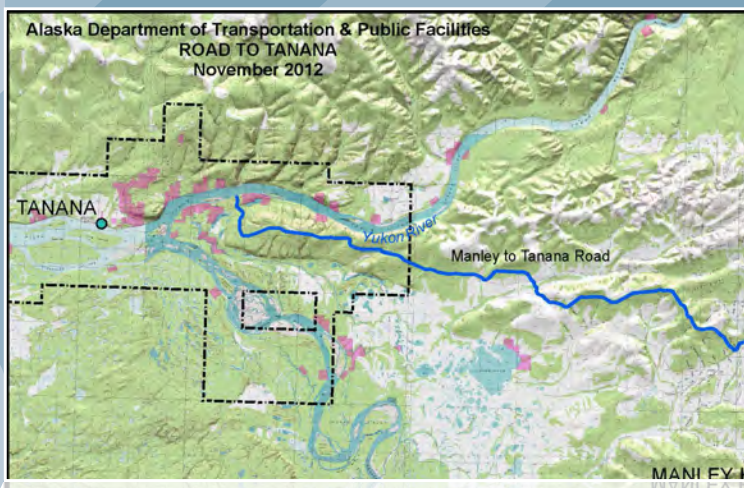
# Manley Hot Springs to Tanana Road Economic Effects




*Prepared for the*

Alaska Department of Transportation and Public Facilities

Final Report

January 2013

Northern Economics

Wisdom • Trust • Relevance • Innovation

# Economic Effects of Proposed Road: Manley Hot Springs to Tanana

## Final Report

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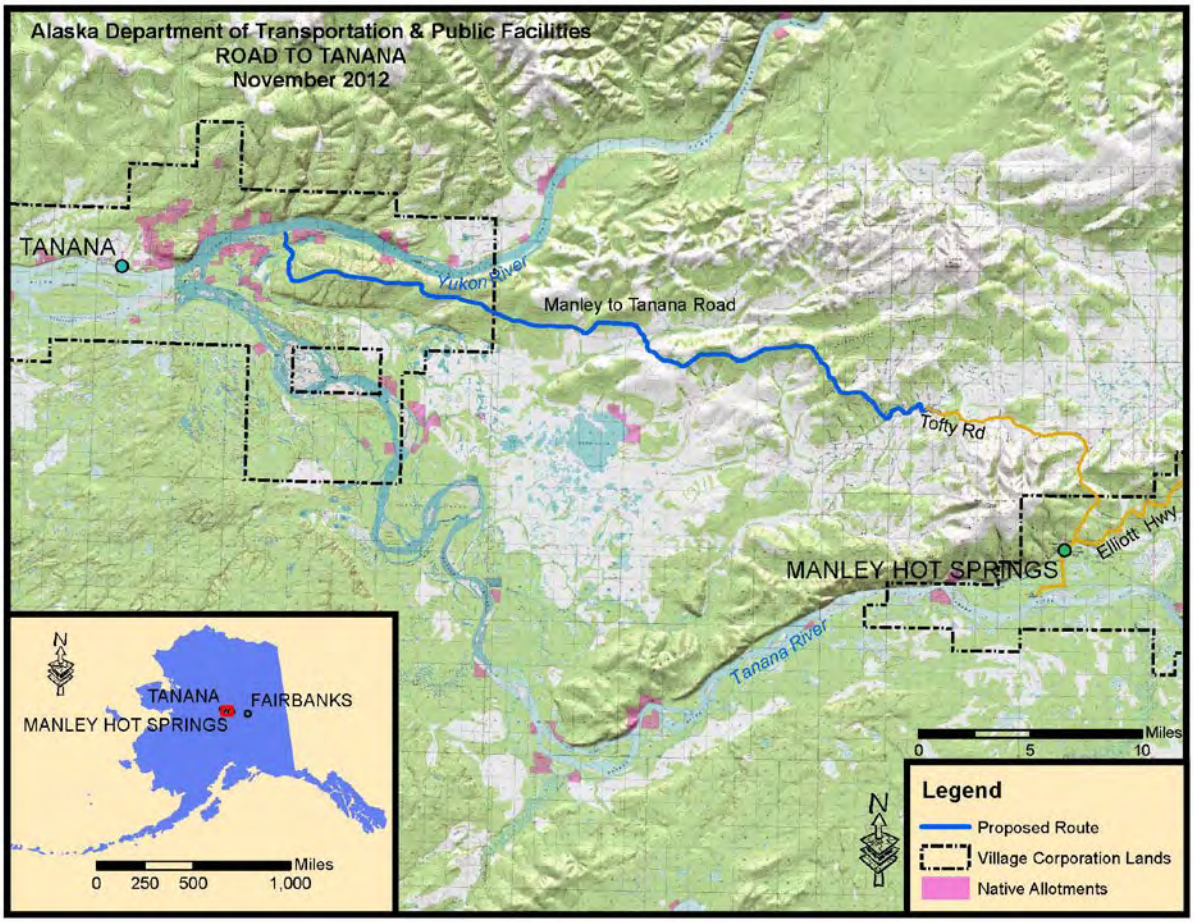
# Abbreviations

| | |
|---|---|
| ADF&G | Alaska Department of Fish and Game |
| DOLWD | Alaska Department of Labor and Workforce Development |
| ADOT&PF | Alaska Department of Transportation and Public Facilities |
| BTS | Bureau of Transportation Statistics |
| DCCED | Alaska Department of Commerce, Community, and Economic Development |
| TVC | Tanana Valley Campus |
| WAAPS | Western Alaska Access Planning Study |
| UAF | University of Alaska Fairbanks |
| USPS | United Stated Postal Service |

# Executive Summary

This analysis estimates the potential economic benefits of extending Alaska's road system from the current endpoint of the Elliott Highway at Manley Hot Springs to Tanana. Figure ES-1 illustrates the proposed road corridor. The corridor and study area for this report are located in the Yukon-Koyukuk Census Area. The boundaries of the project extend from the end of the Elliott Highway at Manley Hot Springs to a terminus on the south shore of the Yukon River. The study assumes that a ferry and ice bridge will initially be used to cross the Yukon to reach Tanana, which is located on the north shore.

**Figure ES-1. Map of the Yukon River Corridor and the Study Area**




Source: State of Alaska, DOT&PF, 2012

The various transportation modes likely affected by a new access route, include:

- Passenger air travel
- Barged fuel and freight shipments
- Bypass mail
- Air cargo

All of the freight, fuel, and mail moved into Tanana arrives by either barge or air. This analysis estimates cost savings for the new road by keeping current commodity volumes constant under the

"with road" scenario, while assuming the cost of transportation changes. Under the "with road" scenario, the study team anticipates that a significant percentage of the current commodity volumes will shift from a more expensive mode of transportation (i.e. air or barge) to less expensive truck transport.

In order to capture current transportation costs, the study team relied on publically available data from the 2010 Bureau of Transportation Statistics, the Internal Revenue Service, and published airfares. In several instances, the study team conducted interviews with vendors, shippers and other key stakeholders to obtain current commodity volumes or shipping costs. The study concludes that there is potential to achieve substantial annual transportation cost savings from the proposed Manley to Tanana road. The results suggest savings of nearly $600,000 annually associated with the community of Tanana and a potential annual savings of up to $2.4 million in shipping costs to other Yukon River communities (see Table ES-1).

**Table ES-1. Estimated Transportation Related Savings**

| Community | Freight and Fuel ($) | Mail ($) | Passengers ($) | Total ($) |
|---|---|---|---|---|
| Tanana | 295,000 | 141,000 | 140,000 | 576,000 |
| Rampart | 5,000 | N/A | N/A | 5,000 |
| Ruby | 26,000 | N/A | N/A | 26,000 |
| Galena | 184,000 | N/A | N/A | 184,000 |
| Koyukuk | 15,000 | N/A | N/A | 15,000 |
| Nulato | 66,000 | N/A | N/A | 66,000 |
| Kaltag | 68,000 | N/A | N/A | 68,000 |
| Grayling | 89,000 | N/A | N/A | 89,000 |
| Anvik | 48,000 | N/A | N/A | 48,000 |
| Holy Cross | 108,000 | N/A | N/A | 108,000 |
| Russian Mission | 218,000 | N/A | N/A | 218,000 |
| Marshall | 273,000 | N/A | N/A | 273,000 |
| Pilot Station | 387,000 | N/A | N/A | 387,000 |
| St. Mary's | 384,000 | N/A | N/A | 384,000 |
| Mt. Village | 549,000 | N/A | N/A | 549,000 |
| **Total** | **2,715,000** | **141,000** | **140,000** | **2,996,000** |

Note: Estimates are rounded

Source: Estimates by Northern Economics, Inc. based on Bureau of Transportation Statistics, 2010; Ruby Marine, 2012; Sweeny, 2012; Sweetsir, 2012.

With a new road that provides access from Tanana to Fairbanks, much of the passenger and air cargo volumes will likely shift to ground transportation. The most significant cost savings will likely be from shifting cargo and mail from air delivery to truck delivery. The study notes that in order for trucks and passenger vehicles to become the primary modes of transportation, the road terminus must be in a location that is well suited to creating a ferry landing and barge tie-up. If the terminus is placed in an inconvenient location, then many of the benefits noted in this report will not begin to accrue until the Alaska Department of Transportation and Public Facilities reconfigures the terminus to accept infrastructure necessary to move people and goods across the Yukon. In addition, the savings are dependent on transportation companies moving some or all of their loading operations to the road terminus. While the barge companies interviewed in this report did not commit to moving, during

interviews, at least some participants indicated that they might consider moving their operations under the right conditions. Others indicated a preference of staying in Nenana given existing investments there. Thus, the savings estimates in this report are upper bound estimates based on current volumes should loading occur on the Yukon near Tanana.

It is clear that the road would create an opportunity for potential new investments by barge companies and/or utilities at the proposed new landing near Tanana on the Yukon River if the road alignment takes the need of barge/utility companies into consideration. The study team anticipates that the logistics of delivering the current fuel and freight volumes will change substantially. For example, rather than seasonal barge shipments from Nenana, the study team anticipates that fuel will ship directly via truck from the refineries located in North Pole to the road terminus on the eastern banks of the Yukon River. The fuel would then be moved across the Yukon via an ice road, ferry, or barge for the short trip to Tanana. Note that there would be periods of time during freeze-up and breakup when movement across the Yukon River would not be possible until a permanent bridge is constructed.

Additionally, the study notes that the savings associated with transportation cost reductions will accrue to different user groups. For example, residents will likely experience direct savings from passenger travel. Fairbanks is a common destination of Tanana residents, or a transfer point for further travel. The study suggests that based on proximity and a lower cost of using passenger vehicles, many Tanana residents will choose to drive to Fairbanks rather than fly. There is quite a bit of variation in this result, however, as the savings will depend on volume of vehicle ownership, road conditions, and personal preferences for travel. Therefore, it is important to note that many of the estimated savings may represent general savings to society, rather than direct savings to the nearby communities. That is, while residents are likely to experience significant benefits from reduced freight and cargo costs, it is difficult to anticipate how much of the cost savings will transfer directly to them. How the savings will be distributed between the carriers and consumers depends on how the cost of conducting business shifts, or does not shift, in the study area.

# 1 Introduction

This report, requested by the Alaska Department of Transportation and Public Facilities (ADOT&PF), evaluates the economic benefits of constructing a road between the communities of Manley Hot Springs and Tanana. The first portion of the report summarizes and discusses the existing socioeconomic conditions of the project study area, while the second half lays out the potential effects under the "with road" scenario.

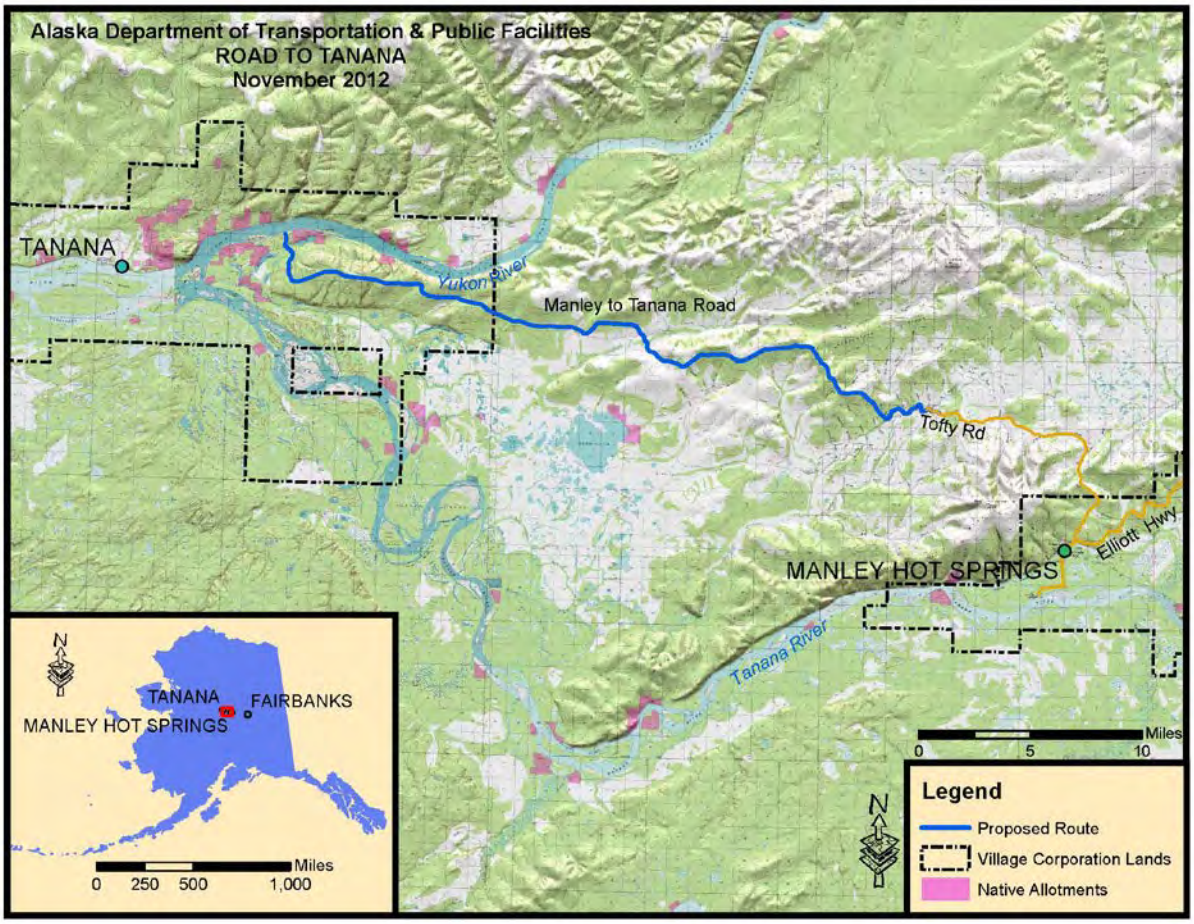
This study considers the direct effects on communities directly connected to the project, by analyzing likely transportation changes in the area. The list of potential effects includes passenger travel, fuel and freight shipments, bypass mail, air cargo, and local industries likely to benefit from road access to the area. Where possible for each topic, the study team interviewed vendors, shippers, local elected officials and other key stakeholders to ensure various aspects of the economic effects are estimated as accurately as possible.

Additionally, the study team considered other socioeconomic effects from a new road by analyzing the potential changes in employment, subsistence, income, population, and public services. The study's intent is for stakeholders, policy makers, and other interested parties to have accurate information to decide if the benefits of connecting a road between Manley Hot Springs and Tanana exceed the costs.

## 1.1 Study Area

The study area for this report is located in the Yukon-Koyukuk Census Area, along the Yukon River. The boundaries of the current project extend from the end of the Elliott Highway at Manley Hot Springs to a terminus on the south shore of the Yukon River. The study assumes that a ferry and ice bridge will initially be used to cross the Yukon to reach Tanana, which is located on the north shore. Figure 1 depicts the study area for this analysis. The communities of Manley Hot Springs and Tanana are the only communities expected to experience direct effects from the new road; however, communities downstream of Tanana may experience some benefits of lower shipping costs, if fuel ships from Tanana rather than Nenana. Additionally, the Tofty Ridge mine is also included in the analysis to provide a comprehensive analysis of socioeconomic impacts to the region.

**Figure 1. Map of Study Area and the Proposed Road**




Source: State of Alaska, DOT&PF, 2012

There is only one route for the proposed road currently under consideration by ADOT&PF. The proposed road begins outside of Manley Hot Springs and extends to the west from Tofty Road at the terminus of the Elliott Highway.

### Road Characteristics

There are two options currently under consideration for the Manley Hot Springs to Tanana road. The first option is an 18-foot, single-lane road with pullouts every quarter mile for passing traffic. The second is a 24-foot, two-lane road. Both options will be topped with 6 inches of crushed aggregate with embankment depths ranging from 2–5 feet of sub-base material to help accommodate heavier traffic loads. The benefit to both options, compared to the original cross-section, is reduced construction costs. The current project estimate is $10M for a pioneer road and $30M for a two-lane road. On the other hand, the narrower roads will likely require slightly higher long-term maintenance costs due to the same amount of axle load driving over a smaller surface.

## 1.1.1 Study Area Communities

As previously discussed, Manley Hot Springs and Tanana are the only two communities located in the study area. The two villages are approximately 70 nautical miles apart via the Tanana River, and

accessible to each other through air transportation. A new road will likely reduce the costs of traveling between the communities, but will have a more pronounced effect on Tanana, which would have road access to the Elliott and Dalton Highways. The impacts discussed in the analysis measure the cost savings for these two communities, but it is important to note that these savings represent only the first-order effects of a new road. It is likely that other communities in the Fairbanks North Star Borough will also experience secondary or indirect effects from construction and maintenance of the road, and cheaper access to the region.

A brief description of the two communities follows to provide context of the region in which the project will occur. Chapter 2, the existing conditions section, contains a detailed discussion of the study communities, including socioeconomic data.

## Manley Hot Springs

Manley Hot Springs is located near the Tanana River, approximately 160 road miles west of Fairbanks. According to 2010 population estimates, Manley Hot Springs is currently home to 89 residents. Originally claimed in 1902 by a mine prospector, the area also became a telegraph station for the U.S. Army and a supply point for the Eureka and Tofty mining belts (Alaska Department of Commerce, Community, and Economic Development [DCCED] 2012a). Despite the community's proximity to the two mining districts, the population has remained relatively small and government continues to provide approximately a quarter of the cash jobs in the community. Both subsistence and a barter system remain in place for residents, with local gardening and hunting providing much of the food.

**Figure 2. Manley Hot Springs Roadhouse**

Source: Wikipedia (Public Release), 2009

## Tanana

Tanana is a small community of 246 residents (2010) located near the junction of the Tanana and Yukon Rivers, approximately 130 air miles west of Fairbanks. The community began as a trading post for Koyukon and Tanana Athabascans due to the village's proximity to the juncture of the Tanana and Yukon Rivers. Since the early twentieth century, local hospitals and government employment have generated the majority of economic activity in the local cash economy (DCCED 2012a). Currently, city government, the school district, and the Tanana Tribal Council provide the majority of full-time work in the community. Seasonal work in fishing, firefighting, and construction provide additional income for local residents. Subsistence hunting also plays an important role in providing food to the community.

**Figure 3. Tanana Health Center**

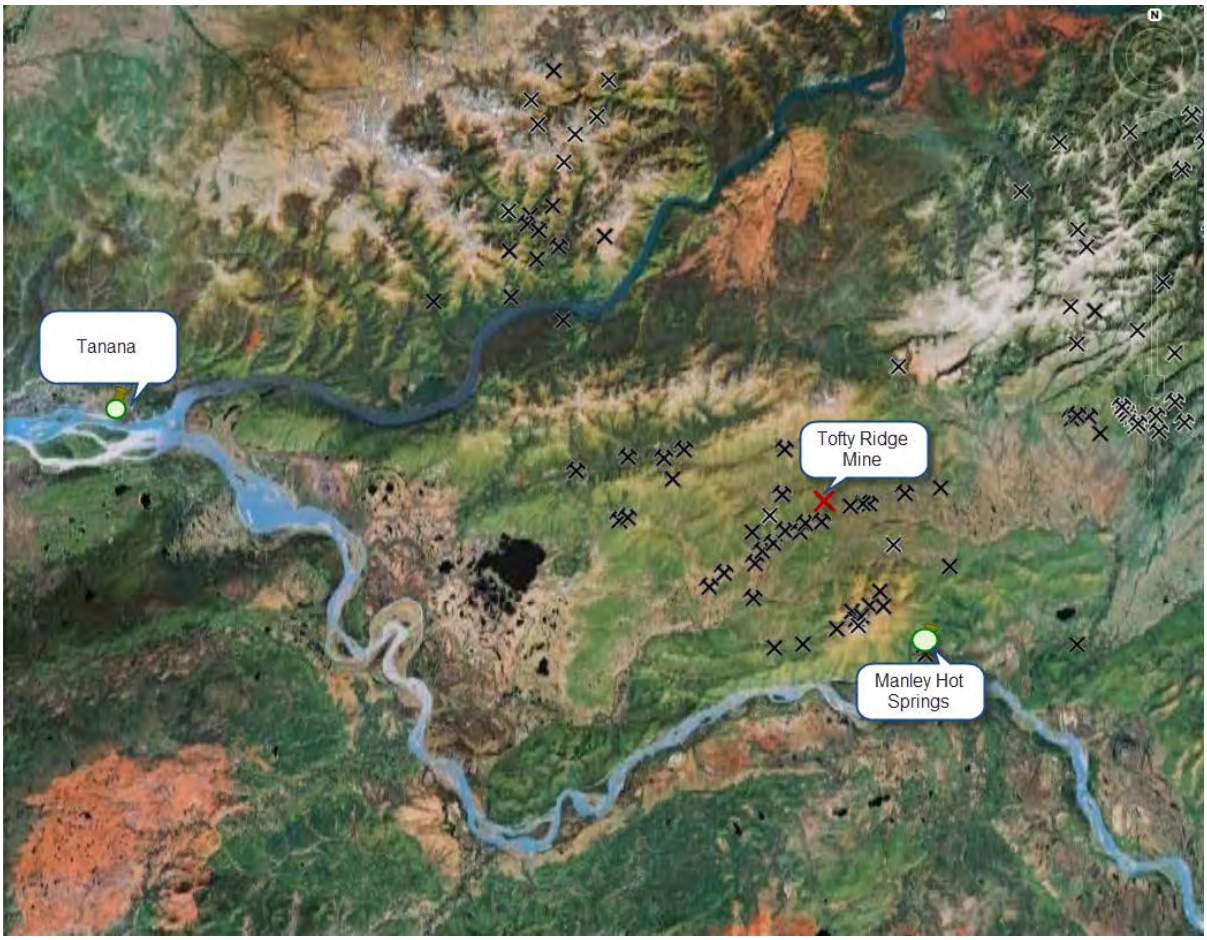

Source: Northern Economics, Inc., 2007

### 1.1.2 Mineral Deposits and Proposed Mines

The study area contains the Tofty Tin Belt, a 12-mile long area north of Manley Hot Springs, which has been of interest for mineral extraction since the end of the nineteenth century. Surveyors first discovered gold between 1906 and 1907, prior to the U.S. Geological Survey (USGS) finishing the first geologic map in 1913 (Stevens 1999). Significant surveying and exploration occurred throughout the twentieth century with numerous deposits located and developed during the early twentieth century.

Despite the number of exploratory sites listed, many sites remain undeveloped due to limited reserves, remoteness, arctic climate, and lack of transportation infrastructure. Figure 4 illustrates the location of various mines, prospects, or mineral occurrences identified in the study area. There are numerous prospects and mine sites near Manley Hot Springs, which may be easier to access after the construction of the proposed road. There are no major mines sites located in the immediate vicinity of Tanana; however, significant deposits have been identified west of Tanana. While this road will not facilitate direct road access to these sites, the road would make Tanana a more viable base for exploration.

**Figure 4. Mineral Deposits inside the Study Area**




Source: USGS Alaska Data Resource File and Google Earth, 2012

The Tofty Ridge Prospect has been identified as the most likely candidate for further exploration after the extension of a new road to Tanana (DOWL HKM 2010). As a source of significant mineral value in the study area, Tofty Ridge holds significant occurrences of uranium, thorium, and rare earth elements. A gross mineral value was not determined for Tofty Ridge in the report, since the value of rare earth elements was still uncertain. Figure 4 illustrates the proximity of the Tofty Ridge Prospect to Manley Hot Springs and Tanana. The construction of a new road between Manley Hot Springs and Tanana may increase the economic viability of mining in the Tofty Ridge Prospect. However much of this area is currently served by the pioneer road in the area.

### 1.1.3 Other Resources

This report focuses on the socioeconomic benefits to the communities identified within the study region. As part of this research, the study team identifies potential resources along the route that may complement the other identified benefits for local residents. Mining is the primary resource with potential for further development along the Yukon River; however, the new route would also open up the area to more recreational use from residents in the nearby Fairbanks North Star Borough and more distant road system communities.

Tourism is a potential growth industry to the area, and Manley Hot Springs currently receives some tourism traffic to the Manley Road House. The high cost of reaching the interior, however, will likely constrain tourism growth in the near future. It is possible that recreational and commercial hunting and fishing activities will grow as the new road creates easier access to new resources in the study area. However, some of this growth will depend on residents' acceptance of a larger recreational hunting and fishing industry in the area. Some local residents may view a growth in the sport hunting and fishing industry as having a negative effect on subsistence resources.

Estimates of available resources in the study area suggest a limited potential for expanding into other resource industries, such as forestry and agriculture, which currently represent a small proportion of Alaska's overall economy (DOWL HKM 2010). The study team also does not expect significant growth in the energy industry within the study area resulting from the construction of this road. At this time, the study is not aware of any pipeline construction expected in the area, nor are there any known deposits of coal in the region. However, DOWL HKM (2010) does note that with the construction of future roads and the development of the Donlin Creek mine, a natural gas pipeline could extend to the mine, which could also provide natural gas to the surrounding communities

# 2 Existing Conditions

This section profiles the socioeconomic conditions for the study communities. Current demographic and economic data from the U.S. Census and American Community survey provide the most recent statistics available for both communities. The study also describes the current public infrastructure for Manley and Tanana, with an emphasis on transportation and energy conditions.

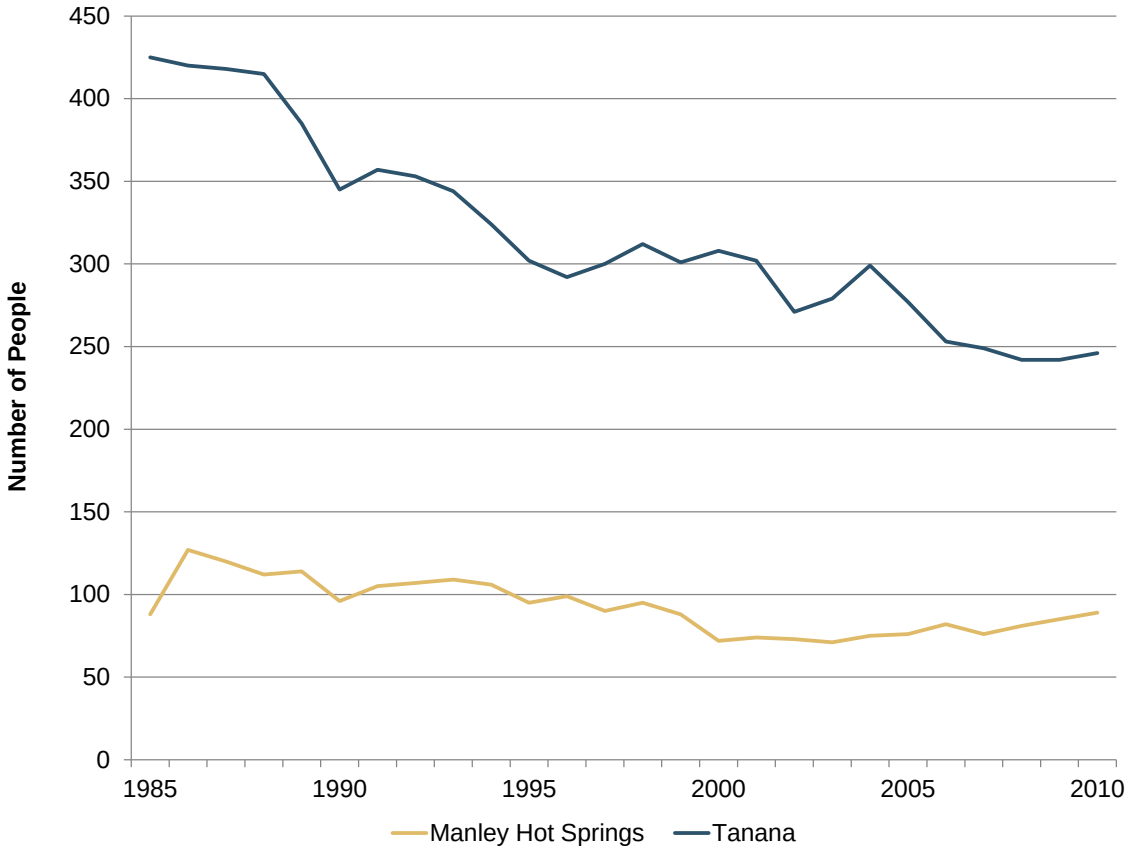
## 2.1 Demographic Characteristics

This section describes the social characteristics of the identified population within the study area. The different categories included for this study are population, race/ethnicity, age, education, and household composition. The different data and trends represented below provide context and understanding of the population likely affected by the new road.

### 2.1.1 Population

During 2010, Manley Hot Springs was home to 89 residents, while Tanana had a population of 246. As shown in Figure 5, the population of Manley Hot Springs increased slightly over the last decade, likely due to increased tourist activity. Additionally, Manley Hot Springs is on the road system and has a lower cost of living. The population of Tanana has trended downward over the decade. The downward trend for Tanana began after 1982, when the community lost 52 jobs due to the closure of the local hospital (City of Tanana), but the decrease in population over the last decade has been proportionately similar to that of the Yukon-Koyukuk Census Area (Alaska Department of Labor and Workforce Development [DOLWD] 2012).

**Figure 5. Manley Hot Springs and Tanana Population, 1985-2010**




Source: DOLWD, 2012

Table 2 compares the population growth in the study area with the Yukon-Koyukuk Census area, the interior region, and the State of Alaska since 1985. The area as a whole has declined in population since 1985, with Tanana above the average decline rate for the Yukon-Koyukuk Census area. The DOLWD projects that under current conditions, the population in the region will continue to decline at one percent per annum through 2035. The state overall has shown a continued increase in population since 1985, which the DOLWD expects will continue at one to two percent per year through 2035.

**Table 1. Population Comparison, 1985-2010**

| Area | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 | Percent Growth 1985-2010 |
|---|---|---|---|---|---|---|---|
| Manley Hot Springs | 88 | 96 | 95 | 72 | 76 | 89 | 1.1 |
| Tanana | 425 | 345 | 302 | 308 | 277 | 246 | -42.1 |
| Y-K Census Area | 9,082 | 6,714 | 6,390 | 6,510 | 6,042 | 5,588 | -38.5 |
| Interior Region | 88,343 | 92,111 | 96,184 | 97,417 | 104,391 | 112,024 | 26.8 |
| State of Alaska | 541,300 | 550,043 | 601,581 | 626,932 | 667,146 | 710,231 | 31.2 |

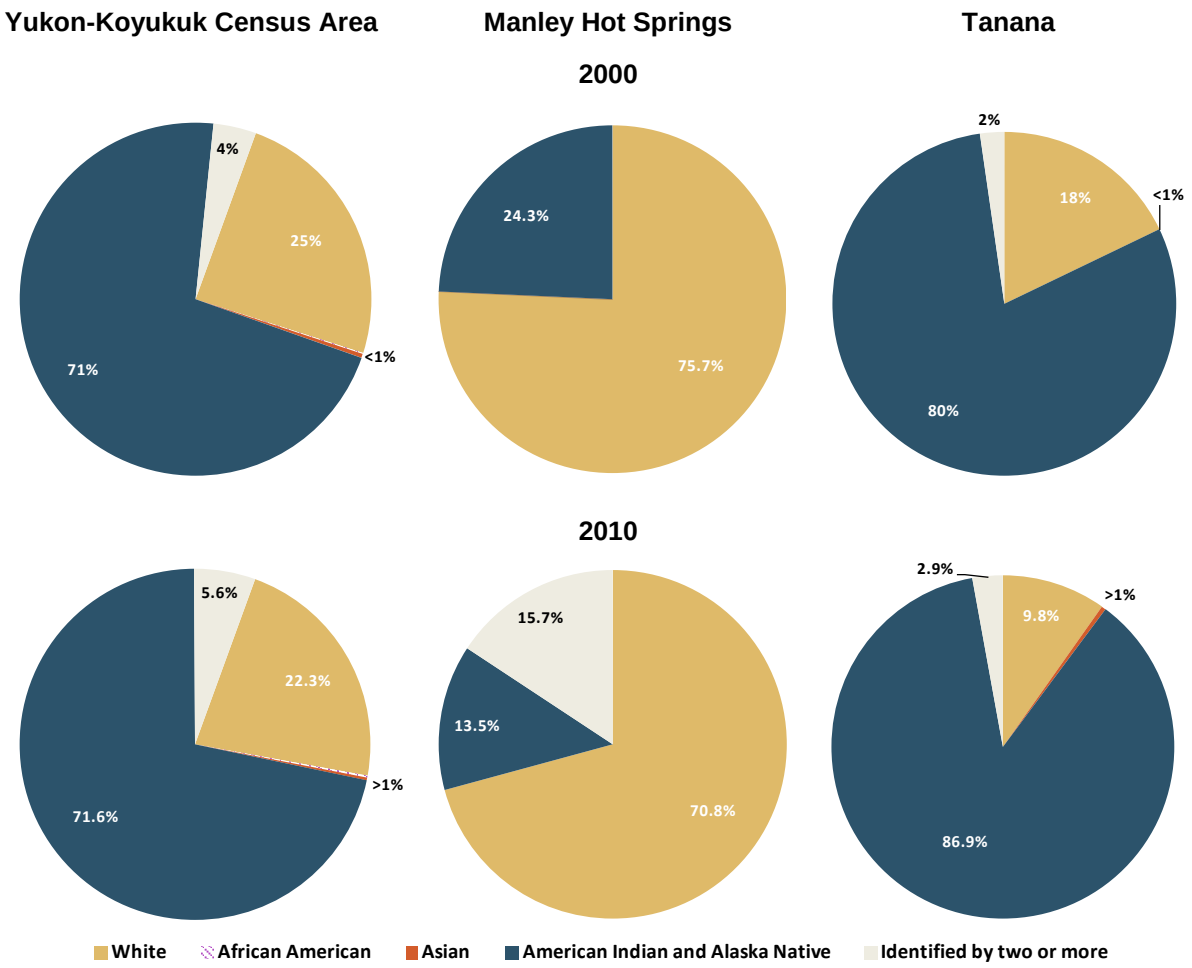
Source: DOLWD, 2012

### 2.1.2 Race/Ethnicity

The demographic composition of both study area communities shifted in recent years. The proportion of Alaska Natives and White residents in Manley Hot Springs shrank over the last decade as the percentage of residents who identified themselves as "two or more" races increased. In Tanana, however, the percentage of Alaska Natives increased, while the proportion of White residents shrank. Though the number of residents living in Tanana shrank overall, from 308 to 246 over the last decade, Tanana lost half of its White residents (dropping from 55 to 24). In contrast, only 33 fewer Alaska Natives (or 13 percent) lived in Tanana in 2010.

It is worth noting that the population in the study area communities is small, so the movement of one or two families in any given year could account for dramatic shifts in ethnic composition. Additionally, for both communities and the census area overall, census data suggest an increase in the number of residents who identify as two or more races. This growth generally follows a larger population trend across the United States, which saw a significant increase (33 percent) of citizens identifying as two or more races (U.S. Census 2011). The growth is likely due to an increased acceptance of multi-racial marriages, along with a greater awareness of multi-ethnic backgrounds (Pew 2012).

**Figure 6. Race Profile in Study Area**

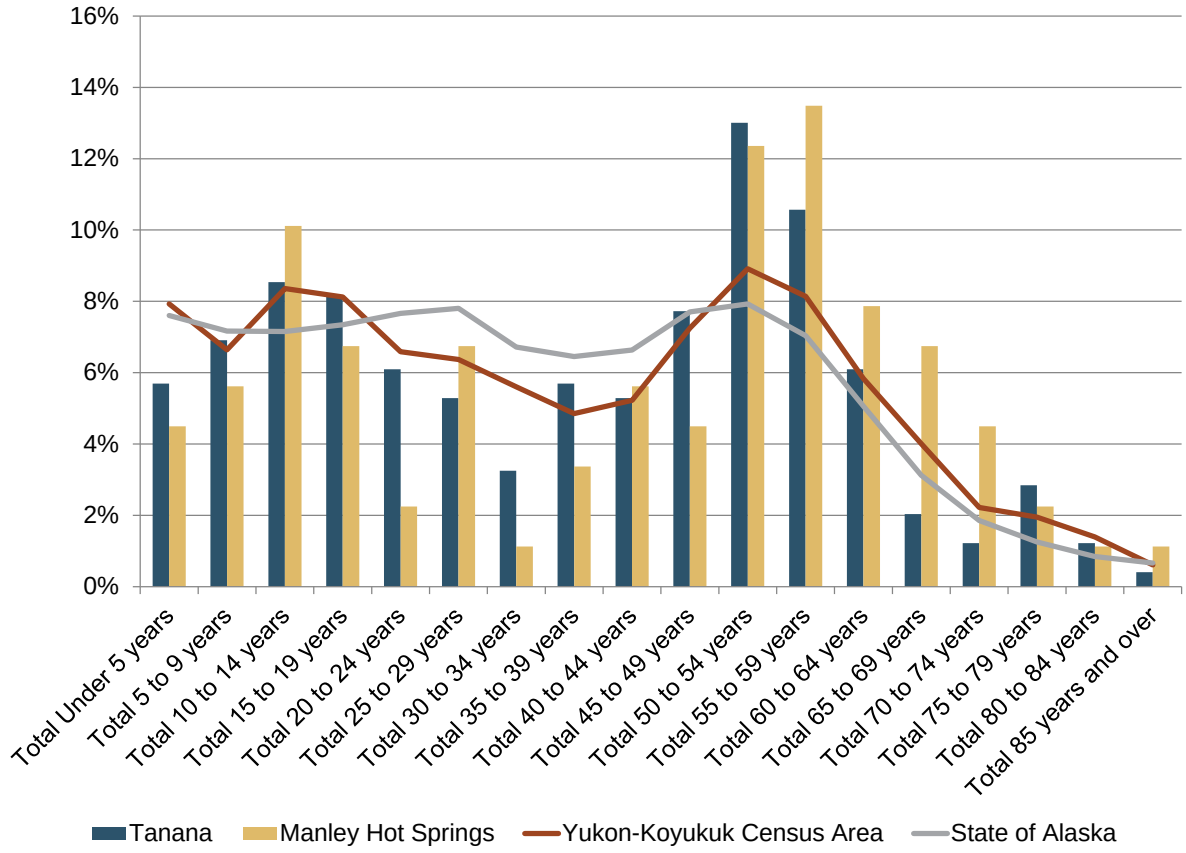



Source: Northern Economics, Inc. using U.S. Census Bureau, Decennial Census, 2010

### 2.1.3 Age and Household Composition

The age profiles of Manley Hot Springs and Tanana differ slightly from the Yukon-Koyukuk Census Area and the state. As seen in Figure 7, the two villages appear to have disproportionately fewer children under 5 years and adults between ages 30-34. The difference in the population is significant, since the concentration of children and absence of young adults is common among remote rural Alaskan populations (Goldsmith 2007). However, the two communities do have disproportionately more adults between the ages of 50-60. Additionally, Manley Hot Springs has a higher proportion of elders (residents between the ages of 60 and 75) than the Yukon-Koyukuk Census Area and state.

**Figure 7. Manley Hot Springs and Tanana Age Profile Comparison to Borough and State, 2010**




Source: Northern Economics, Inc. using U.S. Census Bureau, Decennial Census, 2010

Table 3 shows the median age for Manley Hot Springs and Tanana compared to the Census area and State of Alaska. The median ages for Manley Hot Springs and Tanana are 50 and 42 respectively, between 8 and 16 years above the median for the state. The disproportionately high percentage of older residents is likely due to younger members leaving the communities for improved economic and educational opportunities—a common trend throughout rural Alaska (Goldsmith 2007).

**Table 2. Median Age, Average Family Size, and Average Household Size, 2010**

| Area | Median Age | Average Family Size | Average Household Size |
|---|---|---|---|
| Manley Hot Springs | 50 | 3.0 | 2.2 |
| Tanana | 42 | 3.3 | 2.4 |
| Y-K Census Area | 35 | 3.2 | 2.5 |
| State of Alaska | 34 | 3.2 | 2.7 |

Source: U.S. Census Bureau, Decennial Census, 2010

### 2.1.4 Education

Both Manley Hot Springs and Tanana have public schools that offer Pre-Kindergarten to 12th grade education to local residents. The small student population and limited number of teachers typically require students in different grades be combined for classes. Schools in rural Alaska also often have a larger role in the community, beyond youth education; in many locations, schools also act as a cultural center and gathering location for many community events (Alaska Department of Education and Early Development 2012).

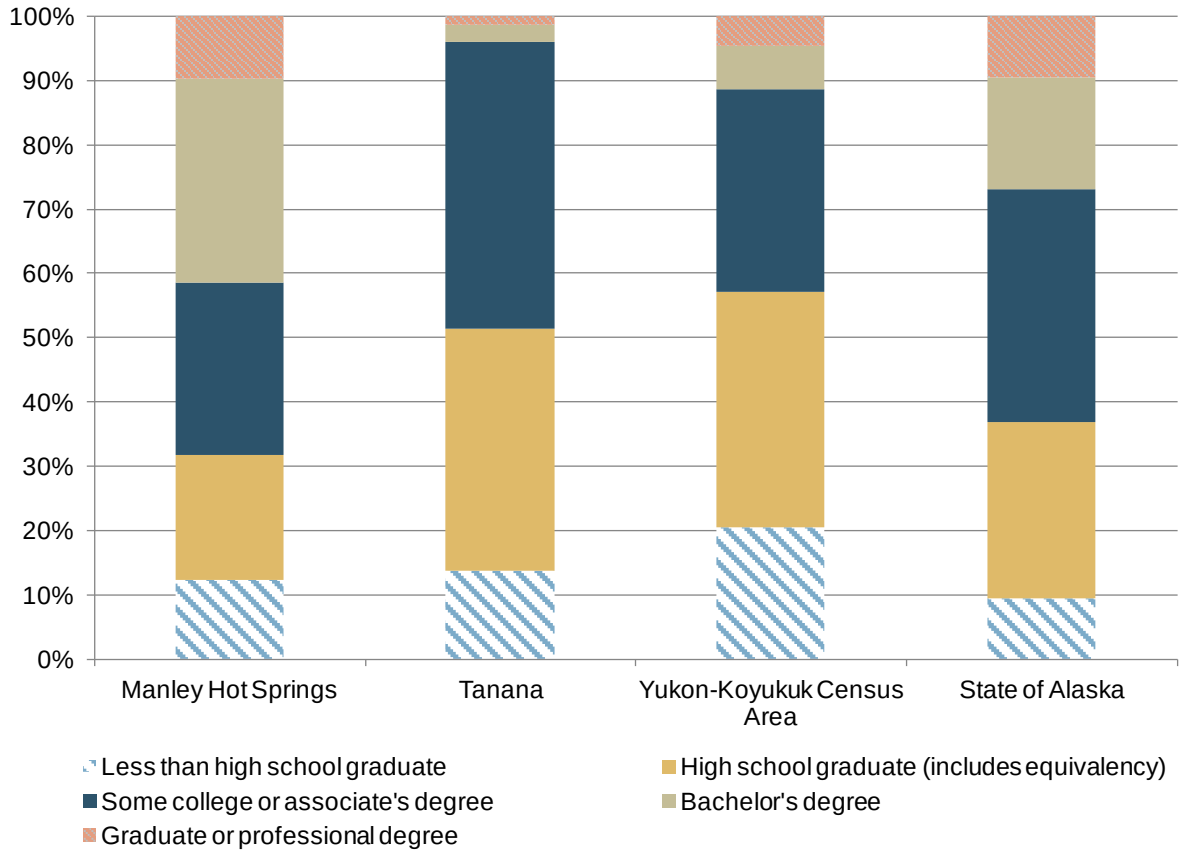
**Figure 8. Welcome Sign for Gladys Dart School, Manley Hot Springs**


Source: Yukon-Kuskokwim School District, 2012.

As shown in Figure 9, most of the residents of Manley Hot Springs and Tanana attained a high school diploma or the equivalent; however, only a small percentage reported obtaining a bachelor's degree or higher. Tanana's percentage of college graduates placed it below the statewide average for educational attainment in 2010. Tanana is not unique in this regard; many small, rural villages report a similar pattern. As noted in a University of Alaska publication:

> Still, despite substantial progress, Alaska Natives who enroll at UAA are still far less likely than other students to stay in college and to earn bachelor's degrees. The reasons why are not entirely clear, but students from small Alaska Native communities certainly face major cultural and other adjustments to attending a large institution in a city. Many Native students, including those now living in urban areas, are also still the first in their families to attend college—and first-generation college students also face extra hurdles. (Erickson and Hirshberg 2008)

**Figure 9. Educational Attainment of Population 25 Years and Older, 2010**




Source: Northern Economics, Inc. using U.S. Census Bureau, American Community Survey 5-year Estimates and 3-year Estimates, 2012

Access may explain some of the lower levels of education attainment in Tanana. Opportunities to pursue university education exist in the region, with Tanana Valley Campus (TVC), located just north of Fairbanks. TVC has a distinctive community college mission within the University of Alaska Fairbanks (UAF) to meet the needs of nontraditional students, military students, and residents seeking quality job training (UAF 2012).

The level of education attained in Manley Hot Springs, as shown in Table 4, was above the state average during 2010. The accessibility of TVC and the University of Alaska Fairbanks to Manly Hot Springs may help explain the percentage of people with bachelor degrees or higher when compared to the state.

**Table 3. Educational Attainment of Population 25 Years and Over, 2010**

| Area | Population 25 years and over | Less than high school graduate | High school graduate (includes equivalency) | Some college or associate's degree | Bachelor's degree | Graduate or professional degree |
|---|---|---|---|---|---|---|
| | | Percentage | | | | |
| Manley | 41 | 12.2 | 19.5 | 26.8 | 31.7 | 9.8 |
| Tanana | 197 | 13.7 | 37.6 | 44.7 | 2.5 | 1.5 |
| Yukon-Koyukuk Census Area | 3,490 | 20.5 | 36.5 | 31.5 | 6.8 | 4.7 |
| State of Alaska | 429,979 | 9.3 | 27.4 | 36.3 | 17.4 | 9.6 |

Source: U.S. Census Bureau, American Community Survey 5-year Estimates, 2012

## 2.2 Economic Characteristics

This section summarizes key economic data about the communities identified in the study area. These characteristics are especially relevant in rural parts of Alaska where the cost of living can be significantly higher than the state and U.S. averages (Fried 2011). The main economic indicators used in this study are employment/unemployment, labor force participation, income, and subsistence activities.

### 2.2.1 Employment

As shown in Table 5, both Manley Hot Springs and Tanana have a lower percentage of the working-age population (age 16 and above) employed relative to the state average; however, this is also the case for the Yukon-Koyukuk Census Area. The lower levels of employment and work force participation are typical for rural areas of Alaska, since subsistence is more prevalent and employment opportunities are limited (Goldsmith 2007). As previously mentioned, both communities rely heavily on subsistence harvesting, with Manley Hot Springs also commonly using a bartering system in lieu of cash for many goods and services (DCCED 2012a).

**Table 4. Labor Force and Employment, Population 16 Years and Over, 2010**

| Location | Population 16 years and over | Population 16+ in labor force | Population 16+ employed |
|---|---|---|---|
| | | Percentage | |
| Manley Hot Springs | 55 | 34.5 | 34.5 |
| Tanana | 266 | 60.5 | 53.4 |
| Yukon-Koyukuk Census Area | 4,276 | 64.1 | 48.6 |
| State of Alaska | 528,189 | 72.0 | 62.9 |

Source: U.S. Census Bureau, American Community Survey 5-year Estimates, 2012

As Table 6 shows, the majority of those individuals employed in wage and salary jobs work for the public sector. Local government employment, especially, is proportionally higher relative to the state average. These employees include all city staff, such as clerks and administrators.

**Table 5. Employment by Industry Comparison to Borough and State (%), 2010**

| | Manley | Tanana | Yukon-Koyukuk | State of Alaska |
|---|---|---|---|---|
| **Industry** | **Percent Employed (%)** | | | |
| Manufacturing | -- | -- | 0.3 | 2.8 |
| Natural Resources and Mining | 2.4 | 4.7 | 3.7 | 4.8 |
| Construction | 2.4 | 8.7 | 8.8 | 6.5 |
| Trade, Transportation and Utilities | 16.7 | 8.1 | 8.9 | 20.5 |
| Information | 2.4 | 0.7 | 1.3 | 2.1 |
| Financial Activities | -- | 1.3 | 1.7 | 4.8 |
| Professional and Business Services | 4.8 | 4 | 3 | 8.5 |
| Educational and Health Services | 7.1 | 5.4 | 10.2 | 13.4 |
| Leisure and Hospitality | -- | 2 | 5.7 | 9.7 |
| State Government | 9.5 | 1.3 | 3 | 8.2 |
| Local Government | 54.8 | 63.1 | 49.6 | 14.9 |
| Other | -- | 0.7 | 3.5 | 3.6 |
| Unknown | -- | -- | 0.3 | 0.3 |

Source: DOLWD, 2012

Table 7 provides context to the type of employment found in Manley Hot Springs and Tanana. As mentioned above, local and state government accounts for the majority of wage and salary employment in the villages, but private employers such as the Manley Trading Post and American Mechanical also provide significant employment in the communities. Private employment in the study area consists mainly of small companies providing local services such as groceries, accommodations and food, or construction. Other private employers such as Doyon Drilling, however, have a partnership with the Tanana Chiefs Conference to recruit and train roustabouts from interior Alaska (Doyon 2012).

**Table 6. Top 10 Employers by Community, 2010**

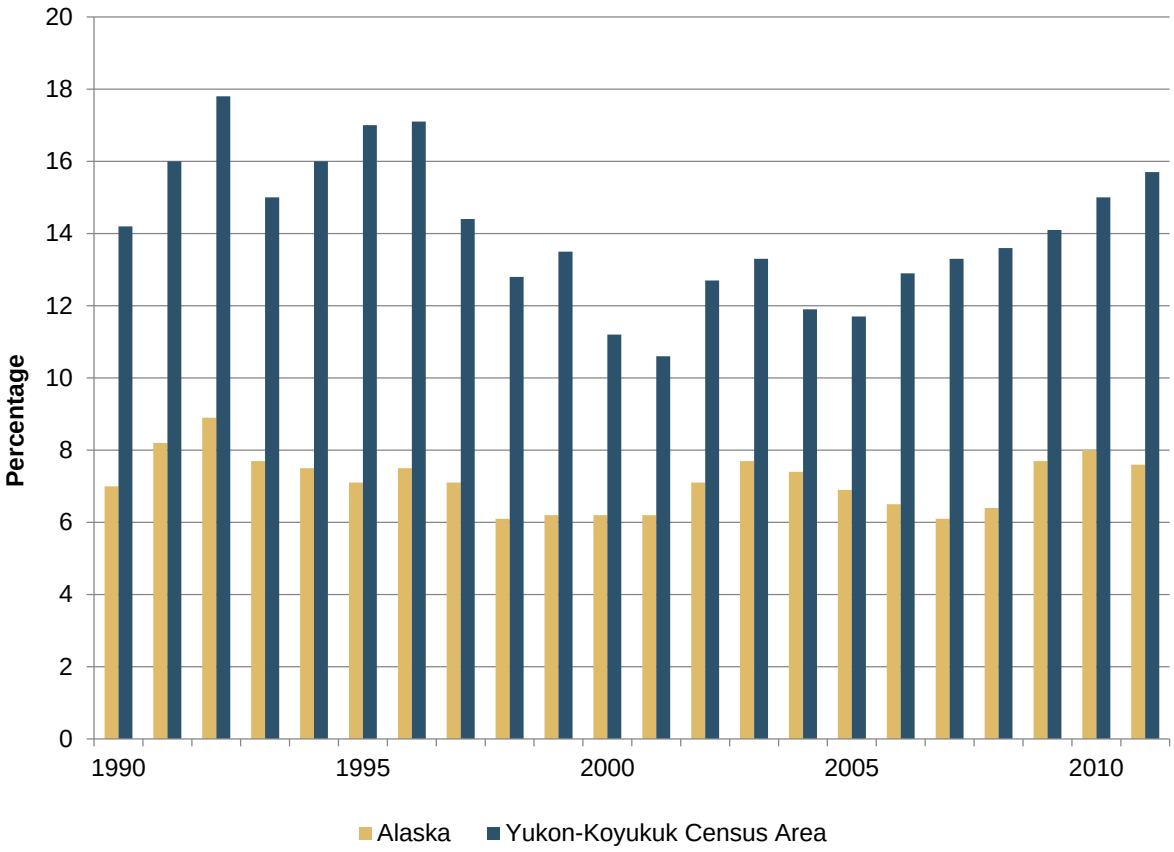
| Rank | Manley Hot Springs | Tanana |
|---|---|---|
| 1 | Manley Village Council | Tanana Native Council |
| 2 | Manley Trading Post, Inc. | City of Tanana |
| 3 | State of AK (excludes U of A) | Tanana City School District |
| 4 | Yukon Koyukuk School District | American Mechanical, Inc. |
| 5 | Manley Hot Springs Community Association | Tanana Chiefs Conference |
| 6 | Tanana Chiefs Conference | Tanana Commercial Co LLC |
| 7 | N/A | Too'gha, Inc. |
| 8 | N/A | Doyon Drilling, Inc. |
| 9 | N/A | IBEX Group, Inc. |
| 10 | N/A | VSW Tanana Project |

Source: DOLWD, 2012

### 2.2.2 Unemployment

Time-series unemployment data at the community level were not available for the study; therefore, the study uses the average unemployment rate for the Yukon-Koyukuk Census Area. Figure 10 shows the historical unadjusted annual unemployment rate for the Yukon-Koyukuk Census Area and the State of Alaska. Unemployment in the study area is higher than unemployment in the rest of the state; between 1990 and 2011, the unemployment rate in the Yukon-Koyukuk Census Area exceeded the state rate by 4.4 to 9.9 percent each year. As with all unemployment data, the unemployment estimates do not include underemployed workers or discouraged workers—those who have given up looking for work because they could not find a job.

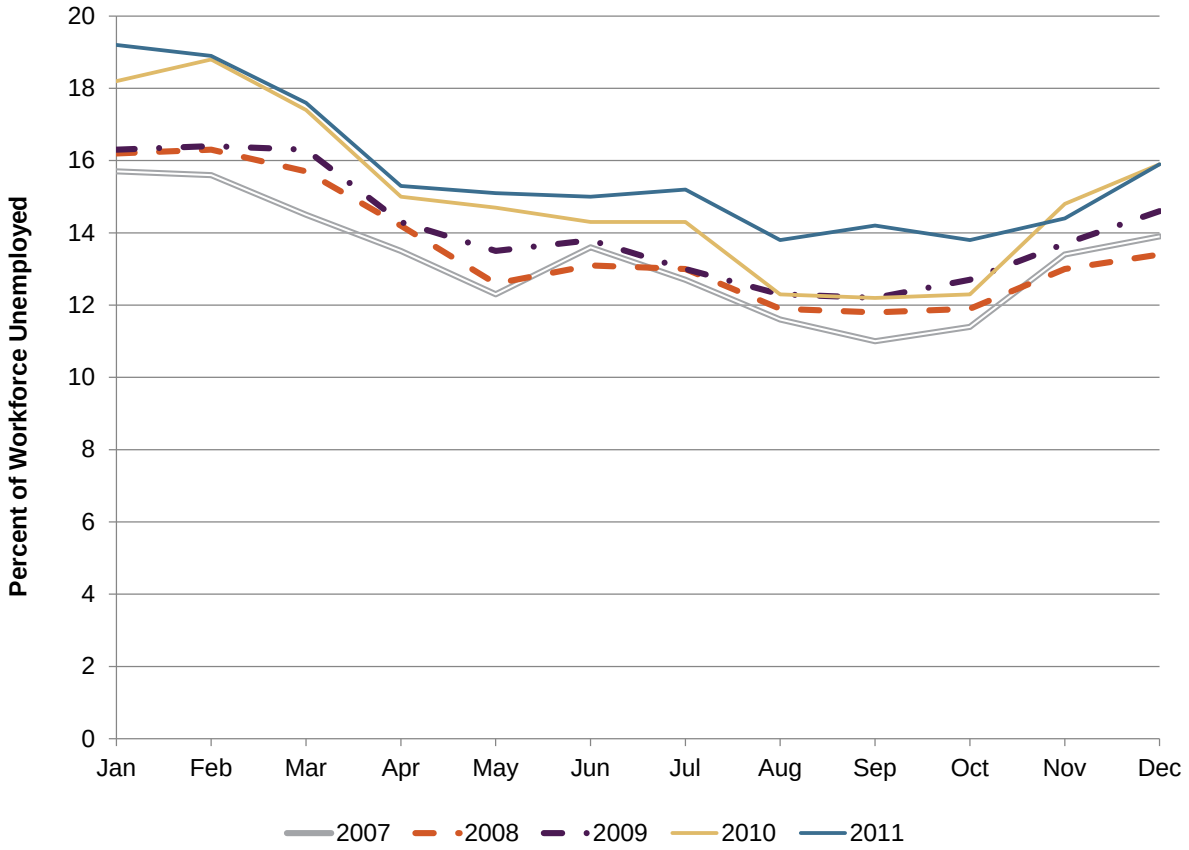
**Figure 10. Annual Average Unemployment Rate, 1990-2011**




Source: DOLWD, 2012

Figure 11 illustrates the seasonal unemployment trends in the study area. The fluctuations are moderate, but consistent, peaking in the winter months and declining in the summer. This trend may be the result of local residents finding temporary employment during the summer in fishing, construction, or natural resource extraction. In contrast to urban Alaska, where the majority of resident employees work year-round, many remote rural Alaskans work during only one or two-quarters of the year, or in part-time jobs (Goldsmith 2007).

**Figure 11. Yukon-Koyukuk Census Area Unemployment Rate, 2007-2011**




Source: DOLWD, 2012.

### 2.2.3 Income

Income statistics do not always capture the purchasing power of a household in rural Alaska. Money income, as defined by the census, is income received on a regular basis[1] before payments for personal income taxes, social security, union dues, Medicare deductions, etc. It does not reflect the fact that some families receive part of their income in the form of noncash benefits, such as food stamps, health benefits, subsidized housing, etc. (U.S. Census Bureau 2012). It also excludes the value of subsistence harvests.

The median household incomes shown in Table 8 for Manley Hot Springs and Tanana were well below the state average. The disparity may be due to the structure of the local economy, which has a higher than average unemployment rate. Additionally, the higher median age of residents in Manley Hot Springs and Tanana suggest that there may be more retirees in the community living on reduced incomes.

[1] Exclusive of certain money receipts such as capital gains.

**Table 7. Income Statistics, 2010**

| Location | Residents Below Poverty Level (%) | Median household income ($) | Per capita income ($) |
|---|---|---|---|
| Manley Hot Springs | 30.7 | 29,583 | 25,632 |
| Tanana | 9.9 | 46,250 | 17,675 |
| Y-K Census Area | 23.6 | 33,712 | 18,614 |
| State of Alaska | 9.5 | 66,521 | 30,726 |

Source: U.S. Census Bureau, American Community Survey 5-year Estimates, 2012

### 2.2.4 Subsistence Activities

Subsistence activities are a key part of the culture and economy for Manley Hot Springs and Tanana, with many residents relying on the harvest of salmon and big game mammals as their primary food source. The subsistence data available for Manley Hot Springs and Tanana are sparse; however, Table 9 presents some of the available harvest information from the Alaska Department of Fish and Game (ADF&G). The average annual harvest per capita of the identified study data is about 104.2 pounds.

**Table 8. Large Land Mammal Subsistence Harvests, Most Recent Years Available**

| | Pounds Harvested | | | | |
|---|---|---|---|---|---|
| | Tanana | | | | Manley |
| Resource | 1997 | 1998 | 1999 | 2002 | 2004 |
| Brown Bear | 0 | 279 | 0 | 0 | 0 |
| Caribou | 0 | 0 | 1,780 | 585 | 0 |
| Moose | 22,781 | 28,843 | 21,261 | 32,198 | 6,450 |
| **Grand Total** | **22,781** | **29,122** | **23,041** | **32,783** | **6,450** |

Source: ADF&G, CSIS 2012

## 2.3 Cost of Living

Cost of living is considered a component of economic well-being, but it has significant enough impact in rural Alaska to merit its own section. The cost of living in an area is measured two different ways: either by comparing the price of commodities to other areas, or by analyzing how prices have changed in the community over time (Fried 2012). For the purposes of this study, we use both methods to help describe the prices residents pay for commodities inside the study area; specifically we look at the cost differential for aggregate goods and services and fuel costs over time.

### 2.3.1 Cost Differential in Study Area

Table 10 illustrates how the cost of living varies in selected communities, using the Municipality of Anchorage for the baseline. According to a 2008 study by the McDowell Group, which measured the cost of living around the state, villages with similar characteristics to Tanana have significantly higher costs of living overall, approximately 31 percent above Anchorage. The differences are especially apparent in food and transportation costs. Fuel costs in Tanana are below the state average (see Table 12), but higher than retail costs in Anchorage. Additionally, the transportation category includes other

costs, such as interstate air travel, vehicle ownership, insurance, and maintenance, which likely push up costs in Tanana.

**Table 9. Geographic Cost Differential for Selected Regions**

| Community | Geographic Cost of Living Differential | Housing | Food | Transportation |
|---|---|---|---|---|
| | | Price Differential | | |
| Anchorage | 1.00 | 1.00 | 1.00 | 1.00 |
| Fairbanks | 1.03 | 0.98 | 1.03 | 1.04 |
| Tanana | 1.31 | 0.81 | 1.55 | 1.49 |
| Manley Hot Springs | 1.00 | 0.75 | 1.10 | 1.10 |

Note: The Roadless Interior sample block is used to represent cost differentials in Tanana
Source: McDowell Group, 2008

Manley Hot Springs has a cost of living index of 1.00, placing the overall cost of living on par with Anchorage. Both food and transportation are still 10 percent higher than the state's baseline; however, residents in Manley Hot Springs pay almost 25 percent less for housing, with most of the savings coming from the actual dwelling, rather than utilities.

Table 11 compares the median number of rooms and home values in the study area relative to Anchorage and Fairbanks. Many of the homes in Manley Hot Springs and Tanana are smaller than in Anchorage, generally fewer than four rooms. This difference corresponds with lower home values in the study area, explaining (along with local market conditions) why the cost differential for housing is significantly less than the state baseline. Structure age does not appear to be a factor for lower housing costs in the study area.

**Table 10. Household Characteristics for Selected Regions**

| Community | Median Home Value ($) | Median Number of Rooms | Built in 1989 or earlier (%) |
|---|---|---|---|
| Anchorage | 229,100 | 4.7 | 76.6 |
| Fairbanks | 192,500 | 4.4 | 88.7 |
| Tanana | 103,300 | 3.4 | 72.3 |
| Manley Hot Springs | 76,700 | 2.7 | 78.5 |

Source: U.S. Census Bureau, American Community Survey 5-year Estimates, 2012

### 2.3.2 Fuel Costs

As of January 2012, retail heating fuel and gasoline costs in the study area were below the state average. Table 12 illustrates how retail prices in the study area compare to the average price across the state. Manley Hot Springs was not included in the DCCED's Alaska Fuel Price Report; the study team uses Minto in place of Manley Hot Springs, due the similarity in geography and logistics. Both Minto and Manley Hot Springs can receive fuel shipments in the winter via road although Minto is harder to reach in the winter due to road conditions. The benefits of being on the road system are largely twofold:

- Communities on the road system do not have to invest in storage systems large enough to carry them through the 8 to 10-month period in which Alaska's rivers are frozen.

Communities with these large storage systems face significant "carrying costs" in operating the system and storing the fuel.

- Communities on the road system can take advantage of swings in fuel prices and order fuel during price drops throughout the year. Communities off the road system are "stuck" with the price of the fuel when the barge delivers fuel to their community. Thus, fuel prices are more reflective of variable market conditions.

Both Manley Hot Springs and Tanana likely experience some benefit by receiving fuel from the refineries in the City of North Pole. Fairbanks, which also receives fuel from North Pole, reported the lowest retail prices in the Interior Region for heating fuel and gasoline during 2012, at $3.93 and $3.83 respectively. Tanana pays a higher premium than Minto, but still benefits from the community's proximity to North Pole and bulk fuel shipments, which help reduce the shipping costs.

**Table 11. Fuel Price Comparison, 2012**

| Area | Residential Heating Fuel ($) | Percent +/- State Heating Fuel Average (%) | Regular Gasoline ($) | Percent +/- State Average (%) |
|---|---|---|---|---|
| Minto | 5.05 | -12.0 | 5.56 | -6.0 |
| Tanana | 5.50 | -4.0 | 5.89 | -1.0 |
| Fairbanks | 3.93 | -32.0 | 3.83 | -34.0 |
| Interior Region | 5.49 | -4.0 | 5.81 | -2.0 |
| State of Alaska* | 5.71 | N/A | 5.93 | N/A |

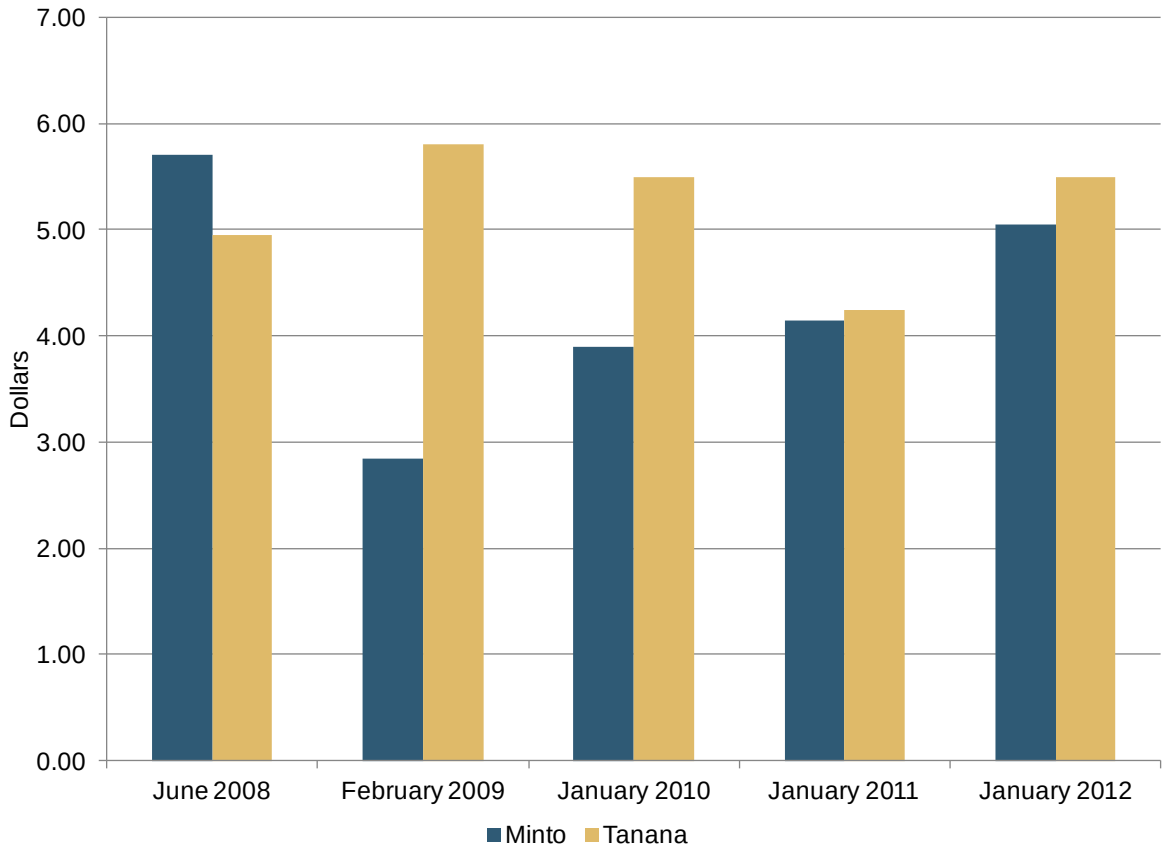
Note: State fuel and gasoline prices are a straight average. Heating fuel average does not include northern communities, whose residential fuel is subsidized by the North Slope Borough.
Source: DCCED, 2012b.

While retail prices in the study area are below the state average, the perceived cost savings should not be overstated. The DCCED study does not weight the state average for volume and skews upward by including retail prices in Western Alaska, which averaged $6.87 per gallon in January 2012; none of the communities surveyed in Western Alaska were on the road system. Retail prices in Tanana are typical of other rural communities in Alaska that receive their fuel via barge.

Figure 12 and Figure 13 display retail heating fuel and gasoline prices for Minto and Tanana. Heating fuel and gasoline prices have remained consistently high in Tanana over the past four years, even in February 2009, when Minto experienced a significant drop in gasoline and heating fuel costs.[2] This pattern is consistent with higher fuel prices found in interior communities off the road system, since they still pay a higher premium to transport fuel into the communities.

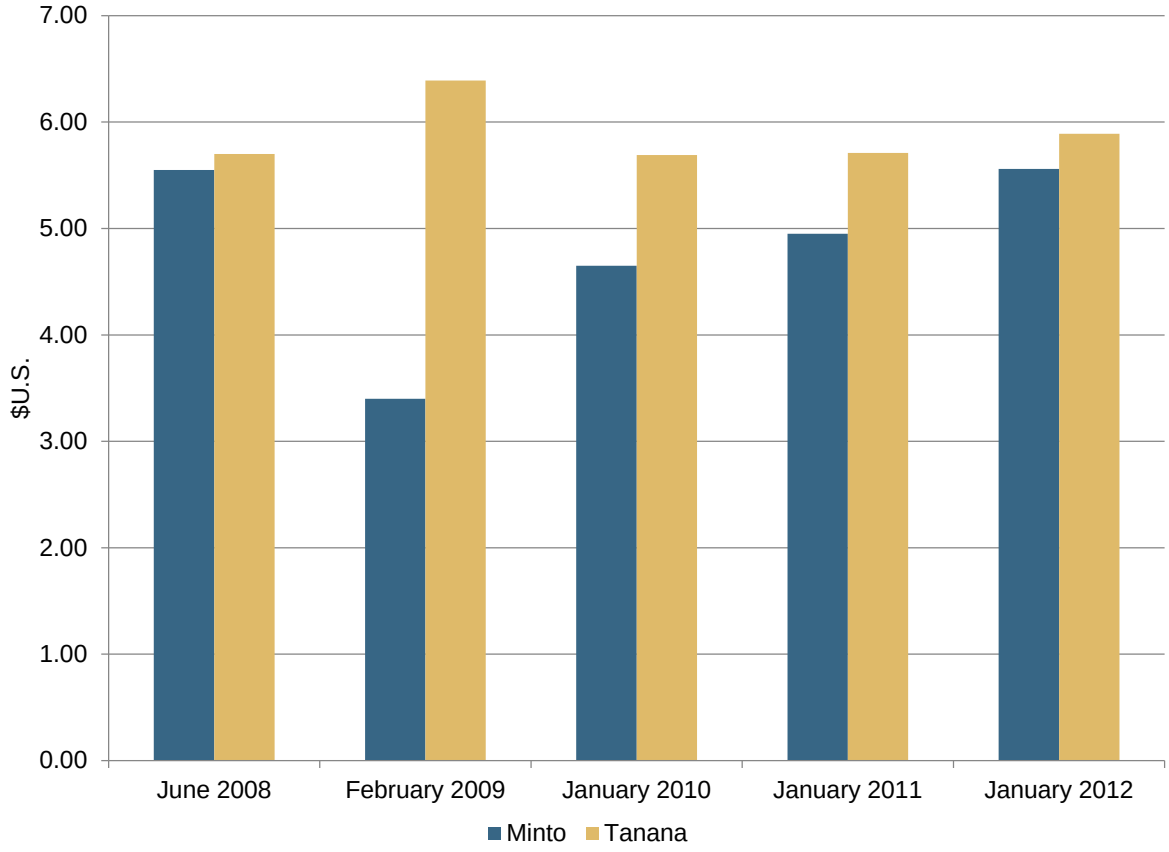
[2] The drop in Minto's fuel price in February 2009 shows the advantages of being near a road and within 100 air miles of Fairbanks. In the winter of 2008/2009, communities that were only accessible by barge experienced fuel prices associated with summer lift dates for barge deliveries. These dates coincided with record high oil prices. Road accessible communities and those very close to Fairbanks by air, saw their fuel prices drop as oil prices collapsed into early 2009. The air communities very close to Fairbanks could actually fly fuel in that was cheaper than the summer fuel purchased earlier in 2008.

**Figure 12. Heating Fuel Prices per Gallon, 2008-2012**




Source: DCCED, 2012b

**Figure 13. Gasoline Prices per Gallon, 2008-2012**




Source: DCCED, 2012b

## 2.4 Public Infrastructure

Public transportation and energy infrastructure in the study area is comparable to other rural areas of Alaska. Both communities have consistent access to transportation infrastructure and energy supplies; however, since Tanana is not on the road system, the community pays a higher premium due to a greater cost of moving supplies and passengers into or out of the community. The study team drew the following information from the DCCED Community Database and Power Cost Equalization Program.

### 2.4.1 Manley Hot Springs

#### Transportation

Manley Hot Springs connects to the Alaska transportation system via the ElliotHighway, which the state began maintaining for year-round access in 1982 (DCCED 2012a). The road runs through Manley and ends at the Tanana River Landing, approximately three miles away, which residents occasionally use for barge service; however, there is no dock in the community due to erosion. The community also has a state-owned gravel runway, which provides year-round regional air service.

**Figure 14. Air Strip in Manley Hot Springs**

Source: ADOT&PF, 2012

## Energy

TDX Manley Generating (TDX Power) provides electric utility service to the village of Manley Hot Springs. The community is part of the power cost equalization subsidy program, which set the residential price at $0.144 per kWh in 2011. Because Manley Hot Springs is on the road system, Crowley delivers fuel to the community year-round; storing large quantities of fuel is not required. Additionally, Manley Hot Springs uses alternative energy resources, including geothermal and wind power to offset the higher cost of diesel fuel.

Table 13 shows the average price of diesel paid by utilities in Manley Hot Springs from 2007 to 2011. The number of consumers has remained consistent, while total kWh sold has risen more slowly than the rate of population growth in the community. What is striking, however, is the significant increase of diesel prices in Manley Hot Springs, which have risen almost 100 percent since 2007.

**Table 12. Manley Hot Springs Consumer and Fuel Price Data, 2007 to 2011**

| | Number of Customers | | | | Total Fuel Used | | Average |
|---|---|---|---|---|---|---|---|
| Year | Residential | Common Facilities | Total kWh Generated | Total kWh Sold | Gallons | Cost $ | $/gal (not retail) |
| 2011 | 81 | 3 | 313,508 | 236,196 | 24,569 | 112,201 | 4.57 |
| 2010 | 79 | 3 | 351,708 | 285,858 | 30,858 | 120,939 | 3.92 |
| 2009 | 75 | 3 | 305,880 | 250,609 | 29,111 | 86,390 | 2.97 |
| 2008 | 77 | 3 | 292,920 | 230,947 | 27,741 | 82,334 | 2.97 |
| 2007 | 73 | 3 | 276,240 | 224,934 | 27,217 | 62,236 | 2.29 |

Source: Alaska Department of Commerce, Community and Economic Development, Power Equalization Program, 2007-2012.

### 2.4.2 Tanana

#### Transportation

Though Tanana is accessible only by air and river craft, the community maintains 32 miles of roads. The village also maintains a city dock for barged goods and maintains a state-owned airport with a 4,400-foot long gravel runway that provides regional access to transportation hubs. Local transportation consists of ATVs and snow machines, riverboats, and cars or trucks (DCCED 2012a).

**Figure 15. Crowley Fuel Barge Delivering Supplies to Tanana**


Source: Northern Economics, Inc., 2007

Table 14 shows the estimated freight and volume that arrives to Tanana by tug and barge annually, and provides the corresponding costs to transport those volumes. The study team based the fuel transportation costs on interviews with industry and utility representatives. It is worth noting that the costs provided below are estimates and do not account for any variations in rates. On occasion, shippers may contract to receive different rates for special projects or frequent shipments; in these instances, the published tariff rates may not apply.

**Table 13. Current Annual Barge Transportation Volumes and Costs in Tanana, Barge ($)**

| Barge Shipments | Freight (lbs.) | Fuel (gal.) |
|---|---|---|
| Volume | 257,000 | 217,500 |
| Transport Cost ($ per unit) | 0.2 | 0.8 |
| Subtotal ($) | 51,000 | 174,000 |
| **Total Barge Transport Cost ($)** | **225,000** | |

Note: This analysis assumes that freight moves from Anchorage and fuel arrives from the City of North Pole.
Source: Estimates by Northern Economics, Inc. from information provided by Ruby Marine, 2012; Sweeny, 2012; Sweetsir, 2012.

The seasonal nature of tug and barge transportation in the study area substantially affects the transportation costs to Tanana. The community must include the lifecycle costs of capital and other fixed costs as part of the ongoing cost of operation during the short summer shipping season, which increases the per-unit costs of each pound of freight or gallon of fuel transported.

Table 15 illustrates the estimated total transportation costs for personal travel, mail, and air cargo in Tanana. As noted earlier in the report, the majority of passenger travel in Tanana occurs by air. Since Tanana is not on the road system, residents are also heavily reliant on air services to deliver mail and cargo to the community. The study team based the cost estimates on published rates for passenger travel and volumes from the Bureau of Transportation Statistics for 2010.[3]

The study assumes that freight moves by truck from Anchorage to Nenana and is then barged into Tanana. It also assumes that fuel moves from the City of North Pole to Nenana, where it is transferred to a barge for delivery into Tanana. Both conventional and bypass mail are flown directly into Tanana from Fairbanks

**Table 14. Current Annual Tanana Transportation Costs**

| | Cost by Mode ($) | | |
|---|---|---|---|
| Payload | Current Air | Current Barge | Total Transportation Cost ($) |
| Passengers | 770,000 | N/A | 770,000 |
| Mail | 171,000 | N/A | 171,000 |
| Cargo, Freight | 223,000 | 51,000 | 274,000 |
| Fuel | N/A | 174,000 | 174,000 |
| **Total** | **1,164,000** | **225,000** | **1,389,000** |

Source: Northern Economics, Inc. estimates based on Bureau of Transportation Statistics, 2010.

Under the current volumes, air cargo accounts for just over 50 percent of the total freight transportation costs in the community. Even though Tanana receives a comparable amount of freight by barge, the cost to move supplies by air cargo is significantly higher due to the higher cost of air travel.

Passenger travel is the largest single transportation cost in the community. With a new road connecting Tanana to the communities in the Fairbanks North Star Borough, the cost savings could be significant. Additionally, many of the savings could go directly to residents who opt to drive rather than fly to their destinations. Besides the direct effect of lowering payments to rural airlines, a road to

[3] 2010 is the latest year for which full-year information was available at the time of the report.

Tanana could change the way in which these airlines serve Tanana and the surrounding communities. Flight and payload data from the U.S. Bureau of Transportation indicate that in 2011 approximately 40 percent of the passengers, 35 percent of the mail, and 25 percent of the cargo landing in Tanana continued on to other destinations without deplaning in the community. Thus, Tanana is part of a larger milk run system whereby airlines make up for the lack of sufficient demand in a single community to support direct flights by aggregating overall demand and linking communities together from a single originating destination (i.e., Fairbanks). These data further indicate that flights from Fairbanks represent roughly two-thirds of the total number of inbound flights and that in 2011 there were nearly three flights per day arriving from Fairbanks International on commercial carriers.[4] However, these flights were operating only at 63 percent of total payload capacity. The study team believes that the most likely result of fewer passengers demanding flights to and from Tanana would be a reduction in the overall number of flights arriving and departing from the community. It is highly likely that the community would still receive service because the community's inclusion in the Alaska Bypass Mail program requires that carriers provide a minimum of three scheduled flights per week to ensure that they deliver parcel post in a timely manner. In addition, the Alaska Bypass Mail program requires that flights carrying mail also have seats for passengers. An open question is how the loss of Tanana traffic would affect surrounding communities. Would airlines overfly Tanana while maintaining current frequency to other communities? Alternatively, would they reduce service overall given the excess payload capacity currently in the system? Individual carriers will determine these effects based on their business models and what they believe are their competitive advantages. Local carriers did not respond to requests for interviews.

## Energy

The privately owned Tanana Power Company supplies electricity to Tanana's residents at a rate of $0.295 per kWh, with a fuel subsidy from the PCE program. Tanana is not located on the road system and receives large volumes of diesel via barge during the summer months. There are several bulk-fuel tanks in the community to store fuel throughout the year, with a total fuel storage capacity of 299,600 gallons. A diesel-powered generator and wind turbine generate the majority of electricity in the community.

The City of Tanana installed two cordwood boilers to heat the school and washeteria in November of 2007 (Ketzler 2012). The system is heat-only and offsets approximately 9,000 gallons of fuel per year (250 gallons/day). The biomass facility consumes approximately 80 cords of wood a year. Cordwood for the community is supplied by harvesting floating wood in the Yukon and Tanana rivers, trees from Long Island, and snags throughout the river. City officials indicate that the biomass facility would benefit most from road access through byproducts created from clearing and construction of the proposed road, access to new harvesting grounds, and lower costs associated with bringing in parts (Ketzler 2012).

Table 16 shows the average price of fuel paid by utilities in Tanana. With the exception of a spike in 2009, the average price per gallon has dropped from $3.07 in 2007 to $2.94 in 2011. This is likely due to Ruby Marine starting barge service in late 2007, which facilitated more competition for fuel and cargo movements in the region. Although the numbers of consumers and kWh sold have remained stable since 2007, the average price per gallon paid by utilities has dropped from $3.07 to $2.94.

[4] In comparison, Manley received 160 flights in 2011 (3 per week) and the arriving payload was 27 percent passengers, 70 percent mail, and 3 percent cargo. Minto, another comparison community, receives 194 flights in 2011 and the arriving payload was 52 percent passengers, 43 percent mail, and 5 percent cargo.

It is important to note that the prices in Table 16 are not retail prices, but the average wholesale price paid by the Tanana Power Company to move diesel into the community. The prices do not correlate strongly with retail prices in Tanana, since utilities typically get a volume discount for bulk shipments.

**Table 15. Tanana Consumer and Fuel Price Data, 2007-2012**

| | Number of Customers | | | | Total Fuel Used | | Average |
|---|---|---|---|---|---|---|---|
| Year | Residential | Common Facilities | Total kWh Generated | Total kWh Sold | Gallons | Cost $ | Price $/gal (not retail) |
| 2011 | 107 | 12 | 1,211,200 | 1,093,989 | 91,421 | 268,630 | 2.94 |
| 2010 | 110 | 12 | 1,193,275 | 1,070,243 | 89,161 | 260,750 | 2.92 |
| 2009 | 103 | 11 | 1,249,970 | 1,092,269 | 90,459 | 374,877 | 4.14 |
| 2008 | 116 | 11 | 1,264,325 | 1,092,479 | 93,988 | 261,955 | 2.79 |
| 2007 | 113 | 11 | 1,422,715 | 1,280,092 | 104,243 | 319,655 | 3.07 |

Source: Alaska Department of Commerce, Community and Economic Development, Power Equalization Program, 2007-2012.

# 3 With Project Scenario

This section describes the changes that may occur in the study area communities if ADOT&PF chooses to proceed with the proposed road. For the purposes of this report, the study discusses the effects of the analysis in detail for Manley and Tanana and then provides some discussion for downriver communities that could be affected if barge-loading facilities are developed on the Yukon River near Tanana. The main indicators taken into consideration during the analysis are the effects on transportation and energy infrastructure. The study also provides a qualitative discussion about the possible impacts on social and economic characteristics that may occur in the study area.

## 3.1 Transportation Effects

A new access road to Tanana will result in changes to resident and commodity transportation patterns and costs. As previously discussed, the majority of passenger transit, air cargo, and bypass mail currently move by airplane, while fuel arrives via barge. The construction of a road connecting Manley Hot Springs to Tanana will change how residents and goods move into and out of the communities. The study estimates potential transportation-related savings of nearly $3 million under the assumptions noted above. These savings are highly dependent on independent decisions made by individual shipping companies.

**Table 16. Estimated Transportation Related Savings**

| Community | Freight and Fuel ($) | Mail ($) | Passengers ($) | Total ($) |
|---|---|---|---|---|
| Tanana | 295,000 | 141,000 | 140,000 | 576,000 |
| Rampart | 5,000 | N/A | N/A | 5,000 |
| Ruby | 26,000 | N/A | N/A | 26,000 |
| Galena | 184,000 | N/A | N/A | 184,000 |
| Koyukuk | 15,000 | N/A | N/A | 15,000 |
| Nulato | 66,000 | N/A | N/A | 66,000 |
| Kaltag | 68,000 | N/A | N/A | 68,000 |
| Grayling | 89,000 | N/A | N/A | 89,000 |
| Anvik | 48,000 | N/A | N/A | 48,000 |
| Holy Cross | 108,000 | N/A | N/A | 108,000 |
| Russian Mission | 218,000 | N/A | N/A | 218,000 |
| Marshall | 273,000 | N/A | N/A | 273,000 |
| Pilot Station | 387,000 | N/A | N/A | 387,000 |
| St. Mary's | 384,000 | N/A | N/A | 384,000 |
| Mt. Village | 549,000 | N/A | N/A | 549,000 |
| **Total** | **2,715,000** | **141,000** | **140,000** | **2,996,000** |

Note: Estimates are rounded

Source: Estimates by Northern Economics, Inc. based on Bureau of Transportation Statistics, 2010; Ruby Marine, 2012; Sweeny, 2012; Sweetsir, 2012.

### 3.1.1 Primary Communities

#### Manley Hot Springs

Manley Hot Springs is currently on the road system and while it may receive some cost savings benefits from the road extending to Tanana, it is not anticipated to see significant savings from the proposed road. Larger volumes of freight and cargo shipments along the new road may reduce per-unit costs, potentially benefiting residents in Manley Hot Springs, should any significant cost savings be passed on to the end-user.

The majority of cost savings for Manley Hot Springs will likely occur during later stages of the project if utilities and barge companies build new infrastructure, reducing the cost of energy in the region. Other long-term benefits could come from increased employment from construction and mining activities. However, mining activities are not likely to be close to town as there is limited potential for high value minerals along the actual road corridor. Manley Hot Springs would be more likely to benefit from the secondary effects of development (i.e., more people staying in town, more people buying fuel, sundries or meals at a restaurant, etc.).

#### Tanana

The study estimates that a road to Tanana would reduce shipping costs to the community by nearly $600,000 per year under current conditions (e.g., fuel volumes, passenger transit volumes, commodity volumes). The proposed road would connect the existing road structure in Tanana with the Elliot and Dalton Highways, reducing the cost of moving fuel, freight, and cargo into the community. Relative to current barge and air cargo, the cost of trucking freight, fuel, and cargo into the community is significantly cheaper. The result is that under the "with road" scenario, the study team expects almost all of the freight and fuel will shift to the new transportation system to take advantage of the cost savings. Mail and air cargo will likely see the greatest cost reduction given the disparity between the costs of moving bulk products by air rather than by road.

While residents could see savings from shipping cargo by road rather than air, most of the mail cost savings will accrue to the United States Postal Service (USPS), which currently subsidizes the cost of shipping mail to Tanana via the Alaska Bypass Mail Program. Without a permanent bridge to cross the Yukon River, Tanana will likely have partial road access throughout the year. The study team is not able to anticipate if the USPS would choose to continue Alaska Bypass Mail service to the community once the road is in place; however, Nuiqsut has continued to receive bypass mail with only seasonal road access. Thus, the mail savings are partially dependent on a permanent Yukon crossing. If Tanana remains an Alaska Bypass community, the USPS could still accrue savings as the road would likely make residents less likely to use the subsidy program. Based on estimates calculated by Northern Economics for ADOT&PF, the savings to the USPS is $0.78 for every pound of freight not transported via bypass mail. The savings on everyday items and perishables that are difficult to receive via barge, such as milk and bread, could be substantial.

**Table 17. Tanana Transportation Costs, with Road[5]**

| Category (Original Travel Mode) | Costs ($) | | Savings ($) |
|---|---|---|---|
| | Current | With Road | |
| Passengers (Air) | 770,000 | 630,000 | 140,000 |
| Mail (Air) | 171,000 | 30,000 | 141,000 |
| Cargo (Air) | 223,000 | 85,000 | 138,000 |
| Freight (Barge) | 35,000 | 19,000 | 16,000 |
| Fuel (Barge) | 174,000 | 33,000 | 141,000 |
| **Total Savings** | **1,373,000** | **797,000** | **576,000** |

Note: Subtotal estimates are rounded

Source: Estimates by Northern Economics, Inc. based on Bureau of Transportation Statistics, 2010; Ruby Marine, 2012; Sweeny, 2012; Sweetsir, 2012.

Residents will directly benefit from reduced costs in passenger travel. According to the 2010 Bureau of Transportation Statistics, the primary destination for Tanana residents was Fairbanks, which accounted for 90 percent of flights into and out of the community. The remaining flights from Tanana were to other villages in the region. The study suggests that based on the relatively short distance and lower cost, many Tanana residents will choose to drive to Fairbanks rather than fly. There are good reasons that some residents may continue flying to Fairbanks, however, including lack of a vehicle, poor road conditions, or simply a preference for flying.

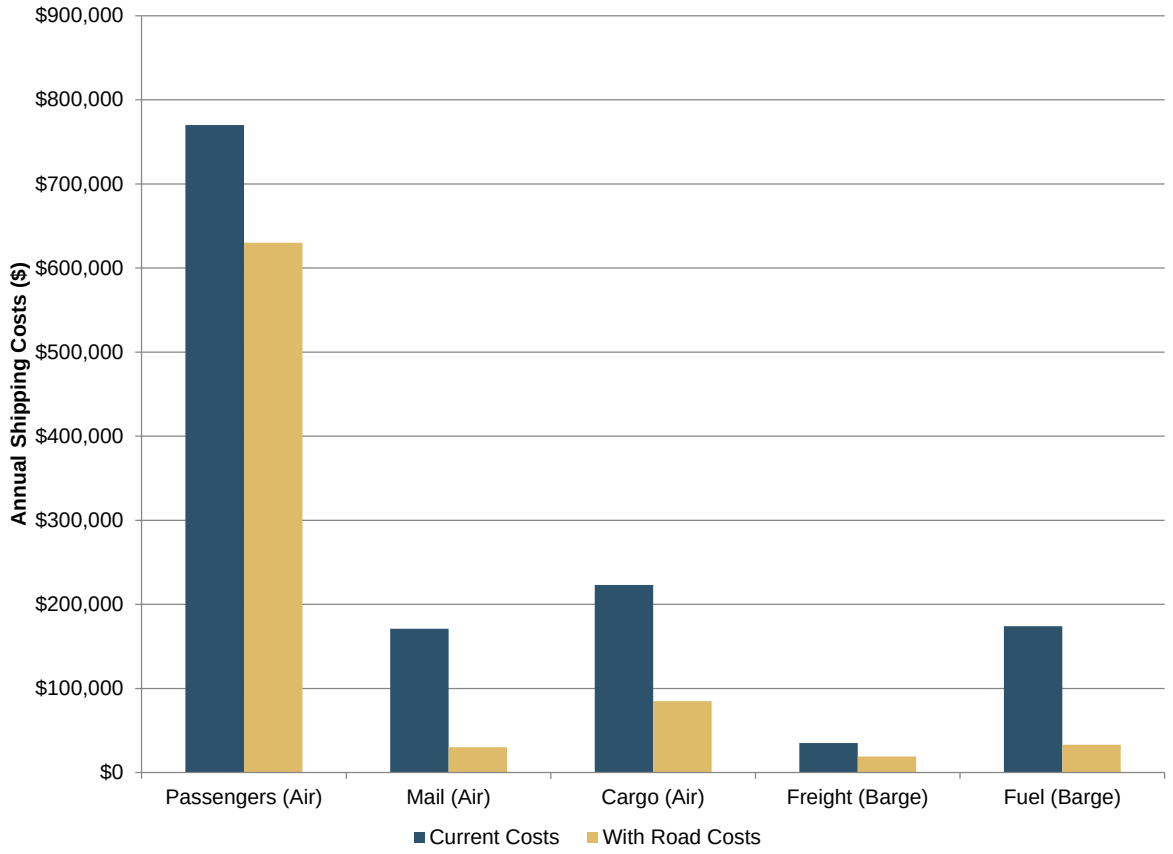
Passenger travel will likely have more variation in how much traffic will shift to the road system. Using estimates from published air ticket prices and the average operating cost data from the U.S. Internal Revenue Service,[6] the study determined that a single passenger flying to Fairbanks could experience a greater cost savings by driving, rather than flying. The savings incurred by driving increase as more passengers travel in the vehicle, reducing the per-unit costs of road travel. It is worth noting that while the new road will likely make driving a preferable option for residents to get to nearby communities; it is unclear how the new road will affect travel at longer distances.

Figure 16 compares the current transportation costs for Tanana against the estimated costs based on the study analysis. As mentioned above, air cargo, mail, and passenger travel will experience the most dramatic change in costs, given the high cost of air travel. Changes to the transportation infrastructure will generate cost savings for fuel, but fuel will still be an expensive resource and, in fact, it will account for a larger share of the total transportation cost to the community, given its high base price.

[5] It is difficult to project what percentage of the total cost savings shippers may pass on to residents. It will depend on how the cost of conducting business changes in the study area; however, the community is likely to experience significant benefits from reduced freight and cargo costs.

[6] See Appendix A for more detail about the vehicle savings.

**Figure 16. Estimated Changes in Tanana's Total Transportation Costs, by Commodity**




Source: Estimates by Northern Economics, Inc. based on Bureau of Transportation Statistics, 2010; Ruby Marine, 2012; Sweeney, 2012; Sweetsir, 2012.

### 3.1.2 Downriver Communities

A road to Tanana has the potential to lower fuel and barge transportation costs for freight to communities on the Yukon River if barge-shipping companies are willing to invest in fuel and freight loading facilities at the Yukon River terminus.[7] Facilities at this location would allow a company operating there to load their barges to deeper drafts, as they would not have to navigate the shallow sections of the Tanana River. Individual barges would be more efficient and could take fewer trips while reducing vessel and equipment wear. Key stakeholder interviews indicated that, as a rough estimate, shipping costs could fall by up to 30 percent from greater efficiency and loading capacities. The study developed barge shipping cost curves and road shipping cost curves to estimate that if the fuel and cargo consumed in communities between Mountain Village and Tanana shipped from a new barge facility near the Tanana road terminus that delivered these efficiencies, total shipping costs between these communities would fall by approximately $2.4 million per year (see Table 19). The study notes that capturing all of these savings would require that all of the shipping companies move their operations from their current locations; this action is not assured, and will be dependent on independent business decisions made in a competitive environment. During interviews, at least some participants indicated that they might consider moving their operations under the right conditions.

[7] Passengers, mail, and air cargo would continue to travel by airplane.

**Table 18. Estimated Potential Annual Savings for Yukon River Communities (Mountain Village to Tanana) with a Road and Current Volumes[8]**

| Category (Original Travel Mode) | Est. Shipping Costs ($) | | Annual Savings ($) |
|---|---|---|---|
| | Current | With Road | |
| Freight (Barge) | 1,230,000 | 1,000,000 | 230,000 |
| Fuel (Barge) | 6,510,000 | 4,320,000 | 2,190,000 |
| **Totals** | **7,740,000** | **5,320,000** | **2,420,000** |

Source: Estimates by Northern Economics, Inc. based on Bureau of Transportation Statistics, 2010; Ruby Marine, 2012; Sweeney, 2012; Sweetsir, 2012.

The estimated annual transportation savings by community vary widely and these savings are driven by factors such as population size, economy, relative efficiency in power consumption, personal consumption habits, and distance from Tanana (see Table 20). The study estimates that communities that consume large amount of fuel (e.g., Galena) and those that will benefit the most from the ability of barges to carry large amount of fuel efficiently over longer distances will show the greatest nominal reductions in expenditures.

**Table 19. Detailed Estimated Potential Annual Savings for Freight and Fuel by Community with a Road**

| Community | Total Estimated Annual Savings ($) |
|---|---|
| Rampart | 5,000 |
| Ruby | 26,000 |
| Galena | 184,000 |
| Koyukuk | 15,000 |
| Nulato | 66,000 |
| Kaltag | 68,000 |
| Grayling | 89,000 |
| Anvik | 48,000 |
| Holy Cross | 108,000 |
| Russian Mission | 218,000 |
| Marshall | 273,000 |
| Pilot Station | 387,000 |
| St. Mary's | 384,000 |
| Mt. Village | 549,000 |
| **Total** | **2,420,000** |

Note: Estimates are rounded

Source: Estimates by Northern Economics, Inc. based on Bureau of Transportation Statistics, 2010; Ruby Marine, 2012; Sweeny, 2012; Sweetsir, 2012.

[8] The communities included in this estimate are: Rampart, Ruby, Galena, Koyukuk, Nulato, Kaltag, Grayling, Anvik, Holy Cross, Russian Mission, Marshall, Pilot Station, St. Mary's and Mountain Village.

## 3.2 Potential Mines

Tofty Ridge is the only close mineral occurrence in the area. According to the USGS, there are potential rare earth metal deposits in the prospect. As of the last USGS report in 2004, there is no indication of extraction at the Tofty Ridge site. Current records by the Alaska Department of Natural Resources suggest that while many of the sites in the area remain under ownership by various companies, many are currently listed as closed or inactive (Brooks 2012). Given the prospect's proximity to Manley Hot Springs and the existing road connection to the deposit, it is unlikely that the proposed road alone would significantly increase extraction activities in the area.

Another mining region that could be served by the eventual expansion of the road beyond Tanana is the Melozitna Mining District. The District is located 25 miles west of Tanana and is the subject of current rare earth element exploration activity by both the Alaska Department of Natural Resources and private companies (Lasley 2012). A road terminating in Tanana would still be too far from the mining district to facilitate ore production, but a terminus in Tanana could lower exploration costs by lowering the cost of shipping equipment to Tanana. The equipment could then be shipped by barge down the Yukon to a point closer to the Melozitna.

## 3.3 Other Energy and Infrastructure Effects

Prior studies examined the possibility of using LNG as an alternative fuel source to offset the high diesel cost in the study area (DOWL HKM, 2010). In the near term, the study team does not anticipate LNG to be a viable alternative to diesel, given the lack of infrastructure in the study area. Significant capital investment would be needed to bring a piped distribution system into the community. Given the high capital cost of bringing LNG into the community, propane may be a more likely alternative during this phase of development.

Propane may be a viable option for Tanana, but is only likely to expand to other communities as they move onto the road system. Transportation and storage costs are significantly higher for propane relative to diesel fuels. Propane only has two-thirds the energy content of diesel and requires significantly more storage to achieve the same energy content of distillate fuels. Additionally, propane tanks require pressurization for storage and are typically filled to 80 percent capacity (compared to 90 percent for distillate fuel tanks) (Northern Economics 2010). The need for greater capacity and larger volume of propane to achieve the same energy usage as diesel suggests that it is a viable option only when communities are able to take advantage of the lower road transport costs and have a road that is open the majority of the year with closures lasting less than three months.

## 3.4 Economic and Social Effects

This section describes additional socioeconomic effects that may occur because of the new road. The most likely socioeconomic areas impacted by a new transportation corridor in rural Alaska are employment and income, public services, population, and subsistence hunting. The study presents both the positive and negative effects for each category to ensure transparency about how residents may be affected.

### 3.4.1 Employment and Income

The study does not currently anticipate a significant increase in employment from the proposed road. The study does not anticipate significant development of marine facilities if fuel is the primary product shipped downstream from Tanana as fuel loading does not require significant additional infrastructure

developments. If cargo is shipped downstream from a newly developed facility, there would be increased local employment associated with running those facilities, but those jobs would likely be transfers from existing facilities owned by the barge companies and not new jobs for the state. There is potential for future employment if a permanent ferry system is created to move passengers and vehicles across the Yukon River.

Mining is the most likely industry in the region to increase employment opportunities. There may also be opportunities for residents to seek employment during the construction of the new road and any ensuing sections built in later phases.

Some residents have raised concerns in prior studies about diminished opportunities for tourism and big game guiding with the presence of a large transportation corridor and large-scale mining (DOWL HKM, 2010). A major expansion in the study area may also create conflict within the community over how to balance economic development with preserving social and cultural traditions, which remain important to the Alaska Native community.

### 3.4.2 Public Services

Both communities in the study area have local access to fire/rescue and public safety. The proposed road could help facilitate coordination between Manley Hot Springs and Tanana for significant public health, or other incidents. The proposed road may also improve response time by Alaska State Troopers, who currently cover a large area and rely on air or water transport to move among these Interior communities. With the new road, safety officers may be able to reduce time and costs of providing service within the study area.

While the new road can help create efficiencies for public services between communities, there is the potential that an influx of workers for construction or mining activities could place a strain on the current service infrastructure.

### 3.4.3 Population Trends

Unemployment is a major problem in many remote rural Alaska communities, including the study area, and the pursuit of economic opportunities appears to be a predominant cause of out-migration (Martin et al. 2008). As people leave, some of the jobs they support go away, and more people leave. When the population becomes very small, schools close, more jobs end, and even more people move away. As mentioned in Section 2.1.1, Tanana experienced a downward trend in 1982, when the community lost 52 jobs due to the closure of the local hospital (City of Tanana 2012).

The local mining or tourism jobs that the proposed road connection may create could ease population loss by stemming out-migration. On the other hand, mining operations located in remote areas with limited road connections may do little to reduce out-migration. It is also important to note that road construction without economic development could result in an increase in out-migration from Tanana if out-migration patterns are currently restricted by the cost of leaving the community. However, lower costs of living can also encourage people to stay and may increase community viability and quality of life.

### 3.4.4 Subsistence

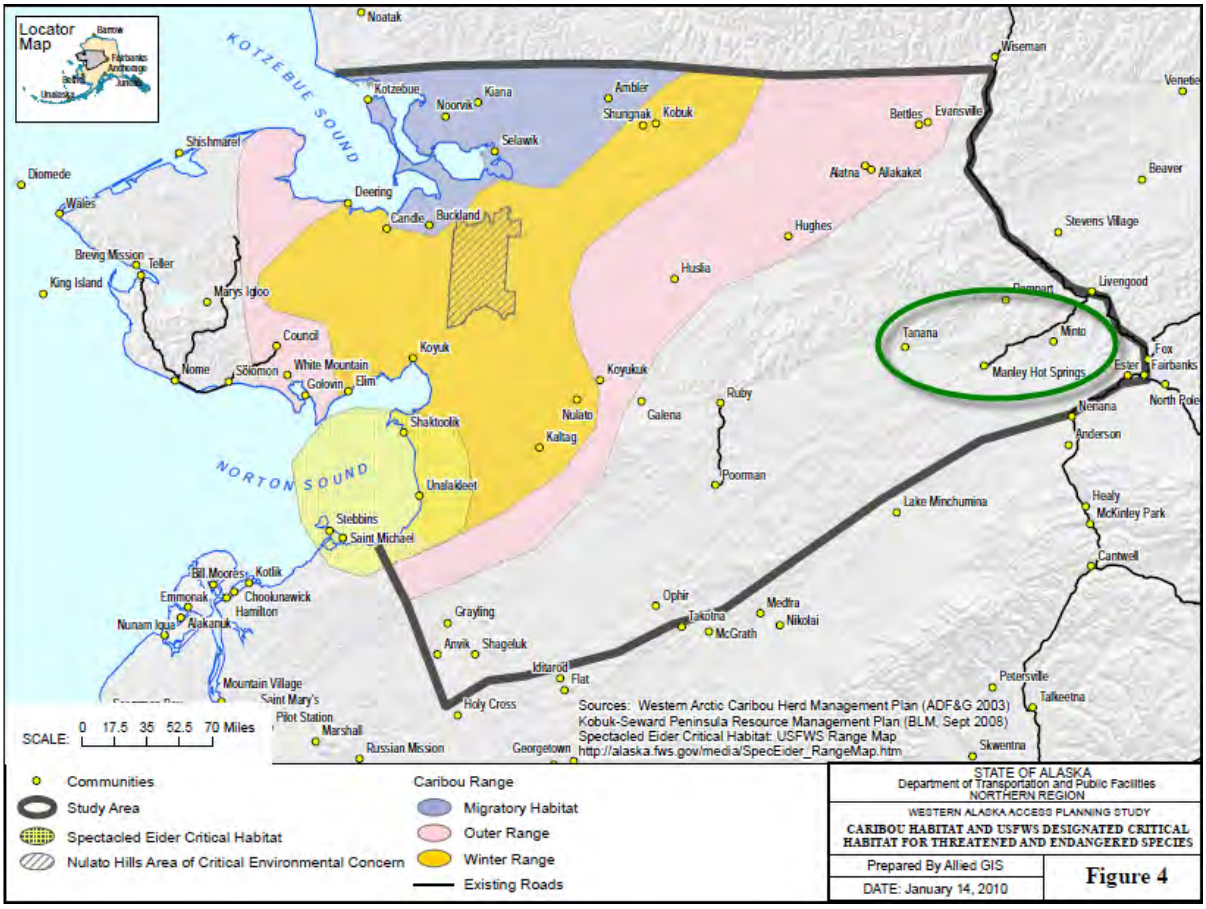
Subsistence fishing and hunting continue to figure prominently in the household economies and social welfare of most residents in the study area. To some extent, subsistence harvesting helps offset unemployment and the high cost of living in western Alaska (Fried and Windisch-Cole 2005). As the study team noted in Table 10, the cost of food ranges from 10 to 55 percent above what residents

pay in Anchorage. Therefore, subsistence is likely to remain a vital source of food for residents in the study area.

In addition to being an important source of nutrition, subsistence activities are central to the customs and traditions of many cultural groups in Alaska, including the Athabascans, Iñupiat, and other Alaska Natives in the case study communities. A new road extending to Tanana will likely benefit residents in the broader study area by increasing access to subsistence resources. There has also been concern expressed throughout the broader study area that road access to traditional hunting grounds could bring urban hunters north to compete for the limited subsistence resources.

Moose is the primary source of subsistence meat in the study area; however, residents also hunt caribou. Figure 17 provides the primary habitat and migratory range for caribou near the proposed road. The study team does not anticipate that the corridor construction will significantly affect caribou migratory patterns.

**Figure 17. Western Arctic Caribou Herd Migration Pattern and Spectacled Eider Habitat**




Source: DOWL HKM, 2010

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# Appendix A: Analytical Framework and Detailed Transportation Cost Tables.

This appendix briefly describes the assumptions used to derive the cost-savings data in the report, as well as the data sources used to estimate the existing conditions. Additionally, detailed transportation tables located below provide the estimated volumes and transportation costs used to estimate the savings from the proposed road.

## Assumptions and Inputs

To measure the effects of a road linking Manley Hot Springs to Tanana, the study team assumes all volumes of freight, fuel, and mail remains constant for this analysis. The effects of the proposed road measure the marginal change in transportation costs, by assuming that most goods will travel via the least expensive alternative. The analysis then calculates the savings, or costs, associated with the road. Any savings or costs associated with the road represent a cost savings to society, rather than a direct benefit to the end consumer. In other words, the revised transportation cost represents the new cost to move a commodity over a specified distance. The study team is not able to anticipate what proportion of those savings business will pass on to the end user.

In cases where only operating costs are available, the transportation costs used include business margins that are consistent within their industry.

## Data Sources

For existing conditions, the study uses data from the United States Census Bureau and DOLWD. To provide information on subsistence activities, the study uses data from the ADF&G database.

All air carrier information comes from the Bureau of Transportation Statistics for 2010, which is the most recent data available that includes complete air carrier statistics and financial reports. The study team also contacted the Bureau of Transportation directly to provide F-2 schedules for Alaskan and Non-Alaskan carriers.

Key industry informants provided the majority of information pertaining to barge and road transportation. Northern Economics was able to obtain rates, operating costs, historic transactions, location specific details, and valuable insight into intermodal transportation between Manley Hot Springs and Tanana.

## Detailed Transportation Tables

Table 21 displays the current volumes and transportation prices for commodities moved into Tanana during 2010. Both the volumes and transport prices derive from a combination of publically available rates and key informant interviews with members of the industry. The cost per pound represents the price to move one pound of a particular commodity, over a specified distance. For example, based on the study analysis, it costs $0.80 to move one gallon of fuel from Nenena to Tanana, including the initial trucking cost to move that gallon from North Pole to Nenena for barging.

**Table 20. Current Total Tanana Freight and Fuel Transportation Costs**

| Commodity | Cost ($) |
|---|---|
| **Freight** | |
| Volume (pounds) | 257,000 |
| Current Transport cost ($ per pound) | 0.20 |
| **Subtotal ($)** | **51,000** |
| **Air Cargo** | |
| Volume (pounds) | 262,000 |
| Transport cost ($ per pound) | 0.85 |
| **Subtotal ($)** | **223,000** |
| **Mail** | |
| Volume (pounds) | 145,000 |
| Current Transport cost ($ per pound) | 1.18 |
| **Subtotal ($)** | **171,000** |
| **Fuel** | |
| Volume (gallons) | 217,500 |
| Truck Transport cost ($ per gallon) | 0.80 |
| **Subtotal ($)** | **174,000** |
| **Total Transport Cost ($)** | **619,000** |

Source: Estimates by Northern Economics, Inc. based on Bureau of Transportation Statistics, 2010; Ruby Marine, 2012; Sweeny, 2012; Sweetsir, 2012.

Table 22 provides detailed information on the anticipated transportation costs under the "with road" scenario. The study assumes that communities will take full advantage of the lower transportation costs of moving freight and fuel by road. During periods of breakup and freezing, when hauling mail and cargo across the Yukon River may not be possible, the study team believes both commodities will continue to move by air.

According to the 2010 BTS data, approximately 31 percent of mail and 35 percent of cargo move through the community during the transitional months of April–May and October–November. As such, the analysis assumes that only 69 percent of mail and 65 percent of cargo will move to the road system, until a permanent structure is built to haul goods across the Yukon River. The revised transportation costs for the air cargo and mail volumes below represent a combination of the percent of volumes that will move via the road at $0.04 per pound and the remaining volumes that will continue to move at the assumed airfreight cost of $0.85 per pound.

**Table 21. Total Tanana Freight and Fuel Transportation Cost, With Road**

| Commodity | Cost ($) |
|---|---|
| **Freight** | |
| Volume (pounds) | 257,000 |
| Truck Transport cost ($ per pound) | 0.04 |
| Subtotal ($) | 11,000 |
| **Air Cargo** | |
| Volume (pounds) | 262,000 |
| Transport cost ($ per pound) | 0.04 |
| Subtotal ($) | 85,000 |
| **Mail** | |
| Volume (pounds) | 145,000 |
| Truck Transport cost ($ per pound) | 0.04 |
| Subtotal ($) | 30,000 |
| **Fuel** | |
| Volume (gallons) | 217,500 |
| Truck Transport cost ($ per gallon) | 0.19 |
| Subtotal ($) | 42,000 |
| **Total Truck Transport Cost ($)** | **168,000** |

Source: Estimates by Northern Economics, Inc. based on Bureau of Transportation Statistics, 2010; Ruby Marine, 2012; Sweeny, 2012; Sweetsir, 2012.

This analysis uses the standard mileage rate published by the Internal Revenue Service of $0.55 per mile to operate a vehicle. The rate encompasses the average fixed and variable costs to operate a vehicle. Based on this assumption, the study estimates that it is cheaper for one person to drive a vehicle to Fairbanks, compared to the cost of airfare. The cost of travel decreases as more passengers are included in the vehicle and the costs spread across a larger group.

**Table 22. Estimated Air and Vehicle Travel Cost by Passenger, Tanana to Fairbanks**

| Information/Cost Item | Estimated Costs ($) |
|---|---|
| One-way airfare ($) | 120 |
| Road miles to destination | 210 |
| Driving time for one-way trip (hours) | 4.2 |
| Full cost of operation ($/mile) | 0.55 |
| Cost per vehicle passenger ($) | |
| Driver only | 116 |
| Two passengers | 58 |
| Four passengers | 29 |

Source: Northern Economics, Inc. based published airfares, 2012; Internal Revenue Service, 2012.