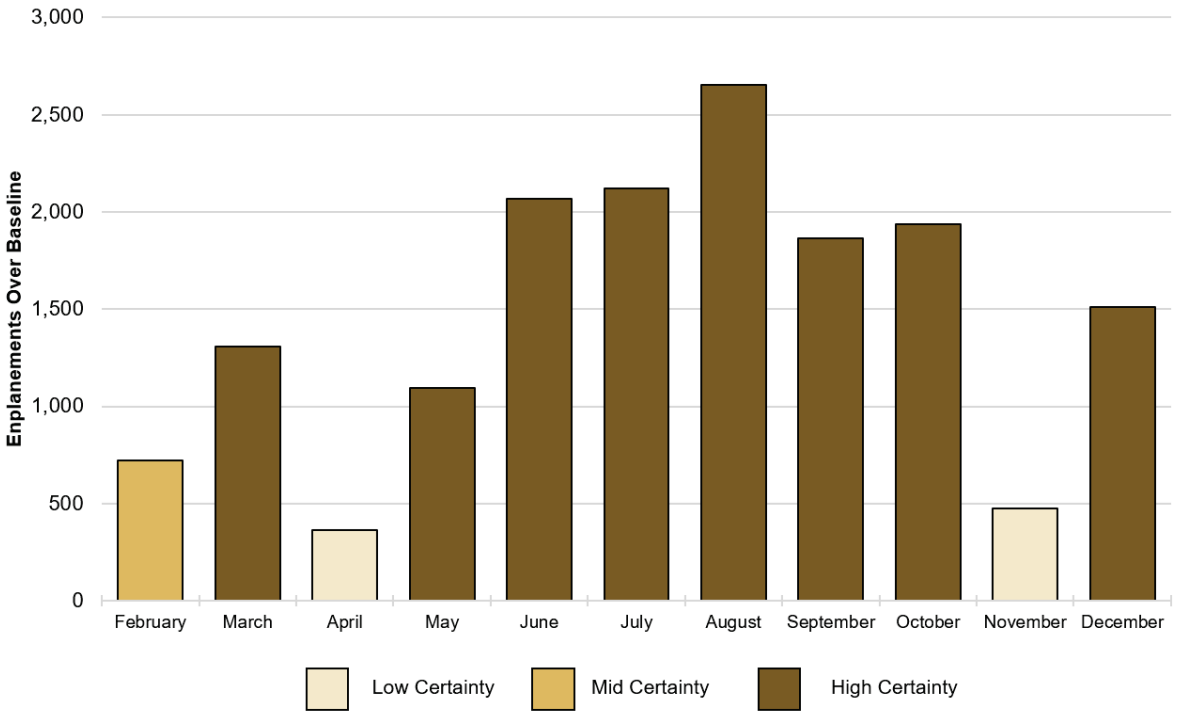
Variables	Monthly Passenger Enplanements	Monthly Freight (Pounds)	Monthly Mail (Pounds)
Population	-2.9**	-398.7	-43.7
Dividend Income (Nominal $)	0.13**	26.41*	-3.15
Lagged Dividend Income (Nominal $)	0.07	2.02	-0.39
Month (January Baseline)			
February	723**	-100,231	-7,990
March	1,310***	69,271	171,125**
April	364	258,037***	45,729
May	1,094***	581,085***	70,050
June	2,068***	326,003***	93,974
July	2,123***	495,513***	114,166
August	2,655***	475,236***	335,369***
September	1,865***	269,004**	231,234**
October	1,938***	56,069	322,648***
November	476***	-28,023	176,855**
December	1,513	-58,365	35,098
Constant	25,395***	3,776,210	1,581,127
R squared	78.5%	75.8%	50.4%
Number of observations	65	65	65

Note: Statistical significance indicated as: 0>P>|0.01|*** representing high level of statistical significance; |0.01|>P>|0.05|** representing moderate level of statistical significance; |0.05>P>|0.10|* representing low level of statistical significance. Unmarked values are not statistically significant in the model.
Data Sources: BTS, 2019; DOR, 2019; Arctic Slope Regional Corporation (ASRC), 2019b

Population increases are negatively related to the passenger enplanements, which is an unexpected result, but may indicate that overall growth of the community (including other infrastructure) decreases the need for aviation transportation. Similarly, it is often easier to arrange an ice road caravan or summer barge delivery when there are more people in the community willing to participate (higher population). Monthly passenger enplanements also increase with dividend income, at a rate of about 0.13 passengers per dollar of dividend value, or 1 passenger per $7.69 of dividend value. For example, a $2,000 dividend payment should increase the number of passenger enplanements in any one month by 260 (2,000 x 0.13), holding all else constant. The lagged dividend income coefficient is also positive and indicates that there are some additional increases in passenger activity over time, but the variable is not statistically significant in the model.

Seasonal effects on passenger travel by air are captured with the monthly indicator variables, and the coefficient values are shown graphically in Figure 18. Each value is also color coded to indicate statistical significance of the variable in the regression model. Coefficient estimates of low certainty (April and November) are not statistically significant in the regression model. The model shows that passenger travel is highest in the NSB from June through October, when winter trails are not available.

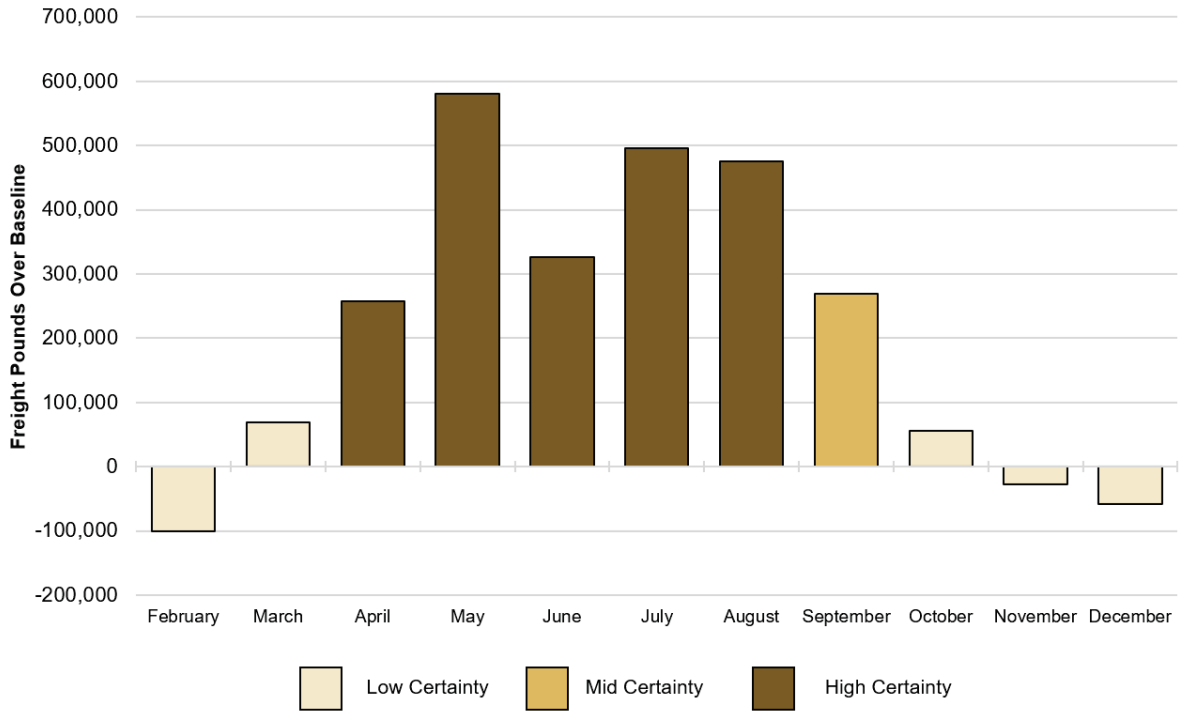
Figure 18. Regression Coefficients of Monthly Indicator Variables, Enplanement Increases over January Baseline



Data Sources: BTS, 2019; DOR, 2019; ASRC, 2019b

Population changes are not statistically significant in the air freight model, though the variable coefficient is again negative. Dividend income is statistically significant, and each dollar of value increases monthly freight by about 26 pounds. For example, a $2,000 dividend payment would cause air freight volume in the NSB to increase by 53,000 pounds (2,000 x 26), holding all other variables constant. Seasonality is an important consideration for air freight too, with peak levels from May through August (Figure 19). Freight volume is 580,000 pounds higher in May than in January, although coefficient estimates for the winter months are not statistically significant.

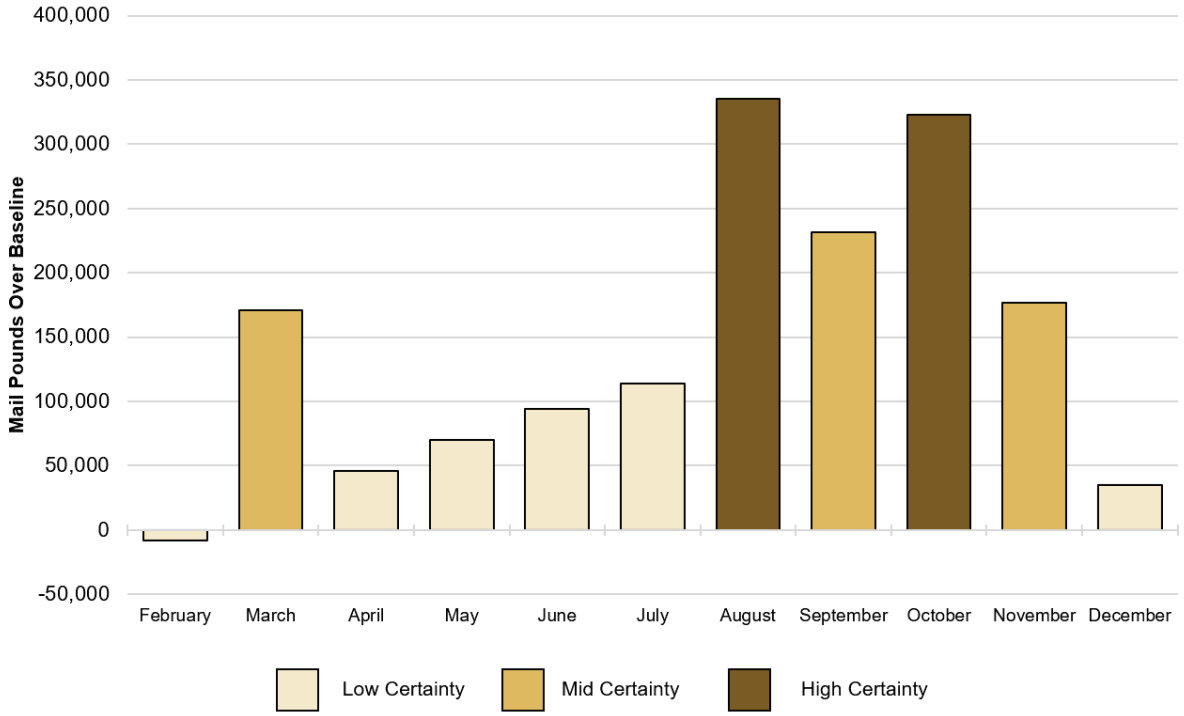
Figure 19 Regression Coefficients of Monthly Indicator Variables, Freight Increases over January Baseline



Data Sources: BTS, 2019; DOR, 2019; ASRC, 2019b

The model of monthly mail volume in the borough is weaker than the passenger and freight demand models, explaining a much smaller portion of observed variation (as measured with an R-squared value, see Table 6). A smaller number of the monthly coefficient estimates are statistically significant, as shown in Figure 20.Population and income changes are not statistically significant in the model, but it does still provide some information on seasonal trends. Mail volumes tend to be largest from August through September and smallest in December, January, and February.

Figure 20 Regression Coefficients of Monthly Indicator Variables, Mail Increases over January Baseline



Data Sources: BTS, 2019; DOR, 2019; ASRC, 2019b

The results of the model demonstrate that marginal increases in dividend payments generally increase aviation activity in the NSB. Another interpretation could be that additional employment opportunities or other increases to income would contribute to increased demand for aviation services, holding all else constant. It should be noted that aviation transportation is the most expensive option for borough residents, and research demonstrates that residents prefer overland transport when it is available. Therefore, economic growth in the NSB may not increase air travel if improvements to road, trail, and port infrastructure are the source of growth.

Seasonality is the predominant factor which affects aviation activity in the NSB. Historically, there is air travel and cargo transport during the late winter months (January to April) when trails and ice roads are available to residents. Similarly, aviation activity is higher in the summer because aircraft are the only means for year-round access. The NSB's transportation network is intricate and widely varied between communities, which is why the regression models are only able to explain 50 to 79 percent[1] of the variation in aviation activity.

[1] Explanatory power of the regression models is measured with an R-squared value, as shown in Table 6.

3 Data Collection Needs

Quantitative analysis of the northern Alaska transportation system is limited by a lack of available data. While there are clearly established modes of transportation and networks of infrastructure within the NSB, estimating the number of passengers or amount of cargo is difficult. This section identifies areas of weakness in data collection for the NSB and provides suggestions for future development.

The primary source of data for this study was aviation data as published by the Bureau of Transportation Statistics (BTS). These data are consistently reported and clearly demonstrated for long-term and short-term trends for the movement of passengers, mail and freight. However, they fail to capture private industry air traffic, some tourist activities, and project-specific flights. There are several private airports within the NSB that are owned and operated by oil and gas companies, who are not required to report air carrier data. Shared Services, an airline operated specifically for the transport of oil field employees, also operates several flights each day to various public and private airport locations in the NSB. Some chartered flights are also not included in the BTS data. For communities like Kaktovik, that means a substantial underestimate for the use of airport facilities during the polar bear viewing season. Additionally, helicopter and other chartered flights for remote projects (public and private) are not included in BTS data, despite having a significant effect on infrastructure utilization.

There are no published data sources that cover marine freight transport in the NSB. Several coastal communities receive shipments via lightering barges or landing craft, but there is limited information on what and how much is being moved. Commentary from NSB residents suggests that highway and off-road vehicles and fuel are commonly moved by barge. Basic reporting on annual deliveries could be valuable for determining the importance of marine freight to residents of each community and would allow the borough to compare marine freight to alternatives like overland transport or air cargo.

The CWAT program has been popular with borough residents by providing an inexpensive mode of transportation. Seasonal trails provide the additional benefit of protecting important subsistence wildlife populations from urban hunters. The borough has collected some data on the guided CWAT caravans, including the number of vehicles, passengers, and extra fuel carried, along with snow conditions and activity reports. Unfortunately, this recorded usage represents an unknown portion of the actual activity due to non-conforming users and snowmachines that traverse the trails.

Table 7 presents recommended data collection efforts to improve future transportation planning efforts.

Table 7. Recommended Data Collection Efforts

Marine	Air	Seasonal Overland
• Basic count of barge deliveries by community with delivery date • Types of cargo, e.g. highway vehicles, containers, construction materials, fuel etc. • Quantity of cargo	• Count of chartered aircraft by community, plane type, date • Head count of tourists by community, length of trip, amenities used • Count of rural flight plans by date and departure point	• Find method to reduce or estimate non-conforming CWAT use • Collect data for return caravans on type of goods, value of goods, new vehicle purchases etc. • Collect information on private overland freight service operators, number of trips, cargo transported etc. • Estimates of trail construction cost per unit length • Estimates of caravan guide cost per trip segment

4 Community Profiles

4.1 Utqiaġvik Community Profile

Utqiaġvik (formerly Barrow) is the largest city in the NSB, with 5,256 permanent residents in 2018 (Table 8). It serves as a hub for travel and services, since it has a large enough population to sustain businesses not present in many of the outlying villages. Utqiaġvik also has the region's only hospital and Alaska State Trooper post. From 2010 to 2015, the community grew by 17 percent and the trend is expected to continue in the future.

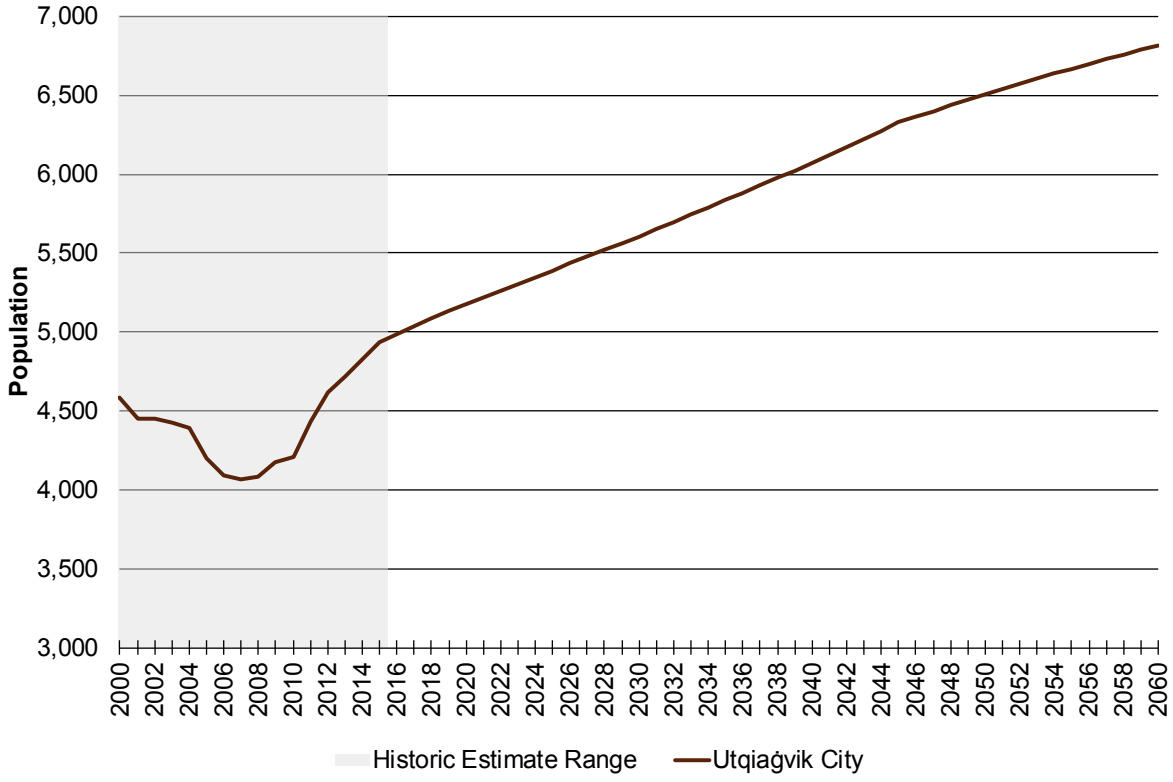
Table 8. Utqiaġvik Commissioner Certified Population Estimates

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Utqiaġvik	4,212	4,437	4,617	4,717	4,825	4,933	NA	5,041	5,256

Source: NSBEP&CR, 2016; NSB Staff, 2019

Figure 21 shows historic estimates of population (shaded in gray) in Utqiaġvik using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected to increase in the future with a diminishing rate of growth, and an average increase of 42 people per year.

Figure 21. Utqiaġvik Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

As the largest city in the borough, Utqiaġvik has more passenger and freight activity than any of the other NSB communities. In 2017, passenger enplanements and freight weights were largest in August, but mail weight was largest in March (Table 9). On average, mail weights in Utqiaġvik were larger than freight weights by about 24 percent.

Table 9. Aviation Activity in Utqiaġvik, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Passengers	3,335	3,256	3,908	3,228	3,346	4,421	4,365	4,656	3,855	4,116	3,129	3,993	3,801
Mail (1,000s lb)	799.4	795.0	1,093.5	783.4	923.1	899.9	786.7	873.6	1,072.1	904.9	997.9	831.8	896.8
Freight (1,000s lb)	552.1	585.7	821.5	805.5	831.8	745.9	855.1	857.7	729.3	637.1	589.6	681.2	724.4

Source: BTS, 2019

Residents of Utqiaġvik are primarily of Iñupiat descent, making up about 66 percent of the population (Table 10). Caucasian residents represent about 12 percent of the population, and the remainder includes all other Alaska Native and other ethnicities.

Table 10. Utqiaġvik Ethnic Profile, 2015

Ethnicity	Percentage (%)
Iñupiat	65.9
Caucasian	11.6
Other Ethnicities	22.6

Source: NSBEP&CR, 2016

Table 11 shows demographic and housing characteristics of Utqiaġvik in 2014. The proportion of men to women is relatively balanced, with slightly fewer women at about 49 percent of the population. In 2014, the median age was 28 and the rate of unemployment was 28.8 percent. While the unemployment rate in Utqiaġvik is significantly higher than urban areas of Alaska or Lower 48 communities, it is not unusual compared to other communities in the NSB. The vacancy rate in Utqiaġvik was 3.1 percent in 2014, with an average of 3.57 persons per occupied home. Residents of Utqiaġvik are dependent on subsistence foods, with 65.2 percent of all households receiving more than half of their diet from locally harvested foods.

Table 11. Demographic and Housing Characteristics, 2014

Demographics	Year 2014
Percent Female	48.9
Percent Male	51.1
Median Age	28
Unemployment (%)	28.8
Housing Characteristics	**Year 2014**
Total Number of Dwelling Units	1,638
Vacancy Rate (%)	3.1
Average Number of People Per Household	3.57
Households Receiving Half or More of Diet from Subsistence Foods (%)	65.2

Source: NSBEP&CR, 2016

Average income in Utqiaġvik is the highest of all the reported communities in the study area at nearly $79,000 per household (Table 12). Utqiaġvik is the largest city within the borough and has infrastructure and amenities that do not exist in many outlying communities. There are more economic opportunities in Utqiaġvik than in smaller villages because the community has a hospital, fire department, an inn, a university, several eating establishments, and other retail stores. Residents of smaller NSB communities may travel to Utqiaġvik to purchase goods and services, and the community serves as an economic hub for the region.

Table 12. Utqiaġvik 2015 Households and Income, Inflation Adjusted Dollars

Number of Households	Number of Individuals	Average Household Income (2018 $)	Per Capita Income (2018 $)
549	2,069	$78,854	$20,923

Source: NSBEP&CR, 2016

In 2017 about 10 percent of all Utqiaġvik households had income below the poverty level within the past 12 months (Table 13). There is also a significant proportion of households with high incomes; nearly 25 percent of households in Utqiaġvik earned more than $100,000 in 2017.

Table 13. Utqiaġvik 2017 Distribution of Household Income and People Living in Poverty

Household Income	Percentage of Total
Less than $10,000	5.0
$10,000 to $14,999	2.7
$15,000 to $24,999	6.4
$25,000 to $34,999	5.5
$35,000 to $49,999	12.0
$50,000 to $74,999	13.9
$75,000 to $99,999	11.7
$100,000 to $149,999	19.1
$150,000 to $199,999	11.3
$200,000 or more	12.4
People living below the poverty level in the past 12 months	**10.3**

Source: United States Census Bureau (USCB), 2017

Table 14 shows the number of workers for the top 20 occupations in Utqiaġvik in 2016. Most workers are associated with office, administrative, or secretarial positions. Many other residents work in public service fields like teaching and counseling, or training sectors.

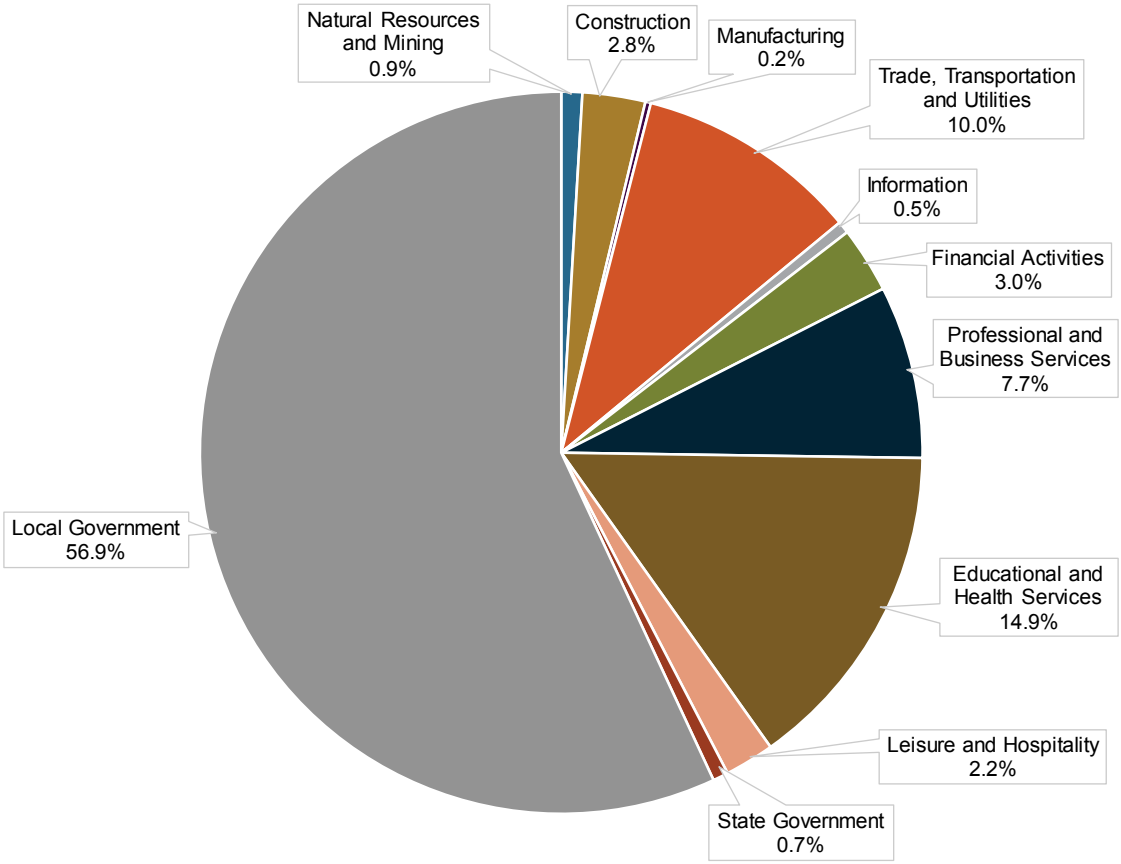
Table 14. Utqiaġvik Top 20 Occupations in 2016

Occupation	Number of Workers
Office and Administrative Support Workers, All Other	107
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	79
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	72
Executive Secretaries and Executive Administrative Assistants	63
First-Line Supervisors of Office and Administrative Support Workers	57
General and Operations Managers	50
Maintenance and Repair Workers, General	47
Teacher Assistants	44
Water and Wastewater Treatment Plant and System Operators	41
Bookkeeping, Accounting, and Auditing Clerks	40
Laborers and Freight, Stock, and Material Movers, Hand	38
Managers, All Other	35
Carpenters	34
Office Clerks, General	33
Construction Laborers	30
Counselors, All Other	27
Education, Training, and Library Workers, All Other	26
Administrative Services Managers	26
Security Guards	25
Maids and Housekeeping Cleaners	23

Source: DOLWD, 2019c

Local government is the single largest employer in Utqiaġvik, providing more than half of all jobs (Figure 22). Educational and Health Services make up 15 percent of jobs, and Trade, Transportation and Utilities includes 10 percent of jobs. As the largest city in the NSB, Utqiaġvik has employment opportunities that may not be available in other communities, leading to a more diverse economy in terms of employment industries.

Figure 22. Workers by Industry, Utqiaġvik, Percentage of Total, 2016



Source: DOLWD, 2019c

There are 132 active status business licenses registered to residents of Utqiaġvik (Table 15). The largest industry sector is Accommodation and Food Services, with 22 licenses making up nearly 17 percent of the total. Other top sectors in Utqiaġvik include Trade, Services, Real Estate/Rentals/Leasing, and Transportation and Warehousing.

Table 15. Utqiaġvik Business Licenses by Industry Sector

NAICS Code	Count	Percent of Total (%)
72 - Accommodation and Food Services	22	16.7
42 - Trade	18	13.6
81 - Services	17	12.9
53 - Real Estate, Rental and Leasing	15	11.4
48 - Transportation and Warehousing	10	7.6
71 - Arts, Entertainment and Recreation	9	6.8
62 - Health Care and Social Assistance	8	6.1
54 - Professional, Scientific and Technical Services	8	6.1
23 - Construction	6	4.5
56 - Administrative, Support, Waste Management and Remediation Services	6	4.5
51 - Information	3	2.3
31 - Manufacturing	3	2.3
92 - Public Administration	2	1.5
61 - Educational Services	2	1.5
55 - Management of companies and enterprises	2	1.5
22 - Utilities	1	0.8
21 - Mining	0	0.0

Source: Department of Commerce, Community, and Economic Development (DCCED), 2019a

In Utqiaġvik there are also 135 residents who hold active professional licenses (Table 16). Nearly one third of those licenses are nursing or medical assistant licenses, which is expected since Utqiaġvik has the only hospital within the NSB. There are also Utqiaġvik residents working as medical doctors, pharmacists, opticians, dental care professionals, physical therapists, and chiropractors, making up another 48 professional licenses. In total, medical related licenses represent two thirds of the professional licenses held by residents of Utqiaġvik. Other professional license holders include residential and general contractors, social workers and counselors, professional geologists, and others.

Table 16. Utqiaġvik Professional Licenses by Occupation

License Type	Count	Percent of Total (%)
Nursing & Medical Assistant	41	30.4
Contractors, Engineers, Surveyors, Architects, and Electrical Admin.	24	17.8
Medical Doctor, Pharmacist, Optician	20	14.8
Dental	19	14.1
Social Workers & Counselors	10	7.4
Physical Therapy & Chiropractic Care	9	6.7
Barbers and Hairdressers	5	3.7
Veterinary	4	3.0
Professional Geologists	2	1.5
Big Game Guides and Transporters	1	0.7

Source: DCCED, 2019b

4.2 Anaktuvuk Pass Community Profile

Anaktuvuk Pass is an interior city of the NSB within the Brooks Range and had 376 permanent residents in 2018 (Table 17). The community can be accessed year-round by plane, and ATVs and snowmachines are used for local travel (DCCED, 2019). From 2010 to 2015, the community grew by 21 percent and the trend is expected to continue in the future.

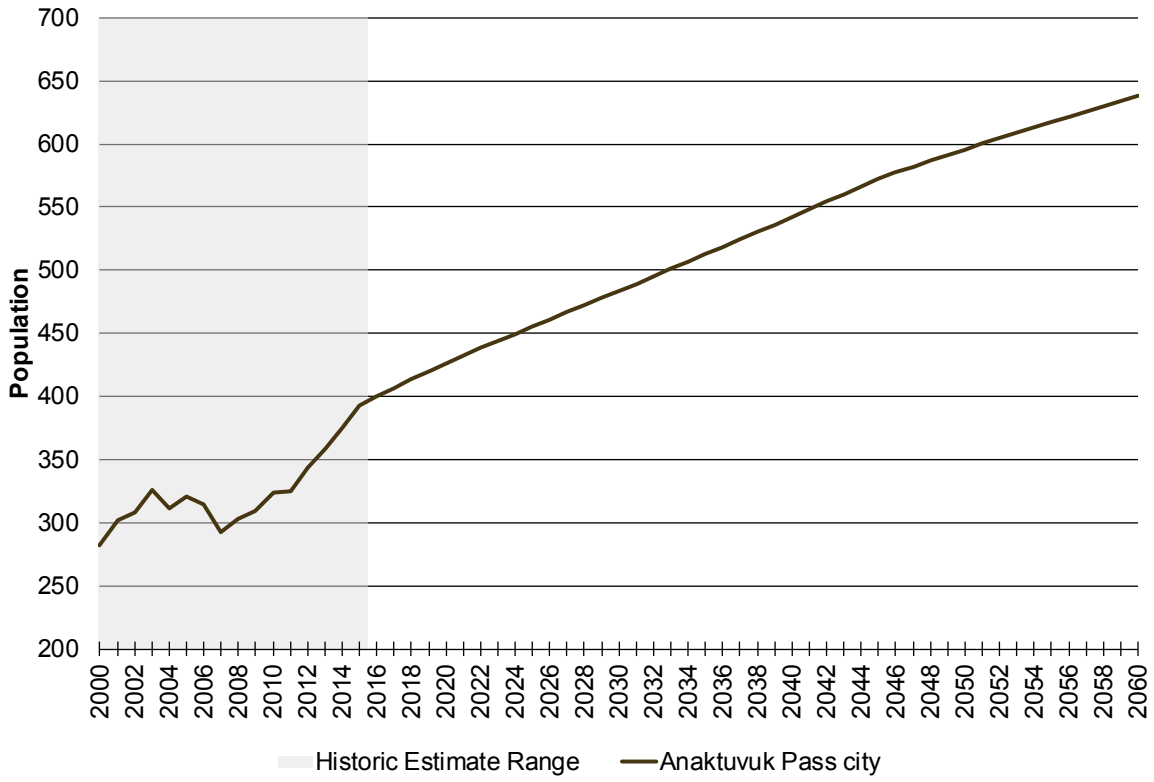
Table 17. Anaktuvuk Pass Commissioner Certified Population Estimates

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Anaktuvuk Pass	324	325	344	358	375	393	NA	393	376

Source: NSBEP&CR, 2016; NSB Staff, 2019

Figure 23 shows historic estimates of population (shaded in gray) in Anaktuvuk Pass using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected to increase in the future with a diminishing rate of growth, and an average increase of 5 people per year.

Figure 23. Anaktuvuk Pass Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

In 2017, Anaktuvuk Pass passenger enplanements were highest in August, while mail and freight weights were highest in July (Table 18). On average, monthly freight weights were larger than mail weights by about 12 percent. However, the seasonal fluctuation in cargo deliveries is much greater for freight than for mail.

Table 18. Aviation Activity in Anaktuvuk Pass, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Passengers	307	298	356	252	302	479	352	480	287	317	256	376	339
Mail (1,000s lb)	45.3	46.6	59.4	32.8	40.2	45.0	77.3	66.9	32.0	53.9	58.9	35.1	49.4
Freight (1,000s lb)	20.8	17.2	20.5	20.4	61.0	32.5	162.0	125.0	89.8	51.4	25.6	40.2	55.5

Source: BTS, 2019

Residents of Anaktuvuk Pass are primarily of Iñupiat descent, making up about 88.9 percent of the population (Table 19). Caucasian residents represent about eight percent of the population, and the remainder includes all other Alaska Native and other ethnicities.

Table 19. Anaktuvuk Pass Ethnic Profile, 2015

Ethnicity	Percentage (%)
Iñupiat	88.9
Caucasian	8.4
Other Ethnicities	2.7

Source: NSBEP&CR, 2016

Table 20 shows demographic and housing characteristics of Anaktuvuk Pass in 2014. The proportion of men to women is slightly imbalanced, with fewer women at about 48 percent of the population. In 2014, the median age was 26 and the rate of unemployment was 23.6 percent. While the unemployment rate in Anaktuvuk Pass is significantly higher than urban areas of Alaska or Lower 48 communities, it is not unusual compared to other communities in the NSB. The vacancy rate in Anaktuvuk Pass was low at 1.6 percent in 2014, with an average of 3.57 persons per occupied home. Residents of Anaktuvuk Pass are dependent on subsistence foods, with 70.9 percent of all households receiving more than half of their diet from locally harvested foods.

Table 20. Demographic and Housing Characteristics, 2014

Demographics	Year 2014
Percent Female	48.3
Percent Male	51.7
Median Age	26
Unemployment (%)	23.6
Housing Characteristics	**Year 2014**
Total Number of Dwelling Units	122
Vacancy Rate (%)	1.6
Average Number of People Per Household	3.6
Households Receiving Half or More of Diet from Subsistence Foods (%)	70.9

Source: NSBEP&CR, 2016

Average income in Anaktuvuk Pass, at nearly $64,000 per household, is higher than the study area average and median incomes (Table 21). However, Anaktuvuk Pass is one of the most isolated cities within the borough. Without access to the ocean or a large river, all freight and passengers must be transported by air, which could disproportionately affect their ability to pay for transportation services, as compared to other communities.

Table 21. Anaktuvuk Pass 2015 Households and Income, Inflation Adjusted Dollars

Number of Households	Number of Individuals	Average Household Income (2018 $)	Per Capita Income (2018 $)
83	298	63,859	17,786

Source: NSBEP&CR, 2016

In 2017 about 22 percent of all Anaktuvuk Pass households had income below the poverty level within the past 12 months which is the second highest rate of unemployment among the NSB communities (Table 22). There were no residents with income above $200,000 and more than one fifth had household incomes between $75,000 and $100,000.

Table 22. Anaktuvuk Pass 2017 Distribution of Household Income and People Living in Poverty

Household Income	Percentage of Total
Less than $10,000	3.8
$10,000 to $14,999	9.0
$15,000 to $24,999	1.3
$25,000 to $34,999	11.5
$35,000 to $49,999	16.7
$50,000 to $74,999	14.1
$75,000 to $99,999	20.5
$100,000 to $149,999	15.4
$150,000 to $199,999	7.7
$200,000 or more	0.0
People living below the poverty level in the past 12 months	22.1

Source: USCB, 2017

Table 23 shows the number of workers for the top occupations in Anaktuvuk Pass in 2016. Most workers are associated with Janitor and custodial duties, educational or teaching positions, maintenance and repair workers, and retail.

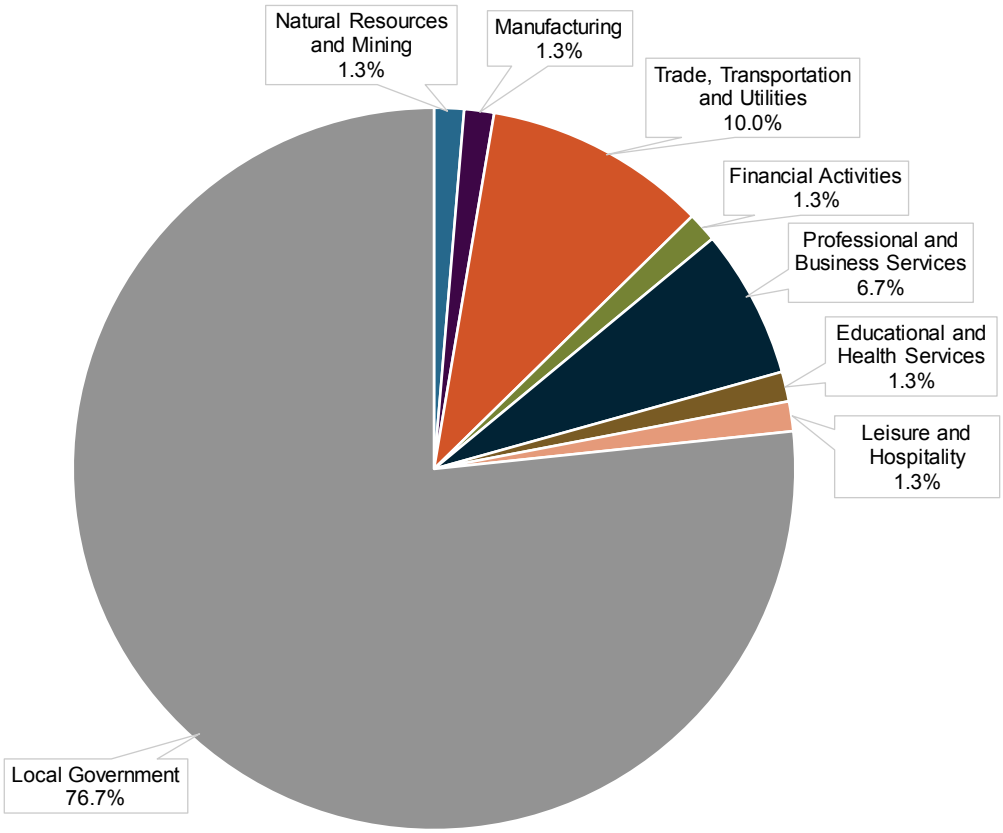
Table 23. Anaktuvuk Pass Top Occupations in 2016

Occupation	Number of Workers
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	14
Teacher Assistants	8
Maintenance and Repair Workers, General	8
First-Line Supervisors of Retail Sales Workers	7
Retail Salespersons	7
Education, Training, and Library Workers, All Other	6
Recreation Workers	6
Heavy and Tractor-Trailer Truck Drivers	6
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	5
Power Plant Operators	5

Source: DOLWD, 2019c

Local government is the single largest employer in Anaktuvuk Pass, providing about 77 percent of all jobs (Figure 24) Trade, Transportation, and Utilities is the second largest employment industry (10 percent), followed by Professional and Business Services (6.7 percent).

Figure 24. Workers by Industry, Anaktuvuk Pass, Percentage of Total, 2016



Source: DOLWD, 2019c

4.3 Atqasuk Community Profile

Atqasuk is an inland city of the NSB, with 261 permanent residents in 2018 (NSBEP&CR 2016). From 2010 to 2015, the community grew by 6.5 percent and the trend is expected to continue in the future. For community services, Atqasuk has a clinic, library, and water treatment facility (DCCED 2019).

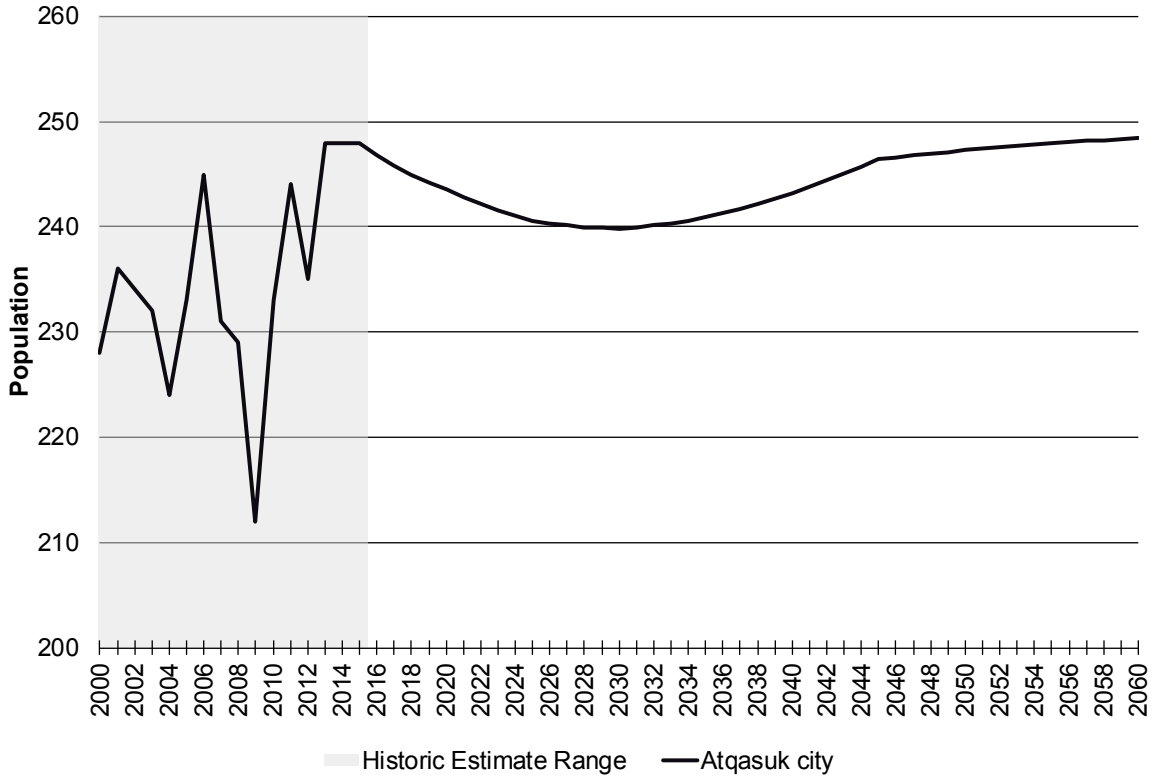
Table 24. Atqasuk Commissioner Certified Population Estimates

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Atqasuk	233	244	235	248	248	248	NA	248	261

Source: NSBEP&CR, 2016; NSB Staff, 2019

Figure 25 shows historic estimates of population (shaded in gray) in Atqasuk using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected remain relatively constant over time, continuing the observed trend from 2013 to 2015.

Figure 25. Atqasuk Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

In 2017, Atqasuk enplanements were highest in October, mail weight was highest in March, and freight weight was highest in July. On average monthly mail weights were larger than freight weights by about 77 percent (Table 25). However, freight weights seem to be more sensitive to seasonal effects.

Table 25. Aviation Activity in Atqasuk, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Passengers	256	185	148	187	93	221	347	261	161	350	184	217	218
Mail (1,000s lb)	36.1	24.0	63.8	43.5	34.9	38.2	62.7	53.9	38.0	38.4	35.1	50.2	43.2
Freight (1,000s lb)	12.0	10.7	17.5	18.0	13.3	44.7	53.5	21.9	47.2	22.7	14.6	17.2	24.4

Source: BTS, 2019

Residents of Atqasuk are primarily of Iñupiat descent, making up about 90 percent of the population (Table 26). Caucasian residents represent about 8.5 percent of the population, and the remainder includes all other Alaska Native and other ethnicities.

Table 26. Atqasuk Ethnic Profile, 2015

Ethnicity	Percentage (%)
Iñupiat	90.0
Caucasian	8.5
Other Ethnicities	1.5

Source: NSBEP&CR, 2016

Table 27 shows demographic and housing characteristics of Atqasuk in 2014. The proportion of men to women is skewed, with women making up only about 44 percent of the population. In 2014, the median age was 24 and the rate of unemployment was 13.2 percent. While the unemployment rate in Atqasuk is significantly higher than urban areas of Alaska or Lower 48 communities, it is relatively low compared to other communities in the NSB. The vacancy rate in Atqasuk was 6.5 percent in 2014, with an average of 4.2 persons per occupied home. Residents of Atqasuk are dependent on subsistence foods, with 55.8 percent of all households receiving more than half of their diet from locally harvested foods.

Table 27. Demographic and Housing Characteristics, 2014

Demographics	Year 2014
Percent Female	44.1
Percent Male	55.9
Median Age	24
Unemployment (%)	13.2
Housing Characteristics	**Year 2014**
Total Number of Dwelling Units	92
Vacancy Rate (%)	6.5
Average Number of People Per Household	4.2
Households Receiving Half or More of Diet from Subsistence Foods (%)	55.8

Source: NSBEP&CR, 2016

Average income in Atqasuk is $57,000 per household, which is the median value of all communities in the NSB (Table 28).

Table 28. Atqasuk 2015 Households and Income, Inflation Adjusted Dollars

Number of Households	Number of Individuals	Average Household Income (2018 $)	Per Capita Income (2018 $)
64	211	57,059	17,307

Source: NSBEP&CR, 2016

In 2017 about 19 percent of all Atqasuk households had income below the poverty level within the past 12 months (Table 29). The distribution seems to be bimodal with a 19.1 percent of households earning $25,000 to $35,000 and 27.7 percent earning between $100,000 and $150,000.

Table 29. Atqasuk 2017 Distribution of Household Income and People Living in Poverty

Household Income	Percentage of Total
Less than $10,000	2.1
$10,000 to $14,999	2.1
$15,000 to $24,999	4.3
$25,000 to $34,999	19.1
$35,000 to $49,999	8.5
$50,000 to $74,999	17.0
$75,000 to $99,999	6.4
$100,000 to $149,999	27.7
$150,000 to $199,999	10.6
$200,000 or more	2.1
People living below the poverty level in the past 12 months	19.3

Source: USCB, 2017

Table 30 shows the number of workers for the top occupations in Atqasuk in 2016. Most workers are associated with janitorial or maintenance worker positions, though there are also construction workers, power plant operators, and teaching assistants.

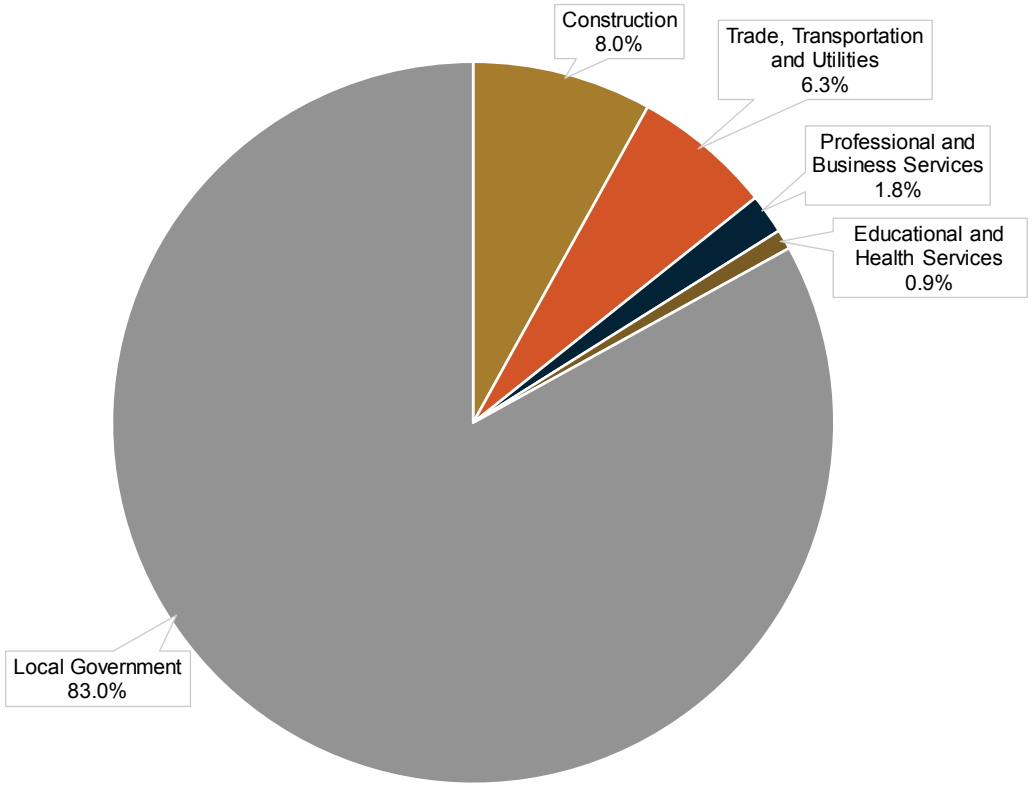
Table 30. Atqasuk Top Occupations in 2016

Occupation	Number of Workers
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	11
Grounds Maintenance Workers, All Other	8
Recreation Workers	8
Power Plant Operators	8
Construction Laborers	7
Maintenance and Repair Workers, General	7
Teacher Assistants	6

Source: DOLWD, 2019c

Local government is the single largest employer in Atqasuk, providing 83 percent of all jobs (Figure 26). Construction makes up 8 percent of jobs, and Trade, Transportation and Utilities includes 6.3 percent of jobs.

Figure 26. Workers by Industry, Atqasuk, Percentage of Total, 2016



Source: DOLWD, 2019c

There are nine active status business licenses registered to residents of Atqasuk (Table 31). Seven of those licenses are in the trade sector and two are in service industries.

Table 31. Atqasuk Business Licenses by Industry Sector

NAICS Code	Count	Percent of Total (%)
42 - Trade	7	77.8
72 - Accommodation and Food Services	1	11.1
81 - Services	1	11.1

Source: DCCED, 2019a

4.4 Nuiqsut Community Profile

Nuiqsut is one of the few cities in the NSB where most homes have running water, natural gas, and electricity (Kuukpik 2019). Located near the Alpine oil and gas field, the community negotiated for free natural gas for use in homes and community buildings (COPA 2015). There were 481 permanent residents living in Nuiqsut in 2018 (Table 32).

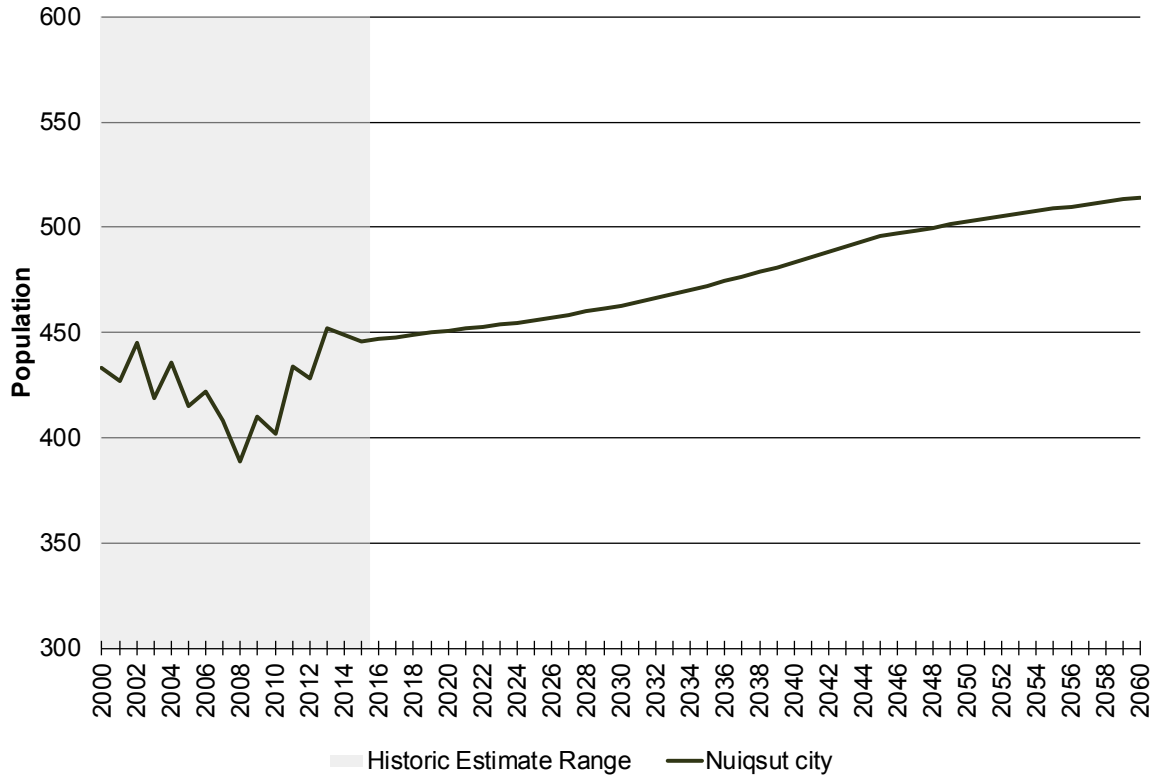
Table 32. Nuiqsut Commissioner Certified Population Estimates

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Nuiqsut	402	434	428	452	449	446	NA	446	481

Source: NSBEP&CR, 2016; NSB Staff, 2019

Figure 27 shows historic estimates of population (shaded in gray) in Nuiqsut using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected to increase in the future with a diminishing rate of growth, and an average increase of 2 people per year.

Figure 27. Nuiqsut Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

A gravel airstrip is operated in Nuiqsut by the NSB, and is the only year-round means for passenger and cargo transportation. During the winter an ice road from Deadhorse provides temporary access to the Dalton Highway (DCCED 2019). DOT&PF as well as private oil and gas companies introduced plans to build a permanent road (Colville River Road) which could connect Nuiqsut to the Dalton Highway, but funding has not been secured and there is no current schedule for the work (ASRC 2016). On average there were 281 passengers, 43,000 pounds of mail and 35,000 pounds of freight delivered by air each month in Nuiqsut (Table 33). Air mail and freight deliveries seem to be seasonal with larger volumes in the summer and fall. Mail volumes were smallest in February, March, and April while freight volumes were more varied. Passenger enplanements in Nuiqsut were largest in July during 2017, when other modes of transportation were not available.

Table 33. Aviation Activity in Nuiqsut, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Passengers	227	258	224	184	175	313	436	318	250	390	283	312	281
Mail (1,000s lb)	53.6	14.6	20.1	15.3	36.3	70.7	49.8	46.7	43.3	87.8	44.1	33.5	43.0
Freight (1,000s lb)	14.0	15.1	29.6	20.1	19.3	37.5	34.3	55.7	114.6	33.0	25.1	25.7	35.3

Source: BTS, 2019

Residents of Nuiqsut are primarily of Iñupiat descent, making up about 90.5 percent of the population (Table 34). Caucasian residents represent about 6.5 percent of the population, and the remainder includes all other Alaska Native and other ethnicities.

Table 34. Nuiqsut Ethnic Profile, 2015

Ethnicity	Percentage (%)
Iñupiat	90.5
Caucasian	6.5
Other Ethnicities	3.0

Source: NSBEP&CR, 2016

Table 35 shows demographic and housing characteristics of Nuiqsut in 2014. The proportion of men to women is relatively balanced, with slightly more women at about 51 percent of the population. In 2014, the median age was 24 and the rate of unemployment was 36.5 percent, which was the highest among the NSB communities. The vacancy rate in Nuiqsut was 14.8 percent in 2014, with an average of 3.7 persons per occupied home. Residents of Nuiqsut are dependent on subsistence foods, with 70.2 percent of all households receiving more than half of their diet from locally harvested foods.

Table 35. Demographic and Housing Characteristics, 2014

Demographics	Year 2014
Percent Female	51.0
Percent Male	49.0
Median Age	24
Unemployment (%)	36.5
Housing Characteristics	**Year 2014**
Total Number of Dwelling Units	149
Vacancy Rate (%)	14.8
Average Number of People Per Household	3.7
Households Receiving Half or More of Diet from Subsistence Foods (%)	70.2

Source: NSBEP&CR, 2016

Average income in Nuiqsut is about $47,000 per household, which is less than the NSB average, but higher than the household average in several other communities (Table 36).

Table 36. Nuiqsut 2015 Households and Income, Inflation Adjusted Dollars

Number of Households	Number of Individuals	Average Household Income (2018 $)	Per Capita Income (2018 $)
108	398	47,430	12,871

Source: NSBEP&CR, 2016

In 2017 about 10 percent of all Nuiqsut households had income below the poverty level within the past 12 months, which is the second lowest rate of poverty among the NSB communities (Table 37).

Table 37. Nuiqsut 2017 Distribution of Household Income and People Living in Poverty

Household Income	Percentage of Total
Less than $10,000	3.8
$10,000 to $14,999	0.0
$15,000 to $24,999	0.0
$25,000 to $34,999	8.6
$35,000 to $49,999	9.5
$50,000 to $74,999	24.8
$75,000 to $99,999	19.0
$100,000 to $149,999	21.9
$150,000 to $199,999	5.7
$200,000 or more	6.7
People living below the poverty level in the past 12 months	9.6

Source: USCB, 2017

Table 38 shows the number of workers for the top occupations in Nuiqsut in 2016. Workers associated with bookkeeping, accounting, auditing made up nearly 25 percent of the reported jobs. There are a significant number of other office or administrative workers, teaching assistants, laborers, maintenance workers, janitorial staff, and other occupations.

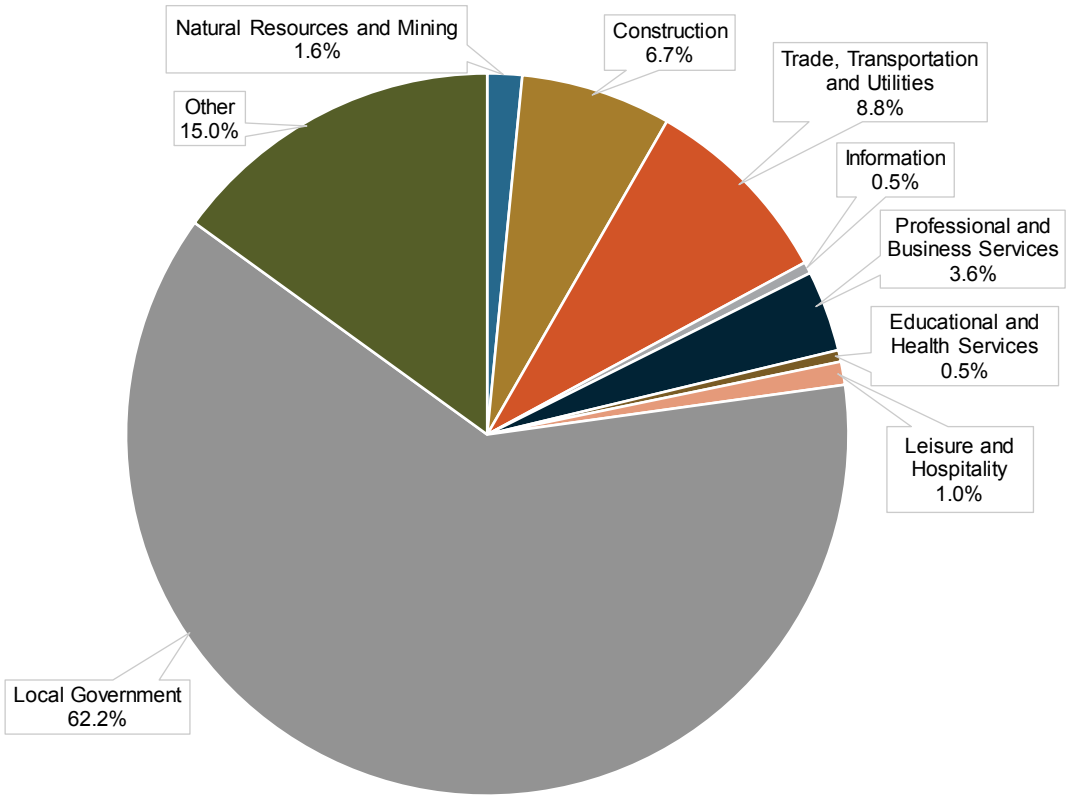
Table 38. Nuiqsut Top Occupations in 2016

Occupation	Number of Workers
Bookkeeping, Accounting, and Auditing Clerks	25
Heavy and Tractor-Trailer Truck Drivers	10
Teacher Assistants	9
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	9
Maintenance and Repair Workers, General	9
Executive Secretaries and Executive Administrative Assistants	7
Recreation Workers	6
Office Clerks, General	6
Power Plant Operators	6
Home Health Aides	5
Construction Laborers	5
Laborers and Freight, Stock, and Material Movers, Hand	5

Source: DOLWD, 2019c

Local government is the single largest employer in Nuiqsut, providing 62 percent of all jobs (Figure 28) Trade, Transportation and Utilities includes 8.8 percent of jobs, followed by Construction with 6.7 percent.

Figure 28. Workers by Industry, Nuiqsut, Percentage of Total, 2016



Source: DOLWD, 2019c

There are seven active status business licenses registered to residents of Nuiqsut (Table 39). The largest industry sector is public administration with five of the licenses, though there are also license holders in the real estate, health care, and manufacturing sectors.

Table 39. Nuiqsut Business Licenses by Industry Sector

NAICS Code	Count	Percent of Total (%)
92 - Public Administration	3	42.9
53 - Real Estate, Rental and Leasing	2	28.6
62 - Health Care and Social Assistance	1	14.3
31 - Manufacturing	1	14.3

Source: DCCED, 2019a

4.5 Point Hope Community Profile

Point Hope is a coastal city in the NSB, with 749 permanent residents in 2018 (Table 40). Its geography is favorable for a subsistence lifestyle which depends on marine mammals like whales and seals for food (Manilaq Association 2019).

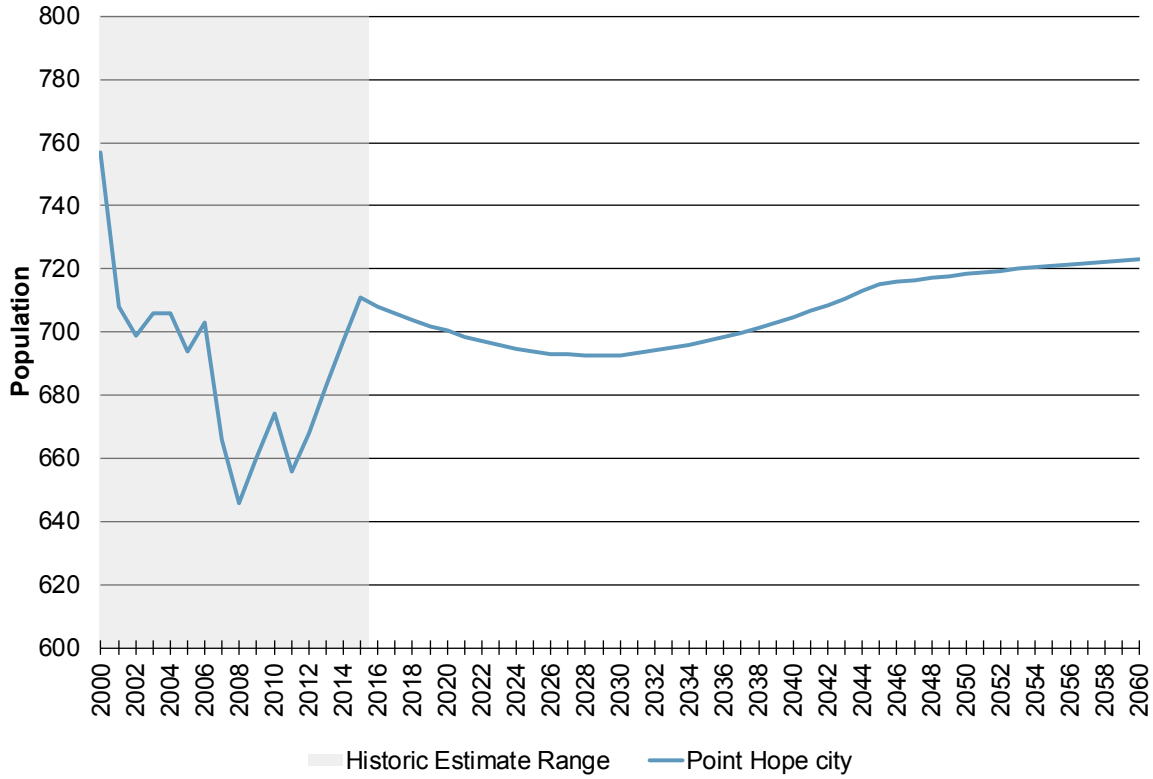
Table 40. Point Hope Commissioner Certified Population Estimates

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Point Hope	674	656	668	683	697	711	NA	711	749

Source: NSBEP&CR, 2016; NSB Staff, 2019

From 2010 to 2015, the community grew by five percent, though the population is expected to remain relatively constant in the future. Figure 29 shows historic estimates of population (shaded in gray) in Point Hope using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. The community population is expected to remain relatively constant over time, and the average population change each year is less than one.

Figure 29. Point Hope Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

Point Hope has a paved airstrip that is owned by the state, and the community also receives freight deliveries by barge during the ice-free season that is generally from June through September (DCCED 2019). In 2017, passenger enplanements were highest August, mail weight was highest in March, and Freight weight was highest in May. However, Point Hope's aviation activity is varied from month to month, especially compared to other NSB communities and it is more difficult to discern trends.

Table 41. Aviation Activity in Point Hope, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Passengers	489	412	548	395	403	488	403	564	408	475	273	496	446
Mail (1,000s lb)	138.3	125.5	188.3	143.0	137.5	170.7	142.0	164.0	164.7	176.8	137.7	121.9	150.9
Freight (1,000s lb)	35.2	34.0	55.4	46.4	223.2	107.8	89.5	67.0	36.9	34.7	33.2	42.3	67.1

Source: BTS, 2019

Residents of Point Hope are primarily of Iñupiat descent, making up about 93 percent of the population (Table 42). Caucasian residents represent about three percent of the population, and the remainder includes all other Alaska Native and other ethnicities.

Table 42. Point Hope Ethnic Profile, 2015

Ethnicity	Percentage (%)
Iñupiat	93.1
Caucasian	2.9
Other Ethnicities	4.0

Source: NSBEP&CR, 2016

Table 43 shows demographic and housing characteristics of Point Hope in 2014. The proportion of men to women is relatively balanced, with slightly fewer women at about 48 percent of the population. In 2014, the median age was 25 and the rate of unemployment was 13.4 percent, which is the second lowest of the NSB communities. The vacancy rate in Point Hope was less than one percent in 2014, with an average of four persons per occupied home. Residents of Point Hope are dependent on subsistence foods, with 64.3 percent of all households receiving more than half of their diet from locally harvested foods.

Table 43. Demographic and Housing Characteristics, 2014

Demographics	Year 2014
Percent Female	48.3
Percent Male	51.7
Median Age	25
Unemployment (%)	13.4
Housing Characteristics	**Year 2014**
Total Number of Dwelling Units	231
Vacancy Rate (%)	<1.0
Average Number of People Per Household	4.0
Households Receiving Half or More of Diet from Subsistence Foods (%)	64.3

Source: NSBEP&CR, 2016

Average income in Point Hope is the second highest of the reported communities in the study area at nearly $65,000 per household (Table 44).

Table 44. Point Hope 2015 Households and Income, Inflation Adjusted Dollars

Number of Households	Number of Individuals	Average Household Income (2018 $)	Per Capita Income (2018 $)
148	582	64,900	16,504

Source: NSBEP&CR, 2016

In 2017 about 15 percent of all Point Hope households had income below the poverty level within the past 12 months (Table 45).

Table 45. Point Hope 2017 Distribution of Household Income and People Living in Poverty

Household Income	Percentage of Total
Less than $10,000	3.6
$10,000 to $14,999	3.0
$15,000 to $24,999	7.7
$25,000 to $34,999	10.1
$35,000 to $49,999	16.1
$50,000 to $74,999	25.6
$75,000 to $99,999	9.5
$100,000 to $149,999	19.0
$150,000 to $199,999	3.0
$200,000 or more	2.4
People living below the poverty level in the past 12 months	15.2

Source: USCB, 2017

Table 46 shows the number of workers for the top occupations in Point Hope in 2016. Most workers are associated with construction, general labor, maintenance, or plant operations. There are also a significant number of jobs in the janitorial, teaching and education, secretarial, office, and administrative sectors.

Table 46. Point Hope Top Occupations in 2016

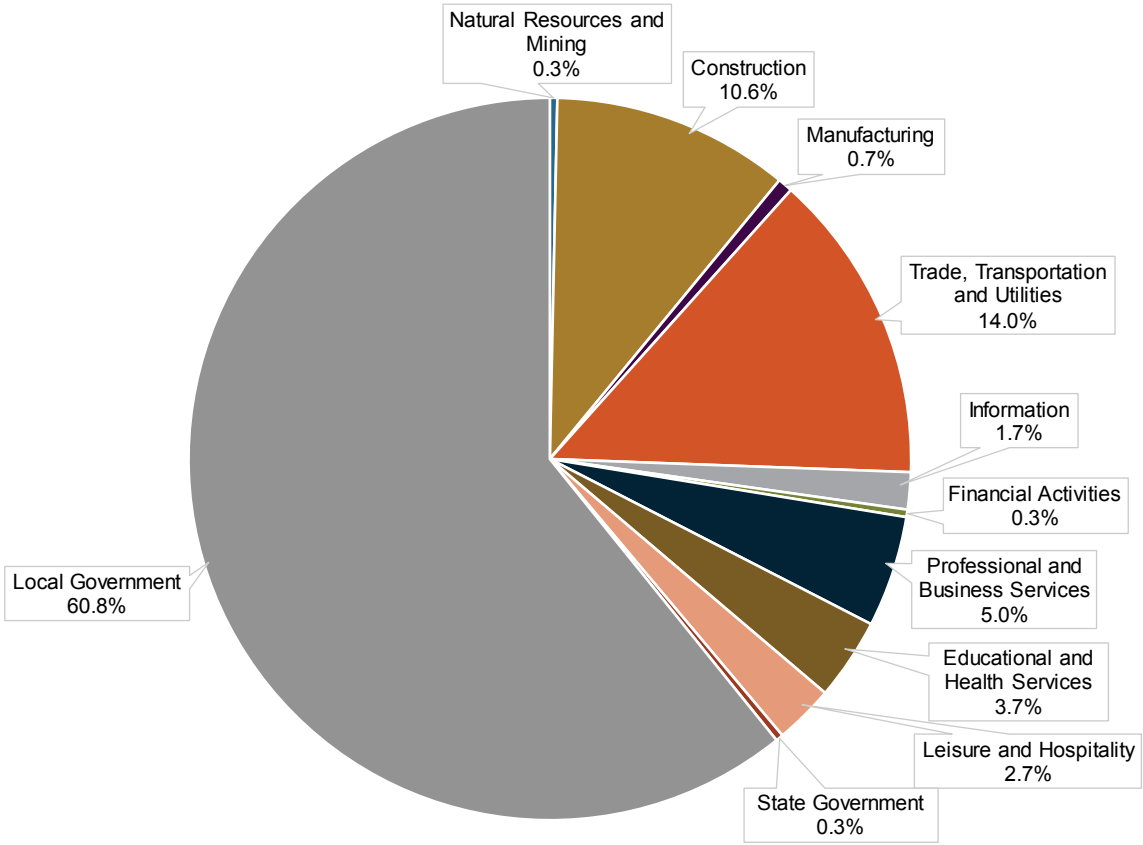
Occupation	Number of Workers
Construction Laborers	26
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	23
Teacher Assistants	19
Office Clerks, General	16
Power Plant Operators	14
Laborers and Freight, Stock, and Material Movers, Hand	12
Reservation and Transportation Ticket Agents and Travel Clerks	11
Maintenance and Repair Workers, General	10
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	9
Water and Wastewater Treatment Plant and System Operators	9
Education, Training, and Library Workers, All Other	8
Automotive and Watercraft Service Attendants	8
Bookkeeping, Accounting, and Auditing Clerks	7
Office and Administrative Support Workers, All Other	7
Chief Executives	5
Cooks, Institution and Cafeteria	5
Stock Clerks and Order Fillers	5

Source: DOLWD, 2019c

Local government is the single largest employer in Point Hope, providing about 61 percent of all jobs (Figure 22). Trade, Transportation and Utilities includes 14 percent of jobs, followed by Construction

(10.6 percent) and Professional and Business Services (5.0 percent). Point Hope is one of the more economically diverse communities in the borough in terms of employment industries.

Figure 30. Workers by Industry, Point Hope, Percentage of Total, 2016



Source: DOLWD, 2019c

There are nine active status business licenses registered to residents of Point Hope (Table 47). The largest industry sector is Accommodation and Food Services, with six licenses, and other sectors included trade and services. In Point Hope there is also one resident who holds an active professional license as a contractor, engineer, surveyor, architect or electrical worker.

Table 47. Point Hope Business Licenses by Industry Sector

NAICS Code	Count	Percent of Total (%)
72 - Accommodation and Food Services	6	66.7
42 - Trade	2	22.2
81 - Services	1	11.1

Source: DCCED, 2019a

4.6 Wainwright Community Profile

Wainwright is a coastal city in the NSB, with 555 permanent residents in 2018 (Table 48). It is located on a thin peninsula that separates the Bering Sea from a large tidal lagoon (DCCED 2019.

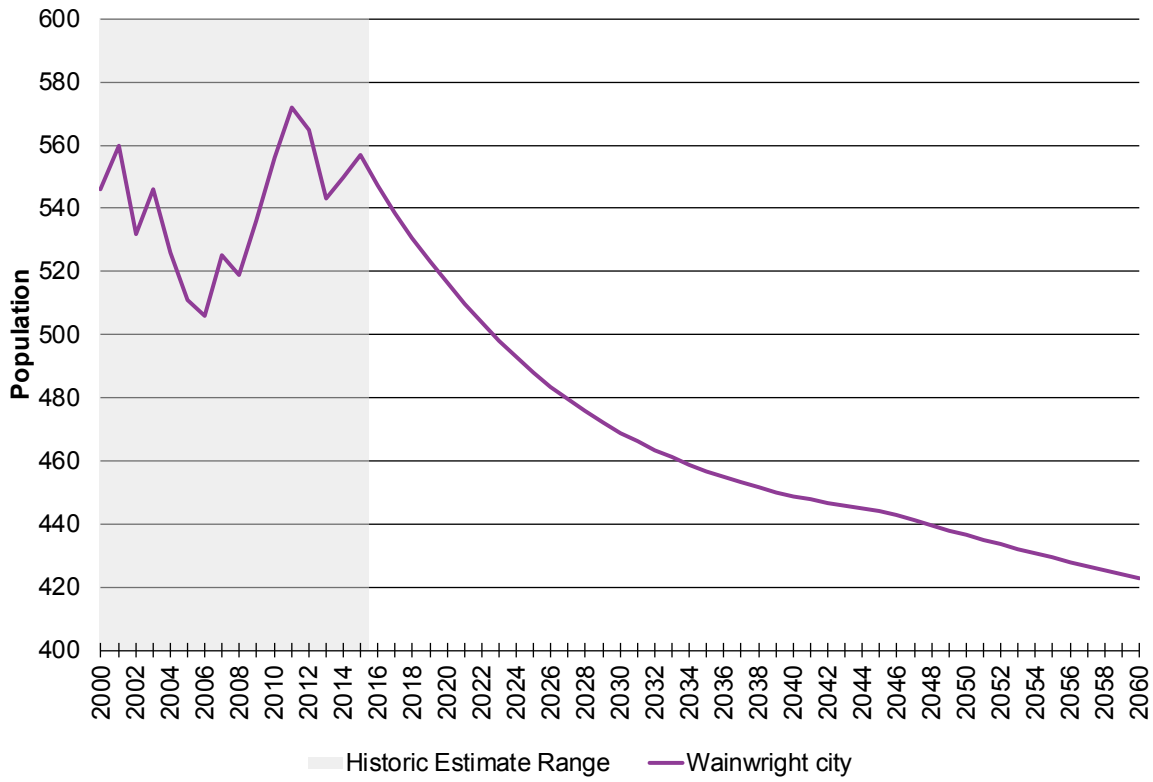
Table 48. Wainwright Commissioner Certified Population Estimates

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Wainwright	556	572	565	543	550	557	NA	557	555

Source: NSBEP&CR, 2016; NSB Staff, 2019

From 2010 to 2015, the community experienced almost no change in population; however, the population is expected to decrease. Figure 31 shows historic estimates of population (shaded in gray) in Wainwright using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. On average, the population of Wainwright is expected to decrease by 3 each year.

Figure 31. Wainwright Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

In 2017, Wainwright's passenger enplanements were highest in July, mail weight was highest in June, and freight weight was highest in May (Table 49). Monthly mail weight was substantially higher than freight weight in every month except May, and seasonal effects on cargo seem to be smaller for Wainwright than in other NSB communities.

Table 49. Aviation Activity in Wainwright, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Passengers	360	358	302	304	202	338	483	323	282	395	210	311	322
Mail (1,000s lb)	88.2	111.4	96.4	108.8	84.6	140.1	102.8	138.4	122.1	90.4	106.3	133.5	110.2
Freight (1,000s lb)	50.2	27.1	53.1	48.0	88.9	61.0	59.5	62.7	46.6	29.3	58.1	41.7	52.2

Source: BTS, 2019

Residents of Wainwright are primarily of Iñupiat descent, making up about 94 percent of the population (Table 50). Caucasian residents represent about four percent of the population, and the remainder includes all other Alaska Native and other ethnicities.

Table 50. Wainwright Ethnic Profile, 2015

Ethnicity	Percentage (%)
Iñupiat	93.6
Caucasian	3.9
Other Ethnicities	2.5

Source: NSBEP&CR, 2016

Table 51 shows demographic and housing characteristics of Wainwright in 2014. The proportion of men to women is relatively balanced, with slightly fewer women at about 48 percent of the population. In 2014, the median age was 31 and the rate of unemployment was 28 percent. While the unemployment rate in Wainwright is significantly higher than urban areas of Alaska or Lower 48 communities, it is not unusual compared to other communities in the NSB. The vacancy rate in Wainwright was 3.6 percent in 2014, with an average of 3.7 persons per occupied home. Residents of Wainwright are dependent on subsistence foods, with 72.6 percent of all households receiving more than half of their diet from locally harvested foods.

Table 51. Demographic and Housing Characteristics, 2014

Demographics	Year 2014
Percent Female	48.3
Percent Male	51.7
Median Age	31
Unemployment (%)	27.9
Housing Characteristics	**Year 2014**
Total Number of Dwelling Units	193
Vacancy Rate (%)	3.7
Average Number of People Per Household	3.6
Households Receiving Half or More of Diet from Subsistence Foods (%)	72.6

Source: NSBEP&CR, 2016

Average income in Wainwright is slightly less than the NSB average at about $55,000 per household (Table 52).

Table 52. Wainwright 2015 Households and Income, Inflation Adjusted Dollars

Number of Households	Number of Individuals	Average Household Income (2018 $)	Per Capita Income (2018 $)
137	517	54,674	14,488

Source: NSBEP&CR, 2016

In 2017 about 12 percent of all Wainwright households had income below the poverty level within the past 12 months (Table 53).

Table 53. Wainwright 2017 Distribution of Household Income and People Living in Poverty

Household Income	Percentage of Total
Less than $10,000	9.0
$10,000 to $14,999	3.0
$15,000 to $24,999	6.0
$25,000 to $34,999	5.2
$35,000 to $49,999	13.4
$50,000 to $74,999	14.2
$75,000 to $99,999	14.9
$100,000 to $149,999	23.1
$150,000 to $199,999	10.4
$200,000 or more	0.7
People living below the poverty level in the past 12 months	12.2

Source: USCB, 2017

Table 54 shows the number of workers for the top occupations in Wainwright in 2016. Most workers are associated with janitorial and cleaner positions. Many other residents work in retail fields as stock clerks and cashiers or maintenance, construction, industrial and plant operations, and a variety of other sectors.

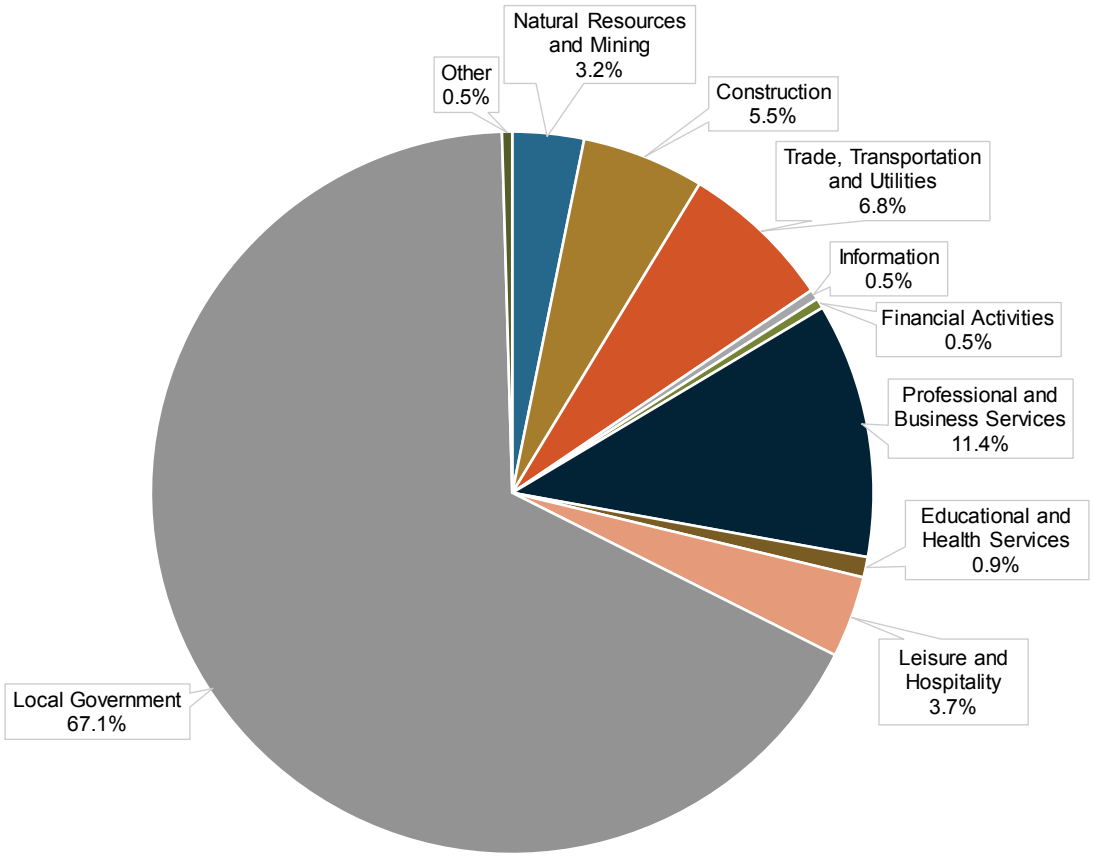
Table 54. Wainwright Top Occupations in 2016

Occupation	Number of Workers
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	23
Recreation Workers	11
Cashiers	11
Stock Clerks and Order Fillers	11
Maintenance and Repair Workers, General	11
Office Clerks, General	8
Power Plant Operators	8
Medical Assistants	7
Teacher Assistants	6
Personal Care Aides	6
Secretaries and Administrative Assistants, Except Legal, Medical, and Executive	6
Office and Administrative Support Workers, All Other	6
Construction Laborers	6
Gas Compressor and Gas Pumping Station Operators	6
Maids and Housekeeping Cleaners	5
Landscaping and Groundskeeping Workers	5
Bus Drivers, School or Special Client	5
Heavy and Tractor-Trailer Truck Drivers	5

Source: DOLWD, 2019c

Local government is the single largest employer in Wainwright, providing 67 percent of all jobs (Figure 32). Professional and Business Services is the second largest industry of employment (11.4 percent), followed by Trade, Transportation, and Utilities (6.8 percent), and Construction (5 percent).

Figure 32. Workers by Industry, Wainwright, Percentage of Total, 2016



Source: DOLWD, 2019c

There are six active status business licenses registered to residents of Wainwright (Table 55). The largest industry sector is Trade with three licenses, but there are also license holders in the Accommodation and Food Services and Construction industries.

Table 55. Wainwright Business Licenses by Industry Sector

NAICS Code	Count	Percent of Total (%)
42 - Trade	3	50.0
72 - Accommodation and Food Services	2	33.3
23 - Construction	1	16.7

Source: DCCED, 2019a

4.7 Kaktovik Community Profile

Kaktovik is a coastal city in the NSB, located to the east of Utqiaġvik and with 246 permanent residents in 2018 (Table 56). The community lies within the Arctic National Wildlife Refuge near calving grounds for the porcupine caribou herd, which is an important source of food for Kaktovik residents (DCCED 2019).

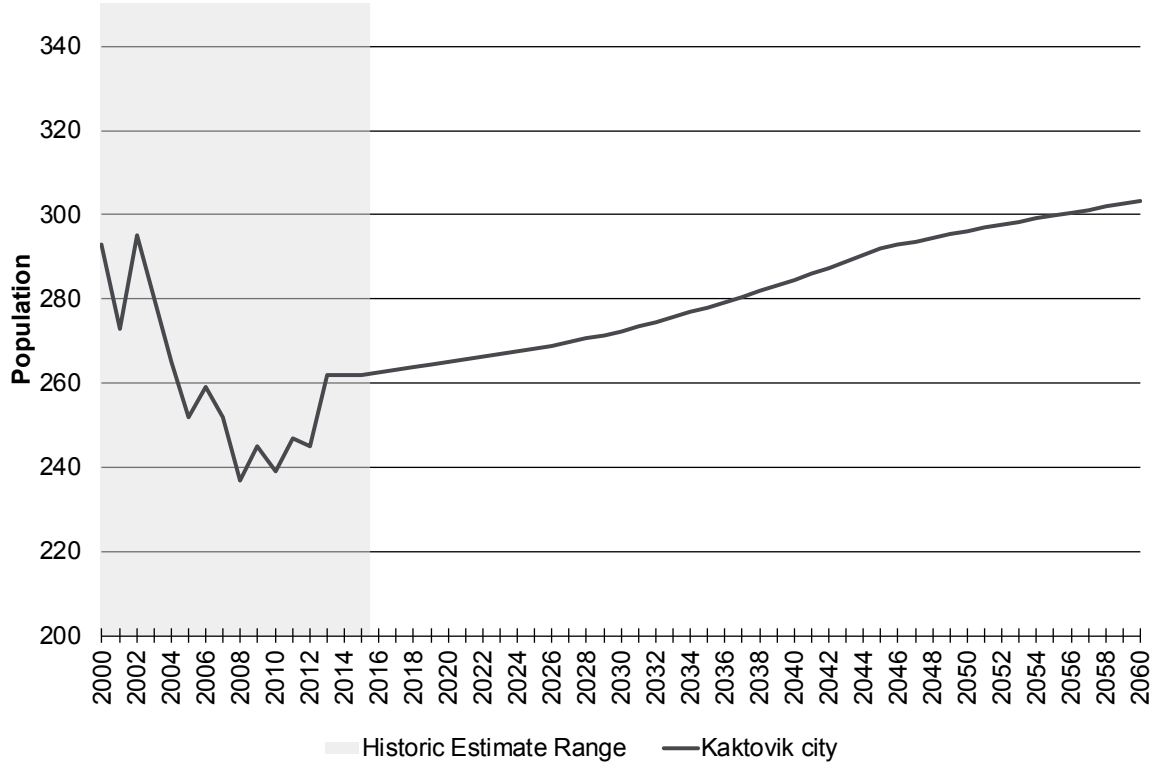
Table 56. Kaktovik Commissioner Certified Population Estimates

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Kaktovik	239	247	245	262	262	262	NA	262	246

Source: NSBEP&CR, 2016; NSB Staff, 2019

From 2010 to 2015, the community grew by 10 percent and a trend of gradual growth is expected in the future. Figure 33 shows historic estimates of population (shaded in gray) in Kaktovik using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. On average, the population of Kaktovik is expected to grow by about one resident per year.

Figure 33. Kaktovik Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

Katovik originally received cargo and passenger flights at the Barter Island Long Range Radar Service Airport, but a relocation project in 2013 involved construction of a new runway and facilities further inland from the radar facility site, which was subject to seasonal flooding and coastal erosion. In addition to regularly scheduled service, chartered flights to Kaktovik have become increasingly more common

with the emergence of a polar bear viewing tourism industry. In 2017, more than 2,000 visitors traveled to Kaktovik to see the endangered species in person, with most visiting in the fall (Alaska Public Media 2018).

In 2017, Kaktovik's passenger enplanements were highest in September, mail weight was highest in August, and freight weight was highest in March (Table 57). Freight weights were widely varied each month, but on average were higher than mail weights. Passenger activity is steady during most of the year except in August and September, which is likely due to wildlife tourism as noted above.

Table 57. Aviation Activity in Kaktovik, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Passengers	285	219	288	207	176	188	226	462	630	295	243	174	283
Mail (1,000s lb)	45.9	41.8	57.7	33.0	41.1	31.8	35.7	71.1	47.1	31.4	51.0	30.8	43.2
Freight (1,000s lb)	95.0	54.4	103.8	47.4	67.8	63.7	49.6	95.4	46.7	32.3	37.5	25.4	59.9

Source: BTS, 2019

Residents of Kaktovik are primarily of Iñupiat descent, making up about 88 percent of the population (Table 58). Caucasian residents represent about nine percent of the population, and the remainder includes all other Alaska Native and other ethnicities.

Table 58. Kaktovik Ethnic Profile, 2015

Ethnicity	Percentage (%)
Iñupiat	87.7
Caucasian	9.0
Other Ethnicities	3.3

Source: NSBEP&CR, 2016

Table 59 shows demographic and housing characteristics of Kaktovik in 2014. The proportion of men to women is unbalanced, with women making up only 43 percent of the population. In 2014, the median age was 28 and the rate of unemployment was 28.2 percent. While the unemployment rate in Kaktovik is significantly higher than urban areas of Alaska or Lower 48 communities, it is not unusual compared to other communities in the NSB. The vacancy rate in Kaktovik was 0 percent in 2014, with an average of 3.9 persons per occupied home. Residents of Kaktovik are dependent on subsistence foods, with 62.6 percent of all households receiving more than half of their diet from locally harvested foods.

Table 59. Demographic and Housing Characteristics, 2014

Demographics	Year 2014
Percent Female	43.1
Percent Male	56.9
Median Age	28
Unemployment (%)	28.2
Housing Characteristics	**Year 2014**
Total Number of Dwelling Units	102
Vacancy Rate (%)	0.0
Average Number of People Per Household	3.9
Households Receiving Half or More of Diet from Subsistence Foods (%)	62.6

Source: NSBEP&CR, 2016

Average income in Kaktovik is the lowest of all the reported communities in the study area at about $33,000 per household (Table 60).

Table 60. Kaktovik 2015 Households and Income, Inflation Adjusted Dollars

Number of Households	Number of Individuals	Average Household Income (2018 $)	Per Capita Income (2018 $)
57	211	32,880	8,882

Source: NSBEP&CR, 2016

In 2017 about 9 percent of all Kaktovik households had income below the poverty level within the past 12 months, which is the lowest rate of poverty in the NSB communities (Table 61). Household income of Kaktovik residents is widely and evenly distributed compared to other NSB communities, and less than one percent of the households reported an income less than $10,000.

Table 61. Kaktovik 2017 Distribution of Household Income and People Living in Poverty

Household Income	Percentage of Total
Less than $10,000	0.0
$10,000 to $14,999	1.8
$15,000 to $24,999	12.3
$25,000 to $34,999	14.0
$35,000 to $49,999	14.0
$50,000 to $74,999	21.1
$75,000 to $99,999	7.0
$100,000 to $149,999	17.5
$150,000 to $199,999	8.8
$200,000 or more	3.5
People living below the poverty level in the past 12 months	9.4

Source: USCB, 2017

Table 62 shows the number of workers for the top occupations in Kaktovik in 2016. Most Kaktovik workers are construction laborers, maintenance workers, plant operators, or truck drivers. There also jobs in administrative and executive roles, as well as teaching assistants.

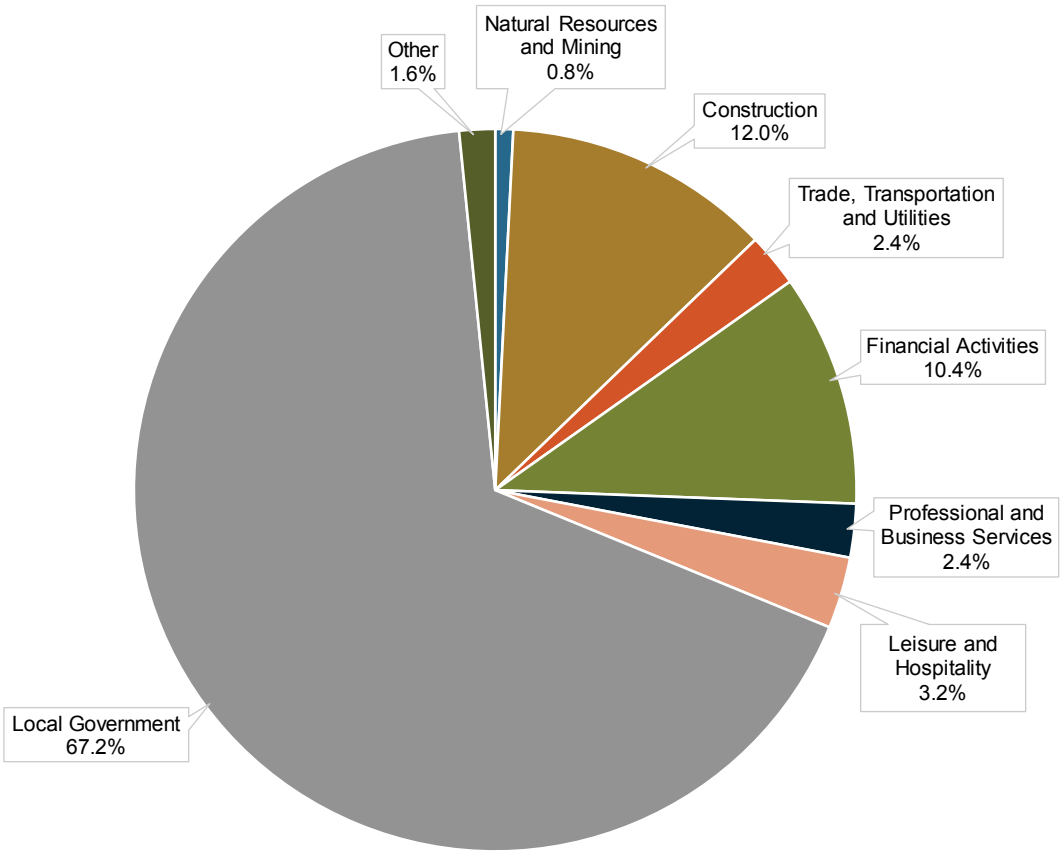
Table 62. Kaktovik Top Occupations in 2016

Occupation	Number of Workers
Construction Laborers	13
Chief Executives	9
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	7
Maintenance and Repair Workers, General	7
Executive Secretaries and Executive Administrative Assistants	6
Power Plant Operators	6
Heavy and Tractor-Trailer Truck Drivers	6
Teacher Assistants	5

Source: DOLWD, 2019c

Local government is the single largest employer in Kaktovik, providing 67.2 percent of all jobs (Figure 34) Construction is the second largest employment industry making up 12 percent of jobs, followed by Financial Activities with 10.4 percent.

Figure 34. Workers by Industry, Kaktovik, Percentage of Total, 2016



Source: DOLWD, 2019c

There are 20 active status business licenses registered to residents of Kaktovik (Table 63). The largest industry sectors are Accommodation and Food Services and Transportation and Warehousing, each with five licenses making up one quarter of the total. Other top sectors in Kaktovik include Trade and Arts, Entertainment and Recreation.

Table 63. Kaktovik Business Licenses by Industry Sector

NAICS Code	Count	Percent of Total (%)
72 - Accommodation and Food Services	5	25.0
48 - Transportation and Warehousing	5	25.0
42 - Trade	4	20.0
71 - Arts, Entertainment and Recreation	2	10.0
23 - Construction	1	5.0
54 - Professional, Scientific and Technical Services	1	5.0
51 - Information	1	5.0
55 - Management of companies and enterprises	1	5.0

Source: DCCED, 2019a

4.8 Point Lay Community Profile

Point Lay is a coastal community in the NSB, with 287 permanent residents in 2018 (Table 64). From 2010 to 2015, the community grew by 42 percent and the trend is expected to continue in the future. Point Lay is also one of the youngest NSB communities, having been settled in the 1930s. The area is subject to coastal erosion and the village has been relocated twice (NSBD 2019).

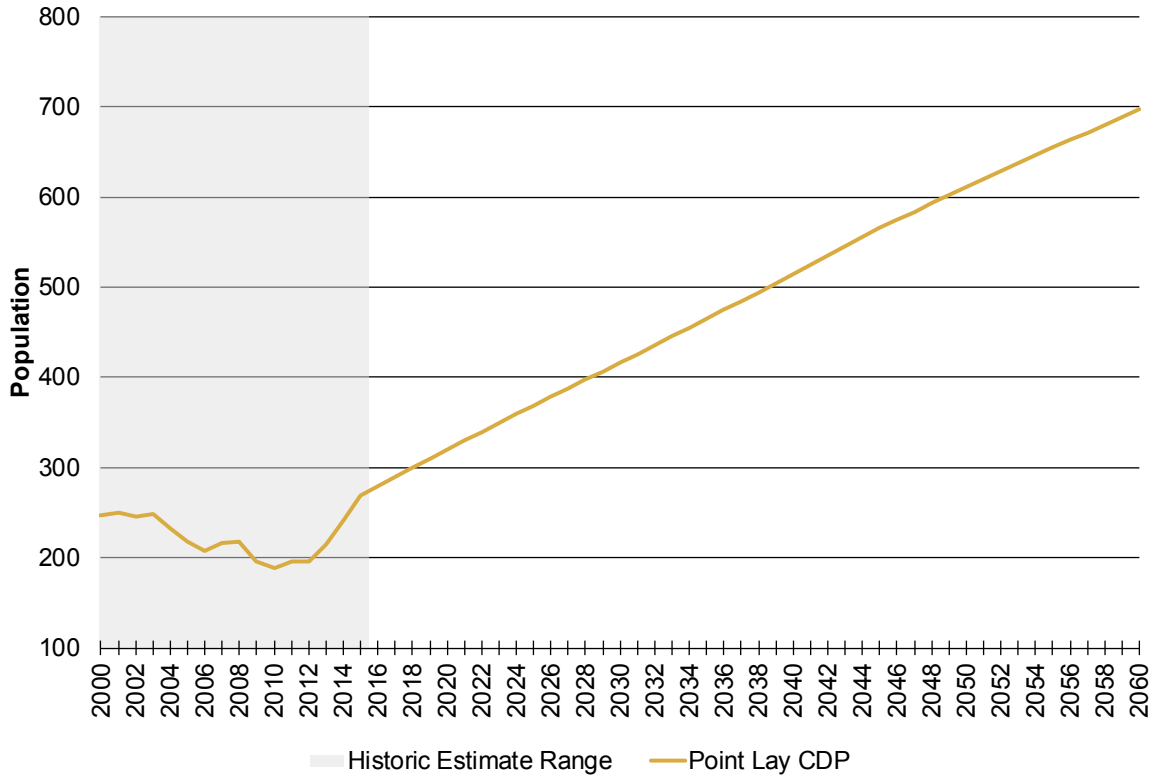
Table 64. Point Lay Commissioner Certified Population Estimates

	2010	2011	2012	2013	2014	2015	2016	2017	2018
Point Lay	189	196	196	215	242	269	NA	269	287

Source: NSBEP&CR, 2016; NSB Staff, 2019

Figure 35 shows historic estimates of population (shaded in gray) in Point Lay using DOLWD data from 2000 to 2009 and NSBEP&CR data from 2010 to 2015. Based on recent increases in population, Point Lay is expected to grow by about 9 residents per year. It has one of the highest expected rates of growth in the NSB.

Figure 35. Point Lay Historic Population Estimates and Forecast



Sources: DOLWD, 2019a; DOLWD, 2019e; NSBEP&CR, 2016; Northern Economics estimates

Point Lay has a gravel airstrip owned by the United States Air Force which is used for passenger and cargo transportation (DCCED 2019). In 2017, Point Lay's passenger enplanements were highest in January, which is unusual compared to the other NSB communities where passenger aviation activity peaks in the summer or fall (Table 65). Monthly mail weight appears to be seasonal with a peak in the fall, but April was also a significant month for mail in 2017. Freight weights on average were substantially smaller than mail weights, and also exhibit some seasonal influence.

Table 65. Aviation Activity in Point Lay, 2017

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Passengers	263	199	153	105	107	137	139	211	171	199	170	117	164
Mail (1,000s lb)	30.1	39.9	38.4	58.0	40.9	46.3	38.4	52.1	56.3	67.1	24.5	41.3	44.4
Freight (1,000s lb)	8.6	9.2	59.4	15.2	19.9	18.3	18.6	14.6	11.1	24.3	10.6	12.2	18.5

Source: BTS, 2019

Residents of Point Lay are primarily of Iñupiat descent, making up about 90 percent of the population (Table 66). Caucasian residents represent about seven percent of the population, and the remainder includes all other Alaska Native and other ethnicities.

Table 66. Point Lay Ethnic Profile, 2015

Ethnicity	Percentage (%)
Iñupiat	89.7
Caucasian	7.3
Other Ethnicities	3.0

Source: NSBEP&CR, 2016

Table 67 shows demographic and housing characteristics of Point Lay in 2014. The proportion of men to women is unbalanced, with slightly fewer women at about 44 percent of the population. In 2014, the median age was 22 and the rate of unemployment was 34.1 percent, which is the second highest rate among the NSB communities. The vacancy rate in Point Lay was 3.9 percent in 2014, with an average of 3.3 persons per occupied home. Residents of Point Lay are dependent on subsistence foods, with 56.1 percent of all households receiving more than half of their diet from locally harvested foods.

Table 67. Demographic and Housing Characteristics, 2014

Demographics	Year 2014
Percent Female	44.2
Percent Male	55.8
Median Age	22
Unemployment (%)	34.1
Housing Characteristics	**Year 2014**
Total Number of Dwelling Units	77
Vacancy Rate (%)	3.9
Average Number of People Per Household	3.3
Households Receiving Half or More of Diet from Subsistence Foods (%)	56.1

Source: NSBEP&CR, 2016

Average income in Point Lay is the second lowest of all the reported communities in the study area at about $36,000 per household (Table 68).

Table 68. Point Lay 2015 Households and Income, Inflation Adjusted Dollars

Number of Households	Number of Individuals	Average Household Income (2018 $)	Per Capita Income (2018 $)
70	233	36,030	10,824

Source: NSBEP&CR, 2016

In 2017 about 22.5 percent of all Point Lay households had income below the poverty level within the past 12 months, which is the highest rate of poverty in the NSB communities (Table 69).

Table 69. Point Lay 2017 Distribution of Household Income and People Living in Poverty

Household Income	Percentage of Total
Less than $10,000	4.5
$10,000 to $14,999	10.4
$15,000 to $24,999	4.5
$25,000 to $34,999	6.0
$35,000 to $49,999	19.4
$50,000 to $74,999	20.9
$75,000 to $99,999	17.9
$100,000 to $149,999	9.0
$150,000 to $199,999	4.5
$200,000 or more	3.0
People living below the poverty level in the past 12 months	22.5

Source: USCB, 2017

Table 70 shows the number of workers for the top occupations in Point Lay in 2016. The two top occupations in Point Lay are janitorial cleaning and power plant operation with nine workers each. There are also Point Lay residents working as teaching assistants, maintenance workers, and water treatment plant operators. The only business license in held Point Lay is in the utilities sector (DCCED 2019a)

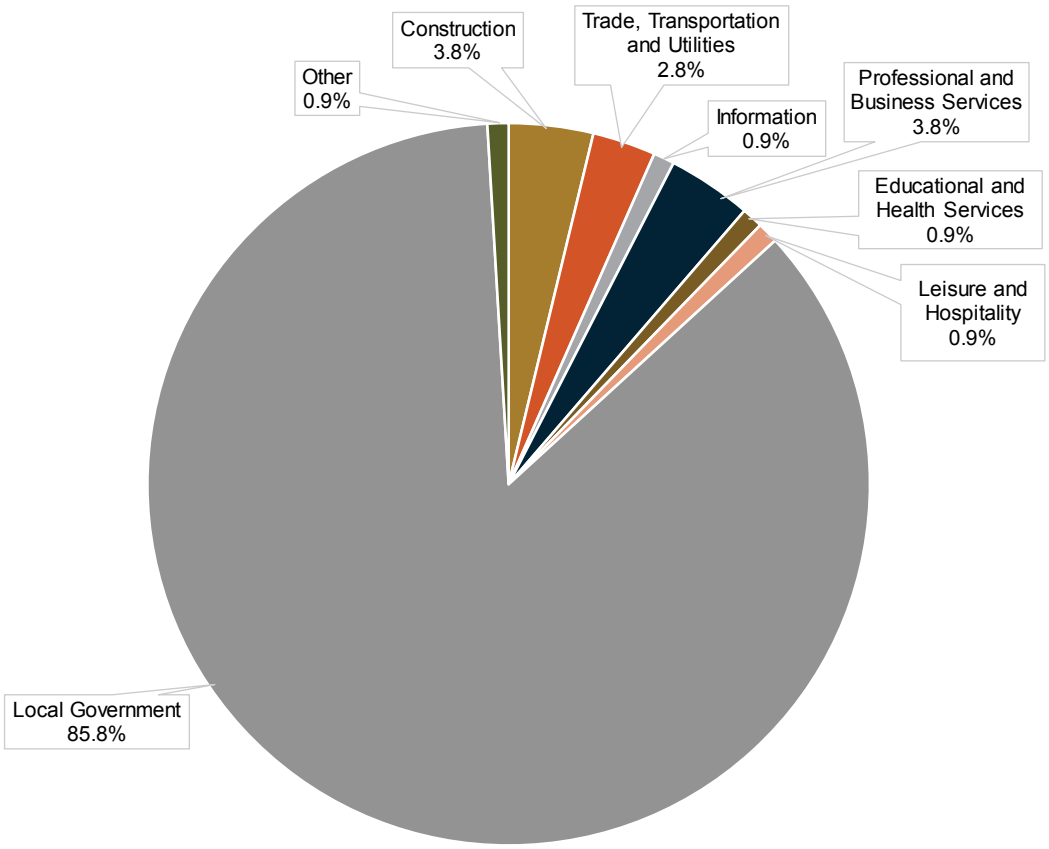
Table 70. Point Lay Top Occupations in 2016

Occupation	Number of Workers
Janitors and Cleaners, Except Maids and Housekeeping Cleaners	9
Power Plant Operators	9
Teacher Assistants	5
Maintenance and Repair Workers, General	5
Water and Wastewater Treatment Plant and System Operators	5

Source: DOLWD, 2019c

Local government is the single largest employer in Point Lay, providing more 85 percent of all jobs (Figure 36) While there are some jobs in construction and other industries, Point Lay is heavily dependent upon local government for employment opportunities.

Figure 36. Workers by Industry, Point Lay, Percentage of Total, 2016



Source: DOLWD, 2019c

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