Tanana Water and Sewer Feasibility Study Update
Final Document

Prepared for:

Too'gha, Inc.
P.O. Box 190
Tanana, AK 99777

and

Village Safe Water
555 Cordova Street
Anchorage, AK 99501

Prepared by:

HDR Alaska, Inc.
2525 C Street, Suite 305
Anchorage, AK 99503

FILE COPY

March 2006

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STATE OF ALASKA

DEPT. OF ENVIRONMENTAL CONSERVATION

DIVISION OF WATER
FACILITY PROGRAMS

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March 14, 2006

Mr. James Roberts
Too'gha Manager
P.O. Box 190
Tanana, Alaska 99777

Dear Mr. Roberts:

In order to be considered eligible for the Village Safe Water funding, projects must be part of an approved sanitation feasibility study, comprehensive plan or master plan. We have reviewed the Water and Sewer Feasibility Study Update for Tanana and although we concur with portions of the plan, we could not approve it in its entirety. Our approval is limited to phases I,II, and II, (downtown water and serer extension and relocation of the community sewage lagoon). We could not approve Phases IV- IX for the following reasons:

- The capital cost associated with Phases IV-VII, (water and serer extension to Circle Subdivision) are considered excessive by VSW as only 31 existing homes would benefit from the $7,719,300 investment.

- We cannot make a determination on phases VIII and IX, (on-site investigation for outlying homes/ on –site systems for outlying homes) until a previously fund soil investigation and sanitation alternative analysis for outlying homes has been completed.

If you have any questions or would like to discuss this determination in more detail, please contact Lynn Marino at (907) 269-7602, or in her absence please contact Greg Magee, VSW Program Manager at (907) 269-7613.

Sincerely,

Bill Griffith

Bill Griffith, P.E.
Facility Programs Manager

Cc: Jenifer Gastrock, HDR
Lynn Marino, VSW

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List of Abbreviations

ADCA	Alaska Division of Community Advocacy
ADEC	Alaska Department of Environmental Conservation
ANCSA	Alaska Native Claims Settlement Act
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BOD	Biochemical Oxygen Demand
City	City of Tanana
CU	Color unit
DOT	Department of Transportation
DCED	Department of Community and Economic Development
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
gpcd	gallons per capita per day
gpm	gallons per minute
GWUISW	Ground Water under the Influence of Surface Water
HDR	HDR Alaska, Inc.
IRA	Indian Reorganization Act
IRHA	Interior Regional Housing Authority
kWh	Kilowatt hours
MCL	maximum contaminant level
mg/L	milligrams per liter
NMFS	National Marine Fisheries Service
NTU	Nephelometric Turbidity Unit
PCE	Power Cost Equalization
PHS	U.S. Public Health Service
TSS	Total Suspended Solids
U.S.	United States
USACE	United States Army Corp of Engineers
USFWS	United States Fish and Wildlife Service
VSW	Village Safe Water
WRCC	Western Regional Climate Center
WTP	Water Treatment Plant

1.0 CONCLUSIONS AND RECOMMENDATIONS

A water and sewer feasibility study has been completed for Too'gha, Inc., Tanana, Alaska's water and sewer utility, and Village Safe Water (VSW). This effort included evaluating sanitation alternatives and obtaining public input. The following summarizes the findings of this feasibility study.

Water and sewer service was evaluated for three areas in town. These areas were treated separately due to the distance from the existing water treatment plant (WTP). The three areas were:

- The un-served, remaining, developed downtown area
- Homes along First Street to the Circle Subdivision
- Outlying areas including White Alice, Mission, and Site Roads

Several alternatives were evaluated for each of the study areas. The alternatives evaluated for the downtown area are summarized in Table 10-14. The alternatives evaluated for the homes along First Avenue to the Circle Subdivision are summarized in Table 10-34. The alternatives evaluated for homes in the outlying areas are summarized in Table 10-53. Alternatives ranged from extending piped water and sewer service to providing community haul systems. Capital investment and annual operations and maintenance costs were developed for each alternative.

An important component of community planning is obtaining community input. To understand the needs of the Tanana community, several efforts were made to obtain community comments. First, two on-site meetings were conducted with the Too'gha board to develop water and sewer alternatives. The kick-off meeting June 1 and 2, 2004 developed the preliminary alternatives for each of the service areas. A community survey was also distributed to the residents in the three service areas to obtain information about existing water and sewer service, as well as desired upgrades. Using this information, the Too'gha Board selected preferred alternatives at the 65% alternative meeting August 26, 2004.

The preferred alternatives were evaluated further to provide refined costs estimates as well as information required for future design of these systems. The preferred alternatives selected at the 65% meeting are summarized below and presented in Chapter 13. The costs in Chapter 13 were modified from the original cost estimates developed in the 65% submittal. Figures from the construction of the existing water and sewer lines were made available and used to better define the range of probable cost by using a running average of past construction costs. Also with this information it was possible to reduce the contingency put on the estimates. Finally, information from design efforts was used to better define the alternatives including survey information that indicated a lift station would not be necessary for the sewer extension.

The preferred alternatives selected by the Too'gha board are as follows:

<u>Downtown Area</u>

- Extend piped water and sewer service to Koyukuk and East Streets, and along First and Second Avenues, as topography allows.

- Relocate the community sewage lagoon north of the existing lagoon. Discharge the effluent to wetlands located north of the airport runway.

Circle Subdivision

- Extend and connect piped water and sewer service from the downtown area extension, east along First Street to the Circle subdivision.

Outlying Areas

- Perform well drilling and geotechnical tests on individual lots to explore conditions for groundwater wells and individual septic systems

The alternatives for each service area were separated into phases that could be completed in a construction season. The overall priority was selected by the Too'gha Board. Phasing for community water improvements is shown in Chapter 13 on Figure 13.8 and phasing for sewer improvements is shown on Figure 13.9. The relocation of the community sewage lagoon is shown on Figure 13.3.

2.0 INTRODUCTION

The purpose of this project is to update Tanana's existing water and sewer feasibility study. Work began in May of 2004 as a result of a grant funded by the State of Alaska, Village Safe Water program. The previous water and sewer feasibility study was completed by CH2M Hill in 1997. Too'gha, Inc., Tanana's water and sewer utility, contracted with HDR Alaska, Inc. (HDR) to update the study. The goal of the feasibility study update is to provide Too'gha with information to plan for future water and sewer service for unserved areas of the community.

Tanana lies within the traditional Koyukon Athabascan territory. Long before European contact, Tanana's prime location at the confluence of two major rivers, the Yukon and the Tanana, made the site well suited to its role as a trading hub for nearby Koyukon and Tanana Indians. In the century since missionaries established a station 8 miles downriver from the present townsite, Tanana has been the site of trading posts and two now-closed military outposts. A mission complex, developed between 1887 and 1890, and including a hospital and a school, continued to grow. The hospital was transferred to Bureau of Indian Affairs (BIA) administration in the 1920s, and new facilities were built in 1949. Hospital administration was transferred to the U.S. Public Health Service (PHS) in the 1950s, and, until the complex was closed in 1982, the hospital was a major employer in Tanana. The complex is served by its own piped water and sewer system.

A new school was built in 1963, and a major addition was added in 1971. In 1978 Village Safe Water built a water plant/laundry and installed a small water and sewer system, serving a few public buildings but not houses. In 1982, a fire hall was built, and Tanana took over operation of its own school district. Television came to Tanana in 1981, and in 1986 viewer service greatly expanded with the introduction of private cable television.

A more extensive piped water and sewer system is currently under construction in the downtown area of the community. Installation started in 1998 with the design and construction of a new water treatment plant and laundry facility. The building opened in 2002. Installation of a piped water and sewer system, which will ultimately serve approximately three fourths of the houses in the downtown area, is ongoing and is scheduled to be completed in the 2005 season. Construction of this system, and other systems to serve the remainder of the community, were recommended in the 1997 feasibility study.

2.1 Objectives of this Study

This water and sewer feasibility study update will review the existing feasibility study with consideration given to the following objectives:

1. To identify and evaluate alternative ways to provide water and sewer service to the unserved residents of Tanana, living outside the limit of the under-construction piped system. These service areas include:
   - Developed areas on Koyukuk Street and First Avenue
   - Circle Subdivision
   - Outlying areas along White Alice, Mission, and Site Roads

2. To evaluate alternate locations for the community sewage lagoon and to investigate the feasibility of wetlands treatment of the sewage effluent.

3. To examine additional infrastructure needs for future development in the Tanana community. The plan will forecast 20 years. The community indicated that they would like to focus on longer term planning for this project, which will be done for the potential growth areas and lagoon location.

4. To present alternatives to the Too'gha Board and to Tanana residents through a public involvement process.

5. To present estimates of capital and operational costs for community water and wastewater system alternatives.

6. To assist the Too'gha Board in selecting recommended water and sewer alternatives for further development, based on community input and engineering analysis.

These objectives will be addressed in subsequent sections of this plan. In addition, the report includes a land status chapter prepared by Robert S. Means of the Alaska Department of Community and Regional Affairs and Nina Miller of Too'gha, Inc., which was completed for the 1997 feasibility study.

3.0 PROJECT PLANNING AREA

3.1 Location and Access

Tanana is located in Interior Alaska about 2 miles west of the confluence of the Tanana and Yukon Rivers, 125 air miles west of Fairbanks, as shown in Figure 3.1. The community has approximately 32 miles of local roads. Cars, trucks, bicycles, snow machines, ATVs, and riverboats provide local transportation.

3.1.1 Airport and Barge Service

Tanana is accessible year-round by air and seasonally by river transportation. The Yukon and Tanana Rivers are typically ice-free from mid-May through mid-October.

The state owns and operates the Ralph M. Calhoun Memorial Airport, which has a 4,400-foot long, lighted, gravel runway. Daily flights are usually available from Fairbanks. Current service providers include:

- Frontier Flying Service
- Warbelow's Air Ventures
- Tanana Air Service
- Arctic Circle Air Service
- Everts Air Alaska
- Servant Air

The community operates a barge landing on the Yukon River. Barged goods are offloaded at a staging and storage area.

3.2 Environmental Conditions and Resources Present

3.2.1 Climate

Tanana experiences a cold, continental climate with extreme temperatures both in the winter and summer. Winter minimum temperatures generally range from -14 to -48 degrees Fahrenheit, with extremes as low as -76 degrees. The average winter temperature is -7.8 degrees Fahrenheit. Average summer temperatures in July range from 64-70 degrees Fahrenheit, with extremes as high as 94 degrees. Average annual precipitation is 13 inches with an average snowfall of 50 inches. Climate data was obtained from the ADCA website and from climate records from the weather station at the airport in Tanana (Western Regional Climate Center 2004).

3.2.2 Geology and Soil Conditions

The area surrounding Tanana is surrounded by gently rolling terrain characteristic of the Yukon River valley. Peaks of the Ray Mountains lie to the north of Tanana. Schist, sandstone, siltstone, claystone, and shale underlie the community at depths of 35 to 140 feet, but most regularly at depths of 40 to 60 feet.

Soils in the vicinity of the community consist of 5 to 15 feet of silt, sandy silt, and silty sand, overlaying gravel sediments, which exist from depths of 35 to 70 feet.

Tanana lies at the northernmost extent of the discontinuous permafrost zone. The town is generally underlain by permafrost 35 to 65 feet thick, but permafrost is likely to be absent in areas adjacent to the thaw bulb of the Yukon River. Seasonal frost has been reported to a depth of 20 feet.

The main community area is generally elevated above the floodplain of the Yukon River, and soils are well drained. There is a large wetland area north of the town.

3.2.3 Flood, Erosion, and Seismic Hazards

Flood Hazard

The U.S. Army Corps of Engineers (USACE) *Floodplain Management Services for Alaska Communities* web site states that the highest recorded flood at Tanana, caused by an ice jam, occurred in 1937 and was recorded at 84.7 ft, based on the ground elevation at the flood site (USACE 2000). No Federal Emergency Management Agency (FEMA) floodplain mapping has been conducted for the Tanana area (FEMA 2003).

The USACE Flood Plain Management Service Branch rates the flood hazard potential at Tanana as low, with flooding capable of inundating 10 percent of the community occurring less than once in 100 years. There is some river erosion described by the USACE as "slight." According to residents, a flood inundated the community in the 1930s. Also, First Avenue, between the downtown and Circle Subdivision, is subject to flooding. USACE flood markers, showing a flood elevation well above the road, are visible on trees along the road to the Circle Subdivision.

Seismic Hazard

Tanana is in seismic zone 3, where major structural damage can be expected from earthquakes measuring greater than 6.0 on the Richter scale.

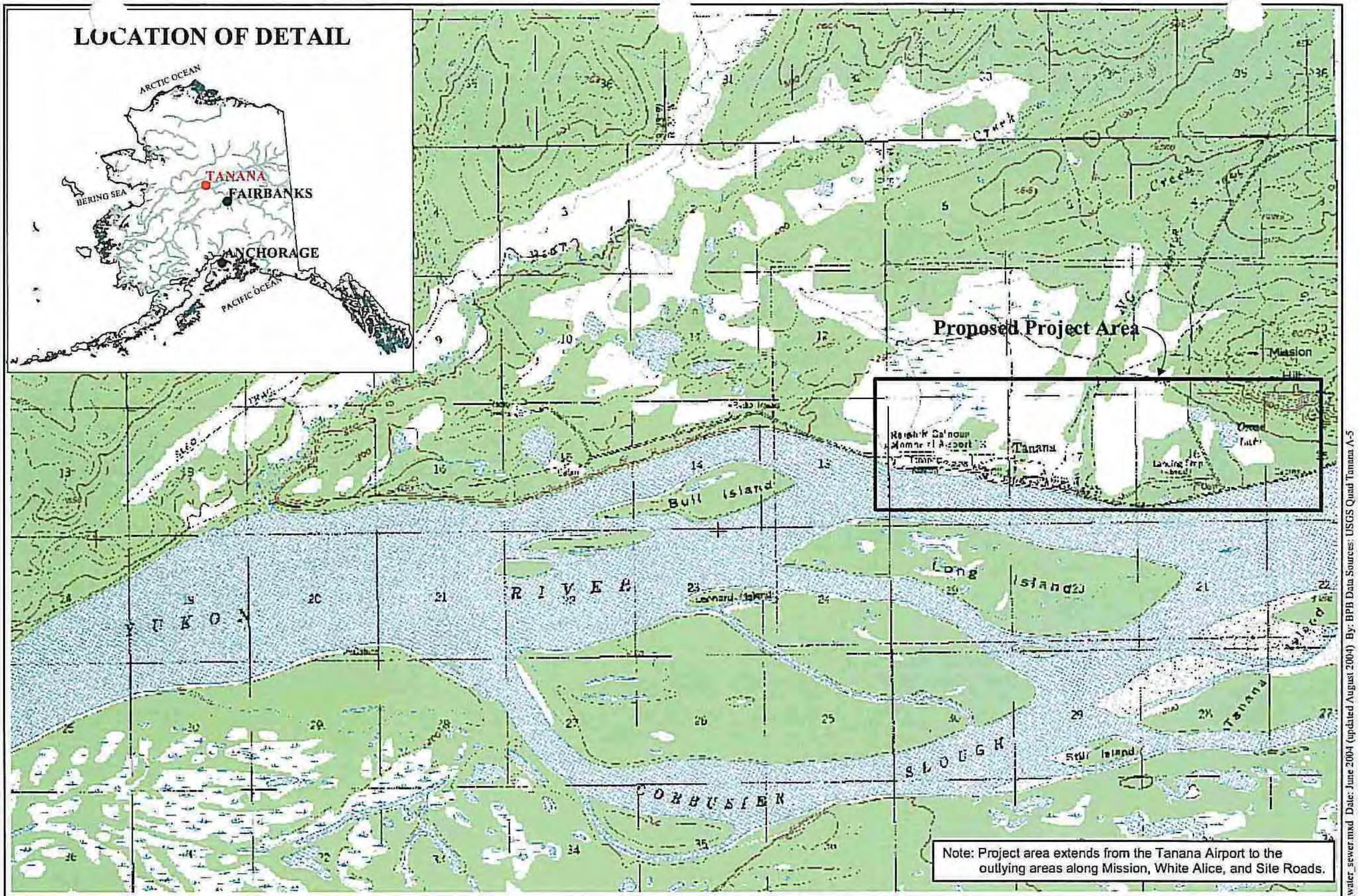
3.2.4 Historic Sites

The Alaska Heritage Resources Survey has several recorded cultural sites in and around the Tanana area. However, many of the recorded sites are beyond the project boundaries of this water and sewer feasibility study. Sites that lie within the project extents include:

- Episcopal Social Hall (TAN-00019)
- Old Post Office (TAN-00020)
- Tanana Beach Historic Midden (TAN-00029)
- FAA Building Quarters (TAN-00059, 00060, 00061, 00062, 00063, 00064)

The Episcopal Social Hall was built in the early 1900's. The structure was moved from the Old Mission Site (TAN-00018), and is now located in Lot 10, Block 9 on First Avenue.

The Old Post Office building was constructed at the turn of the 20th century. The building has a false front and is reportedly in poor condition. The windows have been boarded over. The building is located in Lot 6, Block 9 on First Avenue.



Note: Project area extends from the Tanana Airport to the outlying areas along Mission, White Alice, and Site Roads.

HDR Alaska

SCALE
1 inch = 1 mile

City of Tanana
Water and Sewer Feasibility Study
Location and Vicinity Map

FIGURE
3.1

File: Z:\2009\25\13806\Tanana_water_sewer.mxd Date: June 2004 (updated August 2004) By: BPB Data Sources: USGS Quad Tanana A-5

The Tanana Beach Historic Midden site has subsurface archeological artifacts. The site is located on the north bank of the Yukon River, at the west end of the city, just south of the airport. The site is reported to have artifacts from the late 1800s and early 1900s, coinciding with the occupation of Fort Gibbon. Artifacts noted on the beach include: earthenware and stoneware ceramics, bottle shards, uniform parts, cartridge casings, lamp parts, livery hardware, construction materials, faunal remains, and other items suggesting a general dump site. It is unlikely that water and sewer alternatives in this feasibility study will be near this site.

The FAA Building Quarters have been determined eligible under the National Register of Historic Places, as of August 29, 2000. The buildings were constructed in the 1940's as standardized housing for FAA employees. The buildings are significant because they were constructed during a period when the Civil Aeronautics Administration was active in Alaska (1940-1958), and the buildings retain the physical integrity of the FAA facilities in Tanana.

The alternatives described in Section 10.0 are not expected to have any impact on the cultural sites described above. The cultural building sites are shown on Figure 3.2.

3.2.5 Endangered Species and Critical Habitats

The U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) indicate that Tanana is not within the breeding range of any threatened or endangered species under their jurisdiction and that there are no known threatened or endangered species in the area (USFWS 2003; NMFS 2003).

Flora and Fauna

The following information is from the PHS Project Summary for Project AN-90-30 (1990).

> Tanana's vegetation consists of upland spruce-hardwood forest. This is a fairly dense forest of white spruce, birch, aspen, and balsam poplar, with black spruce replacing white spruce in poorly drained areas and north-facing slopes. High bush cranberries, raspberries, lingonberries, currants, grasses, and mosses are among the important plants of the area; willows, roses, and fireweed also grow in the area.
>
> Moose may concentrate along the riverbank near Tanana, but generally the upland spruce-hardwood forest supports few animals. The red squirrel and pine marten are exceptional in being able to meet all their habitat requirements in this single environment. Shrews, bats, voles, porcupine, fox, bear, lynx, and weasel are among the other animals identified with the area.

Tanana is in a medium density waterfowl range, and the Yukon River harbors significant runs of salmon, as well as grayling, pike, and other fish.

3.3 Economy and Financial Profile

Approximately 48 percent of Tanana's potential workforce is employed. Government entities such as the city, school district, post office, National Weather Service weather station, and Tanana Tribal Council provide approximately two-thirds of the full time jobs in the community.

Local businesses and services add to Tanana's economic base. Bureau of Land Management (BLM) firefighting, trapping, construction, and commercial fishing provide important seasonal employment. Approximately 17 residents hold commercial fishing permits.

Figure 3.3 shows the employment, by industry, in Tanana (ADCA Community Database 2004).

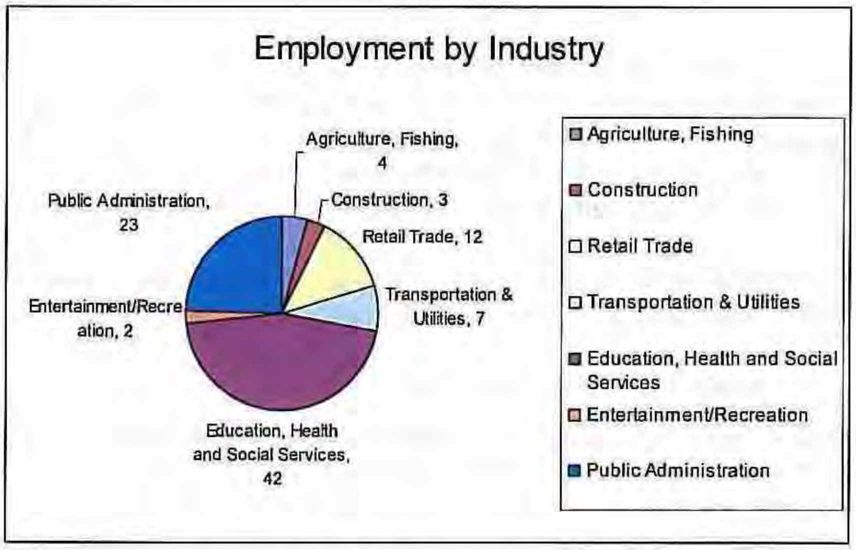


Figure 3.3: Employment by Industry

The unemployment rate in Tanana is 24 percent. The median household income is approximately $29,750, with 23.0% of the residents living below the poverty level (ADCA Community Database 2004).

3.4 Potential Growth Areas

The community is currently developing a comprehensive plan to identify potential growth areas in Tanana. Although this plan is not yet completed, community leaders have indicated that potential new housing and development will most likely occur up-river from the existing downtown. Based on conversations with community leaders, likely areas for growth include First Avenue, Second Avenue, and between the Circle Subdivision and Koyukuk Street. There are also undeveloped lots within downtown that would be desirable to develop because of the presence of water and sewer service in much of this area.

3.5 Power Generation and Fuel Storage Facilities

Power Generation

Electricity is provided by the Tanana Power Company, which has implemented a fully automated switch gear system. Rates are subsidized through the Alaska Power Cost Equalization Program (PCE). Power is generated using four diesel generators with the following capacities: 350, 500, 650, and 900 kilowatts (kW).

HDR Alaska, Inc.

Tanana

WATER AND SEWER FEASIBILITY STUDY

PUBLIC FACILITIES

Date

Aug. 2004

Figure

3.2

Bulk Fuel

Bulk fuel storage in Tanana includes:

Tank Owner	Total Capacity
Tanana Tribal Council	191,000 gallons
Department of Transportation (DOT)	2,000 gallons
Too'gha Laundry Facility	10,000 gallons
Power Plant	25,000 gallons
School	25,000 gallons
City	25,000 gallons

The average price of diesel fuel in Tanana is $1.74 per gallon, according to the 2003 Statistical Report of the Power Cost Equalization (PCE) Program. However, the water/sewer project construction superintendent, currently working in Tanana, reports that this year (2004) fuel prices have risen to approximately $2.08 per gallon.

3.6 Public Facilities and Housing

Important public and private facilities in Tanana include the health clinic, elders' residence, post office, two general stores, and a primary-through-grade-12 school operated by Tanana City Schools (shown on Figure 3.2). There is also a weather station, located near the airport. The community maintains an office building and fire station. Too'gha operates and maintains the new water treatment plant and Laundromat. Gasoline and fuel oil are available at a local store. Cable television and telephone services are available from Yukon Telephone.

According to the 2000 United States (U.S.) census, there are a total of 166 housing units in Tanana. The majority of housing units (138 structures) are single family detached houses. According to the survey, there are also 7 duplexes, 9 structures that have 10-19 units, and 11 trailer/mobile home structures. Several community representatives commented on the limited housing available in the vicinity, which may be restricting growth in the community.

The 2000 U.S. census surveyed 121 of the 168 housing units. The survey found that 80.5% of the homes lacked complete plumbing (defined as lacking a sink, bath/shower, or flush toilet). The survey also found that 77.9% lacked a complete kitchen (defined as lacking a stove, fridge, or running water). Conditions since the last census survey have improved as a piped water and sewer project has been under construction and now serves the majority of the downtown area. Based on the census survey, 23% of the homes surveyed did not have phone service.

3.7 Public Administration

Tanana has been incorporated since 1961 and became a first class city in 1982. Tanana is also a Native village, reorganized and chartered under the Indian Reorganization Act (IRA). The Tanana Tribal Council is recognized as the legal governing body of the tribe and is able to contract for any federal services that are Indian or Alaska Native specific.

Tozitna, Limited, the village Native Corporation, was established under the terms of the Alaska Native Claims Settlement Act (ANCSA) in 1971.

In addition, Tanana is a member of Doyon Limited, the ANCSA regional corporation, and is a member of the Fairbanks Subregion of Tanana Chiefs Conference, Inc.

On January 10, 1996, the Tanana City Council and the Tanana Tribal Council voted to form a non-profit corporation to run the water and sewer utility. This corporation was named Too'gha, Inc. and was organized to engage in design, construction, ownership, and management of sanitation facilities for Tanana. Too'gha means "place of good water" in Athabascan.

3.8 Population

For population forecasting purposes, the planning period for this feasibility study is 20 years, extending to the year 2024.

3.8.1 Present Population

The most recent population data for Tanana comes from the 2003 state demographer's estimate of 290 people. The U.S. Census Bureau collects population data every 10 years throughout the country. The 2000 U.S. Census reported a total of 308 residents in the community (ADCA). Based on the 2000 U.S. Census, the ethnicity of the population is 82% Native and 18% White.

The population has varied throughout the history of the community. The following table gives a decade-by-decade comparison of population.

Table 3-1: Tanana Population History

Year	1890	1900	1910	1920	1930	1940	1950	1960	1970	1980	1990	2000
Population	203	186	398	213	185	170	228	349	120	388	345	308

The population in Tanana has declined over the past 30 years. Based on conversations with Mr. Greg Williams, demographer for the Alaska Department of Labor, documented in the feasibility study written in 1997, there is a connection between availability of employment and population. Population growth will not exceed the availability of jobs, and the lack of jobs could provide incentive for people to leave Tanana. The community has made efforts to provide more employment opportunities in Tanana by encouraging economic projects and developing infrastructure to support future economic growth.

3.8.2 Projected Population

To project future population values for Tanana, the historical records were plotted over time. Both linear and exponential trend lines were fit to the historical population data set. Regression equations from the trend lines were used to calculate future population values. Figure 3.4 shows the plotted historical population values as well as the projected population values based on the regression equations.

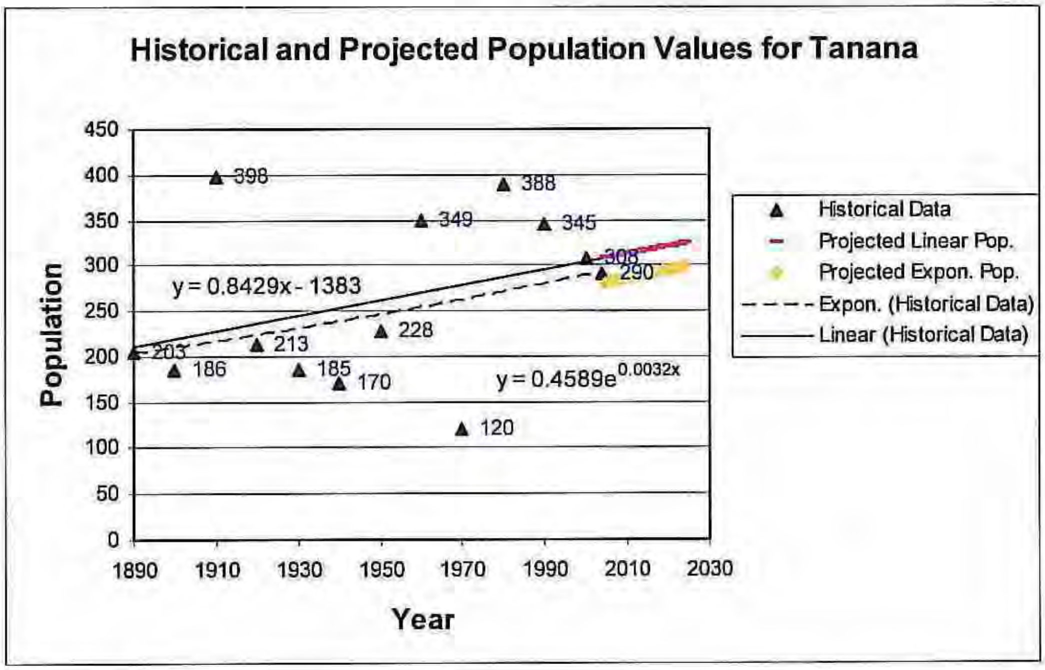


Figure 3.4: Historical and Projected Population Values for Tanana

Based on the calculated 20-year population values from the two regression equations, the linear trend line projected a population of 323 people in the community in 2024, while the exponential trend line predicted 298 people. These numbers are lower than the population values used to design the recently completed water treatment plant and laundry facility in the community. This facility was designed to produce and treat water for a population of 406 people. To select the most conservative population estimate, this feasibility study will use a 20-year design population of 406 people so that any additional modifications to the system will be consistent with the water treatment plant design. This will ensure that adequate water can be produced for the population and any new wastewater treatment facilities that are designed will be capable of treating the maximum water output of the new water treatment plant.

3.8.3 Number of Households to be Served

The number of households to be served will be discussed in the individual alternative sections. Refer to Section 10.0 for this discussion.

3.8.4 Number of People Benefiting from Project

The number of households benefiting from this project will be discussed in the individual alternative sections. Refer to Section 10.0 for this discussion.

4.0 FUTURE CAPITAL PROJECTS, COSTS, AND SCHEDULES

The following future capital projects were researched during conversations with community leaders, community planners, and VSW, and were based on information available on the ADCA database.

4.1 Roads, Airports, and Ports

Several improvements have been planned for the airport. These improvements include:

- Resurfacing the runway and existing safety area
- Constructing and acquiring land for a runway safety area beyond the approach end of the runway
- Constructing a 1.8 mile by-pass road around the north side of the existing runway to eliminate access through the runway safety area
- Realigning the existing road to the back of the apron to allow space for an aviation support area
- Installing new airport lighting
- Purchasing snow removal equipment
- Constructing a new equipment building
- Improving drainage around the site

This project is in the preliminary project stages and has been funded by the Federal Aviation Administration (FAA). Construction is scheduled to begin in the 2005 construction season. Total project costs, as reported on the ADCA website, are reported to be $9.6 million.

4.2 Power Generation and Fuel Storage Facilities

Based on conversations with the community leaders and representatives from the Tanana Power Company, there are no currently planned power generation or fuel storage facilities projects.

4.3 Community Facilities

The community has recently completed construction of a new water treatment plant and laundry facility. In addition, approximately 26,410 lineal feet of water and sewer lines will be installed in the downtown area to provide piped water and sewer service to residents. These projects are being completed as part of the recommended alternatives of the 1997 Tanana Water Sewer Feasibility Study. The piped project is approximately 90% complete, with additional construction planned for the 2005 season. The total project cost is estimated at approximately $11.4 million.

4.4 School and Head Start

The school has recently received approximately $2.5 million in funds for renovations. There are several major improvements and replacements planned for these funds including:

- Replacing the gymnasium floor, including foundation work
- Inspecting and repairing an underground fuel tank
- Connecting one teacher housing trailer unit to the new Too'gha water system
- Improving internal plumbing at the school

- Replacing siding on the building

The school has also requested additional funds to connect the remaining teacher housing units to the new Too'gha water system; however, these funds have not been appropriated or approved at this time. Installation of water and sewer connections for the remaining teacher housing trailers would require excavating in areas of known contaminated soil.

4.5 Health Clinic

Based on conversations with a representative from the Tanana Health Center, there is no new construction, expansion, or renovation projects planned for the health clinic.

4.6 Commercial Facilities

Based on conversations with the community, there are no projects currently planned.

5.0 EXISTING WATER AND SEWER FACILITIES

The following section provides a general description of the existing water and sewer systems in Tanana. A more detailed discussion of the water and sewer system, including conditions of the facilities, is included in Section 5.3. The existing systems are shown on Figure 5.1.

- The Tanana Tribal Council water system was originally built to serve the PHS hospital compound and continues to serve a few buildings in the downtown area. The system includes a well, water treatment plant, and buried concrete water storage tank, and is operated by the Tanana Tribal Council. The Tribal Council's wastewater piping system is connected to Too'gha's system, and is operated by Too'gha.

- The majority of the remaining downtown area is connected to the newly installed Too'gha water system. Water for the Too'gha system comes from the Too'gha well, located on the bank of the Yukon River. Water from the well has been classified as ground water under the influence of surface water (GWUISW), which must meet the treatment requirements for surface water. Treatment of the water takes place at the new Too'gha Water Treatment Plant (WTP) and Laundromat. This facility also provides a watering point for residents who are not connected to the piped system.

- The service area for Too'gha's piped water system extends east to Eamole Street, west to School Street, north along Third Avenue, and south along First Avenue. Too'gha operates both the old sewer system on the PHS property, extending between the Elder's Residence and School Street, and the new sewer system extending east to Eamole Street, west to School Street, north along Third Avenue, and south along First Avenue. Too'gha's new water and sewer system between School and Eamole Streets is currently under construction and anticipated to be complete in 2005.

- One home in the Circle Subdivision and one home on Site Road are served by individual wells; the majority of residents haul water from the community distribution point at the water plant, or from miscellaneous springs and the Yukon River.

- A two-cell sewage lagoon provides wastewater treatment. The lagoon is drained annually through a buried effluent line to the Yukon River.

- Outhouses or pit privies provide wastewater service for individual homes downtown (in areas not served by piped sewer), the Circle Subdivision, and outlying areas.

5.1 Project Planning Area Map

Figures 5.2 and 5.3 show the extent of the planning areas for this feasibility study update. Based on the study's goals, established by the request for proposal and developed in the kick-off meeting with the Too'gha board, there will be three planning areas evaluated in this feasibility update.

- Downtown: The first planning area will look at alternatives for the completion of piped water and sewer service in the downtown area east of Eamole Street, which includes

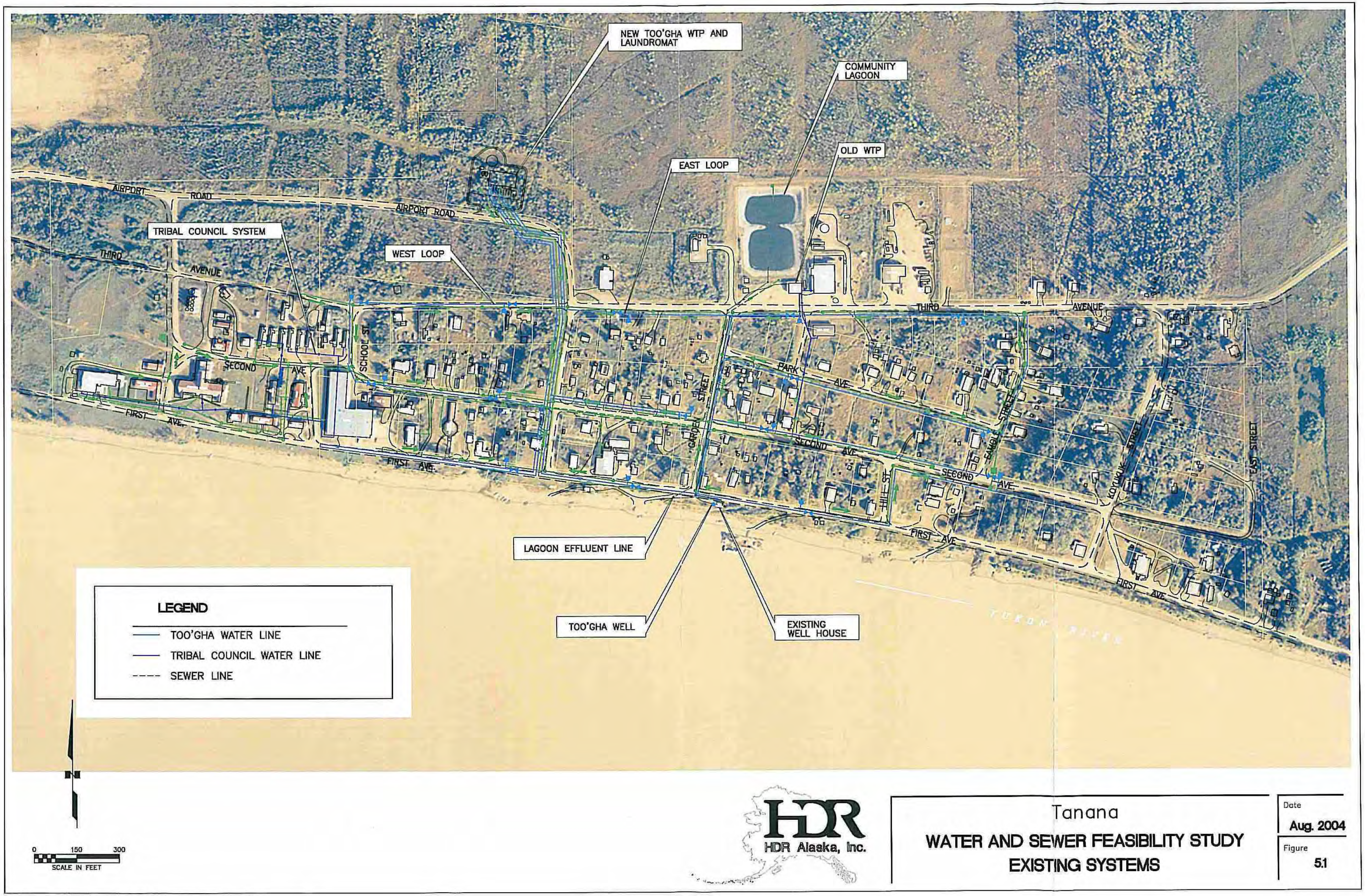
Koyukuk Street and First Avenue. This area will also include an evaluation of the feasibility of relocating the community sewage lagoon.

- Circle Subdivision: The second planning area will evaluate water and sewer service alternatives in the Circle Subdivision and along First Avenue between downtown and the Circle.
- Outlying Areas: The third planning area will evaluate water and sewer service for outlying areas of the community, including White Alice, Mission, and Site Roads.

5.2 History of Sanitation Improvements

Tanana has had many sanitation facilities projects in the past. The following is a summary of the major PHS or VSW-funded projects:

- In 1967 PHS constructed individual wells and outhouses for Native-owned homes. A community well was also drilled in 1967. This well was rehabilitated in 1979 and named city well #2.
- In 1972 PHS drilled a new well for the hospital.
- In 1974 the hospital well was contaminated by an oil spill. A new 97-foot-cased well (Native Council Well) was drilled in August, 1976.
- In 1978 VSW, with additional funding from PHS, built the town's original water plant/Laundromat and improved the existing community well.
- In 1981 PHS provided funds for sanitation improvements for the City of Tanana and the Circle Subdivision. Improvements included a new community well, well house, water transmission line from the well to the old community Laundromat and watering point in the downtown area, and a 300-gallon water haul truck.
- In 1982 the Interior Housing Authority constructed 14 homes in the Circle Subdivision. For water service, 100-gallon individual storage tanks were installed to be filled by a haul service. However, the haul service was not sustained. Outhouses were constructed for the homes, but the pits for the outhouses were never completed. New outhouses with pits were completed for the PHS project (1989) described below.
- In 1982 VSW provided emergency funds for a heating system to prevent the hospital compound sewer lines from freezing.
- In 1984 PHS installed fluoridation equipment in the city's water treatment plant.
- In March 1989 a PHS project provided funds to install pit bunkers, outhouses, and site drainage for the Circle Subdivision; to construct outhouses for two homes in the downtown area; and to repair two sewage lift stations.
- In 1991 a PHS project provided for a new well, well house improvements, and a 2-inch raw water transmission loop from the well to the old WTP and Laundromat.



HDR Alaska, Inc.

Tanana

WATER AND SEWER FEASIBILITY STUDY

EXISTING SYSTEMS

Date

Aug. 2004

Figure

5.1

HDR
HDR Alaska, Inc.

Tanana
WATER AND SEWER FEASIBILITY STUDY
PROJECT EXTENT AND PLANNING AREAS

Date
Aug. 2004

Figure
5.2

HDR Alaska, Inc.

Tanana

WATER AND SEWER FEASIBILITY STUDY

PROJECT EXTENT AND PLANNING AREAS

Date
Aug. 2004

Figure
5.3

- In 1995, VSW funded a feasibility study to evaluate the condition of the existing community systems and recommend upgrades. The study was completed in 1997 and recommended a piped water and sewer system, extending to the Circle Subdivision, with a new WTP and Laundromat in the downtown area, and wells for outlying homes.
- In 1997, VSW funded construction of a new sewage effluent line from the sewage lagoon to a raised bank area on the Yukon River. The discharge location is approximately 60 feet from the Too'gha water well. The effluent line was originally intended to discharge to a drainfield, but was installed as a direct outfall. For seasonal discharges, a hose is connected to the effluent line and extended into the Yukon River.
- In 1998, VSW funds were used to begin construction of the Too'gha Water Treatment Plant and Laundry Facility. This facility was one of the recommended alternatives in the 1997 feasibility study, and was completed in 2002.
- VSW funding for water and sewer improvements continued in 2000 with funding for construction of water and sewer mains and services for the downtown area. Approximately 1,870 lineal feet of water transmission lines, 3,700 lineal feet of water distribution mains, and 2,140 lineal feet of gravity sewer collection mains were installed in the 2001 construction season.
- Construction continued in 2002 with installation of approximately 2,506 lineal feet of water mains, 1,590 lineal feet of gravity sewer pipe, and 560 lineal feet of force main sewer pipe.
- Funding continued in the 2003 construction season with installation of approximately 3,150 lineal feet of water distribution mains, 1,550 lineal feet of gravity sewer collection pipe, and 500 lineal feet of sewer force main.
- In 2003 funding was approved by ADEC/VSW to update the feasibility study for the community (this study).
- Construction of the piped system, as far east as Eamole Street, is continuing through 2004, and is anticipated to be completed in the 2005 construction season. As of 2003, approximately 3,775 lineal feet of water distribution mains, 4,200 lineal feet of gravity sewer collection pipe, and 840 lineal feet of force main sewer pipe were still to be constructed.

5.3 Description and Condition of Facilities

The existing facilities described in Section 5.2 are shown on Figure 5.1. For discussion purposes, the description and condition of the existing facilities will be divided into three sections: the Tribal Council System, the Too'gha System, and Circle Subdivision and Outlying Areas.

5.3.1 Tribal Council System

Water Supply

The Tribal Council operates a well near the river. The well was drilled in 1976 to a depth of 155 feet, but is only cased to a depth of 97-feet with a 6-inch casing. The well is screened approximately 35-45 feet below the ground surface (well log included in Appendix A).

Water Treatment

The water is treated at a water treatment plant and stored in a three-compartment, 60,000-gallon underground tank.

Water Distribution

The system serves a parcel of land owned by the Indian Health Service (IHS) where the former Tanana hospital compound is located, including the majority of the teacher housing, the clinic, the Elder's Residence, and the tribal council offices. The system has reportedly operated dependably through the efforts of a dedicated maintenance staff. The installation date of the system is unknown, but is believed to pre-date the construction of the WTP.

Soil contaminated by petroleum has been found in the Tribal Council system area. Design plans have been prepared, as part of the ongoing water and sewer construction project, to install new water and sewer pipes, and a new lift station, in this area, and connect them to the Too'gha system. However, the Public Health Service (PHS), the owner of the property, will not allow pipes to be installed until after the contaminated soil has been cleaned up. The IHS and the tribe have been discussing clean-up requirements. The current water and sewer construction has no responsibility for the contamination restoration efforts.

Sewer Collection

The condition of the sewer pipes, on the IHS property, is unknown. The lift station (installed during construction of the original WTP) beside the Elders' Residence is close to failing, and is in need of upgrading or replacement. The structure is collapsing and may not last another year. Although, as stated above, there are plans to replace the lift station and the old water and sewer pipes, construction cannot proceed until the contaminated soil in the area has been cleaned up.

Sewer Treatment and Disposal

Wastewater from the Tribal Council system is discharged into Too'gha's sewer system and pumped via two lift stations to the Too'gha-maintained community sewage lagoon (discussed in Section 5.3.2).

Summary of Native Council System Deficiencies

- The Tribal Council well reportedly has periods of low yield when the Yukon River level drops in the late winter and early spring.
- The system on the IHS property is old, and the condition of the underground pipes is unknown.
- Design plans are ready to replace the old pipes and lift station, and serve the buildings on the property, but the contaminated soil prevents construction in the area.

- The elders' lift station is in poor condition. The structure and controls are failing and may not remain standing for another season.

5.3.2 *Too'gha System*

Water Supply

Too'gha operates a well (Too'gha well) on the Yukon River bank beside First Avenue, just east of Garden Street. The Too'gha well was drilled to a depth of 43-feet and developed in June of 1998. It was constructed with an 8-inch diameter casing (well log included in Appendix A). According to operator reports, the Too'gha well produces 16 to 20 gpm, although production can decrease to 13 gpm during the winter when the temperatures drop to -40° Fahrenheit or below.

Water quality is characterized by high concentrations (above the maximum contaminate level, MCL) of iron, manganese, color, turbidity, odor, and total dissolved solids. During the initial completion of the Too'gha well, water tests indicated low concentrations (below the MCL) of benzene. Benzene levels have since fallen, and recent water tests show no trace of benzene. Water quality laboratory results are included in Appendix B.

Based on three microscopic particulate analyses, the Too'gha well water is considered to be groundwater under the direct influence of surface water (GWUISW). Because of this, the water is filtered and disinfected to remove and inactivate *Giardia* cysts to the 3-log level and viruses to the 4-log level.

There are two other wells near the Too'gha well, one inside the well house and one upriver a short distance. City well #2 was drilled in 1981. City well #3 was drilled by PHS in 1991. The well logs for these wells are included in Appendix A. Both of the wells are clogged with iron and have low water yields. Based on conversations with the water/wastewater operator, these wells can be plumbed into the system for use in emergency situations.

Many shallow wells have been drilled, with mixed success, for individual residences in Tanana. The wide range of well yields is attributed to discontinuous permafrost across the area, diminished yields caused by iron encrustation on the well casing perforations, and a limited extent of the aquifer(s) intercepted by the wells. Average yields for successful individual wells are approximately 11 gallons per minute (gpm). Records of the individual wells constructed in the immediate town vicinity are included in Appendix A. Most of these wells were drilled in 1967 by PHS, have an average depth of about 50 feet, are cased most of their depth with 6-inch casing, and are generally perforated in an effort to increase yield. Occasionally wells were left open-ended in an aquifer to increase yield.

Water Treatment

Water is treated in the newly constructed Too'gha WTP and Laundromat building for high levels of iron, manganese, color, turbidity, odor, and total dissolved solids, and for low levels of benzene. The water treatment plant includes a granular activated carbon filter to remove benzene and other organics, if present. Throughout the life of the plant, treatment has brought benzene levels down to a non-detectable level. Recent water readings have found no trace of benzene in the raw water. Because the well has been classified as GWUISW, the treatment also consists of filtration and disinfection to remove and inactivate *Giardia* cysts to the 3-log level and viruses to the 4-log level.

The new Too'gha WTP and Laundromat began operation in February of 2002, providing the community with a treated water supply. The facility has 8 washing machines, 8 dryers, 8 showers (4 men's and 4 women's), a men's restroom with two toilets, and a women's restroom with two toilets. It provides residents with a source of treated water for home use (including a fill point) and is also the water source for firefighting equipment.

The building was recently constructed, and the facility is in excellent condition. Based on conversations with the community and designers, there are still some post-building construction concerns (wall cracks and foundation settlement) which are being reviewed with the design team, and will be analyzed by an independent consultant, who will recommend repairs. These items do not affect the operation of the plant. The treatment equipment is operating well, and water quality tests indicate the facility is meeting, or exceeding, treatment goals for removal of iron, manganese, color, odor, turbidity, total dissolved solids, and benzene. The laundry facility is also operating well.

After initial start up of the plant, calcium chloride (CaCl) precipitated out of the water in the water storage tank. Because water demand from the tank was limited during the plant's initial operation, the residence time in the tank was longer than called for in the design. This led to CaCl precipitation. The tank currently needs to be cleaned to remove the precipitation. Tank cleaning has not been completed to date, and the schedule to clean this tank is unknown. Now that additional services have been installed, reducing residence time, CaCl precipitation should be less of a problem.

Water Distribution

The piped distribution system serves the downtown area. The current, under-construction water and sewer project will provide piped water service east to Eamole Street, west to School Street, north along Third Avenue, and south along First Avenue. The water distribution system consists of two 4-inch diameter circulating water loops (referred to as the east and west loops).

Sewer Collection

Too'gha system and Native Council system sewer collection is combined. The IHS parcel has an old piped sewer system and a lift station (elders' lift station) that Too'gha operates. Sewage from this system flows into Too'gha's newly constructed system.

The new wastewater collection system consists of 8-inch diameter gravity sewer mains, 2 sewage lift stations, and a 4-inch diameter force main that discharges to the community sewage lagoon. The treated effluent is annually pumped from the lagoon to the Yukon River through an 8-inch diameter pipeline. The operator has indicated there are leaks in the manhole, which houses the valve that controls the drainage for the lagoon.

Sewer Treatment and Disposal

Wastewater from both the Tribal Council system and the Too'gha system is treated in the community sewage lagoon. The lagoon is located in the downtown area north of Third Avenue, near the old Laundromat, the Tanana Power Company building, and residential houses.

The two-cell sewage lagoon was completed in 1986. The two cells were constructed separately, the first one by VSW and the second years later by the city. The lagoon is sized for 8 months of hydraulic storage at 14,000 gallons per day. Residents have reported odor problems and voiced concerns over the aesthetics of having a lagoon located in the downtown area, across the street from houses. Leaks from the lagoon have been reported in two areas. First, the lagoon liner is torn, allowing some leaking and seepage. Second, the manhole, which houses the effluent control valve, has leaks around the inlet pipe. Operators have attempted to repair the manhole leak by placing quick-set concrete in the damaged section, but these attempts have not been successful.

Effluent flow from the lagoon is seasonally discharged by gravity through a heat-traced effluent line to the Yukon River. Many residents do not think this practice is good for the river environment and would prefer wetlands treatment.

Summary of Too'gha System Deficiencies

- About half of the individual wells installed in 1967 are in frozen soils and have marginal or unusable well yields. Many of these houses are now connected to piped water, eliminating the need for the wells.
- The water treatment operator reports winter well production for the Too'gha well has decreased (possibly due to iron build up).
- There have been cosmetic issues with Too'gha's new WTP and Laundromat, including wall cracks, cracks in glulam beams, and settlement under the dryers, the watering point, and the boiler room.
- After start-up, CaCl flock precipitated in the water storage tank
- Residents report odor problems from the lagoon and would like to see the lagoon relocated away from the center of the community.
- Residents are concerned about the environmental and water quality aspect of pumping effluent from the lagoon into the Yukon River.
- Sewage effluent leaks from the manhole housing the effluent control valve.

5.3.3 Circle Subdivision and Outlying Areas

The Circle subdivision is located approximately 3,500 feet east of Koyukuk Street. The subdivision consists of fourteen homes that were constructed in 1982 by the Interior Housing Authority (IRHA). Homeowners in the subdivision haul water themselves either from the Too'gha WTP watering point or from various surface water sources such as the Yukon River or nearby streams. They use individual privies for waste disposal. Due to shallow permafrost in the area, many of the privies have been modified and placed on raised gravel mounds.

In 1987, after residents of thc subdivision expressed concern about the sanitation facilities, the IHS evaluated them. Residents commented that standing water was typically found throughout the subdivision during warmer months. IHS found no indication of contaminated water percolating from the individual privy mounds. However, IHS also concluded that run-off from dog yards and surface dumping of honey buckets and grey water were a potential health hazard for the area. Also, poor site drainage in the subdivision exacerbated potential health hazards by concentrating runoff water in the subdivision rather than allowing it to drain away. The study found that soil conditions and area geology made individual wells and septic tank drainfields unfeasible. Based on recommendations from the study, a comprehensive drainage plan was completed and Otto Lake, in the subdivision, was filled. A new city well (#4) was also drilled to provide a public watering point for the residents. Although drainage improvements were completed, drainage problems still exist in the subdivision. The well is currently not being used.

The homes located in outlying areas along White Alice, Mission and Site Roads are not connected to the community piped water distribution or wastewater collection systems. Many residents haul water from the community watering point or from near-by surface water sources. Residents depend on outhouses and pit privies for wastewater disposal.

Summary of Circle Subdivision and Outlying Areas Deficiencies

- Residents worry that seepage from outhouses will contaminate the groundwater/surface water.
- The homes in the Circle Subdivision experience drainage problems during spring runoff and precipitation events, which could affect proper operation of the outhouse mounds.
- The residents have a lower level of water and sewer service than is currently desired.

5.4 Financial Status of Operating Facilities

The Too'gha WTP and Laundromat fees are summarized below.

	Rate Charged Water	Rate Charged Sewer
Customer		
Commercial	$100/month	$100/month
School	$2800/month	$2400/month
Tanana Health Center	-	$410/month
Elder's	-	$550/month
Residential	$50/month	$50/month
Facility Services		
Individual Haul	$0.25/5 gallons	
Washer	$7/load in large machine $5/load in medium machine $3/load in small machine	
Dryer	$0.25/4 minutes	
Shower	$2/15 minutes	

Information on the overall financial viability of the water and sewer system is presented in Section 12.0. This section will include the revenues and expenses for the utility as well as the customer payment rates.

6.0 PROJECT DESIGN CRITERIA AND PLANNING ASSUMPTIONS

6.1 Planning Period

The planning period for this study is 20 years. Projections for population, water needs, and wastewater production will extend to the year 2024. Alternatives and facility site selection for water and sewer service will follow the community's direction, take into account this planning horizon, and also look forward beyond the 20-year horizon when land use planning issues such as lagoon location are evaluated.

6.2 Population Projections

Population projections were discussed in Section 3.8. This feasibility study will use a 20-year design population of 406 people so that any additional modifications to the system will be consistent with the recent water treatment plant design criteria. This will ensure that adequate water can be produced for the population and that any new wastewater treatment facilities are designed to be compatible with the water system in the community.

6.3 Past Project Design Summary

Climate Design Data

The following climate data was taken from the Western Regional Climate Center (WRCC) general climate summary tables. Climate summaries are based on a recording period from 1949 to 2004. Thawing index and freezing index values were obtained from the PHS publication *Sanitation Facilities Alternatives, Sunshine Subdivision, Tanana, Alaska,* dated October 1987. Table 6-1 summarizes the climate design data.

Table 6-1: Climate Design Data in Tanana, AK

Climate Design Data	Value
Mean annual precipitation, inches	12.63
Mean annual temperature, °F	34
Mean annual snowfall, inches	47.2
Maximum temperature recorded, °F	94
Minimum temperature, °F	-76
Mean January minimum temperature, °F	-17.7
Mean July maximum temperature, °F	70.9
Thawing index, degree days	2,500
Freezing index, degree days	5,500
Design freezing index, 1 year in 10, degree days	6,500

Water System Design Criteria

The following criteria were used as the basis for the design of the Too'gha WTP and Laundromat facility. Because this facility is new and the piping infrastructure was designed using these assumptions, many of the same criteria will be carried forward for use in the alternatives outlined in Section 10. Design criteria specific for the individual alternatives will be discussed in Section 10.

Water consumption will vary according to the type of sanitation facilities ultimately selected by the community. The daily demand rates (shown in Table 6-2) were derived from the *Cold Climate Utilities Manual* (Smith, 1986) and from historical consumption data from other rural Alaskan communities. The minimum design rate recommended by the ADEC to maintain adequate sanitation is 20 gpcd for drinking, cooking, bathing, and laundry. The alternatives provided will not use design criteria values lower than this minimum recommended value.

In rural communities, it is common to assume the base sewage disposal rate is similar to the water consumption rate (excluding leakage). This generally holds true because smaller communities like Tanana, unlike larger communities like Fairbanks, do not typically use significant quantities of water for non-contributing uses such as washing cars and watering lawns. Table 6-2 summarizes the criteria used in design of the water treatment plant and piped system. These criteria will continue to be the foundation for the design criteria for the individual alternatives discussed in Section 10.

Table 6-2: Water System Design Criteria in Tanana, AK

Design Criteria	Design Value
Design Population for WTP	406 residents
Daily Capita Demand (Piped)	40 gallons per capita day (gpcd)
Daily Capita Demand (Haul)	25 gallons per capita day (gpcd)
Average Daily Demand	16,240 gpd
Design Flow Rate	20 gpm (28,800 gpd)
Catalytic Media Maximum Flow Rate	2.5 to 3.5 gpm/ft^2
Multi-Media Filter Maximum Flow Rate	2.0 gpm/ft^2
Activated Carbon Flow Rate	1.0 gpm/ft^2
Backwash Pump Flow Rate (Catalytic)	25-30 gpm/ft^2
Backwash Pump Flow Rate (Multi-Media)	20 gpm/ft^2

Table 6-3 outlines the finished water conditions for water from the water treatment plant.

Table 6-3: Finished Water Conditions at the Too'gha Water Treatment Plant

Parameter	Value
Iron	< 0.3 milligrams per liter (mg/L)
Manganese	< 0.05 mg/L
Turbidity	< 0.5 NTU (Goal: <0.1 NTU)
Color	< 15 Color Units (CU)
Odor	< 3 TON
Benzene	Non-detect (<0.20 μg/L)
Total Trihalomethanes	< 80 μg/L
Temperature	35°-50° F
pH	6.5-7.5 pH units
Giardia lamblia	3-log removal or inactivation
viruses	4-log removal or inactivation
Cryptosporidium	2-log removal or inactivation

NTU= Nephelometic Turbidity Unit TON= Threshold Odor Number

6.4 Assumptions for Cost Estimates

Labor rates were assumed to be Davis Bacon wage rates for upcoming construction projects. The current local labor rates for system operators and facility attendants were supplied by city and Too'gha officials.

Table 6-4 summarizes the hourly local labor wages used for developing cost estimates in this feasibility study.

Table 6-4: Hourly Local Labor Wages in Tanana, AK

Position	Wage (per hour)
Water/Wastewater System Operator	$18/hour
Back-up Water/Wastewater Operator	$13/hour
Laundromat/Watering Point Attendant	$9/hour
Project Equipment Operator	$43/hour
Project Construction Laborer	$40/hour
Project Electrician	$50/hour
Project Surveyors	$40/hour

Table 6-5 summarizes the current power rates in Tanana.

Table 6-5: Power Rates in Tanana, AK

Power Consumption	Rate per hour*
Residential	
First 500 kilowatt hour (kWh)	$0.3361 per kWh
Next 500 kWh	$0.5408 per kWh (w/no PCE adjustments)
Small Commercial	
First 10,000 kWh	$0.390 per kWh
Next 10,000 kWh	$0.376 per kWh
More than 20,000 kWh	$0.356 per kWh

**Based on the 2003 Statistical Report of the PCE Program by the Alaska Energy Authority*

Fuel Costs

The average price of fuel in Tanana, according to the 2003 Statistical Report of the PCE Program, is $1.74 per gallon. However, due to the recent increase in fuel prices, the construction superintendent for the water and sewer project commented that fuel prices are now closer to $2.08 per gallon. For the purpose of cost estimate calculations, a fuel price of $2.10 will be used.

Equipment Rental Costs

For capital construction cost estimates, the equipment rental rates will be assumed to be comparable to current rates. Table 6-6 summarizes the equipment rental rates per month.

Table 6-6: Equipment Rental Rates in Tanana, AK

Equipment	Rental Price (per month)
950 C Cat Loader	$6,500/month
D3C Bull Dozer	$3,500/month
450 Hitachi Excavator	$12,200/month
Samsung Excavator	$12,000/month

7.0 LAND STATUS

A majority of the information providing in this section was prepared by Robert S. Means of the Alaska Department of Community and Regional Affairs and Nina Miller of Too'gha, Inc. The information was completed for the 1997 feasibility study.

It is a fundamental rule of real property law that "title always vests": that is, land is always owned by someone. It is also fundamental that a landowner enjoys the exclusive right to make improvements (within certain limits) on his land. Put another way, someone planning to build a project must acquire the land or an interest in the land and thereby demonstrate ownership. The purpose of this chapter is to review the status of land ownership in Tanana. This chapter also describes various land transactions that might be necessary, depending on the scope of the final project design.

7.1 Real Property Law

7.1.1 Source of Land Title

The source of land title in Alaska begins with the United States government. Title to any piece of land can be traced backwards through each previous owner to the federal government. The BLM is the agency chiefly responsible for administering and managing these public lands. Through a variety of federal public land laws, land in Tanana has been transferred to the State of Alaska, the City of Tanana, ANCSA Native Corporations, Native Allottees, Homesteaders and other kinds of applicants. The federal government also reserves or withdraws land for its own use, most commonly by means of a Public Land Order. Some examples include national parks, military withdrawals and Public Health Service withdrawals.

BLM keeps records of the land it retains and of the land it has conveyed to third parties, but does not record what happens to the land after that. The federal land records are the starting point for researching land status in Tanana. Once land is conveyed from the federal government to a third party, the State of Alaska's recording office system is used. In this system, land transfer documents are "recorded" so that the public is given constructive notice of a land transfer or other transactions affecting real property. Both the federal and state systems were used to prepare this chapter.

7.1.2 Types of Land Title

The following list describes some common terms used in discussions of real property:

- Fee Simple - A complete set of all the interests and rights in land that can be transferred from one party to another.
- Less than Fee - A partial interest or estate in the land such as the surface estate, this is an interest or ownership in the surface of the land and everything of value upon it. Subsurface estate is interest or ownership in the land below the surface and everything of value therein.
- Patent - The original title document from the federal (or state) government conveying surveyed land.

- Interim Conveyance or IC - A title document issued to a Native corporation by BLM to show proof of land ownership until a survey can be done and a patent issued.
- Deed - Legal document used to convey title to property. A quit claim deed conveys only the interest(s), if any, which the owner, or grantor, has. A warranty deed incorporates an enforceable guarantee that the grantee is getting good title.
- Lease - The exclusive right to use a parcel of land for a specific use for a specific period of time.
- Easement - A right to use (for a specific purpose) land that is owned by someone else, often used interchangeably with right-of-way. An easement can be created by dedication on a survey plat, by an express grant in an easement document or by reserving an easement in a conveyance document. Easements are typically perpetual.
- Permit - Revocable permission to do something on or to occupy land, usually temporarily.
- Probate - A judicial process validating a will and consequently deciding the ownership of property.
- Lien - A right to take property to satisfy taxes or an unpaid debt incurred by the owner. A well driller may file a lien against a property if the owner fails to pay for the driller's services.
- Encumbrance, Restriction, Covenant or Reservation - A condition that limits or narrows the rights of the landowner or requires the landowner to perform certain acts. A restricted townsite lot or a Native Allotment is not taxable and may be sold only with the approval of the Tanana Tribal Council acting on behalf of the BIA. The interim conveyance to Tozitna, Ltd. contains a covenant requiring the corporation to convey some land to the City of Tanana under Section 14(c)(3) of the ANCSA. One of the patents to Tozitna, Ltd. reserves an existing road for continued public access across corporation land.
- Quiet Title Action - A judicial process that examines conflicting land title claims and establishes title to a parcel in one of the claimants by court order.

In examining title to real property, it is critical to account for the specific factors that affect a parcel of land. Authenticating the ownership interests in land will ensure that subsequent site control transactions are based on good clear title. Bank financing, where land is used as collateral, requires clear title. Likewise, major investments in capital improvement projects require clear title.

7.2 Transfers of Land

Title to real property can be transferred, or conveyed, in many ways. Buildings and other permanent improvements attached to the land are considered part of real property and are transferred along with the real property, unless the improvements are specifically excluded. To be valid, a transfer must be in writing. A written document must state the parties involved in the transfer, include a description of the land being transferred, describe what interest(s) in the land is being transferred, be for valuable consideration (usually money), contain the appropriate signatures, and be accepted by the grantee.

7.2.1 Sale

After land has been conveyed from the federal government, perhaps the most common method of transfer is the land sale. Both the buyer and seller must be willing participants and be knowledgeable about the terms of the sale. A quit claim deed is the most common method of completing the transaction.

The owner of the land has the right to grant a utility easement across the property or to enter into a service line agreement that provides water and sewer hook-up from the main lines to the dwelling.

7.2.2 Exchange

A land exchange is a variation of a land sale. However, instead of money the buyer gives the seller land (valuable consideration). Money can also be used to equalize the value of the parcels being exchanged. The terms of an exchange are spelled out in a land exchange agreement signed by both parties. The terms of an exchange should include a description of the lands being exchanged, a statement defining which party is responsible for any survey costs, and dates by which each party is required to complete its part of the transaction.

7.2.3 ANCSA 14(c)

Section 14(c) of the Alaska Native Claims Settlement Act provides that when a village corporation like Tozitna, Ltd. receives title to land from the federal government, it must then convey title to certain occupants and organizations with valid claims to the land. Under 14(c)(1), Tozitna, Ltd. must convey to any occupant, without consideration, title to the tract of land occupied as of December 18, 1971 as a personal place of residence or business, as a subsistence campsite or a headquarters for reindeer husbandry. The size of the claim and what constitutes use and occupancy are matters for Tozitna, Ltd. to decide. Non-profit organizations, under 14(c)(2), are entitled to the tract occupied as of December 18, 1971, either with or without consideration. Under 14(c)(3), improved land, land for community expansion, rights of way for public use and land for foreseeable community needs must be conveyed to the municipal government in Tanana. 1,280 acres must be conveyed, unless the community and the corporation agree in writing to less. Section 14(c)(4) involves airports and doesn't apply in Tanana since the State of Alaska had already acquired title to the Ralph Calhoun airport by 1971.

7.2.4 Eminent Domain

The community has the power to condemn private property for public purposes and acquire the land only after paying fair market value. State law in Alaska Statute 29.35.030 describes the procedures the city must follow. This is a judicial proceeding that is used in exceptional cases where negotiation to acquire land needed by the public has otherwise failed.

7.2.5 Donation

A common method of acquiring land for a public purpose is by donation. For some landowners, there is a strong incentive to donate land if the project serves a public purpose.

7.2.6 Recording

Recording is not a means of transferring land or making a transfer legal; it is a means of giving legal notice to the world that a land transfer, or any other transaction affecting land, has taken place. As such, it protects subsequent bona fide purchasers of property from the unknown, unrecorded interests of others. A deed may be valid if it is not recorded, but an invalid deed cannot be validated by recording. It is up to the person recording the deed to make sure the information is accurate. Tanana is located in the Ft. Gibbon Recording District. The place of recording is 1648 S. Cushman, Suite 201, Fairbanks, AK 99701, Phone 452-3521.

Documents from the early 1900's to 1975 are bound into books and have not been microfilmed or entered into the computer system. This required paging through each volume and photocopying relevant documents.

Documents from 1975 to the present are microfilmed and available on the statewide computer system. Recording office staff provided a staff workstation and technical assistance to query the system and obtain a brief description of each transaction.

7.3 Affected Landowners

The following landowners may be affected by easement acquisition and service line hook-ups, depending on the scope of this project. This section of the chapter should be read with reference to the land status maps (Figure 7.1). Every attempt has been made to accurately describe the land tenure in Tanana. However, not every recorded document was critically examined and some gaps in the chain of title do exist. Additional research is necessary to authenticate ownership.

7.3.1 State of Alaska, Department of Transportation and Public Facilities

The federal government conveyed the airport land to the State of Alaska by quitclaim deed dated October 1, 1965 under Sec. 45 of the Omnibus Act. A record of survey was filed on December 8, 1992 as Plat No. 92-1RS, containing 714.95 acres.

Contact: Stan Leaphart
State of Alaska
Department of Transportation & Public Facilities
2301 Peger Rd.
Fairbanks, AK 99709-5316
Phone: 451-5484

7.3.2 United States, Public Health Service

Public Land Order No. 1977, dated September 10, 1959, withdrew land for the Tanana Hospital Site and is administered by the Public Health Service. The land is now described as Lot 12 of USS 5958, containing 11.25 acres.

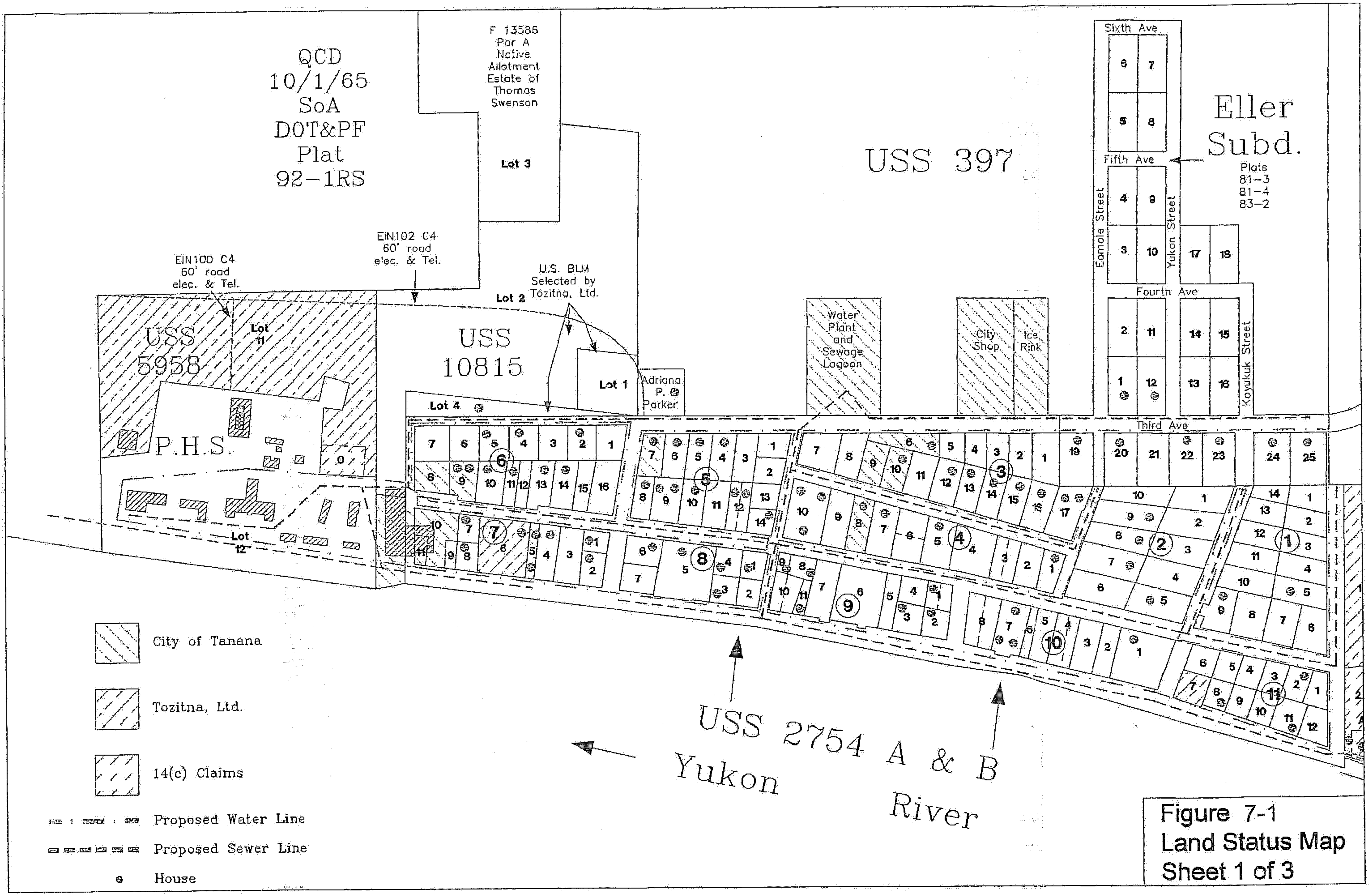


Figure 7-1
Land Status Map
Sheet 1 of 3

Previously seen as figure 5-1 in the 1997 Feasibility Study

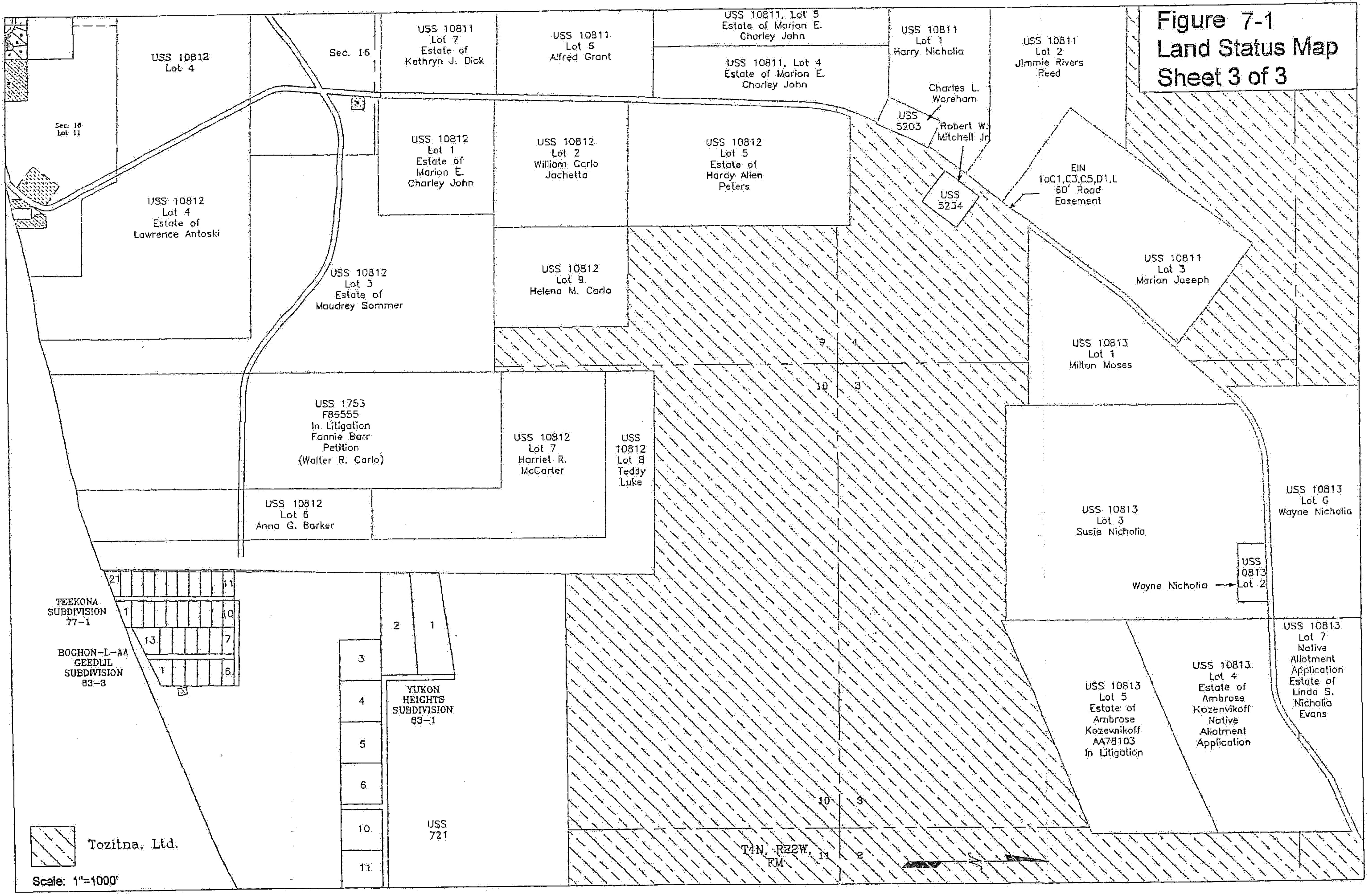


Figure 7-1
Land Status Map
Sheet 3 of 3

Previously seen as figure 5-1 in the 1997 Feasibility Study

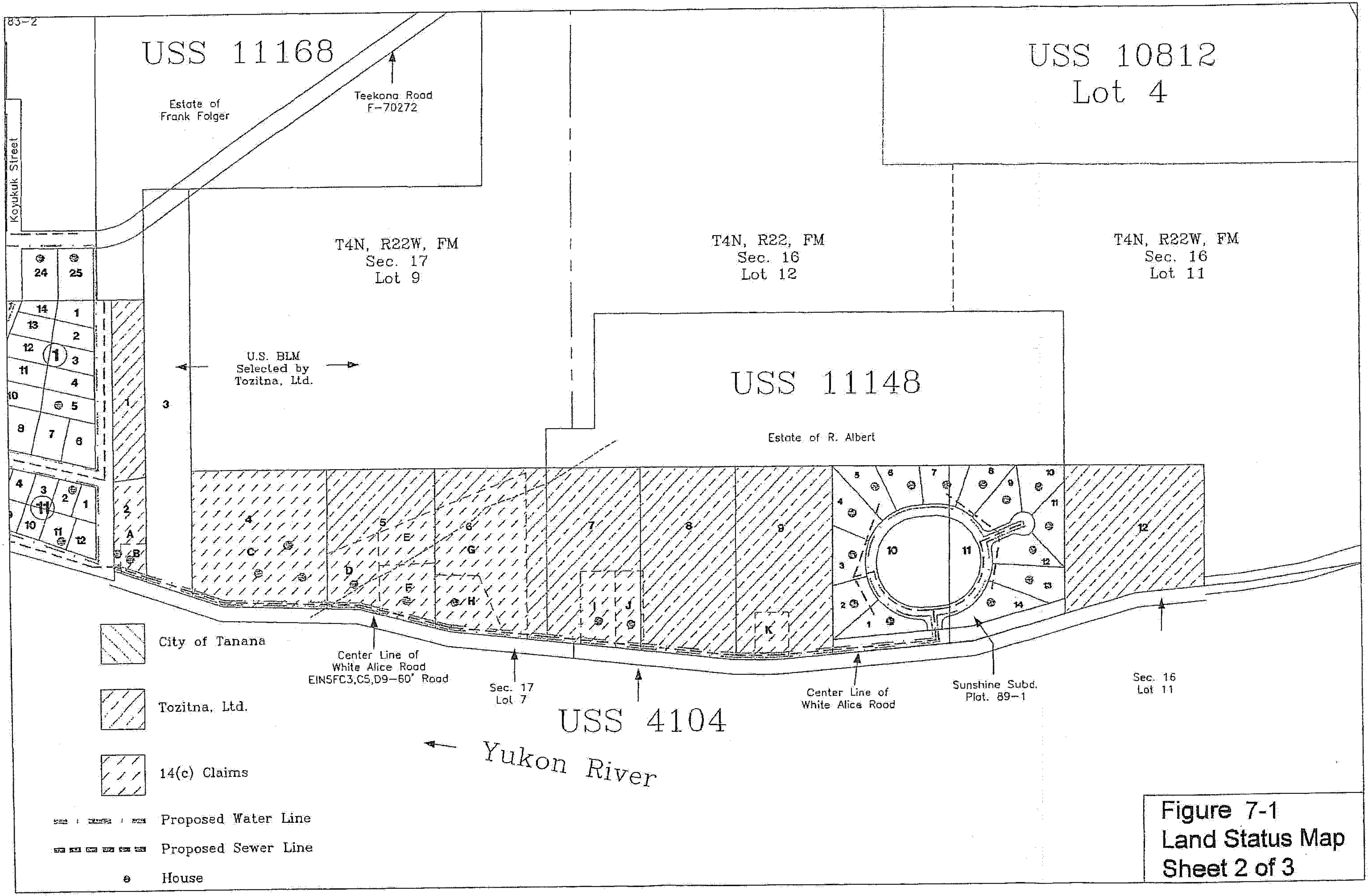


Figure 7-1
Land Status Map
Sheet 2 of 3

Previously seen as figure 5-1 in the 1997 Feasibility Study

Contact: Duncan Purvis
Department of Natural Resources
Land Records Information Services
550 West 7th Avenue, Suite 706
Anchorage, AK 99501
Phone: 269-8832

7.3.3 State of Alaska, Mental Health Trust Land Authority

Lot 2 of US Survey No. 10815, containing 12.15 acres, was tentatively approved for conveyance to the State of Alaska under the Mental Health Act in 1966. However, this land was subsequently selected by Tozitna, Ltd. This lot has not been conveyed from the State of Alaska to the Mental Health Trust Land Authority. BLM retains jurisdiction over this lot and is adjudicating the land interests for eventual conveyance to Tozitna, Ltd.

7.3.4 Tozitna, Ltd./Doyon, Ltd.

Under ANCSA, Tozitna, Ltd. received title to the surface estate and Doyon, Ltd. received title to the corresponding subsurface estate to Lot 11 of US Survey No. 5958, subject to a 60 foot easement for existing roads and telephone and electric lines (EIN 100 C4 and EIN 102 C4); Lot 7 of Block 11 of US Survey No. 2754 A and B and Lots 1,2 and 4-12 of US Survey No. 4104, subject to a 60 foot easement for an existing road (EN 5F C3, C5, D9). These lands are also subject to the requirements of Section 14(c) (see below - 14(c) claimants). Tozitna, Ltd. and Doyon, Ltd. can expect to receive additional land in the near future (see below - Bureau of Land Management). Doyon, Ltd., as owner of the subsurface estate, considers buried water and sewer lines an incidental use of the surface estate. Therefore, an easement for subsurface use is not required, unless gravel is moved from one location to another.

Contact: Cheryl Wright
Tozitna, Ltd.
P.O. Box 129
Tanana, AK 99777
Phone: 366-7255

Jim Merry
Doyon, Ltd., Land Department
1 Doyan Place, Suite 300
Fairbanks, AK 99701-2941
Phone: 459-2000

7.3.5 City of Tanana

The City of Tanana owns 9 lots in the townsite and 3 parcels in US Survey No. 397 which were purchased from J. Clifton Eller. The city office, teen center, day care center, fire hall, apartments, sewage lagoon, Laundromat, shop and hockey rink are on these parcels. Under Section 14(c)(3) of ANCSA, Tozitna, Ltd. is required to convey certain land to the city for community expansion, rights of way for public use and for other foreseeable community needs.

Contact: Donna Folger, Mayor
City of Tanana
P.O. Box 249
Tanana, AK 99777
Phone: 366-7159

7.3.6 United States, Bureau of Land Management

The Bureau of Land Management retains jurisdiction over Lot 3 of US Survey No. 4104; Lots 1, 2, and 4 of US Survey 10815; and those portion of Sections 16 and 17 of T4N, R22W, FM, excluding US Survey Nos. 4104, 11148, 11168, and 10812. BLM is adjudicating these lands for eventual conveyance to Tozitna, Ltd. and Doyon, Ltd. The conveyance to Tozitna, Ltd. could come as early as February 1997 (except for Lot 3 of US Survey No. 4104, which Tozitna, Ltd. has requested not be conveyed until the oil contamination is cleaned up).

Contact: Pat Underwood
Land Status
222 W. 7th Ave. #13
Anchorage, AK 99513
Phone: 271-5406

7.3.7 Native Allotments

A certificate of allotment was issued to the estate of Frank Folger for US Survey No. 11168, containing 39.97 acres and to the estate of Ralph Albert for US Survey No. 11148, containing 19.98 acres. The parcels are not taxable and are inalienable (can't be sold or taken to satisfy a judgment) without the approval of the Tanana Tribal Council, acting on behalf of BIA. There are 24 other native allotments within 3 miles of Tanana.

Contact: Gerald Nicholia
Realty Specialist
Tanana Native Council
P.O. Box 77130
Tanana, AK 99777
Phone: 366-7160

7.3.8 Tanana Townsite

The federal townsite was surveyed in 1957 as US Survey No. 2754 A and B. The 131 lots range in size from 2,754 sq. ft. to 32,656 sq. ft. By 1962, the townsite trustee had issued 138 deeds (6 restricted deeds) to all of the lots. Since that time, there have been numerous land transactions, both recorded and unrecorded. After talking with Tanana landowners, searching local files, and thoroughly searching the recording office, we believe that of the approximately 92 lots with houses on them (a total of 101 houses), about half involve questions of land title and will require further research or corrective action.

7.3.9 14(c)(1) Claimants

Under Section 14(c)(1) of ANCSA, individuals who occupied a tract of Tozitna, Ltd. land as their primary place of residence, business or subsistence campsite as of December 18, 1971 are entitled to a deed from Tozitna, Ltd. At this time, Tozitna, Ltd. has decided to approve 12 applications, while three additional applications require probate proceedings, and two others await further action by Tozitna, Ltd. (they are on land selected by, but not yet conveyed to, Tozitna, Ltd.). Once these lots are surveyed by BLM, Tozitna, Ltd. can issue deeds to the claimants. These claims are within Lots 2 and 4-9 of US Survey No. 4104, Lot 11 of US Survey No. 5958, a portion of Section 16 of T4N, R22W, FM, and will be subject to an existing 60-foot road easement.

Contact: Cheryl Wright
Tozitna, Ltd.
P.O. Box 129
Tanana, AK 99777
Phone: 366-7255

7.3.10 Interior Region Housing Authority

The Interior Region Housing Authority (IRHA) constructed 14 houses in the Sunshine Subdivision (Plat No. 89-1) under the terms of a land exchange agreement with Tozitna, Ltd., which was recorded on December 2, 1981 in Book 6, Pages 892-900. The subdivision streets are dedicated to public use and can be used to bury water and sewer lines. Under the terms of the agreement, Tozitna, Ltd. agreed to convey 14 lots in the Sunshine Subdivision to IRHA for 14 lots IRHA had acquired in the Eller Subdivision. IRHA has conveyed 14 lots it had owned in the Eller Subdivision to Tozitna, Ltd., but not all parts of the agreement have been satisfied. The parties need to completely satisfy the terms of the agreement in order for title to eventually be conveyed to the individual homebuyers.

Contact: Dene Sommer
Interior Regional Housing Authority
828 27th Avenue
Fairbanks, AK
Phone: 452-8315

7.3.11 Eller Subdivision

US Survey No. 397 is located immediately north of the townsite and is owned, except as noted herein, by J. Clifton and Paula Eller. The Eller Subdivision (Plat no. 81-3), the First Addition (Plat no. 81-4) and the Second Addition (Plat no. 83-2) created 25 lots of 20,000 square feet or larger. The streets, which form a natural extension of the townsite streets, are dedicated for public use. Almost all of the lots have been conveyed to third parties. Under the terms of the land exchange described above, Tozitna, Ltd. received title to Lots 1-14 from the Interior Region Housing Authority. Lots 1 and 12 have since been conveyed to third parties. Recently, a bulk fuel project was built on the Eller's homestead, in exchange for easements from the Eller's to put pipes in their property, the water and sewer project paid to survey an extension of Fourth Avenue through the Eller's property.

7.3.12 Tanana Power Company

The existing power and telephone lines enjoy easements throughout much of Tanana. It will be necessary to work with the power and telephone companies if distribution lines are routed along the same corridor.

7.4 Distribution Lines

7.4.1 Townsite Streets

The streets in the Tanana townsite have their origin in the survey of the townsite in 1957. Lots, blocks and roads were all designed around existing improvements and established uses. When the townsite survey plat was officially filed, it had the legal effect of dedicating the streets for use as roads and utilities. No further action is needed to establish site control for the distribution lines within the townsite as long as the lines are located within the dedicated streets.

East Street has not been developed and a house now encroaches into the street.

7.5 Service Lines

A service line is a water and sewer hook-up from the main distribution line to a dwelling. By its nature, a service line crosses private property. The property owner, therefore, must give permission for the installation of the service line. The agreement obligates each party to perform maintenance on the system.

7.6 Right of Way and Land Acquisition

Acquiring land and interests in land for projects will be based on the final design of the project. Conversely, the final design may be significantly influenced by the existing land ownership patterns in Tanana. Too'gha, as a public utility, possesses the authority to acquire (and dispose of) real property and interests in real property necessary for the construction, operation and maintenance of water and sewer projects. For major capital improvement projects, it is best, if possible, to acquire fee simple title for water and sewer facilities and perpetual easements for the main water and sewer lines. At a minimum, Too'gha should acquire a leasehold interest in the land that gives it the exclusive right to use the property for the expected life of the project.

7.6.1 Water Treatment Plant

The new Too’gha water treatment plant and Laundromat is on land formerly owned by Tozitna and now owned by Too’gha.

7.6.2 Sewage Lagoon

The existing sewage lagoon is located on the same parcel as the water treatment plant and is owned by the City of Tanana. Too'gha should acquire either fee simple title or a lease to the property from the city.

If a new sewage lagoon is constructed in a different location, site control will have to be acquired from the appropriate landowner. The current preferred alternative discussed in 13.1.2 proposes a new sewage lagoon be constructed on land owned by Clifton J. Eller Sr. and Paula E. Eller. The new sewage lagoon would require approximately 7 acres of land. An access road will need to be constructed to the new lagoon. The road can follow the approximate alignment of an existing trail extending north on the west side of the current sewage lagoon. The property for the access road also belongs to Clifton and Paula Eller.

In addition, this alternative will discharge effluent from the lagoon for additional treatment through wetlands. A seasonal force main discharge pipe will bring effluent from the new lagoon to land owned by the DOT/FAA. Property rights on the DOT/FAA property benefiting Too'gha will need to be acquired for the purpose of seasonal discharge to this area. Property rights may be obtained with a use easement or a long-term lease or permit agreement with the DOT/FAA. The area allotted for effluent discharge should be determined during the drainage study (to be performed prior to the lagoon design). Also, effluent discharge should not interfere with the primary use of the property for airport operations.

7.6.3 Distribution Lines

The streets within the Tanana downtown are dedicated for public use and may be used to place water and sewer main lines. No additional easement acquisition is required if the distribution lines are within the dedicated public use road easements.

Piping infrastructure required for the Downtown extension (described in section 13.1.1) can be installed within dedicated streets and should not require additional action for site control. East Street has a dedicated road right-of-way but has not been developed at this time; a portion of piping infrastructure will need to be constructed along East Street.

Piping for the extension along First Street to Circle Subdivision is also proposed in an area with a dedicated street and should not require additional action for site control. However, under the proposed alternative (13.1.3) the piping extension would bring water and sewer service to houses along a spur before and along Albert's Alley. This area does not have a dedicated street, so site control will be needed with the individual owners in this area. These claims are within Lots 2 and 4-9 of US Survey No. 4104, Lot 11 of US Survey No. 5958, a portion of Section 16 of T4N, R22W, FM.

7.6.4 Corrective Actions

It may be necessary for an owner to take corrective action where probate is not complete, where conflicts exist or where the title is clouded. The remedy may be for the individual to simply obtain an appropriate quitclaim deed(s) so that clear title is vested in the rightful owner. The parties should obtain a legal review of the transaction to protect their respective interests.

In cases where title to a lot is very clouded, it may be necessary for the individual to file an action to quiet title to the lot. This judicial process requires the services of a lawyer. The decision to pursue this course of action should be made by the individual.

8.0 NEED FOR PROJECT

With this study, Too'gha, the "place of good water," is continuing its mission to provide clean, convenient drinking water and sanitary disposal of wastewater for its residents. This feasibility study will address alternatives to provide water and sewer service to the remaining residences currently without service, and will allow the community to improve sanitation facilities in a systematic manner that promotes awareness of potential increases in operations and maintenance costs.

8.1 Health and Safety Concerns

Water usage rates are important in maintaining the health of a community. As water consumption rates rise, there is a corresponding rise in the overall health of residents. This is due to improved sanitation practices (hand washing, bathing, cleaning, etc.) that are more easily and more conveniently carried out when larger quantities of potable water are available. ADEC recommends that a minimum design rate of 20 gpcd be maintained to promote adequate sanitation. This minimum rate is most likely not achieved by self-haul service. Based on survey results conducted for this document, there are over 50 homes that use self-haul as the primary source of water for the home.

Currently residents in the downtown area east of Eamole Street, the Circle Subdivision, and the outlying areas along White Alice, Site, and Mission Roads dispose of wastes in outhouses located on their property. Gray water is routinely discharged onto the ground. Community members have expressed concern about possible contamination from wastes seeping out of the outhouses, onto the surface around the outhouses, and potentially into the groundwater. Constructing new outhouses or installing community honey bucket waste-disposal bunkers will not alleviate this concern.

8.2 Environmental Concerns

The community would like to eliminate the practice of disposing of treated waste from the sewage lagoon directly into the river. Instead they would like to evaluate the feasibility of using a piece of land near the lagoon for wetlands treatment.

8.3 System Growth Capacity

Future community development will most likely take place in areas that are not part of the current water and sewer system. Expansion of water and sewer service to these areas would allow the community to continue to grow.

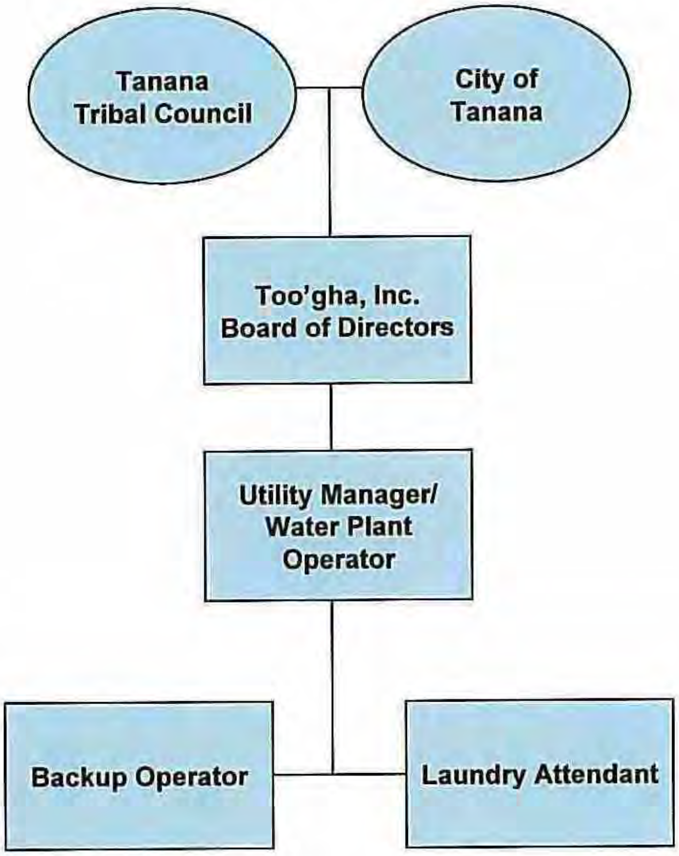
The sewage lagoon is undersized for the 20-year planning horizon in this study. The current lagoon sizing will only accommodate approximately 350 people, rather than the projected population of 406 people.

9.0 COMMUNITY CAPACITY

9.1 Management Status

Recently Too'gha has made changes to the management board. In the past the board was composed of five members, two from the City of Tanana, two from the Tanana Tribal Council, and one elected from the community at large. The board now has three members elected from the community at large, bringing the total number of board members to seven.

Too'gha, Inc. Water and Sewer Utility



9.2 Financial Status

Recently, the financial status of the Too'gha water and sewer utility was reviewed by the Department of Community and Economic Development (DCED). After combining the available data from the accounting programs, DCED found that Too'gha has made a profit over the past three years, and shows a positive balance between income and expenses for operating the water and sewer utility.

Additional financial summaries are available in the business plan section (12.0).

10.0 SANITATION FACILITY ALTERNATIVES

Based on the study's goals, as discussed and developed with input from the Too'gha board and VSW, additional water and sewer service alternatives are needed to meet the needs of three main areas of the community that are currently not being served. These are: (1) properties in the downtown area, which lie beyond the existing piped water and sewer system, (2) Circle Subdivision, and (3) outlying homes along White Alice, Site, and Mission Roads. The alternatives for each area are discussed separately. The proposed study areas are shown on Figures 5.2 and 5.3.

10.1 Area 1: Developed Areas of Downtown

The downtown area consists of those lots south of Third Avenue and west of East Street, as well as several lots along First Avenue, which are not scheduled to be served by the current construction project.

10.1.1 Alternative 1: Complete Piped Water and Sewer Service to the Developed Areas in the Downtown Area

The first alternative is to extend the water and sewer system to Koyukuk and East Streets, and along First and Second Avenues. Gravity sewer pipes will be installed as far east as the topography allows, and a lift station will be required at the creek crossing between the East Street corridor and Koyukuk Street. Approximately 23 homes would receive piped water and sewer service under this alternative. Additional topographic information must be gathered before the exact number of services can be determined.

Design Criteria

An extension of water and sewer service pipes into this area will use the same design criteria as those currently in operation in the downtown area. Table 10-1 summarizes the design criteria.

Table 10-1: Design Criteria for Downtown Area Water and Sewer Service

Design Criteria	Value
Water	
Water consumption	40 gallons/(capita-day)
Minimum pipe flow velocity	1 ft/sec (if using a pitorifice for service to home)
Pitorifice	installed on service connections less than 75 feet in length
Minimum pipe diameter	4 inches
Minimum depth of cover	3 feet
Pipe material	HDPE
Pre-insulated protective coating	HDPE jacket for all water pipe 150-mil thick
Sewer	
Wastewater production	40 gallons/(capita-day)
Minimum pipe diameter	8 inches
Minimum sewer main line grade	0.008
Minimum depth of cover	3 feet
Pipe material	HDPE
Pre-insulated protective coating	16-gage aluminum jacket for all sewer pipe
Manhole and lift station wet-wells material	pre-cast concrete

Conceptual Layout

The new east loop extension will extend to Koyukuk Street and along First, Second and Third Avenues where water lines do not currently exist. An approximate layout of these water lines in relationship to the other infrastructure of the community is shown in Figure 10.1.

The east water loop will be extended approximately 6,085 lineal feet, circulating heated water from the Too'gha WTP to the homes and back to the WTP. The new lines will tie into the existing loop along Third Avenue. Water mains will be constructed using 4-inch HDPE pipe, jacketed with a pre-insulated protective coating. Water pipes will be buried at a minimum depth of 3 feet.

Adding length to the existing pipe system will increase the amount of head the WTP pump will have to overcome to properly circulate water through the east loop extension. Additional head loss will have to be calculated, when the pipe extension is designed, to determine whether the WTP pumps will need to be upgraded to overcome this loss. If the existing pumps cannot supply the additional pressure and flow, either larger pumps will be needed at the WTP or an intermediate booster station will need to be installed to circulate water through the longer loop. For cost estimating purposes a booster station was assumed for this alternative. If a booster station is installed, heat will be added to the pipes at this point.

Hydrants will be required every 300 feet (in populated areas) along the water lines to provide fire protection for the newly served area. Hydrants can also be used as fill stations for a community pumper truck.

Pitorifices will be used to divert water from the mains into the homes. To work, pitorifices require a circulation velocity of at least 1 foot per second. If a service line is longer than 75 feet, a home will require an individual circulation pump.

Gravity sewer lines will be installed following roughly the same layout as the water lines (see Figure 10.2). The topography of the road will determine the exact number of houses that can be served along First Avenue. If this alternative is selected, the topography will be determined as part of the design. Based on the current configuration, approximately 3,275 lineal feet of sewer pipe will be installed to serve the 23 remaining homes in the downtown area.

Since gravity sewer collection systems only flow down gradient, the east extension can only be installed where these gradients can be achieved. All sewage from the new service area will flow to a lift station on Second Avenue, which will pump the wastewater across a small creek to the recently installed lift station at the corner of Second Avenue and Eamole Street. This will require approximately 405 lineal feet of force main.

Manholes will be installed wherever there are significant changes in grade or direction, and at intersections. Distances between manholes should not exceed 300 feet. Based on the conceptual design, 13 manholes will be required.

Both water and sewer pipes will be installed in the existing road right-of-way. Pipes will be buried and insulated to prevent freezing. The construction techniques for installation will be similar to those currently being used in Tanana. Most likely, the construction crews will need to

HDR Alaska, Inc.

Tanana

WATER AND SEWER FEASIBILITY STUDY

ALT 1 PIPED WATER DOWNTOWN

Date
Aug. 2004

Figure
10.1

ALTERNATIVE 1:
TOTAL GRAVITY PIPE = 3,275 FEET
TOTAL FORCE MAIN = 405 FEET
TOTAL LIFT STATION(S) = 1
TOTAL SERVICE CONNECTIONS = 23

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Tanana

WATER AND SEWER FEASIBILITY STUDY
ALT 1 PIPED SEWER DOWNTOWN

Date
Aug. 2004

Figure
10.2

use trench boxes due to the narrow streets and deep trenches (up to 15 feet) required for sewer installation.

Cost Estimates

Cost estimates were calculated using the planning assumptions outlined in Section 6.4, and recent construction figures, provided by VSW, for the ongoing Tanana water and sewer project. To ensure that the cost estimates are conservative, the water system estimate assumes construction of a booster station. Should the final design determine one is not needed because the pumps in the treatment plant can be enlarged sufficiently to accommodate the increased system length, the booster station will be eliminated. Also, this alternative includes costs for mobilization and demobilization of equipment for the construction, freight, and permitting and for an archaeological (State Historic Preservation Office, or SHPO) evaluation. These costs are assumed to be shared by all of the alternatives but have been placed a single time in Alternative 1 to eliminate duplication.

Table 10-2: Piped Water Construction Cost Estimate in Downtown Area

Item	Quantity	Unit	Unit Price	Total
4" HDPE Insulated Circulating Waterline (4" x 12")	6,085	LF	$275	$1,673,375
Booster Station	1	EA	$250,000	$250,000
Buried service lines	1,725	LF	$175	$301,875
Household Water Plumbing	23	EA	$15,000	$345,000
Individual water circulation pump (pitorifice connection not used)	5	EA	$500	$2,500
Mobilization and Demobilization[1]	1	LS	$50,000	$50,000
Freight[1]	1	LS	$25,000	$25,000
Permitting and SHPO Evaluation and Clearence[1]	1	LS	$17,500	$17,500
Subtotal				**$2,665,250**

Table 10-3: Piped Sewer Construction Cost Estimate in Downtown Area

Item	Quantity	Unit	Unit Price	Total
8" Insulated Gravity Sewer line (8" x 15")	3,275	LF	$275	$900,625
4" Insulated Force Main (4" x 12)	405	LF	$275	$111,375
Buried service lines	1,725	LF	$175	$301,875
Deep prepackage lift station (8' to 14' in depth)	1	EA	$250,000	$250,000
Manholes	13	EA	included in pipe cost	
Creek Crossing	1	LS	$50,000	$50,000
In-Home Plumbing Improvements	23	EA	$15,000	$345,000
Mobilization and Demobilization[1]	1	LS	$50,000	$50,000
Freight[1]	1	LS	$25,000	$25,000
Permitting and SHPO Evaluation and Clearence[1]	1	LS	$17,500	$17,500
Subtotal				**$2,051,375**

[1] Assumes costs will apply for all water and sewer improvement alternatives constructed

Table 10-4: Summary of Piped Water and Sewer Construction Cost Estimate in Downtown Area

Total Water & Sewer Capital Costs		
Downtown Piped Water		$2,665,250
Downtown Piped Sewer		$2,051,375
Total Construction Costs		**$4,716,625**
Design Costs (12%)	0.12	$565,995
Construction Management (10%)	0.1	$471,663
Administration and clerical (3%)	0.03	$141,499
Contingency (25%)	0.25	$1,179,156
Total Project Costs:		**$7,074,938**

Table 10-5: Piped Water and Sewer Annual Operation and Maintenance Cost Estimate in Downtown Area

Item	Quantity	Unit	Unit Price	Total
Full time operator + 22% burden[1]	120	Hour	$18	$2,635
Part time operator + 22% burden[1]	120	Hour	$13	$1,903
Well Pump Power (annual)[2]	1,220	kWh	$0.39	$476
Pressure Pump Costs (annual)[3]	1,160	kWh	$0.39	$452
Booster station heating and lighting[4]	177	Gal	$2	$371
Power for heat trace on force main	14,783	kWh	$0.39	$5,765
Miscellaneous supplies for WTP	1	LS	$1,000	$1,000
Pipeline heating - annual (diesel) (new loop only)	2,210	Gal	$2.10	$4,640
Pipeline circulating costs (annual) (new loop only)	12,645	kWh	$0.39	$4,932
Subtotal				**$22,175**

[1] *It is assumed that there will be an additional 3 days of work for the operators to account for additional time needed at the WTP and for operation of the new booster station and lift station*

[2] *Well pump power costs are for the additional water flow from increased demand*

[3] *Pressure pump costs are only those associated with the new loop (pressurizing 0 to 75 psi)*

Advantages and Disadvantages

This alternative will complete the piped water and sewer system for the downtown area and provide the highest level of service to all residents in the core area. It will also serve as incentive to develop remaining lots in the area. Because this part of downtown is so close to the existing piped system, other options, such as community haul, have not been considered.

The extension can be easily integrated into the existing piped system. The water for this alternative will come from the Too'gha WTP, which already provides high quality water to the customers, and meets standards set by the EPA and DEC.

This system will require additional pumping, which will increase the operating costs at the WTP. In addition, because piped water users use more water than people who haul water from a watering point, the plant will have to pump and treat additional water.

10.1.2 Alternative 2: Maintain Current Location of Community Sewage Lagoon

The community sewage lagoon is located in the downtown area beside the old water treatment plant. Since the lagoon is located near the town center and near residential properties, odor, aesthetics, and future development potential are a concern.

Design Criteria - Existing Community Sewage Lagoon

Table 10-6: Design Criteria for Existing Sewage Lagoon

Design Criteria	Value
Average sewage flow	14,000 gpd
Storage time	8 months
Number of discharges	2 per year
Number of cells	2

Conceptual Layout

In this alternative the community would continue to use the lagoon at its current capacity and location. The lagoon is capable of serving a population of up to 350 people. Tanana's current population is 290 people, but population projections show the community may grow to over 400 people in the 20-year planning period. The current lagoon will accommodate the community for approximately ten years. After that, an additional cell will be required.

Cost Estimates

Table 10-7: Construction Cost Estimate to Add a Cell to the Existing Sewage Lagoon

Item	Quantity	Unit	Unit Price	Total
Site Development	1	LS	$10,000	$10,000
Berm Construction (in-place)	616	CY	$9	$5,544
Misc. Pipe Discharge Appurtenances	50	LF	$275	$13,750
Equipment Rental	1	LS	$10,000	$10,000
Fuel	1	LS	$2,813	$2,813
Land Acquisition	2	Acre	see note[1]	see note[1]
Subtotal				**$42,107**

[1] Land acquisition will be required, land cost should be determined during final design

Table 10-8: Capital Costs Estimate to Add a Cell to the Existing Sewage Lagoon

Total Sewage Lagoon Capital Costs		
Expand Existing Community Sewage Lagoon		$42,107
Total Construction Costs		**$42,107**
Design Costs (12%)	0.12	$5,053
Construction Management (10%)	0.1	$4,211
Administration and clerical (3%)	0.03	$1,263
Contingency (25%)	0.25	$10,527
Total Project Costs:		**$63,160**

Table 10-9: Operations and Maintenance Costs to Maintain the Sewage Lagoon in its Current Location

Item	Unit	Unit Price	Quantity	Total
Full Time Operator + 22% burden	Hour	$18	16	$351
Part time operator +22% burden	Hour	$13	8	$127
Miscellaneous Costs[1]	LS	$500	1	$500
Subtotal				**$978**

[1] Miscellaneous costs include vehicle costs, fuel, tools, safety equipment, etc.

Advantages and Disadvantages

This alternative is advantageous because it uses the existing facility for over half the planning period, so there are no immediate construction costs.

However, if the community continues to grow at the projected pace, this alternative will not provide adequate storage capacity throughout the design life of this study. Once extra capacity is needed, Too'gha will have to acquire additional land to construct another lagoon cell. Also, because of where the lagoon is located, it will be difficult to alleviate the problems associated with aesthetics and odor. Another problem with the current location is its distance from the airport runway. It is located directly in the airport's flight path. Once the planned improvements at the airport have been constructed, extending the airport further east, the lagoon will be even closer to the runway.

10.1.3 Alternative 3: Relocate Community Sewage Lagoon

This alternative was developed to address the concerns of the community regarding the existing lagoon including:

- Its proximity to the town center
- Odor and aesthetics
- The impediments its location creates for future community development and growth
- Its discharge to the Yukon River

This alternative will evaluate relocating the lagoon, constructing a force main to convey wastewater from the town to the new lagoon, and providing for wetlands treatment before eventual discharge to the river.

Design Criteria

Table 10-10: Design Criteria for Community Sewage Lagoon

Design Criteria	Value
Influent BOD_5	220 mg/L (assumed, based on typical domestic wastewater)
Max BOD_5 loading	20 lb/(acre-day)
Design population	406 people
Wastewater production	40 gpcd
Side slopes on berm	3:1
Ice allowance	2 feet
Sludge accumulation allowance	2 feet
Working depth	6 feet
Treatment Requirements	
BOD_5	> 45 mg/L (arithmetic mean for 30 consecutive days)
	< 65% BOD_5 removal
Suspended Solids	> 65 mg/L (arithmetic mean for 30 consecutive days)
pH range	6.0-9.0

Conceptual Layout

One emerging concept for treating sewage lagoon effluent is to provide additional treatment by discharging it to wetlands. Wetlands treatment can reduce biochemical oxygen demand (BOD), suspended solids, and nutrients, and does not require additional energy or chemical inputs. If land is available, wetlands treatment can offer a low operations and maintenance cost alternative. If designed and maintained properly, it can create productive plant habitat, and provide ancillary benefits to wildlife. Wetlands treatment is in use in two nearby communities: Noorvik and Nulato.

Discharging to wetlands will require a wastewater disposal permit from DEC. The DEC permit has three major stipulations: the treatment must meet minimum effluent requirements, discharge must occur only in summer, and access to the discharge area must be controlled. DEC prefers that effluent discharged to wetlands receive at least secondary treatment. Based on the state's wastewater regulations (18 AAC 72), secondary treatment requires that no less than 65% of the total incoming BOD_5 be removed and the arithmetic mean of the effluent's BOD_5 not exceed 45 mg/L in 30 consecutive days. In addition, the arithmetic mean for suspended solids cannot exceed 70 mg/L in 30 consecutive days. Discharge from the lagoon will only be allowed during the summer (typically mid June through mid October). Lagoon and wetland access will have to be controlled; typically this requirement can be met with signage.

The proposed location of the new sewage lagoon is north of the airport runway (shown on Figure 10.3). The actual location will depend on the acceptance of the alternative by the Department of Transportation (DOT), because DOT owns the airport site, and the Federal Aviation Administration (FAA) regulates the distance between airports and potential bird attractants, like sewage lagoons. An access road to the new facility, and a force main from a collection point in town, will have to be constructed. The collection point could be the existing lagoon. From here a new lift station would pump the combined sewage from the entire community through a force main to the new lagoon.

To prevent freezing, a heat trace system should be installed with the force main. The amount of power needed to run the heat trace system will depend on soil conditions and the type of insulation selected during design. To evaluate the power needs for this alternative, a range of 6 to 24 hours per day is assumed.

Based on a preliminary site reconnaissance, treated effluent will flow from the proposed lagoon site, away from town and into wetlands for additional treatment. The effluent would eventually flow into the Yukon River, downstream of town. Drainage of the effluent is dependant on DOT and FAA approval of the lagoon location, as well as actual site topography and any changes to the drainage pattern resulting from the planned airport improvements. Once a location is selected and approved by DOT and FAA, it will be necessary to complete a drainage study. FAA may also require an analysis of the risk of future bird/airplane interactions if the lagoon is moved.

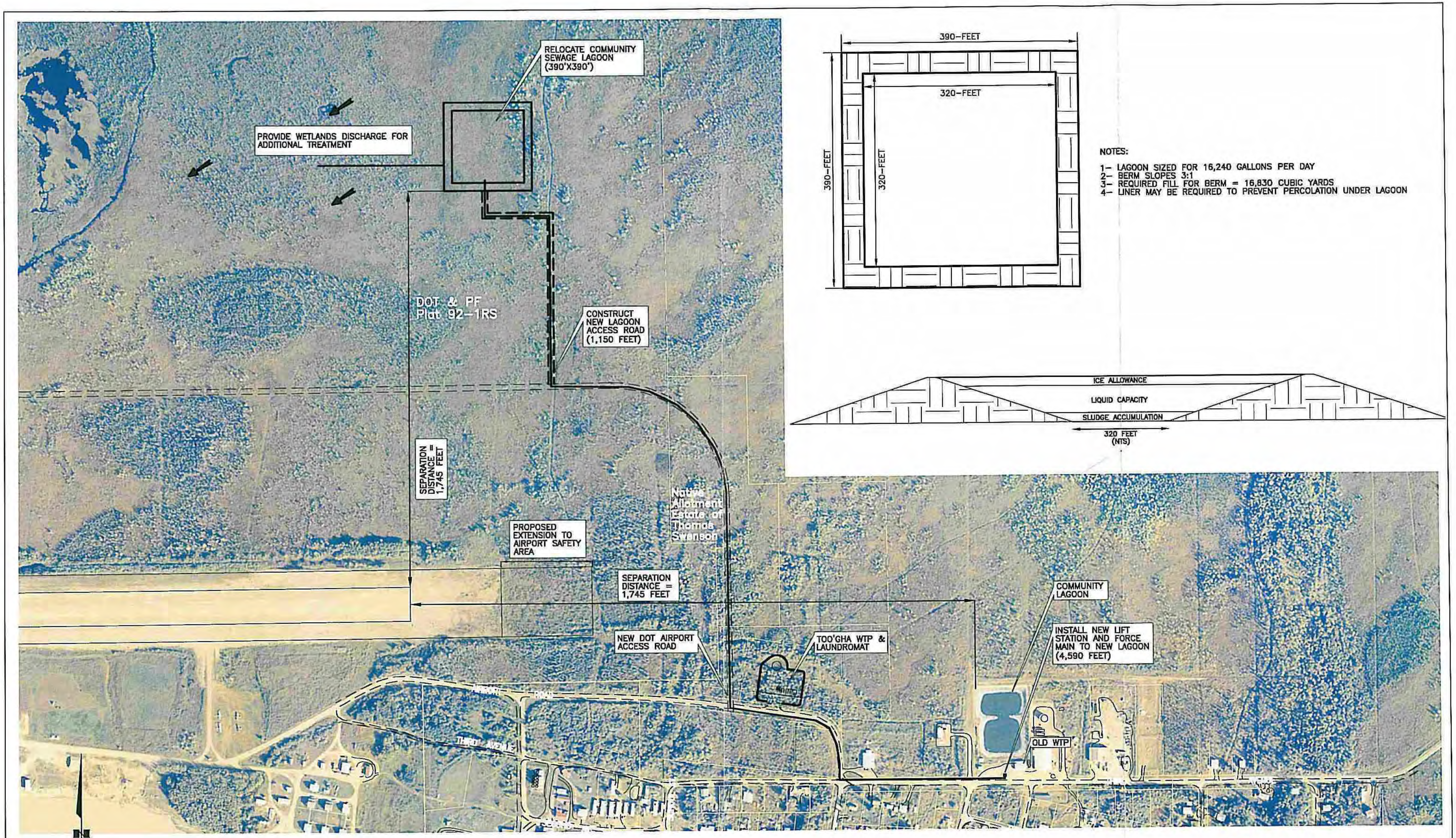
Assuming discharge from June 15 to October 15, the new lagoon will need to provide storage for 9 months. Discharge could be continual over the summer months, or at specific time intervals, as determined by the drainage study. For the 20-year design period, a 2.3-acre lagoon will be required. The lagoon will be constructed by building an earth berm around the storage area. Depending on natural soil conditions, the lagoon will most likely require a geosynthetic impermeable liner to prevent percolation into the soil. After being stored for 9 months, the effluent will be discharged to adjacent wetlands.

Cost Estimates

Table 10-11: New Community Sewage Lagoon Construction Cost Estimate

Item	Quantity	Unit	Unit Price	Total
Drainage Study	1	LS	$55,000	$55,000
Site Development	1	LS	$17,000	$17,000
Berm Construction (in-place)	16,830	CY	$9	$151,470
Access Road Construction	1,143	LF	$275	$314,325
Force main pipe from old lagoon to new	5,490	LF	$275	$1,509,750
Lift station	1	EA	$250,000	$250,000
Wetlands Rerouting	1	LS	$50,000	$50,000
Misc. Pipe Discharge Appurtenances	100	LF	$275	$27,500
Equipment Rental	1	LS	$16,000	$16,000
Fuel	1	LS	$10,000	$10,000
Access Signage	1	LS	$5,000	$5,000
Permit Acquisition	1	LS	$20,000	$20,000
Land Acquisition	5	Acre	see note [1]	see note [1]
Subtotal				**$2,426,045**

[1] Land acquisition will be required, land cost should be determined during final design.



NOTES:

1- LAGOON SIZED FOR 16,240 GALLONS PER DAY
2- BERM SLOPES 3:1
3- REQUIRED FILL FOR BERM = 16,830 CUBIC YARDS
4- LINER MAY BE REQUIRED TO PREVENT PERCOLATION UNDER LAGOON

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WATER AND SEWER FEASIBILITY STUDY
ALT 3 RELOCATE SEWAGE LAGOON

Date
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Figure
10.3

Table 10-12: Capital Cost Estimate for New Sewage Lagoon

Total Sewage Lagoon Capital Costs		
New Community Sewage Lagoon		$2,426,045
Total Construction Costs		**$2,426,045**
Design Costs (12%)	0.12	$291,125
Construction Management (10%)	0.1	$242,605
Administration and Clerical (3%)	0.03	$72,781
Contingency (25%)	0.25	$606,511
Total Project Costs:		**$3,639,068**

Table 10-13: Operations & Maintenance Costs for a Relocated Community Sewage Lagoon

Item	Unit	Unit Price	Quantity (based on 24 hr heat tape)	Total (based on 24 hr heat trace)	Quantity (based on 6 hr heat tape)	Total (based on 6 hr heat trace)
Full-time operator + 22% burden	Hour	$18	120	$2,635	120	$2,635
Part-time operator +22% burden	Hour	$13	120	$1,903	120	$1,903
Pumping for force main	kWh	$0.39	3,882	$1,514	3,882	$1,514
Power for heat trace[1]	kWh	$0.39	180,347	$70,335	45,087	$17,584
Miscellaneous costs[2]	LS	$500	1	$500	1	$500
Subtotal				**$76,888**		**$24,136**

[1] Heat trace use could range from 24hrs/day to 6 hrs/day, to be used for 9 months per year. Annual O&M costs will vary depending on heat trace use requirements

[2] Miscellaneous costs include vehicle costs, fuel, tools, safety equipment, etc.

Advantages and Disadvantages

This alternative will provide the community with adequate sewage treatment capacity at least during the 20-year design period and will allow the community to expand to the north. Treated effluent will flow from the lagoon into wetlands for additional treatment, before draining into the Yukon River. The discharge will flow away from town, toward presently unused land parallel to the airport runway. Discharging to wetlands will address current community concerns about effluent flowing directly into the river with no additional treatment.

Moving the lagoon away from town will also address odor and aesthetic concerns. While the proposed location will be closer to the airport than the recommended FAA separation distance, the new location will not be in the direct flight path of the runway, which may improve safety. Bird activity is not currently a problem in the area, and the modifications to the lagoon for wetlands discharge are not anticipated to encourage additional bird activity.

If this alternative is selected, the community will need to seek construction funding for a new lagoon and access road. This alternative will increase annual operations costs because of the need to pump wastewater to the new lagoon and the additional time spent by operators maintaining the new lift station and draining the lagoon.

Table 10-14: Downtown Advantages and Disadvantages

Alternative		Description	Number of houses served	Level of Service	Advantages	Disadvantages	Estimated Capital Cost	Estimated Annual O&M Cost	Estimated Life Cycle Cost
Area 1 – Downtown									
Alternative 1	Piped Water and Sewer	Extend piped water and sewer service to developed areas downtown. Includes 3rd Ave, 2nd Ave, Koyukuk, and along 1st Ave.	23	High	• Provides highest level of service to residents • Can be integrated into existing piped system • Water source is already developed • Requires little homeowner operation or maintenance • High level of service • Treatment will be provided by Too'gha WTP • Added health benefits	• Additional pumping will be required for extended system length, which will create additional energy costs • Will require booster pump or modification to existing pumps to provide adequate pressure • Booster pump will add complexity to system operation • High capital cost	$7,074,938	$22,175	$7,518,438
Alternative 2	Maintain current location of community sewage lagoon	Use the existing community sewage lagoon for discharge of piped and haul wastewater alternatives	Entire community	High (-)	• Will not have immediate capital costs • Expansion can be deferred • No additional land required in the short term	• Community is concerned about environmental impacts from direct discharge to the Yukon River • Residents have complained of odors • Aesthetic concerns with current location in town • Is not large enough for 20-year design life • Defers problem of purchasing land	$63,130	$978	$82,690
Alternative 3	Relocate Community Sewage Lagoon	Relocate and increase size of community sewage lagoon. Design for additional treatment of wastewater in wetlands.	Entire Community	High (+)	• Lagoon would be sized for the 20-year design population • Land would be acquired for additional lagoon space for long term future planning • Located further from town center to reduce odor problems • Provides additional treatment of discharge in wetlands before eventual drainage into Yukon River • Allows for community growth	• Would have to receive FAA/DOT permission to relocate the lagoon and drain effluent onto airport property • Too'gha would have to acquire land from DOT for the new lagoon site and access road • Requires additional pumping of sewage • Requires heating force main pipe, which increases operation costs • Requires additional road maintenance • Wetlands treatment of lagoon discharge must be permitted by FAA/DOT/COE and other agencies	$3,639,068	$76,888 (24-hr heat trace) $24,136 (6-hr heat trace)	$5,176,828 (24-hr heat trace) $4,121,788 (6-hr heat trace)

10.2 Area 2: Circle Subdivision

The Circle Subdivision is located approximately 3,500 feet east of Koyukuk Street. This study area also encompasses the homes on First Avenue between the downtown area and the subdivision. There are 14 homes in the subdivision and approximately 11 homes along First Avenue, which are serviceable with road access. The following is a summary of the alternatives for the area.

Water Service Alternatives
- Alternative 4: Water haul system from Too'gha's WTP
- Alternative 5: Piped water from Too'gha's WTP
- Alternative 6: Piped water from a satellite WTP

Sewer Collection Alternatives
- Alternative 7: Subdivision piped collection with haul system disposal
- Alternative 8: Subdivision piped collection with a package treatment plant
- Alternative 9: Piped sewer connected to Too'gha's system

10.2.1 Design Criteria

The water and sewer pipes will be designed according to the same criteria as those currently in operation in the downtown area. The water consumption will be slightly less if a haul alternative is selected. Table 10-15 summarizes the design criteria used for the for the Circle Subdivision alternatives.

Table 10-15: Design Criteria for Circle Subdivision Alternatives

Parameter	Value
Water	
Water consumption (haul)	25 gallons/(capita-day)
Water consumption (piped)	40 gallons/(capita-day)
Minimum pipe flow velocity	1 ft/sec (if using a pitorifice for service to home)
Pitorifice	installed on service connections less than 75 feet in length
Minimum pipe diameter	4 inches
Minimum depth of cover	3 feet
Pipe material	HDPE
Pre-insulated protective coating	HDPE jacket for all water pipe 150-mil thick
Sewer	
Wastewater consumption (haul)	25 gallons/(capita-day)
Wastewater production (piped)	40 gallons/(capita-day)
Minimum pipe diameter	8 inches
Minimum sewer main line grade	0.008
Minimum depth of cover	3 feet
Pipe material	HDPE
Pre-insulated protective coating	16-gage aluminum jacket for all sewer pipe
Manhole and lift station wet-wells material	pre-cast concrete

10.2.2 Alternative 4: Water Haul System from Too'gha WTP

This alternative is a haul system providing water to the Circle Subdivision and to homes along First Avenue. Water for the haul system will come from Too'gha's WTP, and Too'gha will be responsible for the operation and maintenance of the haul equipment. A schematic of the water haul system is shown on Figure 10.4.

Conceptual Layout

The major components of a truck haul system include a truck garage, truck fill station, water truck, and individual storage tanks and plumbing at each home. The delivery truck will obtain water at the Too'gha WTP fill point. Because the city clears snow from the streets in winter so that a school bus can get through, a large-scale truck haul system would be feasible. A City ordinance does allow a certain amount of snow to remain on the roads before plow service is initiated

The delivery vehicle will be housed in a heated garage adjacent to the WTP. If a sewer haul system is also selected, that vehicle will also be stored in the garage, but will need to be partitioned from the water haul truck to prevent possible cross-contamination.

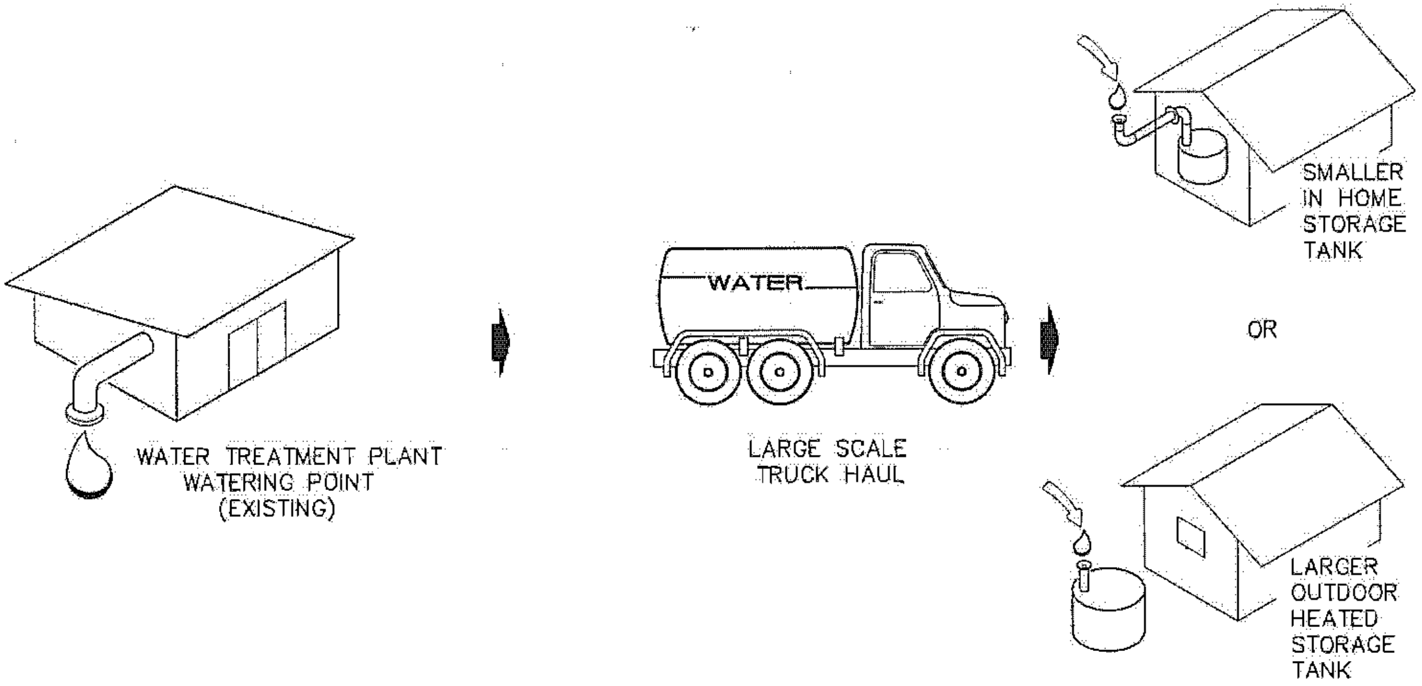
The delivery vehicle will contain a 2,000-gallon water storage tank and be used to fill individual storage tanks at the homes. Water can be distributed on a scheduled basis or upon request by the customer. It will be Too'gha's responsibility to determine the best schedule for delivering water.

Water service will be provided by installing 500-gallon individual water storage tanks in each home. Another possibility may be to install outdoor buried storage tanks, if space is not available in the home. This can be further investigated if a haul system is the selected alternative. Tanks will be equipped with an exterior fill port, so that Too'gha operators can deliver water, without having to enter the house. Each house will also be provided with a water pump and pressure tank to provide running water to fixtures in the home. Water will be provided for a flush toilet, kitchen and bathroom sinks, shower/bathtub, and hot water heater.

Cost Estimates

Table 10-16: Construction Cost Estimated for a Water Haul System for Circle Subdivision

Item	Quantity	Unit	Unit Price	Total
Residential Water Storage Tank (500 gallon)	25	EA	$6,550	$163,750
In-Home Plumbing Improvements	25	EA	$15,000	$375,000
Water Haul Truck	1	EA	$125,000	$125,000
25' x 30' Haul Truck Garage	750	S.F.	$500	$375,000
Subtotal				**$1,038,750**



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ALTERNATIVES 4, 11, 12
WATER HAUL SYSTEM

Date
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Figure
10.4

Table 10-17: Summary of Total Capital Costs for the Water Haul System for Circle Subdivision

Total Water Capital Costs		
Circle Water Haul		$1,038,750
Total Construction Costs		**$1,038,750**
Design Costs (12%)	0.12	$124,650
Construction Management (10%)	0.1	$103,875
Administration and clerical (3%)	0.03	$31,163
Contingency (25%)	0.25	$259,688
Total Project Costs:		**$1,558,125**

Table 10-18: Annual O&M Costs for the Water Haul System for Circle Subdivision

Item	Quantity	Unit	Unit Price	Total
Labor - haul + 22% burden	456	Hour	$18	$10,019
Fuel	114	Gallons	$2.10	$240
Haul Vehicle Service	12	Month	$100	$1,200
Haul Equipment Repairs	1	Year	$5,000	$5,000
Water Haul Truck Depreciation	1	Year	$8,333	$8,333
Garage Lighting	6,221	kWh	$0.39	$2,426
Garage Heating (30' x 25' x 15')	11,250	C.F.	$0.182	$2,044
Subtotal				**$29,262**

Advantages and Disadvantages

A Too'gha-operated haul system will provide the Circle Subdivision and First Avenue residents with a higher level of service than the current self-haul. Because water for the haul system will come from Too'gha's WTP, the source water will not be affected by local soil conditions. Examples of similar haul systems can be found in Fairbanks, Bethel, and Homer. Haul systems provide limited fire control capability because the haul truck can be used as a pumper truck for fire fighting.

This alternative may not provide the level of service residents desire. Another disadvantage is that haul systems are labor intensive and have high annual operation and maintenance costs. The haul truck will need frequent maintenance, especially during bitter cold winter days. The truck should be stored in a heated facility.

Under this alternative, the homeowners will be responsible for upkeep of the individual storage tanks and will have to provide access to their property. This alternative will also increase wear on the road system because of the haul trips required for service.

10.2.3 Alternative 5: Circle Piped Water System from Existing WTP

This alternative will install a piped water system to the Circle Subdivision and the homes along First Avenue. Water will be supplied from Too'gha's WTP, and Too'gha will be responsible for operation and maintenance of the piping infrastructure. A schematic of the piped water system is shown on Figure 10.5. Unless a separate, dedicated loop for the subdivision is constructed from the WTP, this alternative requires that Alternative 1 be constructed.

Conceptual Layout

The new piping will be connected to Alternative 1 piping. The water will be heated and circulated in the distribution loop. The water pipe will be insulated and buried at a minimum depth of 3 feet. This alternative will require installation of approximately 6,270 lineal feet of water service main. Hydrants will be installed to provide water fill points for the community pumper truck *to fight fires.* Three similar options exist to provide a circulating system for the subdivision.

In the first option, pumps at the Too'gha WTP could potentially provide water if they were resized for the additional distance between the current system and the subdivision. Pitorifices would divert water from the mains into the homes. To work, pitorifices require a circulation velocity of at least 1 foot per second. If the service line is longer than 75 feet, the home would require an individual circulation pump.

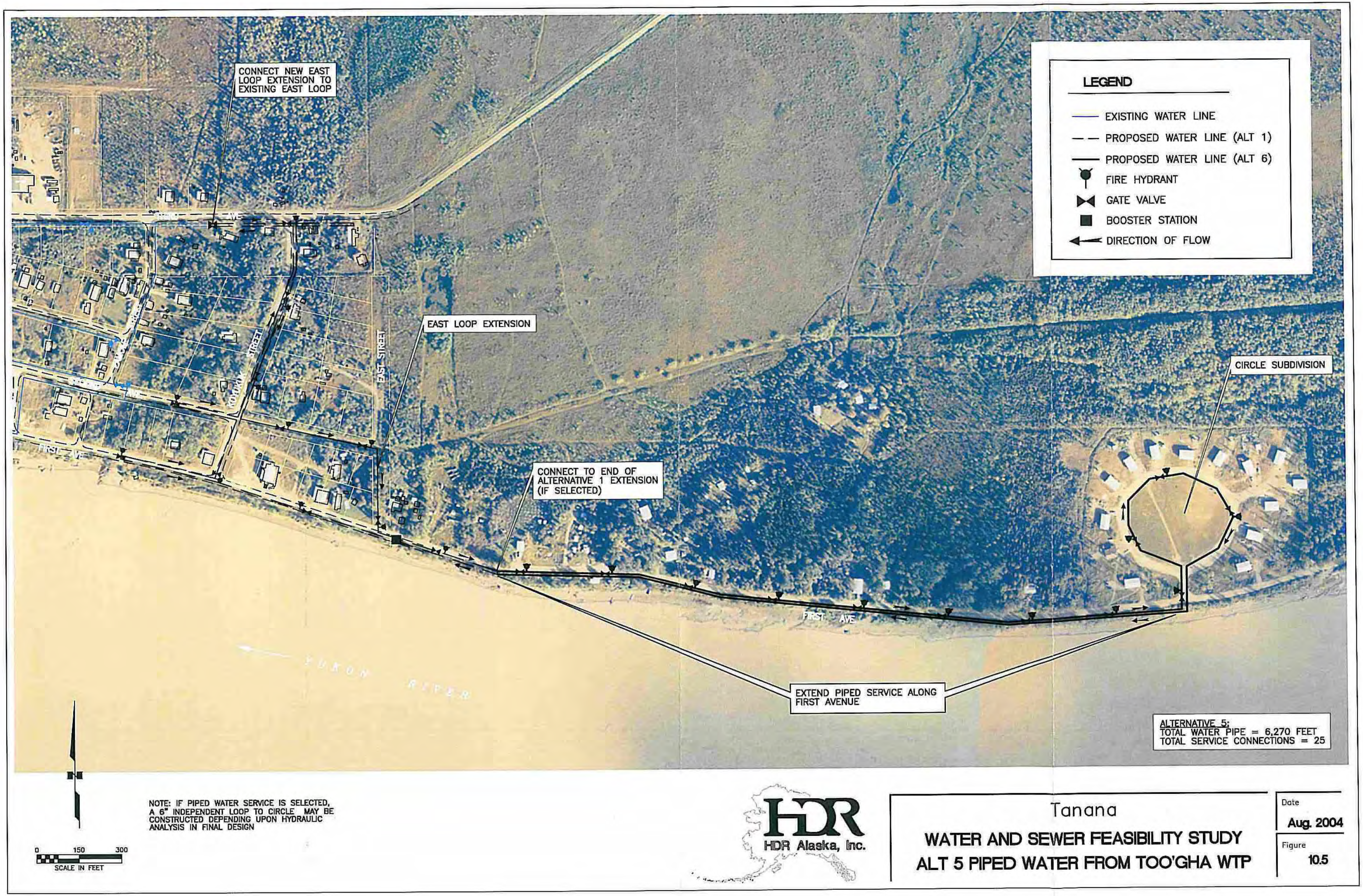
As part of design and assuming installation of 4-inch HDPE water mains, the additional head loss created by the extension of the system will be calculated. If the head loss is too large, an intermediate booster station will be required. Heat will be added to the mains at the booster station. For cost estimating purposes, a booster station has been assumed, below.

Should the head loss through a 4-inch line prove too large or costly to overcome, a second option would provide a dedicated water loop to the subdivision. This option would install a full length of 6-inch pipe from the WTP to the Circle. Individual circulation pumps will provide service to the homes because most likely the velocity requirement for pitorifices will not be met with the larger pipe size.

The third option is to install a slow circulating water loop to the Circle Subdivision, with a booster pump on First Avenue. A slow circulating water loop would circulate the water with less velocity, thereby reducing pumping costs. However, because the velocity will be low, the use of pitorifices at homes will not be feasible. Instead, small individual circulating pumps at each residence will be required to prevent freezing in the water service lines. The advantage of this system is that a booster pump can be sized only for the Circle Subdivision distribution loop, which will simplify modifications to the existing WTP and better fit the existing infrastructure.

Cost Estimates

To ensure that cost estimates are conservative, a booster station is included in the estimate. Should the final design determine one is not needed the booster station will be eliminated.



NOTE: IF PIPED WATER SERVICE IS SELECTED, A 6" INDEPENDENT LOOP TO CIRCLE MAY BE CONSTRUCTED DEPENDING UPON HYDRAULIC ANALYSIS IN FINAL DESIGN

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ALT 5 PIPED WATER FROM TOO'GHA WTP

Date
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Figure
10.5

Table 10-19: Construction Cost Estimate for a Piped Water System from the Too'gha WTP

Item	Quantity	Unit	Unit Price	Total
4" HDPE Insulated Circulating Waterline (4" x 12")	6,270	LF	$275	$1,724,250
Buried Service Lines	1,050	LF	$175	$183,750
Booster Pump Station	1	EA	$250,000	$250,000
Household Water Plumbing	25	EA	$15,000	$375,000
Individual Water Circulation Pump[1]	25	EA	$500	$12,500
Subtotal				**$2,545,500**

[1] Assumes velocity in pipe will require use of individual circulation pumps.

Costs do not include Alternative 1 construction costs.

Table 10-20: Total Capital Cost Estimate for a Piped Water System from the Too'gha WTP

Total Water Capital Costs		
Circle Piped Water		$2,545,500
Total Construction Costs		**$2,545,500**
Design Costs (12%)	0.12	$305,460
Construction Management (10%)	0.1	$254,550
Administration and Clerical (3%)	0.03	$76,365
Contingency (25%)	0.25	$636,375
Total Project Costs:		**$3,818,250**

Table 10-21: Estimated Annual O&M Costs for a Piped Water System from the Too'gha WTP

Item	Quantity	Unit	Unit Price	Total
Full time operator + 22% burden[1]	80	Hour	$18	$1,757
Part time operator + 22% burden[1]	80	Hour	$13	$1,269
Well pump power (annual)[2]	1,822	kWh	$0.39	$710
Pressure pump costs (annual)[3]	1,261	kWh	$0.39	$492
Booster station building heat	177	GAL	$2.10	$371
Miscellaneous supplies for WTP	1	LS	$1,000	$1,000
Pipeline heating - annual (diesel) (new loop only)	2,277	GAL	$2.10	$4,781
Pipeline circulating costs (annual) (new loop only)	12,650	kWh	$0.39	$4,934
Subtotal				**$15,313**

[1] *It is assumed that there will be an additional 2 weeks of work for the operators to account for additional time needed at the WTP and for operation of the new booster station.*

[2] *Well pump power costs are for the additional water flow from increased demand.*

[3] *Pressure pump costs are only those associated with the new loop (pressurizing 0 to 75 psi).*

Advantages and Disadvantages

A piped water system is advantageous because it will provide a high level of convenient and reliable service. This alternative will integrate the extension into the existing piped system downtown. The water for this alternative will come from Too'gha's WTP, which provides high quality water, and meets standards set by the EPA and DEC. Based on preliminary calculations, the extra costs incurred by the piping extension will be covered by increased fees collected from the additional households served.

Because of the distance between the subdivision and the town area, the installation costs for a piped system to the Circle Subdivision are high. Another disadvantage is that it will require additional pumping, over an extended length, which will increase the operating costs at the WTP. If the pumps must be resized, or new pumps for a dedicated loop added, it may be difficult to find space at the WTP for the new equipment. A new loop would also put additional pipes into the already crowded road ROW. If a booster station were added, it would increase the complexity of system operation.

10.2.4 Alternative 6: Piped Water from New Satellite WTP

This alternative will install a piped water system for the homes in the subdivision and along First Avenue, with water supplied from a new WTP. Under this alternative, Too'gha will be responsible for the operation and maintenance of the piping infrastructure and a new package treatment plant. A schematic of the water system is shown on Figure 10.6.

Conceptual Layout

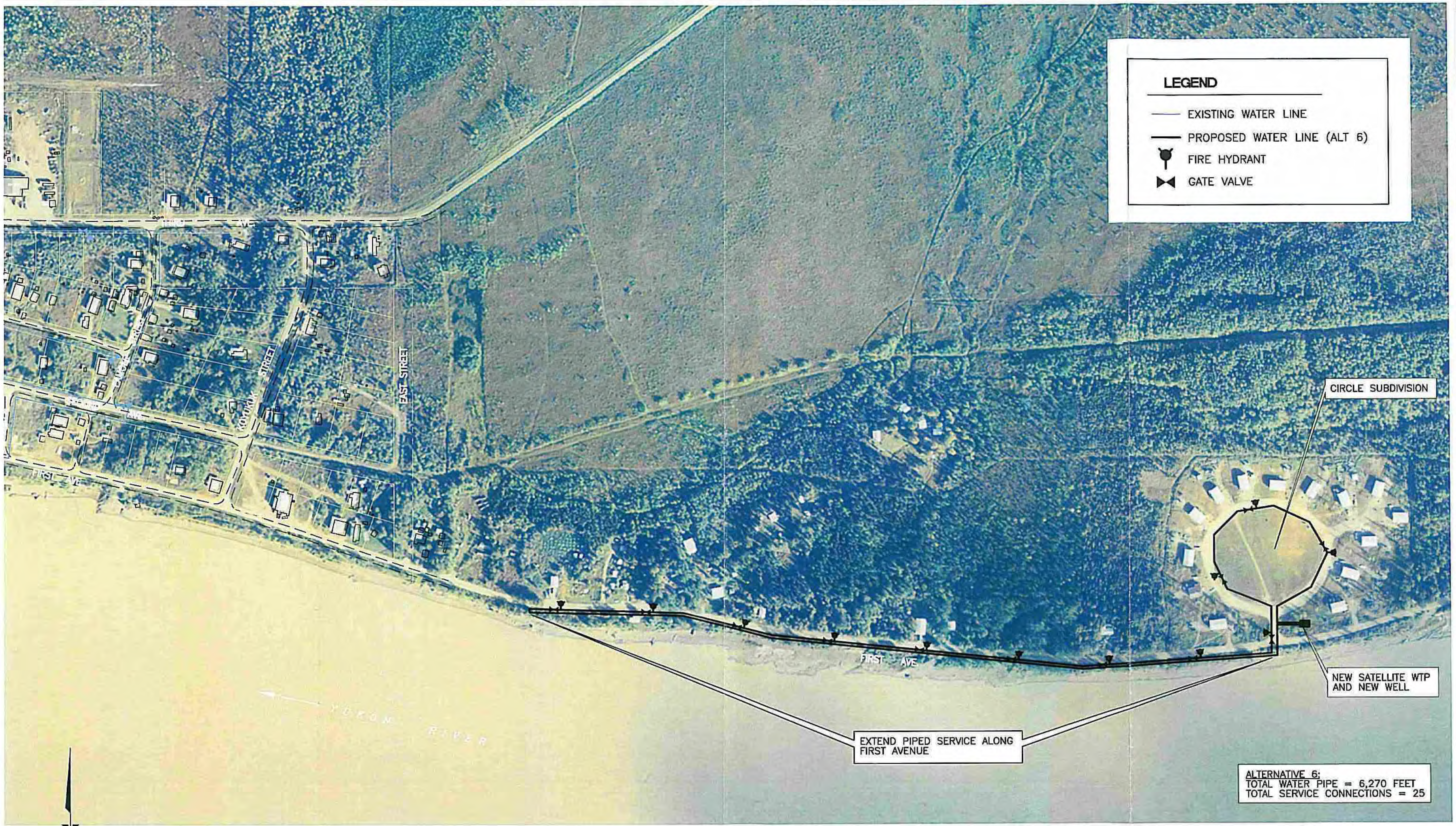
Under this alternative, water service will be provided from a package water treatment plant. This alternative requires development of a new water source. It may be possible to refurbish the well previously drilled in the subdivision. However, further investigation will be needed if this alternative is selected.

To minimize the length of piping required for the transmission main, the source should be located near the new water treatment plant. Once a new source is developed, the water treatment system can be selected and sized. Based on typical water quality results from the area, the water will most likely require treatment for iron, manganese, color, and turbidity. The water might also need treatment for odor and total dissolved solids.

A water storage tank should be constructed to provide capacity to meet peak demands throughout the day, reduce the need for the well to pump all the time, and provide sufficient chlorine contact time, if the water must be disinfected. If, as is the case with the Too'gha well, the water source is located close to the river, the water may be considered GWUDISW and will require disinfection. The tank should be sized to provide a minimum of seven days of storage for the houses in the Circle and on First Avenue.

The new satellite water treatment plant will provide water for a piped system serving the homes in the subdivision and along First Avenue. To prevent freezing, the water system will consist of insulated, buried, circulating mains. Service to the homes will be provided with pitorifices or individual circulation pumps.

The water main will be constructed of 4-inch HDPE pipe with a protective 150-mil thick HDPE jacket. Pipes will be buried at a minimum depth of 3 feet. Based on the preliminary layout shown on Figure 10.6, approximately 6,270 lineal feet of water main will be required. This length of pipe assumes the new WTP will be built in the location shown.



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WATER AND SEWER FEASIBILITY STUDY

ALT 6 PIPED WATER FROM NEW WTP

Date
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Figure
10.6

Cost Estimates

Table 10-22: Construction Cost Estimates for a Piped Water System from a New WTP

Item	Quantity	Unit	Unit Price	Total
Drill new water source	1	LS	$75,000	$75,000
Circulating water transmission main (2" HDPE)	150	LF	$275	$41,250
4" HDPE insulated circulating waterline (4" x 12")	6,270	LF	$275	$1,724,250
Buried service lines	1,875	LF	$175	$328,125
Household water plumbing	25	EA	$15,000	$375,000
Individual water circulation pump[1]	25	EA	$500	$12,500
Construct new satellite WTP (30'x20')	400	SF	$800	$320,000
Water storage tank (30,000 gallons)	30,000	GAL	$2.25	$67,500
Subtotal				**$2,827,375**

[1] Assumes velocity in pipe will require use of individual circulation pumps

Table 10-23: Estimate of Capital Costs for a Piped Water System from a New WTP

Total Water Capital Costs		
Circle Piped Water with new WTP		$2,827,375
Total Construction Costs		**$2,827,375**
Design Costs (12%)	0.12	$339,285
Construction Management (10%)	0.1	$282,738
Administration and Clerical (3%)	0.03	$84,821
Contingency (25%)	0.25	$706,844
Total Project Costs:		**$4,241,063**

Table 10-24: Estimated Annual O&M Costs for a Piped Water System from a New WTP

Item	Quantity	Unit	Unit Price	Total
Full time operator + 22% burden[1]	832	Hour	$18	$18,271
Part time operator + 22% burden[1]	520	Hour	$13	$8,247
Well pump power (annual)	612	kWh	$0.39	$239
Pressure pump costs (annual)	1,261	kWh	$0.39	$492
Heat building (diesel)	6,000	Month	$0.34	$2,040
Lighting and chemical pump electrical (annual)	5,947	kWh	$0.39	$2,319
Chemical costs, miscellaneous items[2]	1	LS	$5,000	$5,000
Pipeline heating - annual (diesel) (new loop only)	2,277	GAL	$2.10	$4,781
Pipeline circulating costs (annual) (new loop only)	12,668	kWh	$0.39	$4,940
Subtotal				**$46,330**

[1] *Assumes plant operation will require 2 per weeks for full time operator and 520 hrs annually for part time operator.*

[2] *Miscellaneous costs include vehicle costs, fuel, telephone, tools, safety equipment, additional chemicals, etc.*

Advantages and Disadvantages

This alternative provides residents with a piped water system, which will provide a high level of convenient and reliable service. Because this system would operate independently of the existing system, Too'gha's water treatment plant would not have to be modified for installation of a bigger pump. The water for this alternative will come from a new WTP, which will provide high quality water that meets EPA and DEC standards.

The installation costs for a piped system to this area will be expensive due to the required length of pipe. Another disadvantage is that a new water source will be needed. It may be difficult to locate and drill a well with adequate water quality and yield. This alternative will also require the construction of a new water treatment facility. The construction costs for such a facility will be high. In addition, the facility will require on-going operator attention and may necessitate hiring additional staff.

10.2.5 Alternative 7: Subdivision Wastewater Collection with Too'gha Operated Haul Collection System

This alternative will provide a haul system to collect wastewater from Circle Subdivision residents. Wastewater will be piped from homes to a centralized location, which will be periodically pumped out by a Too'gha-operated haul truck, and taken for disposal at the community sewage lagoon. Under this alternative, Too'gha will be responsible for the operation and maintenance of the haul equipment. A schematic of the haul system is shown in Figure 10.7.

Conceptual Layout

Wastewater from the Circle Subdivision homes will flow into 8-inch HDPE mains. Piping will be insulated and protected with 16-gage aluminum jackets. All piping will be buried and, where possible, placed in the same trenches as any water lines installed for the subdivision. A waiver from ADEC will be required to place water and sewer pipes in the same trench, but will be similar to the waiver already obtained for the downtown system. Approximately 1,200 feet of piping will be needed to serve the homes in the subdivision. Sewer pipe will be installed so that the sewage drains via gravity to a centralized collection point. The minimum grade for sewer pipe will be 0.008. Approximately 12 manholes will be required, installed at each junction or at a minimum spacing of 300 feet.

Based on a house count of 14 homes and an estimated wastewater generation rate of 25 gpcd, a 16,000 gallon holding tank will be needed. Figure 10.7 shows a preliminary location for the holding tank. Too'gha will need to acquire property for the tank.

This alternative will not provide piping infrastructure along First Avenue. If these homes cannot be served by on-site conventional septic systems, or small, package sewage treatment plants, an alternative would be to serve them with a haul system. Each home would require a sewage holding tank, capable of storing one week's accumulation. The estimated size of the holding tank will be 1,000 gallons (comparable to the size of a conventional septic tank). Because a haul truck would already be required to pump and haul waste from the Circle Subdivision holding tank, individual homes on First Avenue could also be served by a haul system.

This alternative will require Too'gha to purchase a 2,000-gallon sewage haul truck so that operators can haul from individual homes, as well as from the community holding tank. The truck will need to be stored in a heated garage to prevent freezing in winter. The heated garage could be connected to a water haul storage garage.

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ALT 7 CIRCLE COMMUNITY COLLECT/HAUL

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Figure
10.7

Cost Estimates

Table 10-25: Community Collection and Haul System Construction Cost Estimate for Circle Subdivision and First Avenue

Item	Quantity	Unit	Unit Price	Total
Community Collection Tank	1	Each	$50,000	$50,000
8" Insulated Gravity Sewer Line (8" x 15")	1,200	LF	$275	$330,000
Buried Service Lines	1,050	LF	$175	$183,750
Manholes	12	EA	included in pipe cost	
In-Home Plumbing Improvements (Circle Subdivision)	14	EA	$15,000	$210,000
2,000 Gallon Sewage Pumper Truck	1	EA	$125,000	$125,000
25' x 30' Haul Truck Garage	750	S.F.	$500	$375,000
Individual Holding Tanks (1,000-gal)	11	EA	$5,000	$55,000
In-home Plumbing Improvements w/ Individual Haul (First Avenue)	11	EA	$15,000	$165,000
Subtotal				**$1,493,750**

Table 10-26: Capital Cost Estimate for the Community Collection and Haul System for Circle Subdivision

Total Sewer Haul System Capital Costs		
Community Collection and Sewer Haul		$1,493,750
Total Construction Costs		**$1,493,750**
Design Costs (12%)	0.12	$179,250
Construction Management (10%)	0.1	$149,375
Administration and clerical (3%)	0.03	$44,813
Contingency (25%)	0.25	$373,438
Total Project Costs:		**$2,240,625**

Table 10-27: Estimated Annual O&M Costs for the Community Collection and Haul System for Circle Subdivision

Item	Quantity	Unit	Unit Price	Total
Labor - Haul + 22% Burden	456	Hour	$18	$10,019
Fuel	114	Gallons	$2.10	$240
Haul Vehicle Service	12	Month	$100	$1,200
Haul Equipment Repairs	1	Year	$5,000	$5,000
Haul Truck Depreciation	1	Year	$8,333	$8,333
Garage Lighting	5,702	kWh	$0.39	$2,224
Garage Heating (25' x 30' x 15')	11,250	C.F.	$0.182	$2,044
Subtotal				**$29,060**

Advantages and Disadvantages

A haul system will provide a higher level of service than self-haul or outhouses, but may not provide the level of service residents desire. Also, residents' concerns with drainage and groundwater contamination will be reduced.

One of the disadvantages of a haul system is that it is labor intensive and requires significant operator time, increasing annual operation and maintenance costs for this alternative. The haul truck will need frequent maintenance and require a heated garage. Under this alternative, the First Avenue homeowners would be responsible for upkeep of their individual storage tanks and would have to provide access to their property. This alternative will also increase wear and tear on the road system because of the haul trips required for service.

10.2.6 Alternative 8: Subdivision Wastewater Collection with Treatment from Subdivision Package Treatment Plant

This alternative will provide a sewage collection system in which sewage from individual homes in the Circle Subdivision flows to a centralized package sewage treatment plant, located at the Circle. Under this alternative, Too'gha will be responsible for the operation and maintenance of the piping system and the package treatment plant. The treated sewage will be disinfected and discharged to the Yukon River or to wetlands. A schematic of the system is shown on Figure 10.8. This alternative will require Too'gha to acquire land for the treatment plant and piping associated with final discharge. Under this alternative the homes along First Avenue would not receive service, but would continue to use on-site systems such as outhouses or conventional septic systems.

Conceptual Layout

This alternative will be similar to that outlined in Alternative 7; however, instead of hauling wastewater to the community sewage lagoon, wastewater from the Circle homes will be treated on-site by a small package plant.

Wastewater from the Circle Subdivision will flow into 8-inch HDPE mains. Piping will be insulated and protected with 16-gage aluminum jackets. All piping will be buried and, where possible, placed in the same trenches as any water lines installed for the subdivision. A waiver from ADEC will be required to place the water and sewer pipes in the same trench, but will be similar to the waiver already obtained for the downtown system. Approximately 1,200 feet of piping will be needed to serve the homes in the subdivision. Sewer pipe will be installed so that it drains via gravity to the centralized package treatment plant. The minimum grade for sewer pipe will be 0.008. Approximately 12 manholes will be required, installed at each junction or at a minimum spacing of 300 feet.

This alternative includes installation of a small scale prepackaged sewage treatment plant. The plant will be a fully contained, super-insulated, multi-compartment unit, operating year round. The plant can be installed above, partially below, or completely below ground. The unit will include an aerobic treatment unit, where bacteria become attached, or fixed, to a growth medium; an ultraviolet disinfection unit; and an automatic dosing siphon that will eliminate freeze up at the discharge location. The plant will treat all residential wastewater, including raw sewage and gray water. The system will be sized depending on the type of water system that is chosen.

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ALT 8 CIRCLE COMMUNITY COLLECT/TREAT

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Figure
10.8

Often, effluent from this type of unit is discharged to a drainfield. However, since soil conditions in the Circle Subdivision area are too wet to allow use of a drainfield, the treated effluent should be discharged either to wetlands or the Yukon River. Because this type of system produces tertiary treatment, it is reasonable to assume DEC would grant a discharge permit. Similar systems operating around Alaska have obtained DEC discharge permits.

The system depends on biological activity to break down the waste stream. One disadvantage of using biological systems is the risk of killing off the bacteria. Care is needed to avoid destroying the bacteria by putting caustic acids, chemicals, and non-biodegradable detergents into the sewage system. Homeowners will need to be told not to dump these items into the sewer system. The system's air blower also needs power. The maintenance program includes cleaning the UV bulb every 4 to 6 months, and replacing the UV bulb every 1 to 2 years.

Cost Estimates

Table 10-28: Subdivision Collection with Treatment from Package Plant Construction Cost Estimate

Item	Quantity	Unit	Unit Price	Total
Community Package Treatment Unit[1]	1	Each	$245,000	$245,000
Discharge Pipe to the River or to Wetlands[2]	200	LF	$275	$55,000
8" Insulated Gravity Sewer Line (8" x 15")	1,200	LF	$275	$330,000
Buried Service Lines	1,050	LF	$175	$183,750
Manholes	12	EA	included in pipe cost	
In-Home Plumbing Improvements	14	EA	$15,000	$210,000
Discharge Permit Acquisition	1	LS	$20,000	$20,000
Subtotal				**$1,043,750**

[1]Includes package cluster treatment system with data logger package, 6 thermosyphons, and insulated lift station

[2]Wetlands discharge can be evaluated but will increase pumping costs

Table 10-29: Estimated Capital Costs for Subdivision Collection with Treatment from Package Plant

Total Sewer System Capital Costs		
Circle Sewage Collection and Treatment		$1,043,750
Total Construction Costs		**$1,043,750**
Design Costs (12%)	0.12	$125,250
Construction Management (10%)	0.1	$104,375
Administration and clerical (3%)	0.03	$31,313
Contingency (25%)	0.25	$260,938
Total Project Costs:		**$1,565,625**

Table 10-30: Estimated Annual O&M Costs for Community Collection with Package Treatment Plant

Item	Quantity	Unit	Unit Price	Total
Full-time operator + 22% burden[1]	832	Hour	$18	$14,976
Part-time operator +22% burden[1]	520	Hour	$13	$6,760
Power for air blower and UV unit	41,328	kWh	$0.39	$16,118
Miscellaneous costs[2]	1	LS	$1,000	$1,000
Subtotal				**$38,854**

[1] Assumes that full time operator will spend 2 days of every week, and part time operator will spend 13 weeks per year

[2] Miscellaneous costs include filters, chlorine tablets, dechlorination tablets, vehicle costs, fuel, tools, safety equipment, etc.

Advantages and Disadvantages

This alternative will offer a high level of service to the residents of the subdivision. Wastewater will be collected and treated near the subdivision, reducing the amount of piping infrastructure and overall construction costs. The treatment unit will provide a high level of wastewater treatment.

One disadvantage is that the homes along First Avenue will require a different type of treatment, unless lift stations are installed to convey waste to the new package treatment system at the Circle. The treatment package system will also add a level of complexity to water and sewer operation in the community. Treated effluent from the treatment plant will need to be discharged to the river or to wetlands, which will require a discharge permit.

10.2.7 Alternative 9: Piped Sewer connected to Too'gha system

This alternative will provide piped sewer service to Circle Subdivision and First Avenue residents. The piped system will be connected to the existing sewer system in the downtown area. Wastewater will be collected and treated in the community sewage lagoon. Under this alternative, Too'gha will be responsible for the operation and maintenance of the piping infrastructure. This alternative will require the construction of Alternative 1. A schematic of the piped sewer system is shown on Figure 10.9.

Conceptual Layout

This alternative will extend the sewer system from the downtown area to the Circle Subdivision Wastewater from the subdivision will be discharged and treated in the community sewage lagoon. Wastewater will flow through 8-inch HDPE mains, insulated and protected with 16-gage aluminum jackets. All piping will be buried and, where possible, placed in the same trenches as water lines installed for the subdivision. An ADEC waiver will be required to place water and sewer pipes in the same trench, but will be similar to the ADEC waiver previously obtained for the installation of the downtown system.

NOTE: THE NUMBER OF LIFT STATIONS IS DEPENDENT ON COMPLETION OF A TOPOGRAPHIC SURVEY

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ALT 9 PIPED SEWER TO CIRCLE

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Figure
10.9

Approximately 4,030 feet of piping will be needed to serve the homes on First Avenue and in the subdivision. Sewer pipe will be installed so that the sewage drains via gravity, where possible. The minimum grade for sewer pipe will be 0.008. Approximately 19 manholes will be required, installed at junctions, or at a minimum spacing of 300 feet.

Due to the natural topography and length of the line, it will not be possible to serve the subdivision solely by gravity. An estimated three lift stations will be needed. The actual number of lift stations depends on the topography and will be determined as part of design, after a survey has been completed.

Cost Estimates

Table 10-31: Piped Sewer System Construction Cost Estimate

Item	Quantity	Unit	Unit Price	Total
8" insulated gravity sewer line (8" x 15")	4,030	LF	$275	$1,108,250
Buried service lines	1,875	LF	$175	$328,125
Deep pre-package lift station (8' to 14' in depth)	3	EA	$250,000	$750,000
Manholes	19	EA	included in pipe cost	
In-home plumbing improvements	25	EA	$15,000	$375,000
Subtotal				**$2,561,375**

Costs do not include Alternative 1 construction costs

Table 10-32: Total Capital Cost Estimate for Piped Sewer System

Total Sewer Capital Costs		
Circle Piped Sewer		$2,561,375
Total Construction Costs		**$2,561,375**
Design Costs (12%)	0.12	$307,365
Construction Management (10%)	0.1	$256,138
Administration and Clerical (3%)	0.03	$76,841
Contingency (25%)	0.25	$640,344
Total Project Costs:		**$3,842,063**

Table 10-33: Total Annual O&M Cost Estimate for Piped Sewer System

Item	Quantity	Unit	Unit Price	Total
Full time operator + 22% burden[1]	120	Hour	$18	$2,635
Part time operator + 22% burden[1]	120	Hour	$13	$1,903
Lift Station Pumping	250	kWh	$0.39	$97
Subtotal				**$4,636**

[1] It is assumed that each new lift station will require approximately 40 hours per year split between operators.

Advantages and Disadvantages

Piped sewer offers the highest level of service to Circle Subdivision and First Avenue residents. This alternative is also advantageous because it utilizes the existing sewage lagoon, requiring maintenance of a single community sewage treatment system.

One disadvantage is the extensive amount of piping infrastructure needed to serve the subdivision. Because of the distance, approximately three lift stations will be required, which will increase on-going maintenance and operation costs. This alternative also requires that the piping extension in Alternative 1 be completed.

10.2.8 Summary of Alternatives

Table 10-34: Circle Subdivision and First Street Advantages and Disadvantages

Alternative		Description	Number of houses served	Level of Service	Advantages	Disadvantages	Estimated Capital Cost	Estimated Annual O&M Cost	Estimated Life Cycle Cost
Area 2- Circle Subdivision									
Alternative 4	Too'gha operated water haul system	Haul truck delivers water and fills individual water storage tanks at each residence. Haul schedule can either be on-demand or at regular intervals.	25	Medium	• Provides adequate supply • Improves current level of service • Does not add unfamiliar items to system • Not restricted by soil conditions or topography • Minimal construction disturbance • Minimal capital cost	• Requires homeowner maintenance of water storage tanks • Requires access for haul truck deliveries • Requires new building and site for haul truck garage • May cause additional wear on the road system • Haul truck requires maintenance and upkeep • Residents may expect a higher level of service	$1,558,125	$29,262	$2,143,365
Alternative 5	Piped water system from Too'gha WTP	Piped water system provides service to houses. Water is supplied and treated at Too'gha's WTP.	25	High	• Provides highest level of service to residents • Can be integrated into existing piped system • Water source is already developed • Requires little homeowner operation or maintenance • Treatment will be provided by Too'gha's WTP • Water source is required to meet EPA/DEC treatment requirements • Added health benefits	• High capital cost for piping • Additional pumping and heating will be required, which will increase O&M costs • Requires alternative 1 to be constructed • Significant excavation in roadways • Roadway near the WTP already has five pipes in the ground, which will make construction more difficult if a dedicated loop is installed • Will require a booster station, which adds complexity and increases O&M costs	$3,818,250*	$15,313	$4,124,510
Alternative 6	Piped water system from new satellite WTP	Piped water system provides service to houses. New water supply must be developed. Treatment provided from new satellite WTP.	25	High	• Provides highest level of service to residents • No modifications needed to existing WTP infrastructure • Requires little homeowner operation or maintenance • Water source is required to meet EPA/DEC treatment requirements • Do not need to excavate downtown roads to install lines • Added health benefits	• May be difficult to find new water source • High capital cost • Requires operator attention and on-going maintenance at two facilities • Requires chemical storage at two facilities • Land is required for new building site and well	$6,241,063	$46,330	$5,167,663
Alternative 7	Too'gha operated sewer haul system	Wastewater from subdivision homes is stored in community collection tank. Wastewater from homes on First Avenue is stored in individual holding tanks at residences. Too'gha operated haul truck periodically pumps out holding tanks. Haul service can be on-call or at scheduled intervals.	25	Medium	• Reduces sanitation concerns associated with pit privy use • Allows homes to have toilets and sinks • Provides greater level of service compared to current conditions • Installation of system is relatively fast with less capital investment compared to piped system	• High operation and maintenance requirements • Requires access for haul truck and homeowner maintenance of holding tanks • May cause additional wear on the road system • Requires new building and site for haul truck garage	$2,240,625	$29,060	$2,821,825

Alternative		Description	Number of houses served	Level of Service	Advantages	Disadvantages	Estimated Capital Cost	Estimated Annual O&M Cost	Estimated Life Cycle Cost
Alternative 8	Subdivision collection with treatment from subdivision package treatment plant	Wastewater from subdivision homes is piped and collected at a central location. Discharge is treated with a package treatment plant sized for the wastewater generation from the subdivision homes.	14	High (-)	• Requires less piping infrastructure compared to piped system • System can be served by gravity • Offers residents a high level of service • Effluent can be discharged to the river because of high level of treatment received (wetlands discharge an option if effluent is pumped)	• Requires treatment system maintenance • Maintenance adds unfamiliar level of complexity to system operations • Will need to obtain an ADEC discharge permit • Requires land acquisition for new sewage treatment plant • Requires discharge of treated wastewater to Yukon River or wetlands • First Avenue homes will not receive piped service	$1,565,625	$38,854	$2,342,705
Alternative 9	Piped sewer connected to existing Too'gha system	Piped sewer system will be extended from the existing service areas to the subdivision and along First Avenue. Wastewater will be treated in the community sewage lagoon.	25	High (+)	• Offers residents a high level of service • Little to no homeowner maintenance required for the piped system • Utilizes existing lagoon	• Will require lift stations, which will create on-going maintenance and operation costs • Requires extensive piping infrastructure to serve homes • Requires Alternative 1 to be constructed • High capital cost	$3,842,063*	$4,636	$3,934,783

*Does not include Alterative 1 construction costs.

10.3 Area 3: Mission, White Alice, and Site Roads

Due to the remoteness of the homes on Mission, White Alice and Site Roads, piped alternatives will not be evaluated. These homes currently haul water from nearby streams, a spring, or the Too'gha WTP watering point, and use outhouses or honey buckets for wastewater disposal. Based on aerial photography, there are approximately 20 homes in the areas along Mission, White Alice, and Site Roads.

In addition to their remoteness, another challenging aspect to serving these structures is the varying geological conditions. In some cases, on-site wells and conventional septic systems may be feasible. In others, because of permafrost, they will not be feasible. A complete geotechnical investigation will need to be completed. This will allow homeowners to understand the various water supply and sewage treatment options available to them.

Decision trees (Figures 10.10 and 10.11) present a way of understanding various service options available to these homeowners.

10.3.1 Design Criteria

Table 10-35: Design Criteria

Parameter	Value
Water	
Water consumption (haul)	25 gallons/capita-day
Sewer	
Wastewater production (haul)	25 gallons/capita-day
Minimum septic tank size	1,000 gallons or 250 gallons capacity per bedroom

Table 10-36: Minimum Separation Distances

	Distance to				
	Private Sewer Line	Septic Tank	Fuel Tank	Holding Tank	Absorption Field
Private Well	75'	150'	75'	100'	150'

	Distance to						
	Surface Water	Lot Line	Foundation	Absorption Field	Seasonal High Groundwater	Bedrock, Clay	Slopes > 25%
Septic Tank	100'	10'	10'	10'	-	-	-
Absorption Field	100'	10'	10'	-	4'	6'	50'

Table 10-37: Absorption Field Sizing

Soil Type	Soil Description	Infiltration Area *(ft^2 per bedroom)*
Well graded gravel (GW)	50% or more of coarse fraction retained on No. 4 sieve; less than 5% of fine fraction passes No. 200 sieve; wide range of particle sizes	Sand liner or additional treatment required
Poorly graded gravel (GP)	50% or more of coarse fraction retained on No. 4 sieve; less than 5% of fine fraction passes No. 200 sieve; particles predominately one size	Sand liner or additional treatment required
Well graded sand (SW)	More than 50% of coarse fraction passes No. 4 sieve; less than 5% of fine fraction passes No. 200 sieve; wide range of particle sizes	125
Poorly graded sand (SP)	More than 50% of coarse fraction passes No. 4 sieve; less than 5% of fine fraction passes No. 200 sieve; ashtray or beach sand	150
Silty gravel (GM)	Less than 50% of coarse fraction passes No. 4 sieve; more than 12% of fine fraction passes No. 200 sieve; muddy gravel	Requires percolation test for sizing
Silty sand (SM)	More than 50% of coarse fraction passes No. 4 sieve; more than 12% of fine fraction passes No. 200 sieve; muddy sand	Requires percolation test for sizing
Clay/silt (CL,ML)	When damp, soil smears when excavated. Dry clods are firm and hard and may be flour line when pulverized	Engineering plans required

10.3.2 Alternative 10: Individual Well

Conceptual Layout

If conditions are suitable, an individual well could be drilled at each outlying residence. An on-site geotechnical evaluation should be completed for each home to see if an individual well is feasible. If conditions are suitable, an exploratory well program will drill test wells at suitable locations to see if water of good quality and sufficient quantity is available. If the test well is successful, the well can be screened and developed as a water source. Additional treatment of the water might be necessary based on water quality data collected during the evaluation.

Cost Estimates

It will be assumed that 10 homes will be served by this alternative. The final number of services will be determined after a geotechnical investigation has been done.

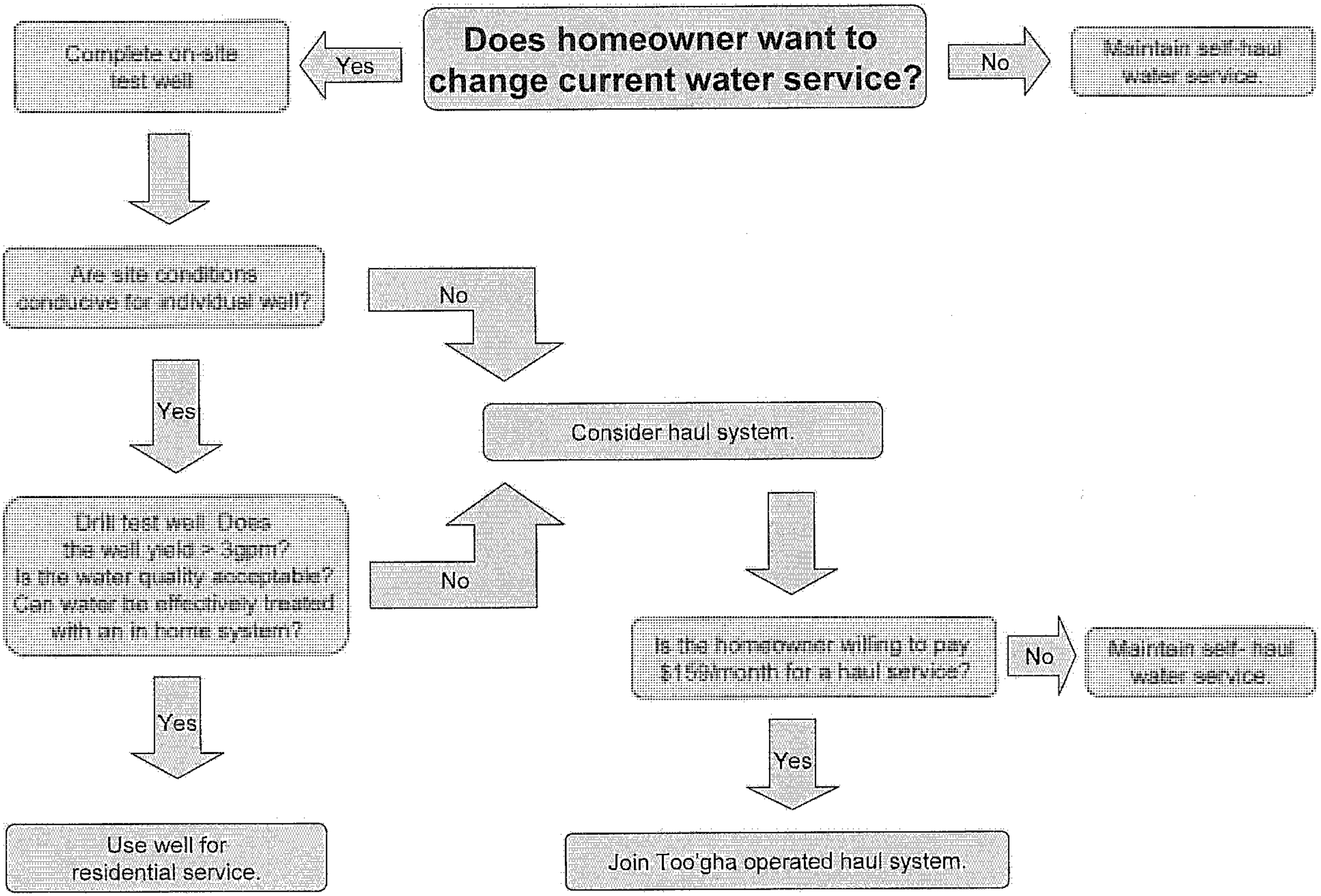


Figure 10.10 – Water Service Decision Tree

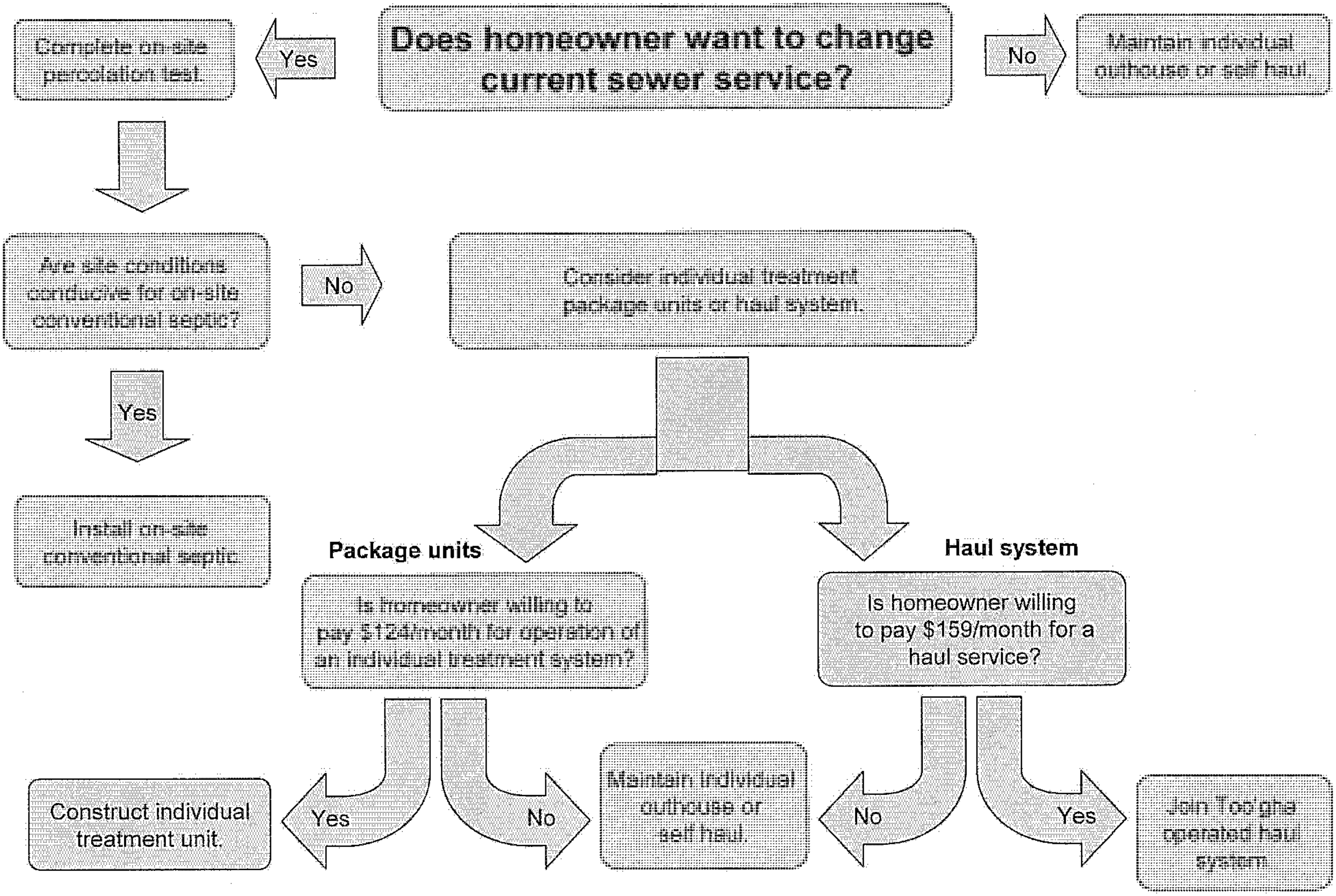


Figure 10.11 – Sewer Service Decision Tree

Table 10-38: Construction Cost Estimate for Individual Well Alternative

Item	Quantity	Unit	Unit Price	Total
On-site test drilling program	18	LS	$20,000	$360,000
Develop new water source[1]	10	LS	$5,000	$50,000
Buried service lines[1]	500	LF	$175	$87,500
Household water plumbing[1]	10	EA	$15,000	$150,000
Pressure tank (30 gallons)[1]	10	EA	$250	$2,500
Subtotal				**$650,000**

[1] Based on 10 wells developed

Table 10-39: Capital Cost Estimate for Individual Well Alternative

Total Water Capital Costs		
Individual Water Well		$650,000
Total Construction Costs		**$650,000**
Design Costs (12%)	0.12	$78,000
Construction Management (10%)	0.1	$65,000
Administration and Clerical (3%)	0.03	$19,500
Contingency (25%)	0.25	$162,500
Total Project Costs:		**$975,000**

Table 10-40: Annual O&M Cost Estimate for Individual Well Alternative for Homeowner

Item	Quantity	Unit	Unit Price	Total
Well Pump Power (Annual)	22	kWh	$0.39	$8
Chemical Costs, Miscellaneous Items[1]	1	LS	$1,200	$1,200
Subtotal				**$1,208**

[1] Miscellaneous costs include tap filters for taste improvement.

[1] Local costs may be higher depending on power required to prevent freezing.

Advantages and Disadvantages

Individual wells would offer a high level of service to homes in the outlying areas and have low operation and maintenance costs.

However, this alternative depends on the findings of a geotechnical investigation. To be viable, water must be available and of good quality, and each well must be capable of yielding at least 3 gpm. The water may need treatment to improve its taste and aesthetic qualities. Treatment needs can be determined after water quality tests have been conducted.

10.3.3 Alternative 11: Outlying Areas Scheduled Water Haul System

This alternative is a haul system, providing scheduled deliveries of water to the outlying areas. Water for the haul system will come from the existing Too'gha WTP. Under this alternative, Too'gha will be responsible for the operation and maintenance of the haul equipment. A schematic of a water haul system is shown on Figure 10.4.

Conceptual Layout

As in Alternative 4 (water haul to the Circle Subdivision), the major components of a truck haul system include a truck garage, truck fill station, water delivery vehicle, individual storage tank, and plumbing at each home. Because the roads are constructed and well maintained, a large scale, 2,000-gallon haul system is possible. The delivery vehicle will contain a 2,000-gallon tank, and will be filled at Too'gha's WTP.

Water will be distributed to individual storage tanks on a scheduled basis. Individual (500-gallon) water storage tanks will be installed at each home. The tanks will have exterior fill ports, so that Too'gha's haul operators can deliver water without having to go into the house. Each house will also receive a water pump, pressure tank, and plumbing.

Cost Estimates

It will be assumed that 10 homes will be served under this alternative.

Table 10-41: Construction Cost Estimates for a Scheduled Water Haul System for Homes in the Outlying Areas

Item	Quantity	Unit	Unit Price	Total
Residential Water Storage Tank (500-gallon)	10	EA	$6,550	$65,500
In-Home Plumbing Improvements	10	EA	$15,000	$150,000
Water Haul Truck	1	EA	$125,000	$125,000
25' x 30' Haul Truck Garage	750	S.F.	$500	$375,000
Subtotal				**$715,500**

Table 10-42: Total Capital Costs Estimate for a Scheduled Haul System for the Outlying Areas

Total Alternative Capital Costs		
Outlying Area Water Haul		$715,500
Total Construction Costs		**$715,500**
Design Costs (12%)	0.12	$85,860
Construction Management (10%)	0.1	$71,550
Administration and clerical (3%)	0.03	$21,465
Contingency (25%)	0.25	$178,875
Total Project Costs:		**$1,073,250**

Table 10-43: Estimated Annual O&M Costs for a Scheduled Water Haul System for Homes in the Outlying Areas

Item	Quantity	Unit	Unit Price	Total
Labor - Haul + 22% Burden	365	Hour	$18	$8,015
Fuel	91	Gallons	$2.10	$192
Haul Vehicle Service	12	Month	$100	$1,200
Haul Equipment Repairs	1	Year	$5,000	$5,000
Water Haul Truck Depreciation	1	Year	$8,333	$8,333
Garage lighting and electricity	5,702	kWh	$0.39	$2,224
Garage Heating (25' x 30' x 15')	11,250	C.F.	$0.182	$2,044
Subtotal				**$27,008**

Advantages and Disadvantages

A haul system is advantageous because it will provide outlying residents with a higher level of service than the current self-haul. A scheduled haul system also allows the operator to manage his hours throughout the day, dividing his time between hauling, and operating and maintaining the WTP and piped systems. Because water for the haul system is supplied from Too'gha's WTP, the source water will be of good quality and not be affected by local soil conditions, unlike wells, whose success depends on local soil conditions. A haul truck can also provide limited fire control capability because it can be used as a pumper truck.

A disadvantage is that compared to on-site wells, the level of service may not be as high as residents desire. Under a scheduled haul service, homeowners' water tanks may be filled before needed, or run out of water before the scheduled delivery. The haul system is also labor intensive, with high annual operation and maintenance costs, especially given the long distances required to serve homes in the outlying areas. To reduce maintenance costs, the water haul truck should be stored in a heated facility. Too'gha will need to acquire property and construct a building. Roads and access will have to be maintained to ensure reliable service.

10.3.4 Alternative 12: Outlying Areas On-Call Water Haul System

An on-call haul system will require the same equipment described under Alternative 11. Alternative 12 differs from the previous alternative in the frequency of haul trips to the houses. In this alternative, residents will call to request water fill for their tanks.

The advantage of an on-call haul system is that it provides more flexibility than regularly scheduled service, and allows residents to decide when it is time to receive water. However, because use varies from house to house, this system may require a trip to an outlying area to serve only one house, which is inefficient. With regularly scheduled trips, the operator may be able to better manage his time.

Cost Estimates

The estimated cost for an on-call haul system will be approximately the same as for a periodic haul system (Alternative 11). However, cost will vary depending on water use and the number of trips required. Costs for this alternative can be found in Section 10.3.3.

Advantages and Disadvantages

As in a scheduled haul service, an on-call haul system will provide outlying residents with a higher level of service than the current self-haul. However, unlike the scheduled haul service, an on-call system is advantageous because it guarantees that homeowners will not run out of water. When the tank gets low, homeowners can call for service, thus ensuring water will always be available.

A disadvantage to the on-call system is that it will be more difficult for Too'gha to manage. Because homeowners will presumably use water at different rates, it will be difficult for Too'gha to coordinate fills and ensure efficient operation of the haul equipment. Most likely additional haul trips will be required, making the system more expensive to operate.

10.3.5 Alternative 13: Outlying Areas Water Self-Haul

Under this alternative, residents would continue to haul their own water. The Too'gha WTP sells treated water for $0.25/5 gallons.

One advantage of this alternative is that there will be no additional installation or operating costs. However, the self-haul alternative offers the lowest level of service to residents, and may not ensure that they have adequate quantities of water to maintain good sanitation. Hauling water may be difficult for elders.

Cost Estimates

Construction Cost Estimates

This alternative does not require the installation or construction of any additional equipment so there will be no costs associated with the self-haul alternative.

Annual Operation and Maintenance Costs

This alternative does not require on-going maintenance so there will be no costs associated with the self-haul alternative.

Advantages and Disadvantages

An advantage of this alternative is that there will be no construction or operation costs associated with it. However, this alternative offers the lowest level of service to homeowners. Self-hauling water does not ensure adequate quantities of water to meet sanitary needs.

10.3.6 Alternative 14: Conventional Septic System

Conventional septic systems can provide sewer service to the outlying homes if proper soil conditions exist. Conventional septic systems offer a low cost method of wastewater treatment and are commonly used in locations that do not offer alternate disposal methods.

Conceptual Layout

A conventional septic system consists of two treatment elements: pretreatment (septic tank) and soil absorption system (drainfield). Sewage flows from a residence, via gravity piping, into a septic tank. Heavier materials settle out, and solids are separated from the liquid portion of the wastewater. The clarified effluent then passes out of the two-compartment septic tank into a soil absorption area for final treatment and disposal. The soil absorption area usually consists of specially graded, clean, sewer rock, placed around pipes that distribute the primary treated effluent both laterally and vertically, throughout the soil absorption area. This secondary treatment reduces total suspended solids (TSS), BOD, and bacteria prior to final discharge. The liquid percolates through the soil absorption area and into the surrounding native soil for final disposal.

A septic system requires sufficient land to install a septic tank and a properly sized drainfield. The size of the drainfield depends on site characteristics such as loading factors and soil percolation rates. ADEC requires that a septic system be an adequate distance, both vertically and horizontally, from groundwater, surface water, steep slopes, and fuel storage tanks. The requirements for drainfield sizing and separation distances are listed in the tables in the design criteria section (10.3.1).

Septic systems have to be pumped regularly to remove settled solids from the septic tank. ADEC recommends pumping residential septic tanks once every two years. The area where the tank and drainfield are located should be kept clear of trees, and large rocks should be removed, to allow drainage to take place and give access to the system, both in summer and winter. This type of system does not treat solvents, petroleum products, pesticides, and other chemicals. If these items are introduced into a septic system, they can potentially contaminate surrounding soil and groundwater systems. Homeowners will need to be aware of these treatment limitations and not introduce these items into their septic systems. A schematic of a typical residential septic system is shown in Figure 10.12.

Cost Estimates

It will be assumed that 10 homes will be served by this alternative. The final number of services will be determined after a geotechnical investigation has been done.

Table 10-44: Total Estimated Construction Costs for a Conventional Septic System

Item	Quantity	Unit	Unit Price	Total
Geotechnical Investigation	18	EA	5,000	90,000
Installation of Septic System[1]	10	EA	$25,000	$250,000
Misc. Pipe Appurtenances[1]	10	LS	$5,000	$50,000
Subtotal				**$390,000**

[1] Based on 10 septic systems installed

Table 10-45: Total Estimated Capital Costs for a Conventional Septic System

Total Capital Costs		
Conventional Septic System		$390,000
Total Construction Costs		**$390,000**
Design Costs (12%)	0.12	$46,800
Construction Management (10%)	0.1	$39,000
Administration and Clerical (3%)	0.03	$11,700
Contingency (25%)	0.25	$97,500
Total Project Costs:		**$585,000**

Table 10-46: Total Annual O&M Costs for a Conventional Septic System

Item	Unit	Unit Price	Quantity	Total
Full Time Operator + 22% Burden[1]	Hour	$18	10	$220
Miscellaneous Costs[2]	LS	$500	1	$500
Subtotal				**$720**

[1] Assumes pumping septic tank every two years will take two hours of operator's time. Assume 5 systems will be pumped per year.

[2] Miscellaneous costs include vehicle costs, fuel, tools, safety equipment, etc.

Advantages and Disadvantages

A conventional septic system has low annual operation and maintenance costs. These systems are ideal for homes that are too far away to be considered for piped service.

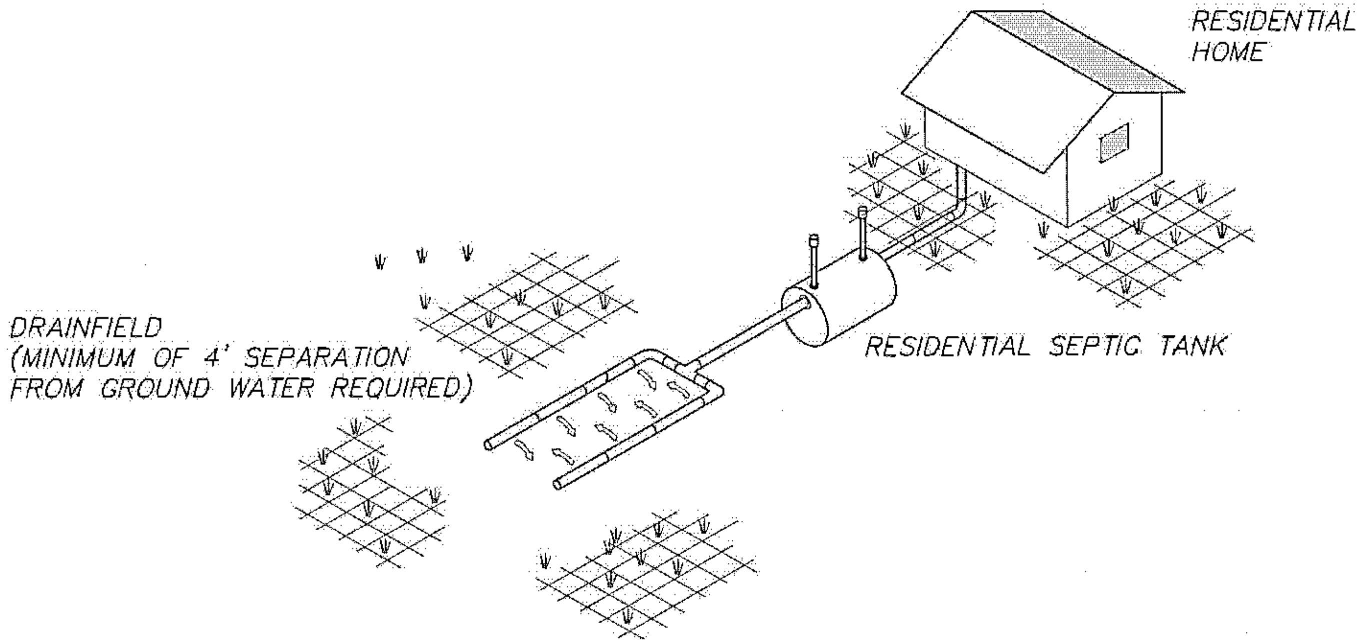
However, this alternative requires adequate soil conditions, and will require an extensive on-site study at each property to determine if a conventional system can be installed. Homeowners will be responsible for periodically pumping solids out of the septic tanks.

10.3.7 Alternative 15: Advanced Septic System

Installation of conventional septic systems is not always possible. If the native soils have insufficient percolation rates, high groundwater levels, steep slopes, or permafrost, conventional septic systems won't work. In these situations, ADEC has approved use of individual package treatment plants, and historically waived separation distance requirements, and sometimes the requirement to discharge to a drainfield. A schematic of these systems is shown on Figure 10.13.

Conceptual Layout

If meeting vertical or horizontal separation distances is difficult at the site, one option may be to install an additional treatment unit prior to the drainfield or to do away with the drainfield altogether. A typical small sewage treatment unit consists of an air blower and optional UV disinfection, and is a self-contained, insulated, and multi-compartment device, able to operate in winter and summer. It can be installed above, partially below, or completely below ground.



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Tanana
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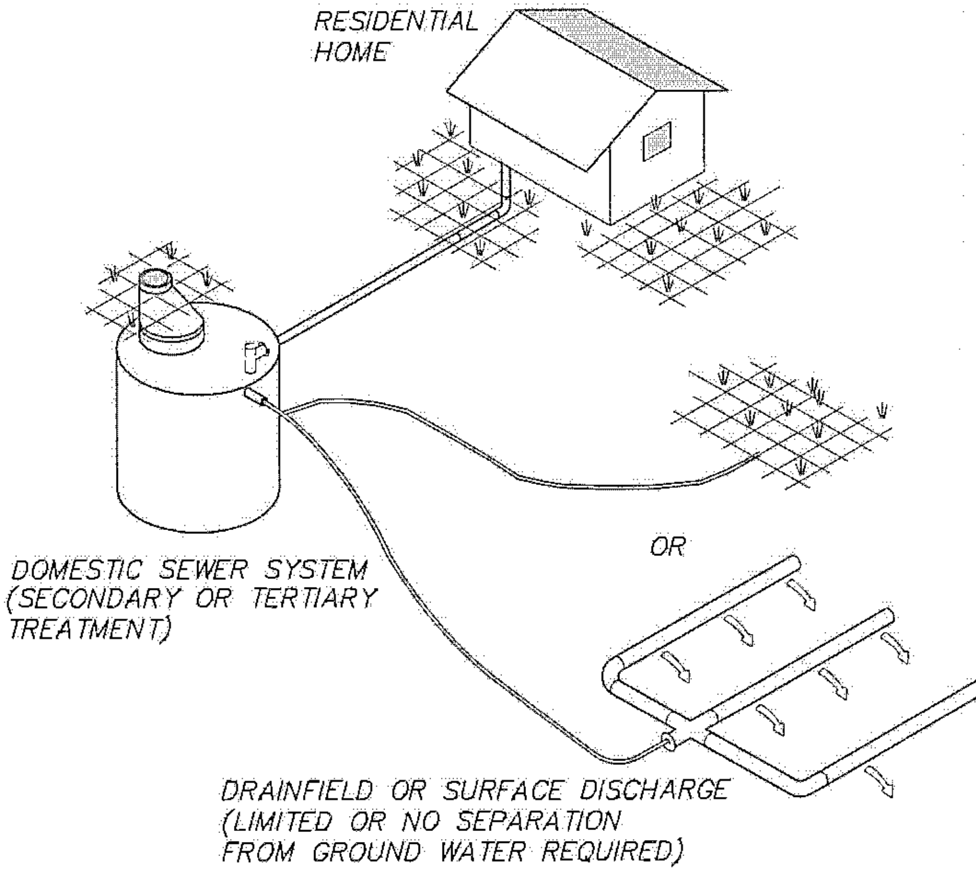
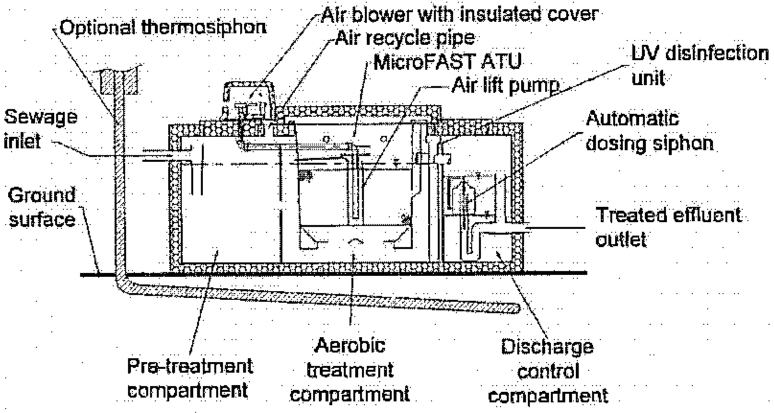
ALTERNATIVE 14
CONVENTIONAL SEPTIC SYSTEM

Date
Aug. 2004

Figure
10.12





CROSS SECTION OF TYPICAL ADVANCE SEPTIC UNIT

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ALTERNATIVE 15
ADVANCED SEPTIC SYSTEM

Date
Aug. 2004

Figure
10.13

Each unit contains an aerobic treatment unit, where bacteria become attached, or fixed, to a growth medium; an ultraviolet disinfection unit; and an automatic dosing siphon, which eliminates the possibility of freeze up at the discharge location. Each unit has the ability to treat all residential wastewater, including raw sewage and gray water. Because of the additional treatment if a UV unit is installed, ADEC has historically granted waivers for separation distances for these units, and allowed them to discharge onto land or into streams, without the use of a drainfield.

The system depends on biological activity to break down the waste stream. One disadvantage of using a biological system is the risk of killing off the population of bacteria. Care is needed to avoid destroying the bacteria in the system with caustic acids, chemicals, and non-biodegradable detergents. Homeowners will need to be told not to dump these items into their sewer systems. The system's air blower and UV disinfection unit also need power. The UV bulb will need to be cleaned every 3 to 6 months, and replaced every 1 to 2 years, and sludge will need to be pumped from the tank every 1 to 2 years.

Cost Estimates

It will be assumed that 10 homes will be served by this alternative. The final number of services will be determined after a geotechnical investigation has been done.

Table 10-47: Total Construction Costs for an Advanced Septic System

Item	Quantity	Unit	Unit Price	Total
Individual package treatment unit (Furnish and install with thermosyphon)	10	EA	$25,000	$250,000
Installation of treatment unit	10	LS	$15,000	$150,000
Misc. pipe appurtenances	10	LS	$5,000	$50,000
Subtotal				**$450,000**

Table 10-48: Total Capital Costs for an Advanced Septic System

Total Alternative Capital Costs		
Advanced Septic System		$450,000
Total Construction Costs		**$450,000**
Design Costs (12%)	0.12	$54,000
Construction Management (10%)	0.1	$45,000
Administration and Clerical (3%)	0.03	$13,500
Contingency (25%)	0.25	$112,500
Total Project Costs:		**$675,000**

Table 10-49: Total Annual O&M Costs for an Advanced Septic System

Item	Unit	Unit Price	Quantity	Total
Full time operator + 22% burden[1]	Hour	$18	70	$1,537
UV bulb replacement[2]	EA	$75	10	$750
Electricity to operate blower and UV	kWh	$0.39	29,760	$11,606
Miscellaneous costs[3]	LS	$1,000	1	$1,000
Subtotal				**$14,894**

[1] Assumes monthly cleaning for UV bulb @ 0.5 hrs per system. Assumes pumping septic tank every two years will take two hours of operator time. Assumes 5 systems will be pumped per year.

[2] Assumes UV bulb replacement $150 per two years ($75 per year)

[3] Miscellaneous costs include vehicle costs, fuel, tools, cleaning solution, filters ($10 each for each month) safety equipment, etc.

Advantages and Disadvantages

This alternative offers on-site treatment to homes where a conventional septic system will not work. Because a package plant offers additional treatment, ADEC has historically granted waivers for separation distances and allowed direct discharge onto the surface.

This alternative will be more expensive to operate and maintain than a conventional septic system. The unit will require periodic pumping to remove solids, and monthly cleaning of the UV bulb. The UV bulb will also need to be replaced approximately once every two years. If several units are installed it may be beneficial for Too'gha to conduct the periodic maintenance activities on these systems.

10.3.8 Alternative 16: Outlying Areas Scheduled Sewage Haul System

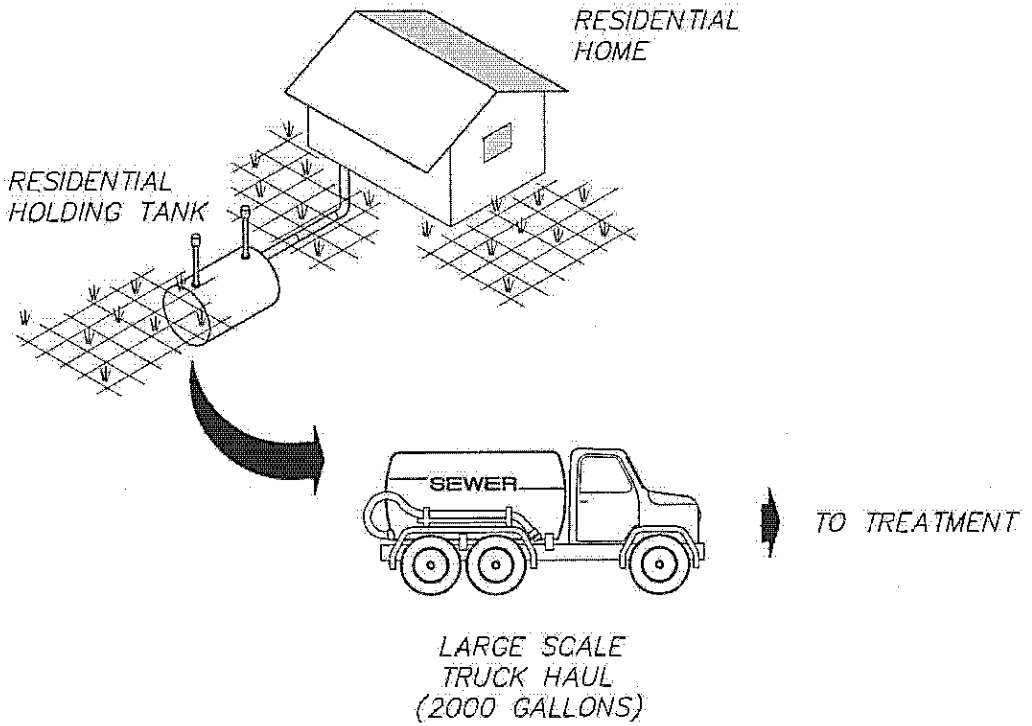
This alternative is to install and operate a wastewater haul system serving the outlying areas. Sewage from each house will flow into an individual holding tank at the home. At scheduled intervals, a Too'gha-operated haul truck will pump out each holding tank and discharge the sewage to the community's sewage lagoon. Under this alternative, Too'gha will be responsible for the operation and maintenance of the haul equipment. A schematic of a haul system is shown in Figure 10.14.

Cost Estimates

It will be assumed that 10 homes will be served by this alternative.

Table 10-50: Total Construction Costs for Outlying Areas Periodic Sewage Haul System

Item	Quantity	Unit	Unit Price	Total
Residential Storage Tank (1,000 gallons)	10	EA	$6,550	$65,500
In-Home Plumbing Improvements	10	EA	$15,000	$150,000
Sewer Haul Truck	1	EA	$125,000	$125,000
25' x 30' Haul Truck Garage	750	S.F.	$500	$375,000
Subtotal				**$715,500**



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Tanana
WATER AND SEWER FEASIBILITY STUDY

ALTERNATIVES 16, 17
SEWER HAUL SYSTEM

Date
Aug. 2004

Figure
10.14

Table 10-51: Total Capital Costs for Outlying Areas Periodic Sewage Haul System

Total Alternative Capital Costs		
Outlying Area Sewer Haul		$715,500
Total Construction Costs		**$715,500**
Design Costs (12%)	0.12	$85,860
Construction Management (10%)	0.1	$71,550
Administration and clerical (3%)	0.03	$21,465
Contingency (25%)	0.25	$178,875
Total Project Costs:		**$1,073,250**

Table 10-52: Annual O&M Costs for Outlying Areas Periodic Sewage Haul System

Item	Quantity	Unit	Unit Price	Total
Labor - Haul + 22% Burden	365	Hour	$18	$8,015
Fuel	91	Gallons	$2.10	$192
Haul Vehicle Service	12	Month	$100	$1,200
Haul Equipment Repairs	1	Year	$5,000	$5,000
Sewer Haul Truck Depreciation	1	Year	$8,333	$8,333
Garage lighting and electricity	5,702	kWh	$0.39	$2,224
Garage Heating (25' x 30' x 15')	11,250	C.F.	$0.182	$2,044
Subtotal				**$27,008**

Advantages and Disadvantages

A haul system is advantageous because it will provide outlying residents with a higher level of service than the current use of pit privies. A scheduled haul system also allows the operator to manage his hours throughout the day, dividing his time between hauling, and operating and maintaining the WTP and piped systems. This option allows the operator to efficiently plan haul trips to multiple homes, reducing the overall number of trips.

A disadvantage is that compared to piped sewer, the level of service may not be as high as residents desire. Under a scheduled haul service, a homeowner's sewage tanks may be pumped before needed or get full before the scheduled pumpout. To save money, homeowners may choose not to dispose of grey water in their sewage systems, but to collect it and dispose of it on the ground.

The haul system is also labor intensive, with high annual operation and maintenance costs, especially given the long distances required to serve homes in the outlying areas. To reduce maintenance costs, the sewage haul truck should be stored in a heated facility. Too'gha will need to acquire property and construct a building. Roads and access will have to be maintained to ensure reliable service.

10.3.9 Alternative 17: Outlying Areas On-Call Sewage Haul System

An on-call haul system will require the same equipment described in Alternative 16, but the frequency of haul trips may vary. Under this alternative, individual residents will call to request sewage pump outs when their tanks are full. To save money, homeowners may choose not to dispose of grey water in their sewage systems, but to collect it and dispose of it on the ground.

The advantage of an on-call haul system is that it provides more flexibility than regularly scheduled service, and allows residents to decide when it is time to pumpout their sewage tanks. Because use may vary among houses, this system may require a trip to an outlying area to serve only one house, which is inefficient. The cost will vary depending on the water use and number of trips required. By scheduling trips, the operator may be able to more efficiently manage his time.

Cost Estimates
The estimated cost for an on-call haul system will be approximately the same as for the periodic haul alternative (Alternative 16). Costs will vary depending on wastewater production and the number of haul trips. Costs for this alternative can be found in Section 10.3.8.

Advantages and Disadvantages
As in a scheduled haul service, an on-call haul system will provide outlying residents with a higher level of service than the use of pit privies. However, unlike scheduled haul service, an on-call system is advantageous because it allows homeowners to completely fill their storage tanks before calling for haul service.

A disadvantage to the on-call system is that it will be more difficult for Too'gha to manage. Because homeowners will presumably fill their tanks at different rates, it will be difficult for Too'gha to coordinate pumpouts and ensure efficient operation of the haul equipment. Most likely additional haul trips will be required, making the system more expensive to operate.

10.3.10 Alternative 18: Outlying Areas Pit Privies

Under this alternative, residents will continue to use, and be responsible for the installation and maintenance of, pit privies. This alternative offers the lowest level of service and offers no protection to surface water or groundwater sources if waste is released into the environment.

Cost Estimates
Construction Cost Estimates. This alternative does not require the installation or construction of any additional equipment so there will be no costs associated with continued use of pit privies.

Annual Operation and Maintenance Costs. This alternative does not require on-going maintenance so there will be no costs associated with continued use of pit privies.

Advantages and Disadvantages
An advantage of this alternative is that there will be no construction or operation costs associated with it. However, this alternative offers the lowest level of service to homeowners and does not address sanitary concerns associated with the pit privies, such as potential contamination of ground and surface water.

Table 10-53: Outlying Homes Advantages and Disadvantages

Alternative		Description	Number of houses served	Level of Service	Advantages	Disadvantages	Estimated Capital Cost	Estimated Annual O&M Cost	Estimated Life Cycle Cost
Area 3- Mission and Site Roads									
Alternative 10	Individual Well	Water service provided by individual on-site well, if site conditions allow	10*	High	• Homes can be fully plumbed • Low operation and maintenance costs for residents • Ideal for homes beyond piped service areas • Provides better sanitation than self-haul • No O&M costs for Too'gha	• Site may not have appropriate conditions for installing a well • Well pump will need to be replaced every 10-20 years • Water may need to be treated to improve taste and aesthetic qualities • Will require an extensive on-site study to determine the feasibility at each lot	$975,000	$1,208 (with treatment)	$999,160
Alternative 11	Scheduled Water Haul	Too'gha operated water haul system with scheduled filling of individual water storage tanks.	10*	Medium (-)	• Less expensive for Too'gha to operate because haul trips can be scheduled and coordinated • Not constricted by well limitations • Minimal construction disturbance	• Water storage tanks may not be empty when hauls are scheduled • Water may run out before a scheduled water haul • Lower level of service than on-call service • Requires access • On-going wear on road from haul equipment • Requires construction of a new storage garage	$1,073,250	$27,008	$1,613,410
Alternative 12	On-call Water Haul	Too'gha operated water haul system with on-call filling of individual water storage tanks.	10*	Medium (+)	• Owner will not run out of water • Higher level of service than scheduled haul • Not constricted by well limitations • Minimal construction disturbance	• Too'gha must have operators on-call • Cannot schedule or coordinate water haul trips • More expensive to operate than scheduled haul • Requires access • On-going wear on road from haul equipment • Requires construction of a new storage garage	$1,073,250	$27,008	$1,613,410
Alternative 13	Self-haul	Resident responsible for hauling water from either Too'gha's WTP watering point or from surface water sources.	10*	Low	• No O&M cost for Too'gha • No additional equipment required • No capital costs incurred	• Low level of service to the homeowner • Residents may not be hauling enough water to meet sanitary needs	$0	$0	$0
Alternative 14	Conventional Septic System	Sewer service provided by conventional septic tank and drainfield.	10*	High (-)	• Low O&M costs for resident • Ideal for homes that are too far away for piped service	• Requires adequate soil conditions for installation of the drainfield • Requires periodic pumping of the septic tanks • Will require an extensive on-site study to determine the feasibility at each lot	$585,000	$720	$599,400

Alternative		Description	Number of houses served	Level of Service	Advantages	Disadvantages	Estimated Capital Cost	Estimated Annual O&M Cost	Estimated Life Cycle Cost
Alternative 15	Advanced Septic System	Wastewater treatment provided by small residential-sized package treatment system with possible discharge to drainfield or to surface	10*	High (-)	• Homes can have fully plumbed system • Can be used in sites with unsuitable soils or violations of required separation distances • Ideal for homes that are too far away for piped service	• Requires maintenance of system, including monthly cleaning of UV bulb and UV bulb replacement every two years • Requires power for air blower and UV unit • Higher operation and maintenance costs compared to conventional systems • May require contract maintenance to inspect units yearly	$675,000	$14,894	$972,880
Alternative 16	Scheduled Haul	Too'gha operated sewage haul system with scheduled evacuation of individual sewage holding tanks.	10*	Medium (-)	• Less expensive for Too'gha to operate because haul trips can be scheduled and coordinated • Not restricted by soil conditions or topography • Minimal construction disturbance • Decreases contamination concerns	• Requires access for truck pump outs • May cause additional wear on road system • Haul truck requires maintenance and upkeep • Requires new building and a site for haul truck garage • Requires homeowner maintenance of sewage tanks • To reduce costs, homeowners may dispose of greywater on the ground and not in the sewage tanks	$1,073,250	$27,008	$1,613,410
Alternative 17	On-call Haul	Too'gha operated haul system with on-call evacuation of individual sewage holding tanks.	10*	Medium (+)	• Not restricted by soil conditions or topography • Minimal construction disturbance • Decreases contamination concerns • Tanks will not get too full before haul service requested	• Too'gha must have operators on-call • Cannot schedule or coordinate sewage haul trips • More expensive to operate than scheduled haul • Requires access for truck pump outs • May cause additional wear on road system • Haul truck requires maintenance and upkeep • Requires new building and a site for haul truck garage • To reduce costs, homeowners may dispose of greywater on the ground and not in the sewage tanks	$1,073,250	$27,008	$1,613,410
Alternative 18	Pit Privies	Resident responsible for wastewater disposal using outhouses or honey buckets.	10*	Low	• No Too'gha O&M costs • No additional equipment required • No capital costs incurred	• Low level of service for the homeowner • Decreased sanitary conditions	$0	$0	$0

* For a basis of comparison, between the alternatives, for the outlying areas it is assumed that 10 homes will be served by each alternative. The final number of services will be determined after a geotechnical investigation has been completed to determine the feasibility of on-site wells and conventional septic systems.

10.4 Unique Environmental Impacts

There should be minimal environmental impacts associated with installation of the piped alternatives. Water and sewer pipes will be installed in the existing road right-of-way.

There should not be any adverse environmental impacts for installation of the haul alternatives. Individual storage tanks will be located in, or beside, homes. Homeowners will need to maintain access routes so that the haul trucks can periodically fill or empty the tanks.

One of the on-site alternatives for the outlying areas is the installation and operation of small wastewater treatment package units. Depending on site conditions, these units may discharge to the surface, after treatment. The treated wastewater will be disinfected by UV, and BOD and suspended solids will be significantly reduced, allowing safe surface discharge. However, the discharge should be in a location with adequate drainage, away from areas commonly used by residents.

10.5 Land Requirements and Easements

The piped alternatives will be installed in the existing road ROW and should not require additional land or easement acquisitions.

To reduce maintenance costs, the haul trucks will require a heated storage building. If both water and sewage haul trucks are purchased, a building 50 x 30 x 15 feet is recommended. Too'gha may be able to place the storage building beside the WTP on land they already own. If not, they will need to acquire land for the building site.

For the haul alternatives, each homeowner will need to provide space for water and/or sewage storage tanks. The homeowner will also be responsible for providing adequate access so that Too'gha's operators can periodically visit the home. For the purposes of this report, the water tanks were sized to be placed in the home and the sewage tanks were sized to be buried outside.

If the alternatives that require building a new satellite water treatment plant or a package treatment plant at the Circle are selected, Too'gha will need to acquire land for these buildings, plus land for access.

10.6 Construction Constraints

The piped alternatives will be constructed in the same manner as the current water and sewer pipe installation. There are several conditions that may make construction of the piped alternatives slower and more expensive than in similar projects in other villages. First, to reduce the number of lift stations and maintain gravity sewer grades, some sewer trenches may be up to 14 feet deep. This will require the use of trench boxes for crew safety. Trench boxes significantly slow construction.

Second, in some areas, narrow streets may make excavating the deep trenches challenging. There is not enough space to store either equipment or dirt excavated from the trench. Excavated soil must be hauled to an alternate location and hauled back once the pipe has been installed, increasing construction time and cost. Some areas may also have low over head power lines, slowing excavation. Finally, as was discovered during the recent construction activity, there may be many other previously buried utilities, including fuel, power, and especially phone lines, in the streets, and they may not have been buried not in parallel lines. Excavation crews may have to dig slowly to keep from damaging other buried utilities, slowing construction and driving up costs.

Construction of on-site systems will be limited by the individual characteristics of each piece of property. Access and consent will be required for well drilling and septic system installation. Site conditions will dictate the feasibility and locations of both.

10.7 Impacts to Existing Infrastructure

10.7.1 Roads

Any additional water and sewer pipes will be installed underground, so there should be no impact to road infrastructure aside from initial road disturbance during construction.

If hauled systems are installed, the haul trucks may cause additional wear on the roads, increasing road maintenance costs. The roads will also have to be kept clear of snow. (However, the City of Tanana already provides this service to allow school bus access.) Driveways to private residences will need to be maintained and cleared to ensure that the haul trucks have access.

10.7.2 Electrical Power Generation

All piped water alternatives will require a circulating water system to prevent the pipes from freezing during winter. Installing additional pipes will require more electrical power than the water/sewer system currently uses. The additional power is not anticipated to be great and should not require any changes to the power grid.

If a haul system is installed or if a treatment plant is built at the Circle, additional power will be needed for heating and lighting the haul truck storage building or the treatment plant. The additional power requirement will be small and will have no effect on required power generation for the community.

If on-site systems are installed, the homeowners will be responsible for paying power costs associated with well pumps. If individual package sewage treatment plants are used, their air blowers will require about as much power as a household refrigerator. The installation of these systems should not change the power generation required for the community.

10.7.3 Bulk Fuel

The piped alternatives will slightly increase the amount of fuel needed because an increase in pump output will require more output from the generators, which supply electricity to Tanana. In addition, the boilers at the WTP will have to run longer to provide heat to the longer length of pipe. However, changes to the community's bulk fuel storage capacity should be unnecessary.

Haul trucks will use fuel; however; it is unlikely that this additional fuel use will require any modifications to the fuel supplies or storage facilities in the community.

On-site alternatives should have no impact on bulk fuel storage.

10.8 Operational Costs for Similar Systems within the Region

Table 10-54: Review of Operational Costs for Similar Systems within the Region

Community	Type of System	Water/Sewer Revenue	Water/Sewer Expenses	Washeteria Revenues	Washeteria Expenses
Nulato	Piped*	$127,050	$116,428	$17,922	N/A
Galena	Haul**	$258,857	$248,432	N/A	N/A
Ruby	Haul***	N/A	N/A	$16,016	$42,573
Fort Yukon	Piped/Haul†	$128,805	$163,923	$10,419	$4,995

Source: Alaska Department of Community and Economic Development Online Community Database

*53 households piped, 34 households haul

**110 households haul, 28 households piped

***70 households

†Approximately half residents on piped, half on haul/septic/honeybuckets

11.0 PUBLIC PARTICIPATION IN THE PLANNING PROCESS

This section describes the program undertaken to involve the residents of Tanana in planning for future sanitation facilities for their community. It also describes communication with the Too'gha board and VSW.

11.1 Methods Used to Gain Community Input and Direction

A kickoff meeting was conducted on May 20, 2004 to:

- identify the goals of the project
- obtain initial community input
- clarify the project scope and activities
- initiate the existing facilities analysis
- make community contacts

Information gathered from the kickoff meeting was compiled into the 35% document, which discussed existing conditions and included background information. The 35% document was submitted to the Too'gha board and VSW for review, and their review comments were incorporated into the document.

The next step was to develop alternatives for improvements extending water and sewer service to currently unserved areas. Associated capital, and operation and maintenance, cost estimates were included in the 65% document. The 65% document was submitted to the Too'gha board and VSW for review. The alternatives were also presented to the Too'gha board at a meeting on August 26, 2004. At this meeting, the board selected preferred alternatives, and provided comments and desired modifications to the alternatives.

Too'gha's comments about their preferred alternatives were incorporated and further developed for the 95% document, and placed in a phased improvement plan. The final preferred alternatives were presented to the Too'gha board at a meeting in January, 2005.

Obtaining the community's input and ideas has been an important component in creating the master plan update. Too'gha board members were integral to the process. They identified the community's desires at the two on-site meetings and provided review comments.

In addition, to foster community involvement and input, a house-to-house survey was sent to homeowners outside the area currently receiving piped water and sewer. This survey inquired about current water and sewer conditions and desired upgrades.

11.2 Survey Results

The survey asked questions about residents' current and desired water and sewer service. The complete results of the survey are provided in Appendix C, and the results are summarized below; 32 out of 36 households answered the survey.

Water

As shown in Figure 11.1, the majority of Tanana residents, who responded to the survey, obtain their water by hauling it from the Too'gha water treatment plant. Additional sources of water include spring water, water from the Yukon River and small creeks running through the area, and rainwater. Regardless of where water is obtained, over half of the residents who responded are satisfied with the quality of their water.

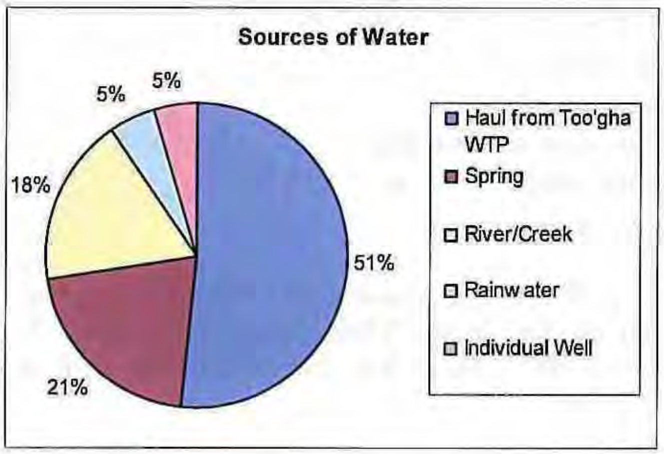


Figure 11.1: Summary of Water Sources

If a piped water system cannot be constructed, nearly three-quarters of the residents would accept a hauled water system. More than twice as many residents favored an on-call service over regularly scheduled service (see Figures 11.2 and 11.3). Also, two-thirds of those residents in favor of a haul system are willing to pay between $35 and $55 for the service, while one resident was willing to pay whatever is necessary.

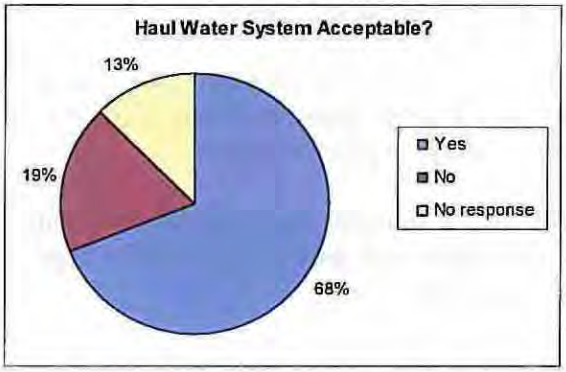


Figure 11.2: Haul Water Survey Results

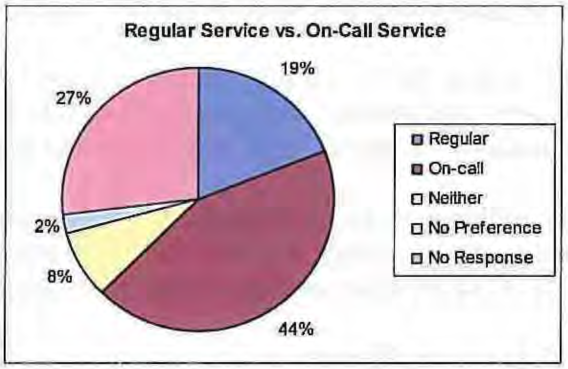


Figure 11.3: Regular vs. On-Call Service Results

Sewer

All residents who responded to the sewage disposal question use on-site septic system, honey buckets, or an outhouse, (see Figure 11.4). Just over half are willing to pay to operate an individual package treatment unit and nearly two-thirds would be in favor of a sewage haul system if a piped system is not constructed. For those in favor of haul service, 50% more residents would prefer service at regular intervals over on-call service. Among those who responded, the majority would be willing to pay between $35 and $55 for haul service.

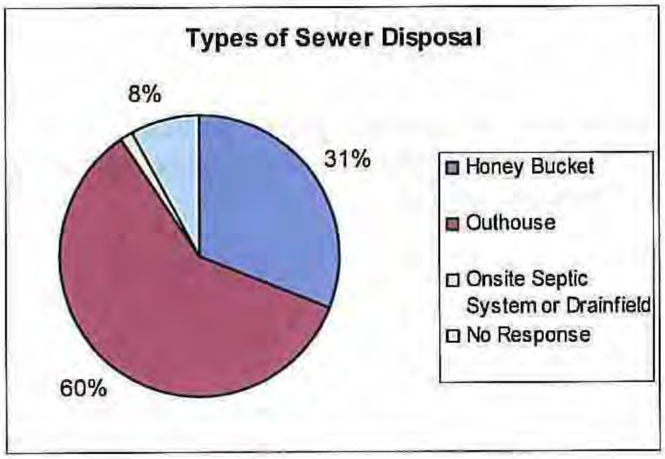


Figure 11.4: Types of Sewer Disposal

With regard to the relocation of the community wastewater lagoon, a significant number of Tanana residents are bothered by the discharge of lagoon effluent into the Yukon River, and the unpleasant odor within the downtown area (see Figures 11.5 and 11.6). The majority of residents, who had suggestions about where to relocate the lagoon, think it should be moved further from town, either north and/or west of the airport and Airport Road, north of the water treatment plant and Laundromat, or near Circle Subdivision.

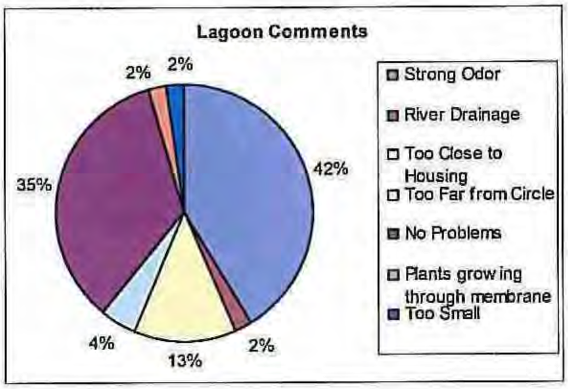


Figure 11.5: Lagoon Comments

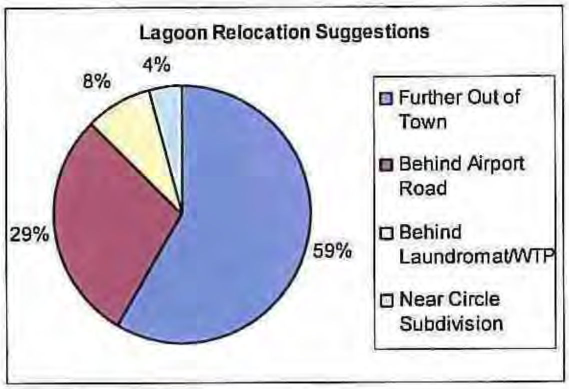


Figure 11.6: Lagoon Relocation Suggestions

11.3 Identification of Community Goals and Objectives

Based on discussions with the Too'gha board members and VSW, and the results of the house-to-house survey, the community wishes to pursue:

- Extending the piped water and sewer system east to the Circle Subdivision.
- Relocating the community sewage lagoon north of its present location, and draining the effluent onto wetlands on airport property.
- Drilling wells and carrying out geotechnical tests on individual lots to explore conditions for groundwater wells and conventional septic systems.

These selections are consistent with the individual responses from the house-to-house survey. Many of the individuals surveyed were concerned with existing water and sewer service and were willing to explore community options.

12.0 COMMUNITY BUISNESS PLAN FOR SELECTED ALTERNATIVES

The City of Tanana has been incorporated since 1961 and became a first class city in 1982. However, the Tanana Tribal Council, under joint agreement with the City, is responsible for administration of the water and sewer utilities. The City of Tanana and the Tanana Tribal Council have determined that the most effective mechanism to improve health and sanitation for the residents of Tanana was to establish a separate water and sewer utility board to provide water and sewer services. On January 10, 1996, the Tanana City Council and the Tanana Tribal Council voted to form a non-profit corporation to run the water and sewer utility. This corporation was named Too'gha, Inc. and was organized to engage in design, construction, ownership, and management of sanitation facilities for Tanana. Too'gha means "place of good water" in Athabascan.

Currently, the Tanana Tribal Council and City of Tanana, in conjunction with the State of Alaska, Village Safe Water, are updating Tanana's existing water and sewer feasibility study as a result of a grant funded by the State of Alaska, Village Safe Water program. The previous water and sewer feasibility study was completed by CH2M Hill in 1997. Too'gha, Inc., Tanana's water and sewer utility, contracted with HDR Alaska, Inc. (HDR) to update the study. The goal of the feasibility study update is to provide Too'gha with information to plan for future water and sewer service for unserved areas of the community considering on-going construction of a new piped water and sewer system in the town area.

A more extensive piped water and sewer system is currently under construction in the downtown area of the community. Installation started in 1998 with the design and construction of a new water treatment plant and laundry facility. The building opened in 2002. Installation of a piped water and sewer system, which will ultimately serve approximately three fourths of the houses in the downtown area, is ongoing and is scheduled to be completed in the 2005 season. Construction of this system, and other systems to serve the remainder of the community, were recommended in the 1997 feasibility study.

This Business Plan is needed to ensure continued fiscal management of the water and sewer utility by Too'gha, Inc. and is part of the overall update to the water and sewer feasibility study. The business plan will address the financial implications of adding the preferred alternatives selected by the community to bring service to the currently un-serviced areas.

12.1 Community Overview

12.1.1 Location

Tanana is located in Interior Alaska about 2 miles west of the confluence of the Tanana and Yukon Rivers, 130 air miles west of Fairbanks. Tanana is located in the Ft. Gibbon Recording District.

12.1.2 Population Served

Due to its location at the confluence of the Tanana and Yukon Rivers, Tanana was a traditional trading settlement for Koyukon and Tanana Athabascans long before European contact. The community continues to be primarily native and traditional Athabascan ways of life persist. Cultural activities include: subsistence, potlatches, dances and foot races. The local economy is based primarily upon commercial fishing and subsistence activities, supplemented by seasonal employment, such as firefighting and project work. Other sources of employment include the school, government services, an elder's residence as well as private enterprises including traditional arts and crafts.

Tanana is located in the Yukon-Koyukuk Census Area. Selected demographic and historical data taken from the 2000 U.S. Census for the community is provided below:

Table 12-1: Demographic and Historical Data for Tanana, Alaska

Population	
2000	308
1990	345
1980	388
1970	120
1960	349
1950	228
Housing (2003) Data	
Occupied Housing	121
Vacant Housing From Seasonal Use	42
Other Vacant Housing	3
Average Household Size	2.55
Economic Data (2000 Data)	
Unemployment Rate	23.70%
Median Household Income	$ 29,750

12.1.3 Transportation Available

Tanana is accessible by air and river transportation. The City operates a dock on the Yukon River where barged goods can be offloaded and stored. The State owns and operates the Ralph M. Calhoun Memorial Airport with a 4,400-foot long gravel, lighted runway. Several safety improvements and upgrades are planned for the airport. This project is in the preliminary project stage and has been funded by the Federal Aviation Administration (FAA). Construction is scheduled to begin in the 2005 construction season. Float planes can also land on the Yukon River. The community has approximately 32 miles of local roads. Cars, trucks, bicycles, snow machines, ATVs, and riverboats provide local transportation.

12.1.4 Current Infrastructure

Water and sewer utilities are operated by Too'gha, Inc., a non-profit utility board. Water is derived from three wells near the Yukon River. In 1976, a piped water and sewer system was constructed to serve the Tanana Hospital, Tanana Health Center, Regional Elder's Residence, and now serves the Tribal council building. A more extensive piped water and sewer system is currently under construction in the downtown area of the community. Installation started in 1998 with the design and construction of a new water treatment plant and laundry facility. The building opened in 2002. The new piped water and sewer system, which will ultimately serve approximately three fourths of the houses in the downtown area, is ongoing and is scheduled to be completed in the 2005 season. The remaining residents haul their own water from a watering point at the new water treatment plant and laundry facility and use outhouse and honey buckets.

Currently, residents and public facilities pay for provided services on the following:

Table 12-2: Current Rates for Water and Sewer Service and Facilities

	Rate Charged Water	Rate Charged Sewer
Customer		
Commercial	$100/month	$100/month
School	$2800/month	$2400/month
Tanana Health Center	-	$410/month
Regional Elder's Residence	-	$550/month
Residential	$50/month	$50/month
Facility Services		
Individual Haul	$0.25/5 gallons	
Washer	$7/load in large machine $5/load in medium machine $3/load in small machine	
Dryer	$0.25/4 minutes	
Shower	$2/15 minutes	

12.1.5 Key Assumptions

Community related assumptions are:

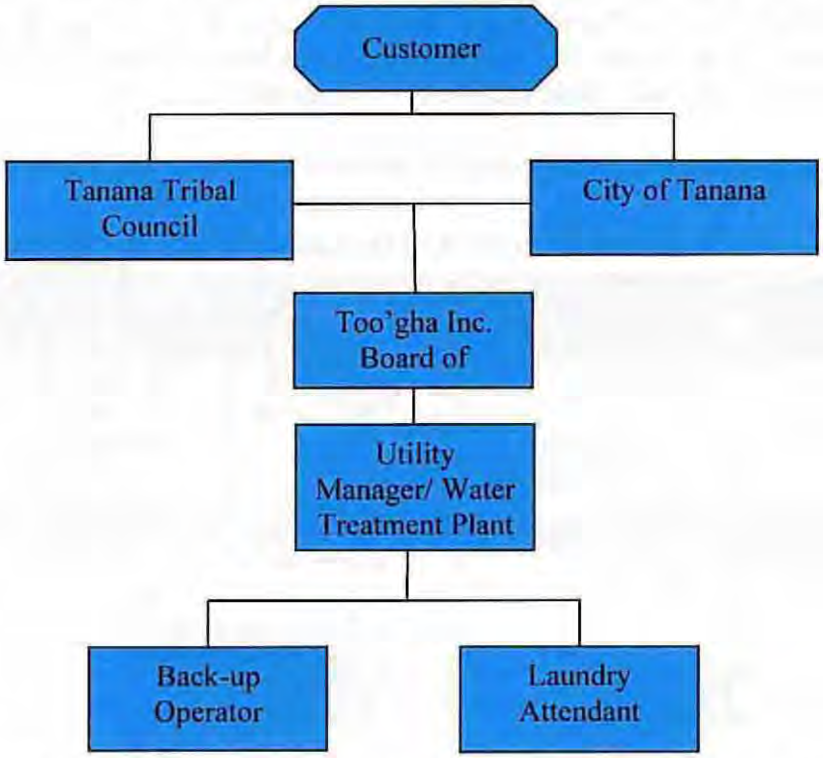
- Demographic information obtained from the state is reliable
- Current population, number of households, commercial establishments are used to generalize the estimated number of users

12.2 Management Structure

12.2.1 Organizational Chart

Recently Too'gha has made changes to the management board. In the past the board was composed of five members, two from the City of Tanana, two from the Tanana Tribal Council, and one elected from the community at large. The board now has three members elected from the community at large, bringing the total number of board members to seven.

The following organizational chart illustrates the staff relationships of the water and sewer utility:



The Tanana City Council and the Tanana Tribal Council voted, in 1996, to form a non-profit corporation to run the water and sewer utility. This corporation was named Too'gha, Inc. and is organized to engage in design, construction, ownership, and management of sanitation facilities for Tanana. The organization structure for Too'gha Inc. is summarized in the organizational chart above, a brief description of the roles and duties relating Water and Sewer Utilities are as follows:

- Too'gha Inc. Board of Directors – Responsible for oversight for engaging in design, construction, future planning, and management of the sanitation facilities
- Utility Manager –Responsible for the oversight and management of physical water and sewer facilities. Responsible for operating the physical plant and piped water and sewer system, minor maintenance and repairs, and coordinating major maintenance and repairs. Responsible for directing financial planning and accounting practices relating to water and sewer operations. Responsible for the budgeting, audit, tax accounting, and proper maintenance of the accounts receivable and receipt of cash and accounts payable and cash disbursements.
- Back-up Operator – Duties include operating the physical plant and piped water and sewer system, and minor maintenance and repairs in the absence of the Utility Manager / Operator.
- Laundry Attendant – Duties include cleaning the laundry facility and water treatment plant daily.

12.2.2 Staffing and Training

Too'gha, Inc., in order to better provide for the health and welfare of the residents of Tanana and to more effectively provide for water and sewer services, has assigned the Board of Directors to operate, maintain, construct, and replace the Tanana water and sewer systems. The powers and duties of the Too'gha, Inc. Board of Directors shall include (but not be limited to):

Too'gha Inc. Board of Directors duties

- Appoint, train, hire, promote, layoff, suspend, demote, or remove all employees for the water and sewer system.
- Administer the water and sewer system budgets and capital improvement programs.
- Prepare annual budgets, capital improvement requests, and make recommendations thereon for the efficient and economical operation of the systems.
- Prepare at the end of each fiscal year a report on the finances and administrative activities of the water and sewer systems; and prepare and make available for public distribution an annual report on the water and sewer systems finances.
- Formulate and enforce the general rules and policies pertaining to water and sewer system operation practices within Tanana and generally have full and complete surveillance of all the systems and their operation and fiscal affairs, including the maintenance, operation, expansion, extension, and improvement of the public utilities.
- Study and make recommendations generally on public utility matters such as, but not limited to, rates, fiscal matters, personnel staffing, labor relations, expansion or extension of services, and public relations.

A copy of the Bylaws of Too'gha, Inc. establishing the powers and duties of the Board of Directors is filed with Too'gha's administration records. Also, a copy of the water and sewer ordinance is being enforced and on file.

Day to day management of the sanitation facilities, including the Too'gha Water Treatment Plant and Laundromat, are the responsibility of the Utility Manager/Water Treatment Plant Operator and the Back-up Operator. Currently, the Utility Manager/Water Treatment Plant Operator is also responsible for the oversight of the finances including billing. The Too'gha board decided to hire a new position for a part-time bookkeeper/office manager. The new position will assist the utility in complying with grant conditions and will assist with oversight of finances. The exact responsibilities for the bookkeeper position have not been established at this time. At a later time, day-to-day management may necessitate the hiring of additional staff or promoting and training existing staff to coordinate day-to-day management.

12.2.3 Training

The existing Utility Manager/Water Plant Operator has been and will continue to receive training pertinent to utility management. Advice regarding appropriate training will be sought through the Department of Community and Economic Development, Rural Utility Business Advisor Program, (RUBA).

12.2.4 Key Personnel

The Too'gha Inc. Board of Directors will be involved in the construction phases of the on-going and future water and sewer infrastructure development. Key personnel involved in the operations of the water and sewer system operations will be the Utility Manager/Water Plant Operator, Back-up Operator, and the Laundry Attendant.

12.2.5 Key Assumptions

Employee related assumptions are:

- The cost of training new employees will be constant
- Training for employees will be available as needed
- Employees will be stable and there will not be significant staff turnover
- Key personnel will be available for hire

12.3 Financial Data

The Too'gha, Inc. Utility Manager / Operator has the authority to submit requests for payment. Such requests must be accompanied by supporting documents prior to being processed. Officials with approval for check-signing consist of Too'gha, Inc. board members and the Utility Manager/ Operator. All checks must be signed by two of the approved officials. A copy of the check is attached to the supporting documents and filed at the Too'gha, Inc. office.

Too'gha, Inc. currently utilizes the accounting software QuickBooks Pro 2004 to track customer transactions and system revenue and expenditures. The system is fairly sophisticated and has numerous reporting options. The annual budget for Too'gha, Inc. is established by the board of directors and the Utility Manager/Operator at a work session and adopted at the next regular meeting.

The accounts receivable records from January 2004 through May 2005 were reviewed. It was found that the collection of fees ranged from 87% for residential users to 83% for some of the small commercial users. The overall collection rate for the water and sewer invoices was calculated to be approximately 91%. Six account balances had outstanding balances more than $400.

The following financial estimates are preliminary in nature and are in year 2005 dollars; however, the assumption is that there are fully functioning systems in place, serving the entire community. In reality, there will be at best a period of seven to eight years during which the system is being constructed. All estimates and assumptions continued in this plan are preliminary and are anticipated to change as the project progresses. Actual revenues and expense will vary throughout the life of the facility and these estimates should not be considered final.

12.3.1 Revenue Source

Revenue required to support the proposed improvements will be met by using a variety of sources including commercial, residential, school, and Laundromat user fees. Revenue generated from within the community will fund the annual operations and maintenance cost to operate the system. The revenue requirement will be estimated based on the projected annual costs for the existing system with the additional users of the preferred alternatives selected by the community from the feasibility planning study. Based on these projections, the annual revenue for the entire utility is projected to be approximately $209,300 per year.

Table 12-3: Revenue Sources for Water and Sewer Facilities Including the Preferred Alternatives

Revenue Source	Monthly Rate	# of Customers	Collection Rate	Yearly Revenues
Residential User Fees	$100	86	87%	**$89,784**
Small Commercial Users	$200	5	83%	**$9,960**
School User Fees	$5,200	1	100%	**$46,800**
Native Council Fees	$100	1	90%	**$1,080**
Health Clinic Fees	$410	1	100%	**$4,920**
Regional Elder's Residence Fees	$550	1	100%	**$6,600**
User Fees from Laundromat	$4,000	1	100%	**$48,000**
Haul Fees from FAA	$0.20	650	100%	**$1,560**
Water Sales (per gallon)	$0.05	1,000	100%	**$600**
Local Capital Contribution				**$-**
Total Revenue				**$209,304**

Notes:

In addition, homeowners will be responsible for the electricity costs for individual circulation pumps

Small commercial users include: Tanana Power, Tanana Commercial, Tanana City, Fire Hall, Tozitna

School fee calculated based on 9 months of service

Collection rates based on records from Jan 2004 through May 2005

Laundromat and water sales based on averaged QuickBooks income records from 1998-2005

12.3.2 Estimated Annual Expenses

There are two cost categories that will be incurred in the ongoing operation and upkeep of the Water and Sewer Utilities – Operations and Maintenance (O&M) and Repairs and Replacements (R&R).

Operations and Maintenance

Too'gha will incur a number of expenses relating to the operations and maintenance of the system. Operations and maintenance items are defined as expenses that are incurred on a regular basis to sustain the operation of utility assets and the cost of utility administration.

The following are operations and maintenance estimates for the existing and proposed preferred alternatives for the system expansion of the water and sewer system for Tanana:

Table 12-4: Annual Operations and Maintenance Expenses for Water and Sewer Facilities Including the Preferred Alternatives

Expense Category	Annual Estimate
Administration	$9,450
Labor	$85,150
Miscellaneous Materials	$2,400
Electricity	$43,800
Heating Fuel	$29,500
Water Treatment	$2,300
Sewage Treatment	$500
Insurance	$20,500
Repair and Replacement Account	$12,333
Other	$9,500
Capital Replacement Account	$28,528
Total Annual Expenses	**$243,961**

Repairs and Replacement

Too'gha, Inc. will also incur expenses relating to the R&R of the system. R&R costs are those expenses defined, as items costing greater than $5,000 and/or that are not replaced on an annual basis. R&R costs are capital costs that will be depreciated over the useful life of the item rather than expensed in the year incurred.

An estimate has been made of the expected annual R&R costs for major equipment, i.e. pumps, heat exchangers, boilers, and system controls. The total amount that should be set aside annually for major equipment R&R costs is approximately $12,000.

Table 12-5: Annual Repair and Replacement Expenses for Water and Sewer Facilities Including the Preferred Alternatives

Description of Equipment	Number	X	Cost	÷	Useful Years of Life	=	Annual cost to set aside
Boilers	2	X	$10,000	÷	15	=	$1,333
Heat exchangers	2	X	$5,000	÷	5	=	$2,000
Lift station pumps	8	X	$5,000	÷	5	=	$8,000
System controls	1	X	$10,000	÷	10	=	$1,000
Total amount that should be set aside annually for major R&R costs							**$12,333**

Time Line / Design Life of Major Components

The design life of the Water Treatment Plant and Laundry facility is estimated to be 30 years. The water plant will need to be replaced in approximately the year 2032. The proposed sewer lagoon will have a design life of 20 years and will need replacement in 2026. The underground water and sewer pipe has an estimated design life of 20 years and will need replacement in 2025. The equipment is shown above in the depreciation schedule and the various items have lives ranging from 5 to 15 years. Maintenance will have a positive effect on the design life of all building, plant and equipment.

12.3.3 Annual Profit

Based on the revenue projected and the annual operation and maintenance costs the Tanana system will generate approximately $6,200 each year. This number does not include money that should be retained for R&R costs relating to the system or money set aside for the capital replacement account.

This annual profit will allow the utility to build up a reserve account that will be available for working capital to cover unexpected expenses or system improvements.

Table 12-6: Annual Profit Summary for Water and Sewer Facilities Including the Preferred Alternatives

Revenue	
Residential User Fees	$89,784
Small Commercial Users	$9,960
School User Fees	$46,800
Native Council Fees	$1,080
Health Clinic Fees	$4,920
Regional Elder's Residential Fees	$6,600
User Fees from Laundromat	$48,000
Haul Fees from FAA	$1,560
Water Sales	$600
Total Revenue	**$209,304**
Expenses	
Annual Operation and Maintenance Costs	$203,100
Annual Repair and Replacement Costs	$12,333
Capital Replacement Account	$28,528
Total Expense	**$243,961**
Net Operating Income (Loss)	**$(34,657)**
Net Operating Income	**$(34,657)**
Local Capital Contribution	$ -
Annual Estimated Profit	**$(34,657)**

12.3.4 Annual Estimated Operating Cash Flow

The annual estimated operating cash flow depicts the annual flow of money in and out of the business over the course of an operating year; regardless of whether or not the expenditure is fully tax deductible, such as capital expenditures (Annual R&R) or loan principal payments.

Table 12-7: Annual Estimated Operating Cash Flow for Water and Sewer Facilities Including the Preferred Alternatives

Cash Sources	
Residential User Fees	$89,784
Small Commercial Users	$9,960
School User Fees	$46,800
Native Council Fees	$1,080
Health Clinic Fees	$4,920
Regional Elder's Residential Fees	$6,600
User Fees from Laundromat	$48,000
Haul Fees from FAA	$1,560
Water Sales (per gallon)	$600
Local Capital Contribution	$ -
Total Cash Sources	**$209,304**
Cash Uses	
Annual Operation and Maintenance Costs	$203,100
Annual Repair and Replacement Costs	$12,333
Capital Replacement Account	$28,528
Total Cash Uses	**$243,961**
Excess (Shortage) of Cash Over Expenditures	**$(34,657)**

Based upon the preliminary estimates for the Too'gha, Inc. water and sewer utility, the annual shortage of cash over expenditures will be approximately $34,650, which includes both the repair and replacement costs and the capital replacement costs. However, if only annual operating costs are taken into consideration, the utility will operate at an excess of approximately $6,200. It is encouraged that these funds be accumulated by the Utility in a reserve account, which will be available for unexpected expenses or system improvements.

12.3.5 Key Assumptions

Financial assumptions are:

- Revenue will be generated from user fees for water, sewer and Laundromat services.
- The collection fees remain consistent with rates experienced from January 2004 to May 2005. These percentages are accounted for in the revenue projections

12.4 Capital Replacement Schedule

12.4.1 Funding

Ultimately, the water and sewer utility will require major capital replacement. Given a system design life of 30 years, it would be necessary to accumulate sufficient funds to replace the system at the end of 30 years. The annual portion of such an annuity, or equivalent annual cycle cost (EACC) is calculated below.

Table 12-8: Major Capital Replacement Cost for Water and Sewer Facilities Including the Preferred Alternatives

Equivalent Annual Cycle Cost						
	Inflation Rate:	0.0%	Reinvestment Rate:		4.0%	
	Project Replacement Costs		**Capital Replacement Fund Balance**			
Year	Total Assets Inflated Cost	10% of Total Asset Cost	Start of Year Balance	Annual Deposit	Interest Earnings	End of Year Balance
1	$16,000,000	$1,600,000	$ -	$28,528	$ -	$ 28,528
2	$16,000,000	$1,600,000	$28,528	$28,528	$1,141	$ 58,197
3	$16,000,000	$1,600,000	$58,197	$28,528	$2,328	$ 89,053
4	$16,000,000	$1,600,000	$89,053	$28,528	$3,562	$121,144
5	$16,000,000	$1,600,000	$121,144	$28,528	$4,846	$154,518
6	$16,000,000	$1,600,000	$154,518	$28,528	$6,181	$189,227
7	$16,000,000	$1,600,000	$189,227	$28,528	$7,569	$225,324
8	$16,000,000	$1,600,000	$225,324	$28,528	$9,013	$262,865
9	$16,000,000	$1,600,000	$262,865	$28,528	$10,515	$301,908
10	$16,000,000	$1,600,000	$301,908	$28,528	$12,076	$342,512
11	$16,000,000	$1,600,000	$342,512	$28,528	$13,700	$384,741
12	$16,000,000	$1,600,000	$384,741	$28,528	$15,390	$428,659
13	$16,000,000	$1,600,000	$428,659	$28,528	$17,146	$474,333
14	$16,000,000	$1,600,000	$474,333	$28,528	$18,973	$521,835
15	$16,000,000	$1,600,000	$521,835	$28,528	$20,873	$571,236
16	$16,000,000	$1,600,000	$571,236	$28,528	$22,849	$622,614
17	$16,000,000	$1,600,000	$622,614	$28,528	$24,905	$676,046
18	$16,000,000	$1,600,000	$676,046	$28,528	$27,042	$731,616
19	$16,000,000	$1,600,000	$731,616	$28,528	$29,265	$789,409
20	$16,000,000	$1,600,000	$789,409	$28,528	$31,576	$849,514
21	$16,000,000	$1,600,000	$849,514	$28,528	$33,981	$912,022
22	$16,000,000	$1,600,000	$912,022	$28,528	$36,481	$977,032
23	$16,000,000	$1,600,000	$977,032	$28,528	$39,081	$1,044,641
24	$16,000,000	$1,600,000	$1,044,641	$28,528	$41,786	$1,114,955
25	$16,000,000	$1,600,000	$1,114,955	$28,528	$44,598	$1,188,081
26	$16,000,000	$1,600,000	$1,188,081	$28,528	$47,523	$1,264,132
27	$16,000,000	$1,600,000	$1,264,132	$28,528	$50,565	$1,343,226
28	$16,000,000	$1,600,000	$1,343,226	$28,528	$53,729	$1,425,483
29	$16,000,000	$1,600,000	$1,425,483	$28,528	$57,019	$1,511,031
30	$16,000,000	$1,600,000	$1,511,031	$28,528	$60,441	$1,600,000
				$855,845	**$744,155**	**$1,600,000**

For this calculation the design life of the system is set at 30 years and the design life factor (DFL), using an interest rate of 4% is 0.0178. Therefore, based on 10% of the estimated capital cost (CC) for the system of $16,000,000 the equivalent annual capital cost would be:

EACC = CC X DLF

= ($1,600,000 X 0.0178)

= **$28,528** (per year)

Note: To compute the sum above, the amount $1,600,000 was divided by the *future amount of an ordinary annuity*. This factor is 56.08494 (1 divided by 56.08494 = .01783). This gives the amount $28,528.49 as the annuity required to fund 10% of a $16 million utility over 30 years at 4% interest.

12.4.2 Funding for Major Components

The State of Alaska Department of Environmental Conservations, Village Safe Water Program will provide the funding for the preferred Too'gha water and sewer system.

12.4.3 Available Resources for the infrastructure

The preferred improvements will extend the system into areas that currently do not have water or sewer service. The proposed improvements are for developed areas so electric power is available. Piping infrastructure will be located in existing road rights-of-way. A portion of new access road will need to be constructed to the proposed location for the new sewage lagoon.

12.4.4 Emergency and Contingency Plan Needs

The water system will be heated and circulated to prevent freeze up problems. The water plant has an emergency generator for power supply during power outages. Thaw tape is installed on force main lines from lift stations for use in case of freezing.

12.4.5 Key Assumptions

Repair and replacement assumptions are:

- Repairs and maintenance will increase as the plant system ages.
- This analysis does not address a rebuild of the system at the end of its useful life.
- Parts will be available when needed.

12.5 Legal Authority and Issues

12.5.1 Ownership

Too'gha Inc. owns and operates the water treatment plant and laundry facility that supplies water to the pipe distribution system in town. Too'gha Inc. will also have full ownership of the proposed system expansion. Too'gha also owns and operates the community sewage lagoon and would obtain ownership of the proposed new sewage lagoon outlined in the preferred alternatives for the community utility expansion.

There is a small existing system that serves a parcel of land owned by the Indian Health Service, located where the former Tanana hospital compound was located. Design plans have been prepared, as part of the ongoing water and sewer construction project, to install new water and sewer pipes, and a new lift station, in this area, and connect them to the Too'gha system. However, the pipes can not be installed until after contaminated soil that has been found in the area has been cleaned up. Too'gha has no responsibility for the contamination restoration efforts.

12.5.2 Ordinances Related to New Project

The powers and duties of the Board of Directors for Too'gha, Inc. are established by a set of by-laws. The by-laws are on file with Too'gha's administration records.

12.5.3 Special Permits, Licenses and Regulations

The following issues that will be addressed and resolved during the engineering and construction phases of the project:

- Any site control or land ownership conflicts related to the specific site chosen for the project
- All rights-of-way and utility easements will be completed prior to construction.
- The need for DEC engineering approval for project plans and specifications.
- The possibility of DEC requiring wastewater disposal permits.

12.5.4 Key Assumptions

Key legal assumptions are:

- Ownership of future water and sewer infrastructure will be owned and operated by Too'gha Inc.

12.6 Interagency Relationships

12.6.1 Involvement of Other Agencies

Involvement in Construction Phase
Department of Environmental Conservation, Village Safe Water will fund and oversee the construction of the preferred alternatives to expand the piped water and sewer system. Expansion will include construction of piped water and sewer service for the remaining portions of the downtown area extending to the Circle Subdivision, construction of a new sewage lagoon, and investigations for individual wells and septic system for homes in the outlying areas.

Involvement in Ongoing Operations
Department of Community and Economic Development will provide training and oversight through the RUBA program.

Replacement Agencies
The replacement of the utilities, at the end of the design life has not been considered in this business plan.

Regulatory Agencies
The primary regulatory agency for the water and wastewater project will be the Alaska Department of Environmental Conservation (ADEC). ADEC regulates a wide array of environmental areas. Of concern to this water and wastewater project is the agencies regulatory authority over wastewater disposal, operator training standards and engineering plan approval.

12.6.2 Phase of Larger Project

The sewer and water utility will be constructed over an eight year period in nine phases.

Phase one will extend water and sewer service along Third Street and begin installation along Koyukuk Street. A lift station and force main and will be installed along Second Street to tie the new sewer service into the existing system. This phase is anticipated to take one year and to be completed in 2006.

Phase two will extend water and sewer mains to the remaining homes along Koyukuk, Second Avenue, and East Street and begin installation along First Avenue. This phase is anticipated to take one year and to be completed in 2007.

Phase three will construct a new sewage lagoon north of town with additional force main pipe to convey waste from the sewage collection system to the new lagoon. A seasonal force main for effluent discharge to wetlands will be constructed after permits for seasonal wetlands discharge are obtained. This phase is anticipated to take two years and to be completed in 2009.

Phase four will extend the piped water and sewer system from the end of the downtown expansion along First Street. This phase is anticipated to take one year and to be completed in 2010.

Phase five will continue to extend the piped water and sewer system from the end the phase four expansion along First Street. This phase is anticipated to take one year and to be completed in 2011.

Phase six will continue to extend the piped water and sewer system along First Street and around the Circle Subdivision. This phase is anticipated to take one year and to be completed in 2012.

Phase seven will extend the piped water and sewer system along Albert's Alley, connect to phase four. This phase is anticipated to take one year and to be completed in 2013.

Phase eight will perform exploratory drilling on individual property lots in outlying areas to investigate the feasibility of installing individual groundwater wells. Also, on-site investigations for individual lots to test soil conditions for installation of conventional septic systems will be completed. This phase can be performed independently of previous phases, as funding becomes available.

Phase nine will install on-site systems at outlying homes where there are suitable site conditions. Cost and schedule for this phase is dependent on the number of homes able to support systems.

The following schedule from the State website outlines the various grants and programs funding the existing village improvements and upcoming design for the preferred alternatives selected during the recent planning study.

Table 12-9: Grants and Programs for Funding Existing Water and Sewer Improvements

Lead Agency	Fiscal Year	Project Status	Project Description	Project Stage	Agency Cost	Total Cost
DEC/VSW	2005	Funded	Water and Sewer Improvements	Preliminary	$725,000	$2,900,000
DEC/VSW	2001	Funded	Sanitation Improvements - Construct piped system for the other half of downtown, plumbing for 40 homes, construct heavy equipment garage	Preliminary	$450,000	$1,800,000
DEC/VSW	2004	Funded	Water & Sewer Improvements, Phase 2 - EPA $2,175.0 Plumbing and service connections for 15 homes, 6,600' water, sewer, & force mains.	Construction	$725,000	$2,900,000
DEC/VSW	2003	Funded	Water and Sewer Project - EPA $1,350.0 Plumbing and service connections for 12 homes, 6,000 feet water and sewer mains. Update feasibility study.	Construction	$450,000	$1,800,000
DEC/VSW	2000	Funded	Water and Sewer Mains - IHS $1,311.0 Construct water & sewer mains	Construction	$0	$1,311,000
DEC/VSW	2000	Funded	Sanitation Improvements, Ph II - Construct piped water and sewer for half of downtown and install plumbing for 40 homes	Construction	$500,000	$2,000,000
DEC/VSW	1999	Funded	Water and Sewer Mains - IHS $940,594 Water and sewer mains	Construction	$0	$940,594
DEC/VSW	1998	Funded	Water Improvements - Construct new water treatment plant and washeteria	Completed	$275,000	$550,000
DEC/VSW	1997	Funded	Piped Water/Sewer Ph I - Construct sewage lagoon and effluent line	Completed	$550,000	$1,100,000
DEC/VSW	1995	Funded	Sanitation Facilities Design/Construction - Feasibility study to address upgrade of piped water and sewer system	Completed	$338,800	$677,600
ANTHC	1995	Funded	New Washeteria & Sewage System Improvements - DEC VSW lead. IHS $1,125.0, EPA $729.0. Est. completion 6/99	Completed	$0	$1,454,000
ANTHC	1990	Funded	Upgrade Water System & distribution loop - IHS funding	Completed	$0	$350,000
DEC/VSW	1990	Funded	Force Main Replace - RSA to DOA	Completed	$0	$0
DEC/VSW	1989	Funded	Water Plant Upgrade	Completed	$97,000	$97,000

12.6.3 Key Assumptions

Agency and phase assumptions are:

- Residential establishments will not be hooked up until the following has occurred:
  - a) each phase is fully complete
  - b) the community has accepted the project
  - c) establishments have been retrofitted to accommodate plumbing
- Revenues will be generated according to the project completion date schedule with the final construction phase being completed in the year 2013.

12.7 Summary

12.7.1 Wrap-up

The sewer and water project will be considered complete when water and sewer service is provided to all the residents in Tanana. This will include investigating the site conditions for offering on-site wells and septic system to homes in the outlying areas.

12.7.2 Timelines

Currently the construction for the original phases for the Too'gha piped water and sewer installation are scheduled to be complete in 2005. The preferred alternatives selected during the planning stages of the feasibility study are scheduled to begin design in 2005 and are anticipated to begin construction in 2006 and is scheduled to be completed in 2013.

By 2006 the first 20 homes, located in the downtown area, will have both piped water and sewer service.

By 2013 the remaining 30 homes along First Street and the Circle Subdivision will have both piped water and sewer service.

Outlying homes will not be served with piped water and sewer due to distance and cost. However, a geotechnical investigation will be performed on each lot to determine the feasibility of installing groundwater wells and septic systems for service.

12.7.3 Effect on Community

Based on the previous discussion of revenues and expenses, and a review of the resulting cash flow and operating income statement, the impact of the future capital replacement costs are significant. The following table is a summary of operating revenue and expenses including an estimate of the total annual amount necessary to extend the Too'gha water and sewer system.

Table 12-10: Summary of Operating Revenue and Expenses for the Water and Sewer Facilities Including the Preferred Alternatives

Revenue	
Residential User Fees	$ 89,784
Small Commercial Users	$ 9,960
School User Fees	$ 46,800
Native Council Fees	$ 1,080
Health Clinic Fees	$ 4,920
Regional Elder's Residence Fees	$ 6,600
User Fees from Laundromat	$ 48,000
Haul Fees from FAA	$ 1,560
Water Sales (per gallon)	$ 600
Local Capital Contribution	$ -
	$ 209,304
Expenses/Excess of Cash over Expenses	
Annual Operation and Maintenance Costs	$ 203,100
Annual Repair and Replacement Costs	$ 12,333
Capital Replacement Account	$ 28,528
	$ 243,961

12.7.4 Cost of Living/Residents Ability to Pay

The following table addresses the resident's ability to pay for water and sewer services. The expenses are estimates based on an average household in the community.

Table 12-8: Average Household Expenses in Tanana, Alaska

Description	Average Rate	Times Paid a Year	Annual Amount
Income Per Household			
Median Household Income	$2,479	12	$29,750
		Total Median Income	**$29,750**
Expenses Per Household			
Rent	$510	12	$6,120
Food	$150	52	$7,800
Electricity	$100	12	$1,200
Fuel	$600	4	$2,400
Water and Sewer	$100	12	$1,200
Airfares	$650	4	$2,600
Clothing	$200	12	$2,400
Gifts/Holidays			$500
Other	$200	12	$2,400
		Total Median Expense	**$26,620**
	Surplus/(Deficit)		$3,130

12.7.5 Key Assumptions

Key assumptions related to community impact are:

- Household income from State of Alaska statistics is correct
- There will be no significant increase in the cost of air and freight transportation
- This document has not considered the effect of natural disasters such as fire, flood, and earthquake.

13.0 CONCLUSIONS AND RECOMMENDED ALTERNATIVES

Viable alternatives were discussed and selected at the 65% alternative meeting. The Too'gha board selected the following alternatives for further evaluation.

Downtown Area

- Extend piped water and sewer service to Koyukuk and East Streets and along First and Second Avenues, as topography allows.
- Relocate the community sewage lagoon north of the existing lagoon. Discharge the effluent to wetlands located north of the airport runway.

Circle Subdivision

- Extend and connect piped water and sewer service from the downtown area extension east along First Street to the Circle Subdivision. Also, connect Albert's Alley enrooted to the subdivision.

Outlying Areas

- Drill wells and perform geotechnical tests on individual lots to explore conditions for groundwater wells and conventional septic systems.

13.1 Description of Recommended Alternatives

The following sections describe the recommended alternatives and include further evaluation.

The cost estimates for each of the recommended alternatives were updated from those presented in Chapter 10 to better reflect actual construction costs reported for installation of piped water and sewer from the water treatment plant to Eamole Street. This was done by using the most recently available costs provided by VSW construction managers. The mobilization, demobilization, freight, and administration and clerical costs are included in the per foot construction costs. These line items were then removed from the preferred alternative cost estimates to avoid being counted twice. Also, after further analysis, it was determined that a lift station would not be required for the Downtown Water and Sewer Extension so these associated costs were also removed from the preferred alternative cost estimates. Finally, the contingency was dropped from 25% to 10%.

13.1.1 Downtown Water and Sewer Extension (Previously described as Alternative 1)

The selected alternative to provide service to the remaining houses in the developed downtown area is to extend the current water and sewer system to Koyukuk and East Streets, and along First and Second Avenues. Based on housing counts conducted at the 65% meeting, 20 homes would receive piped water and sewer service under this alternative. The construction techniques for installation will be similar to those currently being used in Tanana for the current water and sewer installation project.

Water System Extension

An approximate layout of these water lines is shown in Figure 13.1. The east water loop will be extended approximately 5,220 lineal feet, circulating heated water from the Too'gha WTP to the homes and back to the WTP. The new lines will tie into the existing loop along Third Avenue.

The following summarizes the design for the water system extension:

- Water mains will be constructed with HDPE pipe, jacketed with a pre-insulated protective coating.
- Water pipes will be buried at a minimum depth of 3 feet (typical of the existing piped system).
- Hydrants will be installed every 300 feet (in populated areas) along the water lines to provide fire protection to the newly served area.
- Hydrants can be used as fill stations for a community pumper truck.
- Hydrants will be located at high points to serve as air relief valves

Adding length to the existing pipe system will increase the amount of head loss the pumps will have to overcome to maintain service to the customers. Two parameters will need to be evaluated: pressure and velocity. To provide reliable service, the operating pressures at each home must be adequate. Using design criteria similar to those of the current system, system pressures will be targeted to range from 30 to 100 psi. A residual pressure of 30 psi is recommended for pump operation, while pressures higher than 100 psi may cause property damage. Another important parameter is the velocity of water in the pipes. A minimum velocity of 1 ft/s is needed for pitorifice service connections to operate in all existing and new pipes. Pipe velocity should be calculated for pipes installed in the extension. If a minimum velocity of 1 ft/s cannot be met, individual circulation pumps will be required for service connections.

Three configurations were considered for the system extension in the downtown area. Each alternative was evaluated to determine estimated annual pumping costs, in order to ensure that projected revenues from the new service connections meet or exceed the projected additional costs. The three configurations are described below:

- Install 6-inch pipes in the extension area, maintain minimum velocity necessary for pitorifice service connections (for service lines less that 75 feet in length)
- Install 6-inch pipes in the extension area, and install individual circulation pumps for service connections (velocity in newly installed pipes can be lower than 1 ft/s)
- Install 4-inch pipes in the extension area, and install circulation pumps if the minimum velocity is not met in the new system piping

To evaluate and compare the different configurations, a model of the existing and proposed piping was created using EPANET. This water modeling software uses the Hazen-Williams equation to estimate head loss at selected points around a system. The model also calculates pressure at the selected points, and velocity in the system pipes. Table 13-1 summarizes the calculations produced from the system model. Modeling results for the system have been included in Appendix D.

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WATER AND SEWER FEASIBILITY STUDY

PREFERRED WATER EXTENSION DOWNTOWN

Date

Dec. 2004

Figure

13.1

Table 13-1: Summary of System Calculations from Water Model for Downtown System Connection

Configuration	Description	Maximum Head Loss *(ft)*	Maximum Pressure *(psi)*	Minimum Pipe Velocity *(ft/s)*	Pump Size *(hp)*	Est. Pumping Costs/Year *($)*
A	Install 6" pipes in the system extension, pump (71 gpm) to maintain 1ft/s velocity and install pitorifice connections to homes with service lines less than 75' in length	167	73	1.02	7.5	$13,550
B	Install 6" pipes in the system extension, pump at the current flow rate (40gpm), install individual circulation pumps at homes to provide service	81.5	35	0.74 (new section) 1.02 (existing section)	2	$4,150
C	Install 4" pipes in the system extension, pump at the current flow rate (40gpm), install individual circulation pumps at homes where the minimum velocity is not met	128	56	1.02	5	$7,100

The existing system, from the water plant to Eamole Street, has 4-inch water pipes. Configuration A models a system that includes both the existing 4-inch lines and 6-inch lines for all new pipes. A flow rate of 71 gpm is needed to maintain the minimum velocity required for pitorifice use (1 ft/s) for both new and existing services. Pitorifices are advantageous because they do not require additional energy for operation. However, in order to meet the required velocity, the east loop circulating pumps at the WTP would need to be increased significantly from the existing 1 HP pumps to 7.5 HP pumps. Increasing the pump size will increase annual pumping costs. Based on the estimates shown, the annual pumping cost would be approximately $13,550.

Configuration B also assumes new pipes will be 6 inches in diameter, but allows the velocity to decrease in the extension area to less than 1 ft/s. Under this configuration, the newly serviced homes will need individual circulation pumps. The velocity in the existing sections of pipe must still meet the minimum required for pitorifice connections. Configuration B reduces the head loss the pumps must overcome and allows the pump size at the WTP to be less, compared to Configuration A. Based on calculations from the model, the required pump size would be 2 HP. The annual pumping cost for this configuration will be approximately $4,150.

Configuration C assumes 4-inch pipes are installed in the extension area. Based on calculations from the model, all homes would be able to use pitorifice service connections. Pumps at the WTP would need to be increased to a size of 5 HP to compensate for the increased head loss through the additional system length. An estimated annual pumping cost for this configuration is approximately $7,100.

Based on calculations comparing the configurations, the least expensive configuration for Too'gha to operate and maintain will be to install 2 HP pumps at the water treatment plant. This will allow pitorifice service connections to be maintained in the existing system, but will require individual circulation pumps at the new homes. It will be the responsibility of each homeowner to pay for the power required by the individual circulation pumps. This will add to the cost of providing homeowners with water service.

Due to the cold temperatures experienced in Tanana, additional heat may be required for the new system extension. The downtown extension will add approximately 5,220 feet of pipe. Based on calculations made for this system, the water may lose one additional degree of heat due to the increased piping length. During design of the system a check on the heating system should be performed to determine if the existing equipment is capable of compensating for the additional heat loss caused by the extension.

Sewer System Extension

Gravity sewer lines will be installed following roughly the same layout as the water lines (see Figure 13.2). Superintendent Earl Theroux and the construction crew from the current water/sewer project took survey elevation readings along the centerline of First Avenue to provide preliminary information about the location of the break point for gravity sewer service in the downtown extension (see Appendix E). A full survey of the area should be completed prior to design of the downtown extension. The survey information provided by the crew shows that the downtown extension area can be extended to approximately the centerline of the East Street right-of-way before the trench depth will require another lift station to continue service.

Based on the current configuration, approximately 3,250 lineal feet of pipe will be installed to serve the 20 homes in the downtown area.

The following summarizes the design for the wastewater system extension:

- Manholes will be installed at significant changes in grade or direction, and at mainline intersections.
- Distances between manholes shall not exceed 300 feet.
- The minimum sewer main line grade will be 0.008.
- The minimum depth of cover for sewer main lines will be 3 feet.
- The minimum diameter of sewer main lines will be 8 inches.

Most likely, the construction crews will need to use trench boxes due to the narrow streets and deep trenches (up to 15 feet) required for sewer installation. This is similar to current construction practices in Tanana.

13.1.2 Relocate Community Sewage Lagoon (previously described as Alternative 3)

The second highest priority for the community will be to relocate the community sewage lagoon. The current location in the downtown area causes odor and aesthetic complaints. Another concern is the direct discharge of lagoon effluent into the Yukon River. Based on projected community growth calculations, the current sewage lagoon will not be large enough to adequately serve the community throughout the planning period of this study. To address these

DOWNTOWN EXTENSION:
TOTAL GRAVITY PIPE = 3,250 FEET
TOTAL FORCE MAIN = 405 FEET
TOTAL LIFT STATION(S) = 1
TOTAL SERVICE CONNECTIONS = 20

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PREFERRED SEWER EXTENSION DOWNTOWN

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Figure
13.2

concerns, the recommended alternative is to relocate the sewage lagoon away from homes, resize the treatment system for the projected growth in the community, and provide wetlands treatment for the effluent.

For this to be a viable alternative the following must occur:

- Conduct a wildlife and bird hazard assessment to address potential effects of the effluent on animals in the wetland treatment area, and the potential for creating safety hazards for aircraft
- Conduct a hydrology and drainage study to determine drainage patterns in the wetlands treatment area
- Obtain permission from DOT/FAA for effluent discharge through an above ground seasonal discharge pipe onto DOT property north of the runway
- Negotiate and purchase land on the Eller's property for the new sewage lagoon (7 acres)
- Design a new sewage lagoon for 20 years projected wastewater generation
- Obtain a discharge permit (ADEC Seasonal Discharges from Sewage Lagoons 2003-BB001) for seasonal discharge into a wetland

The first location evaluated for a new sewage lagoon was north of the airport runway. However, this land is owned by DOT, and FAA typically discourages building sewage lagoons near or around airport facilities, as they are considered to be bird attractants. After discussions with the agencies, it was deemed unlikely that an easement for the construction of the lagoon in this area would be granted.

During discussions with the Too'gha board members at the 65% alternative selection meeting, an alternate location on property owned by Clifton Sr. and Paula Eller was selected. Direct discharge from this location would not be preferred as it would naturally drain back into town. After further discussion, it was proposed that a seasonal above-ground force main be used to discharge the treated effluent to the wetlands north of the runway. Figure 13.3 shows the preferred location for the new lagoon and discharge pipeline. This alternative is advantageous for several reasons.

- The preferred location (on the Eller's property) will reduce the length of the force main line required to carry wastewater from the existing sewer mains to the new lagoon. This will reduce overall annual pumping costs and capital costs.
- Land purchase from a private seller may be easier than gaining an easement from DOT/FAA.
- Seasonal discharge (if allowed by DOT/FAA) to wetlands north of the airport will take advantage of natural drainage patterns away from the developed town area.

The preliminary design of the lagoon assumes that 9-months of storage will be required. This storage period was selected to meet the wetlands discharge permit stipulation that allows seasonal discharge (typically mid June through mid October) to wetlands.

In addition, the DEC permit encourages applicants to provide secondary treatment for effluent discharged to wetlands. Based on the state wastewater regulations (18 AAC 72), secondary treatment requires that no less than 65% of the total incoming BOD_5 be removed and that the arithmetic mean for BOD_5 of the effluent not exceed 45 mg/L in 30 consecutive days. In addition, the arithmetic mean for suspended solids must not exceed 70 mg/L in 30 consecutive days. The preliminary design of the lagoon accounts for these parameters in its sizing, and should provide secondary level treatment for the effluent.

The new lagoon will be sized to accommodate 16,240 gallons per day, which was developed assuming a 20-year design population of 406 people. Detention time was based on the permit requirement (9 months storage) for seasonal discharge. Using these criteria, the pond will have a required volume of over 600,000 cubic feet. To find the surface area required, a total pond depth of 10 feet was assumed, with allowance for 2 feet of sludge accumulation and 2 feet of ice accumulation. Lagoon berms will be constructed using 3 to 1 slopes. Based on these parameters, the total surface area for the lagoon and berms will be 390 by 390 feet (3.5 acres). It is recommended that the land purchased for the new lagoon be double this size, or 7 acres, to allow for future expansion beyond the 20-year design period. A new force main will be necessary to bring wastewater from the community to the lagoon. This line can he installed in the lagoon's access road. The estimated force main length will be 1,700 feet.

To provide wetlands treatment, a seasonal force main line will be needed, from the lagoon to the discharge location north of the airport. This line will be approximately 2,565 feet in length. To meet permit requirements a final design consideration will be to control access to the wetland discharge area. Typically this requirement can be met with signage.

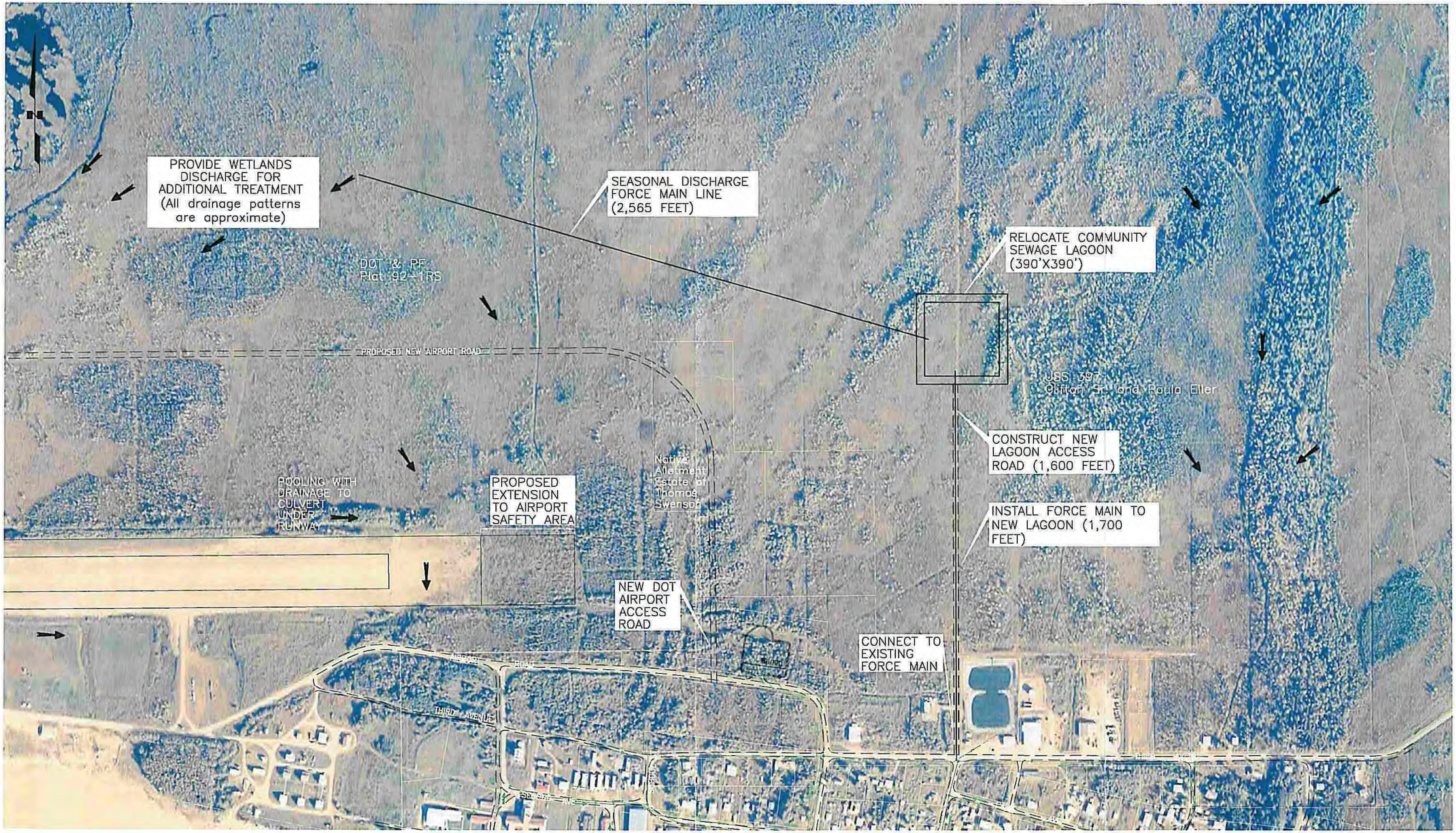
To provide operator access to the new lagoon, an access road approximately 1,600 feet in length will need to be constructed. The access road can be constructed along the trail which lies on the west side of the existing lagoon. The road should be 20 feet wide to allow for truck access.

Wetlands Discharge

The lagoon will provide primary and secondary treatment of the wastewater. Additional treatment will be provided by releasing the effluent to wetlands. Wetlands can be used to provide additional reductions in biological oxygen demand (BOD), total suspended solids (TSS), and total nitrogen (TN). Wetland treatment is useful as a polishing step following conventional treatment processes.

When effluent is discharged to wetlands, plant stems and submerged, underwater plants act as a substrate for bacteria and other microbes that purify water. There are several processes involved including: sedimentation, filtration, precipitation, flocculation, and bio-chemical transformation. Wetlands purify effluent by acting as a sponge, soaking up discharge. Particles of sediment and metals are removed as the water flows through wetland vegetation. Other pollutants such as nutrients are partially extracted as the water percolates through wetland soils. The biological processes used in wetland treatment are limited by temperature and plant activity, which is the reason that ADEC only allows summer discharge.

Before wetlands discharge can occur, additional information should be gathered for design. A topographic survey of the area would be valuable in understanding drainage. Additional studies of the proposed discharge location in the wetlands, and area drainage will also be needed. The drainage study should be completed on-site by a hydrology team, during break-up, so that water flow can be observed. Once additional hydrologic studies have been done, calculations can be



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RELOCATE SEWAGE LAGOON

Date
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Figure
13.3

made to determine the predicted rise in water level, based on plant attenuation and drainage. This will allow designers to determine if discharge to the wetlands will pool water and possibly attract birds. Factors that will affect potential pooling include the pumping rate and duration of the discharge. These factors can be compensated for in the design. Table 13-2 shows how the pumping rates for the lagoon will change based on the duration of discharge.

Table 13-2: Changes to Pumping Rate based on Duration of Discharge

Pumping Duration	Discharge Pumping Rate
7 days	530 gpm
30 days	125 gpm
90 days	41 gpm

FAA Separation Distance

The proposed location of the new lagoon is closer than 10,000 feet, FAA's recommended separation distance from the runway. If FAA requires a 10,000-foot separation distance, the new lagoon would need to be moved between Mission Road and the Yukon River, and would require a significant amount of force main piping (10,250 feet). The force main piping would likely require heat trace operation in winter to prevent freezing, significantly increasing annual operation and maintenance costs. Figure 13.4 shows a potential location for the new lagoon, if FAA requires a 10,000-foot separation distance.

Annual operation costs make this alternative cost prohibitive. The estimated capital cost to construct a lagoon and force main 10,000 feet from the runway is $4,567,400, an increased capital investment cost of over $2,000,000, compared to locating a new lagoon on the Eller's property. Annual operation costs are projected to range between $39,800 (6-hr per day of heat trace use) and $138,300 (24-hr per day of heat trace use). Annual costs will vary depending on the need for heat trace to prevent the force main from freezing. This can be more closely examined if this location is required.

13.1.3 Extend and connect piped water and sewer along First St, Albert's Alley to Circle Subdivision (Previously described as Alternatives 5 and 10)

The alternative selected to serve houses along First Street, Albert's Alley, and at the Circle Subdivision is to extend the piped water and sewer system from the downtown extension. Based on housing counts from the 65% alternative meeting, 30 homes would receive piped water and sewer service under this alternative. Both water and sewer pipes will be installed in the existing road right-of-way. Pipes will be buried and insulated to prevent freezing. The construction techniques for installation will be similar to those currently being used in Tanana.

An approximate layout of the water lines is shown in Figure 13.5. The east water loop will be extended approximately 9,750 lineal feet, circulating heated water from the Too'gha WTP to the homes and back to the WTP. The new lines will tie into the final pipe section installed for the downtown extension.

The following summarizes the design for the water system extension to the Circle Subdivision:

- Water mains will be constructed with HDPE pipe, jacketed with a pre-insulated protective coating.

- Water pipes will be buried at a minimum depth of 3 feet (typical of the existing piped system).
- Hydrants will be installed every 300 feet (in populated areas) along the water lines to provide fire protection to the newly served area.
- Hydrants can be used as fill stations for a community pumper truck.
- Hydrants will be located at high points to serve as air relief valves

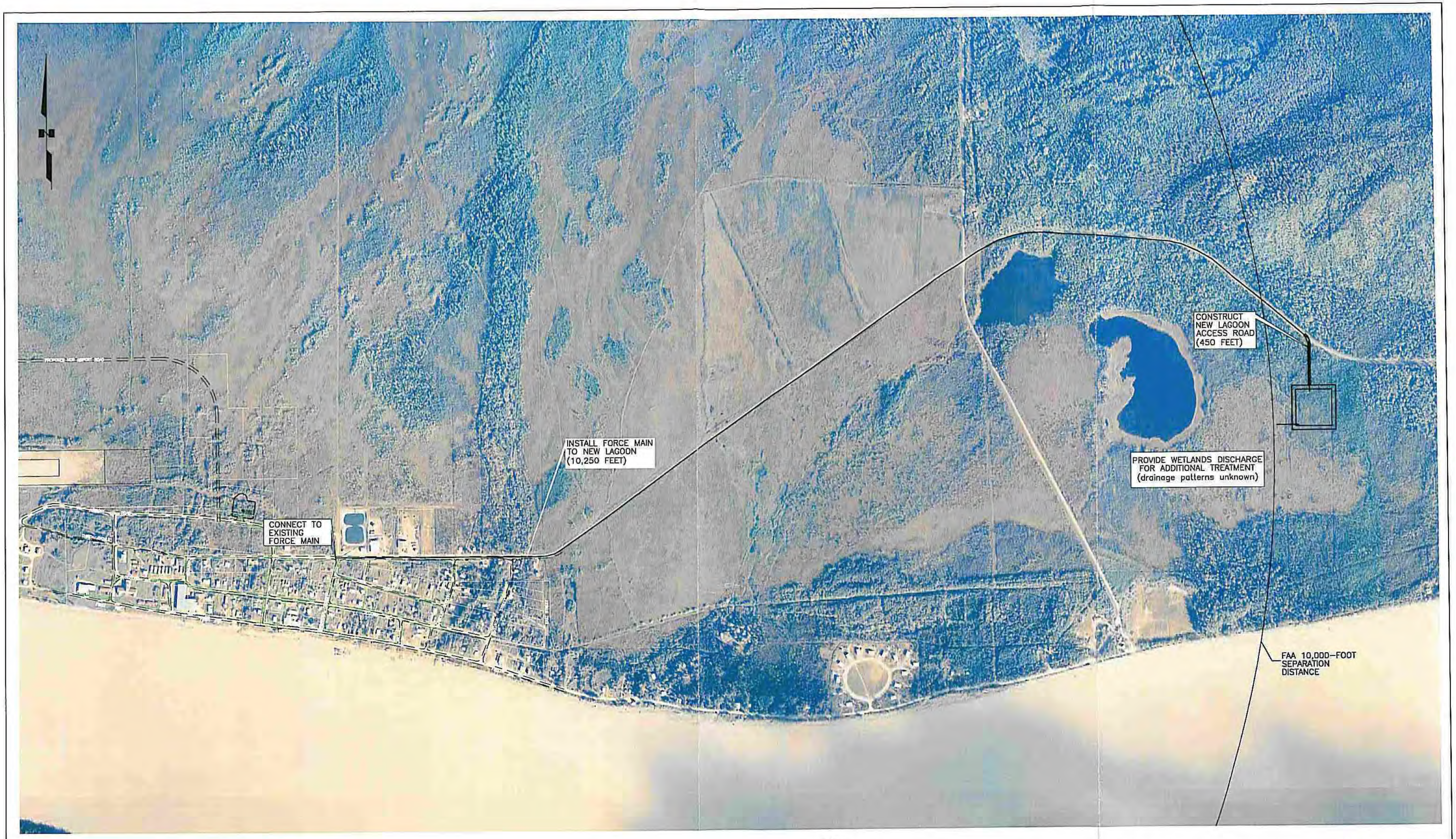
Adding length to the existing pipe system will increase the amount of head loss the pumps will have to overcome to maintain the required circulation velocity so that the existing pitorifices in the east loop will continue to operate. As in the previous discussion of extending the piped system in downtown area, the existing and new pipes were evaluated in a model using EPANET software to determine head loss and pressure through the system, and velocity in the pipes. The model includes the existing pipes, the proposed downtown extension piping, and the proposed Circle extension piping. Table 13-3 summarizes the calculations produced from the system model.

Table 13-3: Calculations Produced from System Model

Configuration	Description	Maximum Head Loss *(ft)*	Maximum Pressure *(psi)*	Minimum Pipe Velocity *(ft/s)*	Pump Size *(hp)*	Est. Pumping Costs/Year *($)*
A	Install 6" pipes for the system extension, pump (71 gpm) to maintain 1ft/s velocity and install pitorifice connections to homes with service lines less than 75' in length	196	85	1.03	10	$17,700
B	Install 6" pipes for the system extension, pump at the current flow rate (40gpm), install individual circulation pumps at homes to provide service	105	45	0.66 (new section) 1.02 (old section)	3	$6,300
C	Install 4" pipes for the system extension, pump at the current flow rate (40gpm), install individual circulation pumps at homes to provide service	175	76	1.02	5	$11,200

Configuration A models a system that includes both the existing 4-inch lines and 6-inch water lines for all new pipes. A flow rate of 71 gpm is needed to maintain the minimum velocity required for pitorifice use (1 ft/s). In order to meet the required velocity, the east loop circulating pumps at the WTP would need to be increased significantly from the existing 1 HP pumps to 10 HP. Increasing the pump size will increase annual pumping costs. Based on the estimates shown, the annual pumping cost for this configuration would be approximately $17,700.

Configuration B also assumes new pipes will be 6 inches in diameter, but allows the velocity to be decrease in the extension area to less than 1 ft/s. Under this configuration, the newly service homes will need individual circulation pumps. The velocity in the existing sections of pipe must



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WATER AND SEWER FEASIBILITY STUDY
MAINTAIN FAA SEPARATION DISTANCE

Date
Dec. 2004

Figure
13.4

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WATER AND SEWER FEASIBILITY STUDY

PREFERRED WATER EXTENSION TO CIRCLE

Date
Dec. 2004

Figure
13.5

still meet the minimum required for pitorifice connections. Configuration B reduces the head loss the pumps must overcome and allows the pump size at the WTP to be less, compared to Configuration A. Based on calculations from the model, the required pump size would be 3 HP. The annual pumping cost for this configuration will be approximately $6,300.

Configuration C assumes 4-inch pipes are installed in the extension area. Based on calculations from the model, all homes would be able to use pitorifice service connections. Pumps at the WTP would need to be increased to a size of 5 HP to compensate for the increased head loss through the additional system length. This estimated annual pumping cost for this configuration is approximately $11,200.

Based on calculations comparing the configurations, the least expensive configuration for Too'gha to operate and maintain will be to install 3 HP pumps (Configuration B) at the water treatment plant. This will allow pitorifice service connections to be maintained in the existing system, but will require individual circulation pumps at the new homes. It will be the responsibility of each homeowner to pay for the power required by the individual circulation pumps. This will add to the cost of providing homeowner's with water service.

The extension will add approximately 9,750 feet of pipe. Based on calculations made for this system, the water may lose an additional 1.5 degrees of heat due to the increased piping length. During design of the system a check on the heating system should be performed to determine if the existing equipment is capable of compensating for the additional heat loss caused by the extension.

Sewer System Extension

Gravity sewer lines will be installed following roughly the same layout as the water lines (see Figure 13.6). Superintendent Earl Theroux and the construction crew from the ongoing water/sewer project took survey elevation readings along the centerline of First Avenue, to provide preliminary information, for gravity sewer line calculations to the Circle. A full survey of the area should be completed prior to design of the Circle extension. The survey information provided by the crew shows that the Circle extension will require 4 lift stations, assuming a lift station will be installed whenever trench depths became deeper than 15 feet. Lift stations will be used to lift the wastewater stream to shallower depths so that gravity flow can continue. (No force main will be required).

Based on the current piping layout, approximately 5,580 lineal feet of pipe will be installed to serve the 30 homes along First Street to the Circle Subdivision. All sewage from the new service area will flow to the extension for the downtown area.

The following summarizes the design for the wastewater system extension:

- Manholes will be installed at significant changes in grade or direction, and at intersections.
- Distances between manholes shall not exceed 300 feet.
- The minimum sewer main line grade will be 0.008.
- The minimum depth of cover for sewer main lines will be 3 feet.
- The minimum diameter of sewer main lines will be 8 inches.

- Manholes and gravity pipelines will need to be anchored against floatation in areas with high groundwater or which are subject to flooding.

Most likely, the construction crew will need to use trench boxes due to the narrow streets and deep trenches (up to 15 feet) required for sewer installation.

13.1.4 Perform on-site investigations at homes in the outlying areas to evaluate the feasibility of using individual groundwater wells and conventional septic systems (previously described as Alternatives 10 and 14)

Ideally it will be possible to serve the homes in the outlying areas with individual on-site systems, such as groundwater wells and conventional septic systems. These systems offer a low operation cost, while still providing a high level of service to the homeowner. Individual systems are dependant on site conditions. To determine if on-site systems can be used, each lot will need to be investigated. Based on a house count, conducted at the 65% alternative meeting, there are 26 homes that will require on-site investigations (shown on Figure 13.7).

Geotechnical Well Investigations

A test well will need to be drilled on each lot to determine if groundwater is available. To save overall equipment mobilization expense, a drill rig should be used to drill test wells at each residence in the outlying areas. Once a test well has been drilled, the driller should conduct a pump test to determine if an adequate, that is, 3 gpm, yield is available at the property. In addition, water quality tests should be done for each well. In particular, the water should be analyzed for coliform, nitrates, iron, manganese, and arsenic. High iron and manganese levels will affect taste and the aesthetic properties of the water. These constituents can be treated with conventional individual treatment units, like water softeners, pressure aeration followed by filtration, or reverse osmosis units.

Conventional Septic System Investigations

An on-site geotechnical investigation will evaluate the soil conditions at each residence to determine if conventional septic systems can be used for wastewater treatment and disposal. A crew will dig a test pit, and an engineer will perform an on-site percolation test and permafrost evaluation at each preferred septic system location. Percolation rates will determine if the soil is suitable for a drainfield, and will assist in determining the required size of the drainfield. Local equipment can be used to dig the test pits for the geotechnical investigation.

Based on the on-site investigations, the number of lots that are suitable for groundwater wells and conventional septic systems can be determined.

13.2 Phasing

The preferred alternatives for the water and wastewater improvements shall be constructed in eight separate phases. Phasing of these projects is done to:

- Keep the project fundable with available grant money
- Fit the length of the construction window in the summer and develop appropriate winter construction work tasks

LEGEND

— EXISTING SEWER LINE
━ PROPOSED SEWER LINE
- - - FORCE MAIN
● MANHOLE
■ LIFT STATION
← DIRECTION OF FLOW
▬ NEW SERIVCE CONNECTION

EXTENSION TO CIRCLE:
TOTAL GRAVITY PIPE = 5,580 FEET
TOTAL LIFT STATION(S) = 4
TOTAL SERVICE CONNECTIONS = 31

NOTE:
1— LOCATE LIFTSTATIONS TO MINIMIZE AESTHETIC IMPACTS TO HOME OWNERS AT THE BANK OF THE RIVER
2— ELEVATE LIFTSTAION PADS TO KEEP WET WELLS FROM FLOODING

0 150 300
SCALE IN FEET

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PREFERRED SEWER EXTENSION TO CIRCLE

Date
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Figure
13.6

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WATER AND SEWER FEASIBILITY STUDY

OUTLYING HOME INVESTIGATIONS

Date Dec. 2004

Figure 13.7

- Allow each phase to be functional and integrated into the existing system by the end of each construction season
- Match the amount of resources the community can supply to the project.

Based on recent construction records, crews were able to install 2,500 to 3,700 lineal feet of water mains and approximately 1,550 to 2,150 lineal feet of gravity sewer mains in a construction season. This will be used as the standard range to establish the amount of piping that can be completed during each phase. Residential service lines can be completed during winter if need be.

Project phasing was completed according to the order of importance provided by the Too'gha board:

1. Provide water and sewer service to the remaining downtown area
2. Relocate the community sewage lagoon
3. Extend water and sewer service along First Street to the Circle Subdivision
4. Provide service to homes in outlying areas

The downtown water and sewer extension will require approximately 5,220 feet of water main and 3,250 of sewer main. Based on the construction records for the current water and sewer installation, this installation will require two construction seasons to complete. The phases of construction for the water improvements are shown on Figure 13.8 and for the sewer improvements are shown on Figure 13.9.

Phase I of the system improvements includes the following:

- Connect the new piping to the existing water and sewer systems
- Upgrade the pumps at the existing WTP
- Install 2,445 LF of heated HDPE water main
- Install 1,310 LF of insulated HDPE gravity sewer main
- Install 10 new service connections

Phase II of the system improvements consists of the following:

- Install 2,775 LF of heated HDPE water main
- Install 1,940 LF of insulated HDPE gravity sewer main
- Install 10 new service connections

The second priority for the community is to relocate the sewage lagoon. The relocation of the lagoon will be Phase III of the community improvements. The relocation of the lagoon is shown on Figure 13.3.

Phase III of the system improvements includes the following features:

- Prepare a wildlife hazard assessment and drainage study for the proposed discharge area
- Negotiate and purchase land for the new sewage lagoon
- Obtain permission for wetland discharge on from FAA and DOT
- Obtain permits for seasonal discharge of the lagoon effluent to wetlands
- Construct an access road to the lagoon

- Install a force main to the new lagoon
- Construct a new sewage lagoon sized for 20-year design life

The next priority for the community is to provide piped water and sewer service along First Street, Albert's Alley, and to the Circle Subdivision. The total piping required is 9,750 lf of water main and 5,580 lf of sewer main. Based on construction records from the ongoing system construction, it will take approximately four construction seasons to extend the system to the Circle Subdivision. The phases of construction for the water improvements are shown on Figure 13.8 and for the sewer improvements are shown on Figure 13.9.

Phase IV of the system improvements consists of the following:
- 2,095 LF of heated HDPE water main
- 1,435 LF of insulated HDPE gravity sewer main
- 1 lift station
- 6 new service connections

Phase V of the system improvements includes the following:
- 2,895 LF of heated HDPE water main
- 1,650 LF of insulated HDPE gravity sewer main
- 2 lift stations
- 3 new service connections

Phase VI of the system improvements consists of the following:
- 2,635 LF of heated HDPE water main
- 1,420 LF of insulated HDPE gravity sewer main
- 14 new service connections

Phase VII of the system improvements consists of the following:
- 2,125 LF of heated HDPE water main
- 1,075 LF of insulated HDPE gravity sewer main
- 1 lift station
- 7 new service connections

The final area of the community that will need water and sewer service are the homes in the outlying areas along White Alice, Mission, and Site Roads. An individual on-site evaluation will determine the type of service that can be provided. Until the investigations have been completed, it is unknown how many groundwater wells and on-site conventional septic systems can be installed. The on-site investigations can be completed in conjunction with any of the above phases, as funding becomes available. For reporting purposes the investigations will be listed as Phase VIII. Once the investigations have been completed, Phase IX will install the systems where site conditions allow.

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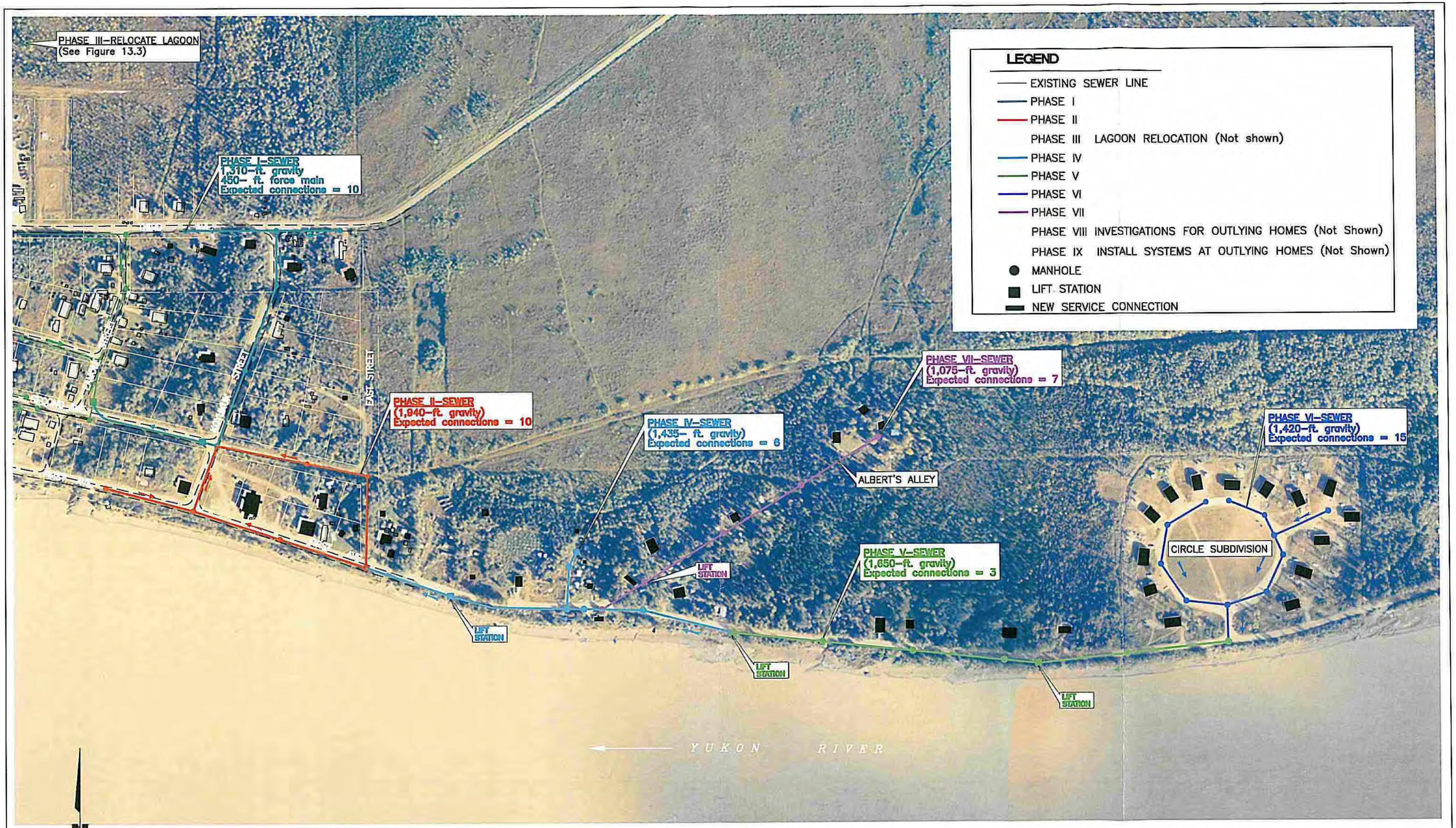
WATER AND SEWER FEASIBILITY STUDY
PHASED WATER SYSTEM IMPROVEMENTS

Date
Dec. 2004

Figure
13.8



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WATER AND SEWER FEASIBILITY STUDY
PHASED SEWER IMPROVEMENTS

Date
Dec. 2004

Figure
13.9

Phase VIII of the system improvements includes the following:

- Complete on-site investigations for each home in the outlying areas
- Drill test wells to evaluate groundwater conditions and the quantity and quality of available water
- Dig test pits to evaluate soil conditions for on-site conventional septic systems

Phase IX of the system improvements consists of the following:

- Install groundwater wells at outlying homes, where viable
- Install on-site septic systems at outlying homes, where viable

Table 13-4: Phased Improvement Plan

Phase	Description	Cost	Cumulative Total
Downtown Extension			
I	Extend water and sewer service along Third Street and begin installation along Koyukuk Street. Install force main and a lift station along Second Street to tie new sewer service into existing system.	$1,820,100	-
II	Extend water and sewer mains to remaining homes along Koyukuk, Second Avenue, and East Street. Begin installation along First Avenue.	$1,996,300	$3,816,400
	Subtotal for Downtown Extension	***$3,816,400***	
Relocate Community Sewage Lagoon			
III	Construct a new sewage lagoon north of town. Install additional force main pipe to convey waste from the sewage collection system to the new lagoon. Construct seasonal force main for effluent discharge to wetlands. Obtain discharge permits for seasonal wetlands discharge.	$2,409,200	$6,225,600
	Subtotal for Lagoon Relocation	***$2,409,200***	
Circle Subdivision Extension			
IV	Extend the piped water and sewer system from the end of the downtown expansion along First Street.	$1,753,500	$7,979,100
V	Extend the piped water and sewer system from the end Phase IV expansion along First Street.	$2,267,300	$10,246,400
VI	Extend the piped water and sewer system along First Street and around the Circle Subdivision.	$2,003,700	$12,250,100
VII	Extend the piped water and sewer system along Albert's Alley, connect to Phase IV.	$1,695,100	$13,945,200
	Subtotal for Circle Subdivision Extension	***$7,719,600***	
On-site Investigation for Outlying Homes			
VIII	*Perform exploratory drilling on individual property lots in outlying are to investigate installation of individual groundwater wells for water service. Complete on-site investigations for individual lots to test the soil conditions for installation of conventional septic systems.	$924,000	$14,869,200
IX	**Install on-site systems at outlying homes with suitable conditions	TBD	
	Subtotal for Outlying Home Investigations	***$924,000***	
	Cumulative System Improvement Costs	$14,869,200	

* This phase can be performed independently of previous phases, as funding becomes available.

** On-site systems will be installed in Phase IX where there are suitable site conditions. Cost for this phase is dependent on the number of homes able to support systems.

All costs included a 12% design cost, 10% construction management cost, and a 10% contingency cost.

13.3 Capital Cost Estimate

The following tables summarize the capital costs for the preferred alternatives. These costs have been updated to reflect the recent (2004 construction season) construction costs for installing piping infrastructure.

<u>Water and Sewer Piped Extension for Remaining Downtown Area (Phases I-II)</u>
The capital cost to install piped water and sewer to the remaining developed downtown area is estimated to be $3,816,300. This includes the mobilization and freight costs for all of the preferred alternatives. In addition, the permitting and SHPO costs for the preferred alternatives have been included in a lump sum in this cost estimate. Itemized capital costs for the downtown extension are shown in Table 13-5.

Table 13-5: Capital Costs for Pipe Water and Sewer Extension for the Downtown Area

Item	Quantity	Unit	Unit Price	Total
4" HDPE insulated circulating waterline (4" x 12")	5,220	LF	$244	$1,273,680
Upgrade WTP pumps and piping	1	LS	$65,000	$65,000
Buried service lines	1,425	LF	$95	$135,375
Household water plumbing	20	EA	$10,715	$214,300
Individual water circulation pump (pitorifice connection not used)	20	EA	$500	$10,000
Subtotal				**$1,698,355**

Item	Quantity	Unit	Unit Price	Total
8" insulated gravity sewer line (8" x 15")	3,250	LF	$244	$793,000
Buried service lines	1,425	LF	$95	$135,375
Creek crossing	1	LS	$50,000	$50,000
In-home plumbing improvements	20	EA	$10,715	$214,300
Subtotal				**$1,192,675**

Summary of Construction Costs

Total Water & Sewer Capital Costs		
Downtown Piped Water		$1,698,355
Downtown Piped Sewer		$1,192,675
Total Construction Costs		**$2,891,100**
Design Costs (12%)	0.12	$346,932
Construction Management (10%)	0.1	$289,110
Contingency (10%)	0.1	$289,110
Total Project Costs:		**$3,816,300**

Lagoon Relocation (Phase III)

The capital cost to construct a new community lagoon is estimated at $2,409,200. The itemized capital costs for the new lagoon are shown in Table 13-6.

Table 13-6: Capital Cost for New Community Sewage Lagoon

Item	Quantity	Unit	Unit Price	Total
Hazard assessment study and drainage study	1	LS	$100,000	$100,000
Site development	1	LS	$17,000	$17,000
Berm construction (in-place)	16,830	CY	$9	$151,470
Access road construction	1,600	LF	$275	$440,000
Force main pipe from old lagoon to new	1,700	LF	$244	$414,800
Force main discharge line to wetlands	2,565	LF	$75	$192,375
Lift station	1	EA	$250,000	$250,000
Misc. pipe discharge appurtenances	100	LF	$244	$24,400
Access signage	1	LS	$5,000	$5,000
Permit acquisition	1	LS	$20,000	$20,000
Land acquisition	7	Acre	$30,000	$210,000
Subtotal				**$1,825,045**

Summary Of Construction Costs

Total Sewage Lagoon Capital Costs		
New Community Sewage Lagoon		$1,825,045
Total Construction Costs		**$1,825,100**
Design Costs (12%)	0.12	$219,012
Construction Management (10%)	0.1	$182,510
Contingency (10%)	0.1	$182,510
Total Project Costs:		**$2,409,200**

Water and Sewer Piped Extension to Circle Subdivision (Phase IV-VII)

The capital cost to extend piped water and sewer service to the Circle Subdivision is estimated at $7,719,300. The itemized capital costs are shown in Table 13-7.

Table 13-7: Capital Costs for Piped Water and Sewer Extension to Circle Subdivision

Item	Quantity	Unit	Unit Price	Total
4" HDPE insulated circulating waterline (4" x 12")	9,750	LF	$244	$2,379,000
Buried service lines	2,250	LF	$95	$213,750
Household water plumbing	31	EA	$10,715	$332,165
Individual water circulation pump[1]	31	EA	$500	$15,500
Subtotal				**$2,940,415**

[1] Assumes velocity in pipe will require use of individual circulation pumps

Item	Quantity	Unit	Unit Price	Total
8" insulated gravity sewer line (8" x 15")	5,580	LF	$244	$1,361,520
Buried service lines	2,250	LF	$95	$213,750
Deep prepackage lift station (8' to 14' in depth)	4	EA	$250,000	$1,000,000
In-home plumbing improvements	31	EA	$10,715	$332,165
Subtotal				**$2,907,435**

Summary of Construction Costs

Total Capital Costs		
Circle Piped Water		$2,940,415
Circle Sewer Water		$2,907,435
Total Construction Costs		**$5,847,900**
Design Costs (12%)	0.12	$701,748
Construction Management (10%)	0.1	$584,790
Contingency (10%)	0.1	$584,790
Total Project Costs:		**$7,719,300**

Outlying Areas Investigations for Individual Wells and Septic Systems (Phase VIII)

The capital cost for individual on-site investigations for groundwater wells and septic systems is estimated at $924,000. The itemized capital costs are shown in Table 13-8.

Table 13-8: Capital Costs for Outlying Area Investigations

Item	Quantity	Unit	Unit Price	Total
On-site test drilling program	26	LS	$20,000	$520,000
Develop new water source[1]	10	LS	$5,000	$50,000
Geotechnical investigation	26	EA	5,000	$130,000
Subtotal				**$700,000**

[1]Based on 10 wells developed

Summary Of Construction Costs

Total Water Capital Costs		
Individual Water Well		$700,000
Total Construction Costs		**$700,000**
Design Costs (12%)	0.12	$84,000
Construction Management (10%)	0.1	$70,000
Contingency (10%)	0.1	$70,000
Total Project Costs:		**$924,000**

13.4 Estimated Annual Revenues and Revenue Sources

Too'gha charges residents for piped water and sewer service. The preferred alternatives will provide additional revenue by increasing the number of services hooked to the system. Currently, Too'gha charges residential properties $50/month for water service and $50/month for sewer service. Table 13-9 shows the expected revenue from the preferred alternatives. At this time, there are no additional commercial or industrial revenue sources that will be added when the system is extended.

Table 13-9: Projected Monthly Revenue Sources from Preferred Alternatives

Preferred Alternative Description	Number of New Services	Revenue/Service	Total Revenue/Month
Downtown Extension	20	$100	$2,000
New Lagoon	89	$0	$0
Circle Extension	31	$100	$3,100
Geotechnical Investigation	26	$0	$0
Total/Month			**$5,100**
Annual Total			**$61,200**

13.5 Annual Operation and Maintenance Costs

Annual operation and maintenance costs were calculated for each of the alternatives. Table 13-10 summarizes the project's O&M costs.

Table 13-10: Projected Increase of Operation and Maintenance Costs for Preferred Alternatives

Preferred Alternative Description	Projected monthly O&M increase	Projected annual O&M increase
Downtown Extension	$1,350	$16,100
New Lagoon*	$1,000	$11,800
Circle Extension	$1,550	$18,600
Geotechnical Investigation**	$0	$0
Total O&M Increase	**$3,900**	**$46,500**

*Based on O&M calculations for 6 hours of heat tape/day during winter months. These costs could increase if heat tape use is needed for longer durations.

** Costs for this alternative will be the responsibility of the homeowner.

13.6 Capital Cost per Home Served

Based on the capital costs developed for each of the preferred alternatives, a per service connection capital cost was calculated. Table 13-11 summarizes these calculations.

Table 13-11: Capital Cost per Home Served for Preferred Alternatives

Preferred Alternative Description	Estimate Capital Cost	Number of New Services	Capital Cost/Service
Downtown Extension	$3,816,300	20	$190,815
New Lagoon	$2,409,200	89	$27,070
Circle Extension	$7,719,300	31	$249,010
Geotechnical Investigation	$924,000	10	$92,400

Appendix A
Well Logs

Summary of [illegible]ana Borings

Boring Number	Location of hole	Setting	Date	Bottom P.F Boring Depth	PVC Pipe	Water Depth	TOP OF Frozen Soil	Fill Thickness	Organic Thickness	Top of Silt	Top of Sand/ Gravel
1	W. P. S./~30 ft. N of Airport Rd	Woodland	8/26/97	30.5 ft	30.0 ft	-	1.5 ft	-	1.0 ft	1.0 ft	12.5 ft
2	W. P. S./~120 ft. N of Airport Rd	Woodland	8/26/97	30.5 ft	30.0 ft	-	1.0 ft	-	4.5 ft	4.5 ft	13.5 ft
3	W. P. S./~140 ft. N of Airport Rd	Woodland	8/27/97	30.5 ft	30.0 ft	-	2.0 ft	-	1.5 ft	1.5 ft	13.5 ft
4	W. P. S./N shoulder of Airport Rd	Road shoulder	8/27/97	31.0 ft	31.0 ft	-	5.5 ft	2.5 ft	1.5 ft	4.0 ft	11.0 ft
5	W. P. S./~130 ft S of Airport Rd	Woodland	8/27/97	30.7 ft	30.0 ft	-	1.0 ft	-	1.0 ft	1.0 ft	14.5 ft
6	W. P. S./~50 ft S of Airport Rd	Woodland	8/28/97	20.5 ft	-	-	1.0 ft	-	1.5 ft	1.5 ft	12.0 ft
7	3rd & Mills, SW cor	Road shoulder	8/28/97	20.5 ft	*20.0 ft	-	4.0?/8.5	2.5 ft	1.5 ft	4.0 ft	6.0 ft
8	2nd & Mills, NW cor	Road shoulder	8/28/97	20.0 ft	*20.0 ft	-	6.0?/8.5	1.5 ft	1.5 ft	3.0 ft	6.0 ft
9	1st & Garden, 30 ft S	Gravel/Grass	8/28/97	21.5 ft	-	-	-	1.0 ft	-	1.0 ft	6.5 ft
10	1st & Mills, ~30 ft S	Park Grassland	8/28/97	21.0 ft	*21.0 ft**	18.0 ft	-	-	1.0 ft	1.0 ft	6.0 ft
11	1st @ school, S edge	Road shoulder	8/28/97	21.5 ft	21.0 ft**	20.5 ft	8.0-14.0	0.3 ft	1.7 ft	2.0 ft	7.0 ft
12	3rd @ ice rink, S edge	Road shoulder	8/29/97	21.0 ft	*21.0 ft	-	7.0 ft	2.2 ft	1.3 ft	3.5 ft	16.5 ft
13	3rd between City & Utility shops, S	Road shoulder	8/29/97	20.5 ft	*20.0 ft	-	8.0 ft	1.5 ft	1.0 ft	2.5 ft	11.0 ft
14	School St between 2nd & 3rd, 14 ft W	Grass	8/29/97	20.0 ft	20.0 ft**	-	6.5-9.0	-	1.5 ft	1.5 ft	11.5 ft
15	3rd between School & Mills, S edge	Road shoulder	8/29/97	20.5 ft	*20.0 ft	-	6.5 ft	1.0 ft	1.5 ft	2.5 ft	8.0 ft
16	Ist & Mills, NW cor	Road shoulder	8/29/97	20.5 ft	*20.0 ft	-	8.0 ft	0.5 ft	0.5 ft	1.0 ft	6.5 ft
17	Park & Garden, SE cor	Road shoulder	8/29/97	20.5 ft	*20.0 ft	-	5.0?/6.0	0.5 ft	0.5 ft	1.0 ft	7.0 ft
18	3rd & Garden, N edge	Road shoulder	8/29/97	15.0 ft	-	-	13.5 ft	2.5 ft	1.0 ft	3.5 ft	13.5 ft

ne = not encountered. *Top of PVC set below grade, covered with steel can. **Bottom 5 ft of pipe is slotted.

Duane Miller & Associates
Job No. 4135.02
September 1997

1397 986

WELL LOG

6/27/75 CLIFF ELLER
POWER PLANT WELL TANANA, ALASKA

0' - 1'	Tundra
1' - 12'	Frozen Silt
12' - 50'	Frozen Gravel
50' - 73'	Hard White Schist & Quartz
73' - 97'	White & Gray Schist
97' - 170'	" " "
170' - 175'	Damp Schist
175' - 215'	White & Gray Schist
215' - 218'	Broken Schist & Water
218' - 223'	Gray Shhist + Water

Well cased to 52' Static water level 155'
No Pump

'om WOLF

~~Well cased to~~ Dry Well

Well 1400.

1401 990

WELL LOG

6/25/75 N.C. Company
Well Location-Tanana, Alaska

0' - 3'	Silt & Wood
3' - 8'	Silt Frozen
8' - 34'	Gravel, Silt & Sand
34' - 45'	Water Bearing Gravel & Sand

Well cased to 45' Johnson Screen #50 slot
6" 10'long
Water static level 19' 10GPM no drawdown

LOG OF DRILLING by A & L DRILLING COMPANY

1

OWNER OF LAND Ekada

ADDRESS 10--6

WELL—SITE Tanana, Alaska

DATE—STARTED July 14, 1967

DATE—ENDED July 14, 1967

DEPTH OF WELL 51 feet

STATIC LEVEL OF WATER FT. 19

DRAW DOWN FT. 0

GALS. PER HR. 420

KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM 0	FT. TO 4	FT. Over Burden	FROM	FT. TO	FT.
FROM 4	FT. TO 33	FT. Perma Frost	FROM	FT. TO	FT.
FROM 33	FT. TO 37	FT. Gravel, Frozen	FROM	FT. TO	FT.
FROM 37	FT. TO 51	FT. Hard Pan, Frozen, Water	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM 51	FT. TO	FT. Sand, Gravel, Water, 7 gpm	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.

MISCL. INFORMATION:

Cased to 42'8"; not cased to full depth of well--water temperature--
32 degrees. Air developed 7 hours.
Well grouted to 10 feet.

PROJECT ENGINEER

DRILLER'S NAME

Block 7, Lot 1

LOG OF DRILLING by A & L DRILLING COMPANY

OWNER OF LAND Edgar Joseph

ADDRESS 17--24

WELL—SITE Tanana, Alaska

DATE—STARTED July 21, 1967

DATE—ENDED July 21, 1967

DEPTH OF WELL 65 feet

STATIC LEVEL OF WATER FT. dry

DRAW DOWN FT. dry

GALS. PER HR. dry

KIND OF CASING ------

KIND OF FORMATION:

FROM 0 FT. TO 1 FT. Over Burdon
FROM 1 FT. TO 6 FT. Clay
FROM 6 FT. TO 21 FT. Sand & Gravel
FROM 21 FT. TO 25 FT. Gravel
FROM 25 FT. TO 50 FT. Sand & Gravel
FROM 50 FT. TO 52 FT. Gravel
FROM 52 FT. TO 65 FT.
FROM FT. TO FT.
FROM FT. TO FT.
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FROM FT. TO FT.
FROM FT. TO FT.

MISCL. INFORMATION:

PROJECT ENGINEER

DRILLER'S NAME

Block 5, Lot 10

LOG OF DRILLING by A & L DRILLING COMPANY

8

OWNER OF LAND Pete Nicholia

ADDRESS 3' 07 B--23

WELL—SITE Tanana, Alaska

DATE—STARTED July 13, 1967

DATE—ENDED July 13, 1967

DEPTH OF WELL 75

STATIC LEVEL OF WATER FT. ----

DRAW DOWN FT. ----

GALS. PER HR. ----

KIND OF CASING ----

KIND OF FORMATION:

FROM 0	FT. TO 4	FT Over Burden	FROM	FT. TO	FT.
FROM 4	FT. TO 75	FT Perma Frost--dry	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.

MISCL. INFORMATION: Sand GRAVEL 44-68ft

DRY HOLE

Sand Stone 68-75

PROJECT ENGINEER

DRILLER'S NAME

Block 5; Lot 9

LOG OF DRILLING by A & L DRILLING COMPANY

#2
43

OWNER OF LAND Hudson Nicholia

ADDRESS 1 42--17

WELL—SITE Tanana, Alaska

DATE—STARTED August 20, 1967

DATE—ENDED August 20, 1967

DEPTH OF WELL 42 feet

STATIC LEVEL OF WATER FT. 0

DRAW DOWN FT. 15

GALS. PER HR. 1080

KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM	0	FT. TO	1	FT. Over Burden	FROM	FT. TO	FT.	
FROM	1	FT. TO	5	FT. Sand	FROM	FT. TO	FT.	
FROM	5	FT. TO	15	FT. Sand, Gravel	FROM	FT. TO	FT.	
FROM	✓ 15	FT. TO	18	FT. Sand, Gravel	FROM	FT. TO	FT.	
FROM	18	FT. TO	26	FT. Sand, Gravel	FROM	FT. TO	FT.	
FROM	26	FT. TO	35	FT. Coarse Sand,	FROM	FT. TO	FT.	
FROM		FT. TO		FT. Small Gravel	FROM	FT. TO	FT.	
FROM	35	FT. TO	36	FT. Sand & Gravel	FROM	FT. TO	FT.	
FROM	36	FT. TO	39	FT. Black Water, sand	FROM	FT. TO	FT.	
FROM	39	FT. TO	42	FT. Hard Pan	FROM	FT. TO	FT.	
FROM		FT. TO		FT.	FROM	FT. TO	FT.	
FROM		FT. TO		FT.	FROM	FT. TO	FT.	

MISCL. INFORMATION:

Well cased to 41'9". Casing perforated from 35'9" to 38'9".
Well grouted to 10 feet.

PROJECT ENGINEER

DRILLER'S NAME

Block G, Lot 14

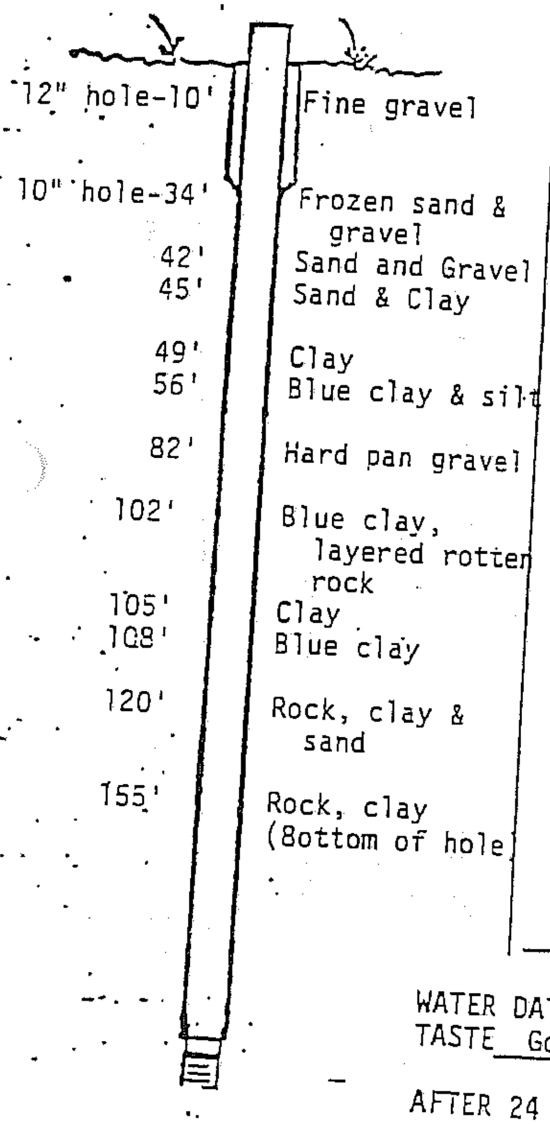
Hospital 2 - in use

'Hospital 2'

WELL LOG

U.S. PUBLIC HEALTH SERVICE, DIVISION OF INDIAN HEALTH

LOCATION PHS Hospital-Tanana, Alaska
DATE STARTED August 18, 1976
DATE COMPLETED August 28, 1976
CREW Bordner & Horner
TOTAL DEPTH OF WELL 155 FT.
CASING INSTALLED 97'
DIAMETER 8" & 6"
GROUT Bentonite
SCREEN SIZE #40
MFG. Johnson
39' - 49' bgs
LENGTH 10'
STATIC WATER LEVEL 25'-6"
HRS. PUMPED 20 @ 50 GPM
DRAWDOWN ____ FT.
DEVELOPMENT PROCEDURES Run surge blocks 8 hrs



DATE	DEPTH FROM - TO	FORMATION
	0-10'	Fine gravel
	10-34'	Frozen sand & gravel
	34-42'	Sand & gravel
	42-45'	Sand & gray clay
	45-49'	Gray clay
	49-56'	Blue clay silt
	56-82'	Hard pan gravel
	82-102'	Blue clay, layered rotten rock
	102-105'	Clay (purplish color)
	105-108'	Blue clay
	108-120'	Rock, clay (gray) & sand
	120-155'	Rock, clay (bottom of hole)

WATER DATA FIELD TEST
TASTE Good
APPEARANCE FRESH Good
AFTER 24 HOURS ____
IRON ____
CHLORIDES ____
TDS ____
ALKALINITY ____
pH ____

SPECIAL NOTES:

See attached drawing.

Native Council Well

... can be used.

Well # 2 (actually #1)

LOG OF DRILLING by A & L DRILLING COMPANY

OWNER OF LAND Community Well
ADDRESS Front Street
WELL—SITE Tanana, Alaska
DATE—STARTED August 28, 1967
DATE—ENDED August 28, 1967

DEPTH OF WELL 49 feet
STATIC LEVEL OF WATER FT 22
DRAW DOWN FT 10
GALS. PER HR. 360
KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM	0	FT. TO	1	FT.	Over Burden
FROM	1	FT. TO	8	FT.	Sand
FROM	8	FT. TO	18	FT.	Sand & Gravel
FROM	18	FT. TO	22	FT.	Coarse Sand & Gravel
FROM	22	FT. TO	23	FT.	Large Gravel, Sand
FROM	23	FT. TO	31	FT.	Coarse Sand & Gravel
FROM	31	FT. TO	36	FT.	Water Sand & Gravel
FROM	36	FT. TO	42	FT.	Water Sand, Fine
FROM	42	FT. TO	49	FT.	Rock

MISCL. INFORMATION:

Well cased to 42 feet 6 inches. Casing perforated from 34'6" to 39'6". Well grouted to 10 feet.

PROJECT ENGINEER
DRILLER'S NAME

City Well #2

1 of 2

CITY WELL #3 (NEW)
In use. -200' from well house.

Project # NOD-2-91 JOB # AN-70-U3U

ICE WATER WELL, INC.

P.O. Box 10529
FAIRBANKS, ALASKA 99710
(907) 457-6444

(1991)

P.H.S.

WELL LOG

Well Owner City of tanana 9-6-91 Date Started 9-11-91 Date Finished

Well Location TAnAnA AK Driller Ice Water Well Inc.

Mailing Address P.H.S. Anch. AK Tac Time N/A To N/A

Size of Casing 6" Steel Depth of Hole 50 Cased To 38'

Static Water Level 27' 11" Drawdown to 33' 6" Finish of Well Screen

Well Pump Test at 15 fifteen Gallons per minute for Ten Hours

Formations Encountered:

0	to 10	Silt
10	to 25	Silty Gravel
25	to 36	Sandy Gravel
36	to 46	Large Water Bearing Gravel
46	to 50	Bed Rock
	to	
	to	Well Screened 38 to 50
	to	# 40 Slot Stainles Steel
	to	Well Capped w/steel plate 9-11-91

Pump Installation:

Date Installed *Test Pump* Type Goulds 18EM Size 1 1/2 HP

Removed after test pumping was complete

Material Used:

6" Pipe
6" Shoe
10' #40 Slot Screen + 2' Blank 5' Stinger
K Packer NeoPream
Bentonite Seal

New City Well #3

LOCATED BLOC - 6
LOT 10

WELL LOG

U.S. PUBLIC HEALTH SERVICE, DIVISION OF INDIAN HEALTH

LOCATION TANANA ALASKA / JUDY SOMMERS DATE STARTED 3/22/81
DATE COMPLETED 3/24/81 DRILLER PETE ARCHIBALD / GLENN FOWLE
TOTAL DEPTH OF WELL 52 FT. CASING INSTALLED 52 DIAMETER 6"
GROUT CEMENT BENTONITE SCREEN SIZE 20 SLOT MFG. JOHNSON LENGTH 5'
STATIC WATER LEVEL 31 HRS. PUMPED 12 @ 20 GPM DRAWDOWN 72" FT.

DEPTH	HOLE DIAMETER	CASING DIAMETER	FORMATION
0 - 2'			FROZEN SILT
2' - 20'			SAND
20' - 50'			GRAVELS
0' - 52'			BLUE CLAY

SOIL DATA TO 15 FT.
FEET THAWED
BOTTOM OF FROST & MATERIAL 2'
SEASONAL OR PERMA FROST SEASONAL

WATER DATA FIELD TEST
TASTE NO IRON TASTE
APPEARANCE FRESH GOOD
AFTER 24 HOURS NO VISUAL TRACE OF IRO
IRON
CHLORIDES
TDS

PUMP TEST 31' - STATIC LEVEL
PUMPING LEVEL 45' @ 20 GPM
AFTER HRS.

HIGHEST RECOMMENDED PUMP RATE
WILL STATIC LEVEL CHANGE WITH
TIDES OR FROST

Judy Sommers We

DEVELOP PROCEDURE SURGE BLOCK

ESTIMATED MAN HOURS FOR DRILLING 40 HRS HOURS FOR TOTAL JOB 40 HRS

CREW PETE ARCHIBALD / GLENN FOWLER

17

50

LOG OF DRILLIN A & L DRILLING COMPANY

OWNER OF LAND Walter Nicholia

ADDRESS 36--13

WELL—SITE Tanana, Alaska

DATE—STARTED August 9, 1967

DATE—ENDED August 9, 1967

DEPTH OF WELL 50 feet

STATIC LEVEL OF WATER FT. 18

DRAW DOWN FT. 17

GALS. PER HR. 1800

KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM 0 FT. TO 2 FT. Over Burden

FROM 2 FT. TO 10 FT. Sand

FROM 10 FT. TO 15 FT. Small Gravel, Sand

FROM 15 FT. TO 20 FT. Large Gravel, Sand

FROM 20 FT. TO 41 FT. Small Gravel, Sand

FROM FT. TO FT.

FROM 41 FT. TO 47 FT. Water, Sand

FROM 47 FT. TO 50 FT. Sand Stone

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

MISCL. INFORMATION:

Well cased to 49'9". Casing perforated from 42'9" to 46'9".
Well grouted to 10 feet.

PROJECT ENGINEER

DRILLER'S NAME

Block 6, Lot 11

Block 7, Lot 2

45

LOG OF DRILLING by A & L DRILLING COMPANY

OWNER OF LAND Episcopal Residence

ADDRESS Episcopal Residence

WELL—SITE Tanana, Alaska

DATE—STARTED August 23, 1967

DATE—ENDED August 23, 1967

DEPTH OF WELL 43 feet

STATIC LEVEL OF WATER FT. 14

DRAW DOWN FT. 10

GALS. PER HR. 1600

KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM 0 FT. TO 2 FT. Over Burden

FROM 2 FT. TO 15 FT. Sand

FROM 15 FT. TO 18 FT. Sand & Gravel

FROM 18 FT. TO 25 FT. Coarse Sand, Small Gravel

FROM FT. TO FT.

FROM 25 FT. TO 28 FT. Large Gravel, Sand

FROM FT. TO FT.

FROM 28 FT. TO 34 FT. Sand & Gravel

FROM 34 FT. TO 42 FT. Water Sand

FROM 42 FT. TO 43 FT. Clay

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

MISCL. INFORMATION:

Well cased to 42 feet 10 inches. Casing perforated from 36'10" to 39'10". No Grout.

PROJECT ENGINEER

DRILLER'S NAME

Block 7, Lot 2

WELL LOG

U.S. PUBLIC HEALTH SERVICE, DIVISION OF INDIAN HEALTH

.TION Tanana, City Well #2 DATE STARTED March 17, 1981

COMPLETED March 20, 1981 DRILLER Archibald

AL DEPTH OF WELL 48 FT. CASING INSTALLED 44 DIAMETER 6"

T Bentowite SCREEN SIZE 40 MFG. Johnson LENGTH 5 feet

TIC WATER LEVEL 32 feet HRS. PUMPED ______ @ 10 GPM DRAWDOWN 43-1/2" FT.

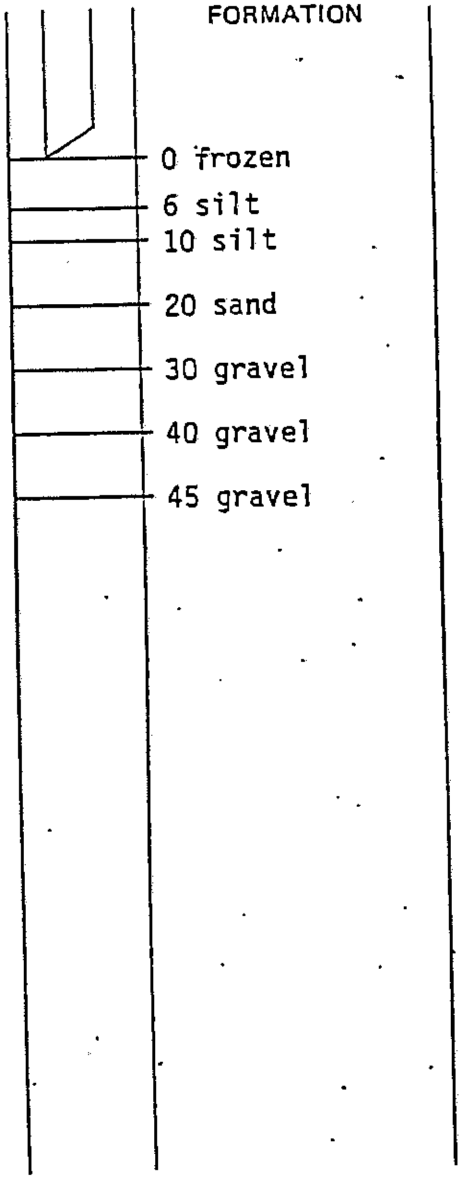
DEPTH

HOLE DIAMETER

CASING DIAMETER

FORMATION

rch 20, 1981



0 frozen

6 silt

10 silt

20 sand

30 gravel

40 gravel

45 gravel

feet top --
creen

SOIL DATA TO 15 FT.

FEET THAWED ______

BOTTOM OF FROST & MATERIAL 6 feet

SEASONAL OR PERMA FROST ______

WATER DATA FIELD TEST

TASTE Iron

APPEARANCE FRESH yes

AFTER 24 HOURS yes

IRON 3 ppm

CHLORIDES ______

TDS ______

PUMP TEST 32 feet - STATIC LEVEL

PUMPING LEVEL 42 feet @ 10 GPM

AFTER 12 HRS.

HIGHEST RECOMMENDED PUMP RATE

WILL STATIC LEVEL CHANGE WITH

TIDES ______ OR FROST ______

-LOP PROCEDURE ______

-'MATED MAN HOURS FOR DRILLING ______ HOURS FOR TOTAL JOB ______

EW Archibald

WELL LOG

'Hospital 2'

U.S. PUBLIC HEALTH SERVICE, DIVISION OF INDIAN HEALTH

LOCATION PHS Hospital-Tanana, Alaska DATE STARTED August 18, 1976

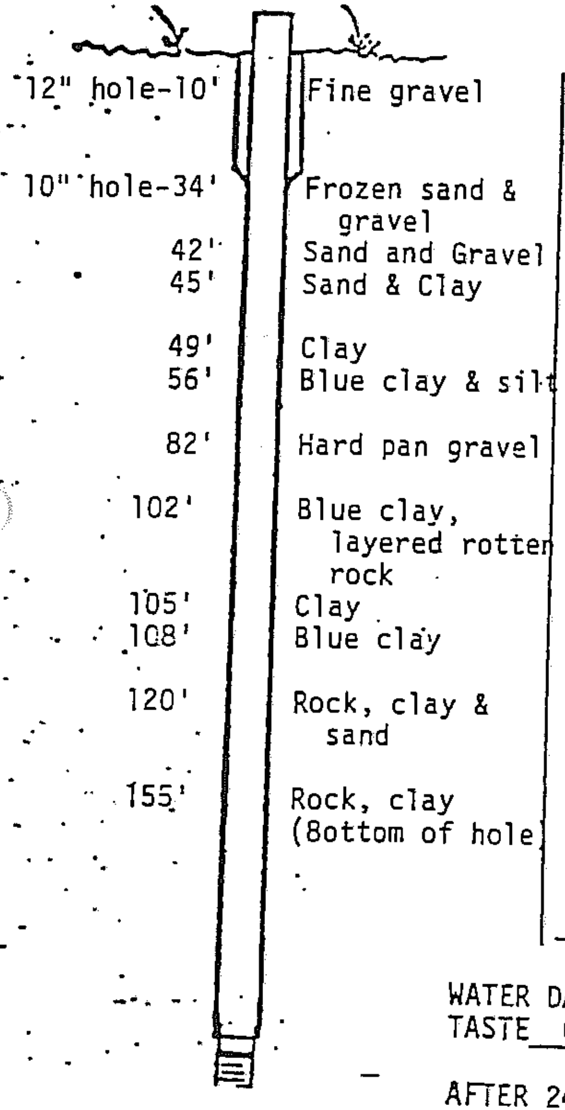
DATE COMPLETED August 28, 1976 CREW Bordner & Horner

TOTAL DEPTH OF WELL 155 FT. CASING INSTALLED 97' DIAMETER 8" & 6"

GROUT Bentonite SCREEN SIZE #40 MFG. Johnson 39'-49' bgs LENGTH 10'

STATIC WATER LEVEL 25'-6" HRS. PUMPED 20 @ 50 GPM DRAWDOWN ____ FT.

DEVELOPMENT PROCEDURES Run surge blocks 8 h



DATE	DEPTH FROM - TO	FORMATION
	0-10'	Fine gravel
	10-34'	Frozen sand & gravel
	34-42'	Sand & gravel
	42-45'	Sand & gray clay
	45-49'	Gray clay
	49-56'	Blue clay silt
	56-82'	Hard pan gravel
	82-102'	Blue clay, layered rotten rock
	102-105'	Clay (purplish color)
	105-108'	Blue clay
	108-120'	Rock, clay (gray) & sand
	120-155'	Rock, clay (bottom of hole)

WATER DATA FIELD TEST

TASTE Good APPEARANCE FRESH Good

AFTER 24 HOURS ____ IRON ____ CHLORIDES ____

TDS ____ ALKALINITY ____ pH ____

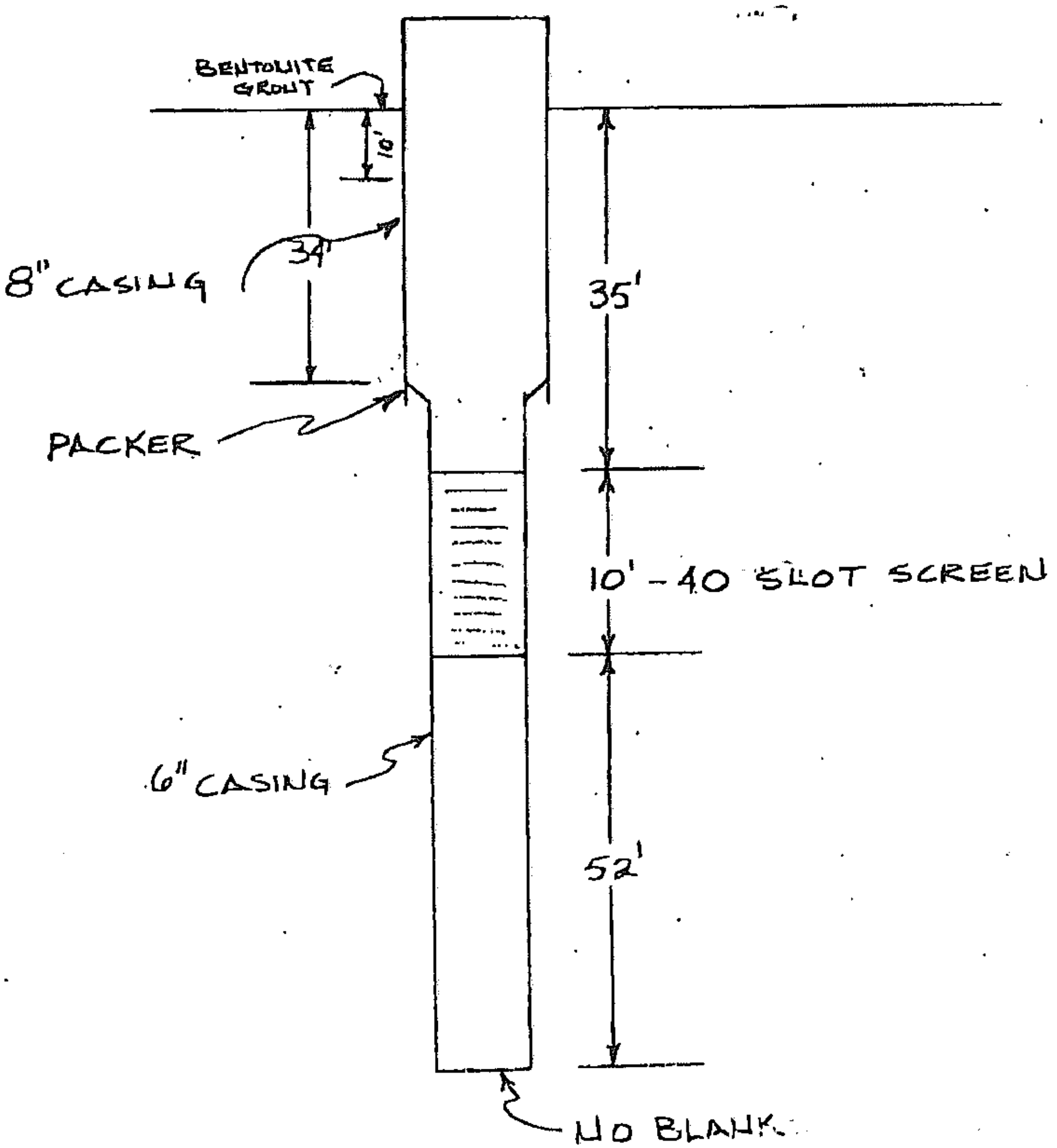
SPECIAL NOTES:

See attached drawing.

Native Council Well

NATIVE COUNCIL WELL

* DRAWING REFERRED TO
BY THE WELL LOG



DEPTH OF WELL = 155 FT
CASING ONLY TO 97 FT (PULLED BACK FROM 155 FT)
REMAINDER OF HOLE FROM 97 FT TO 155 FT FILLED W/ CUTTINGS

SOURCE! MARCH 1977
WATER WELL ANALYSIS
SANITATION FACILITIES CONSTRUCTION
TANANA, ALASKA
PROJECT # AN-76-621R

Native Council Well

WELL LOG

U.S. PUBLIC HEALTH SERVICE, DIVISION OF INDIAN HEALTH

LOCATION PHS Hospital-Tanana, Alaska **DATE STARTED** August 18, 1976

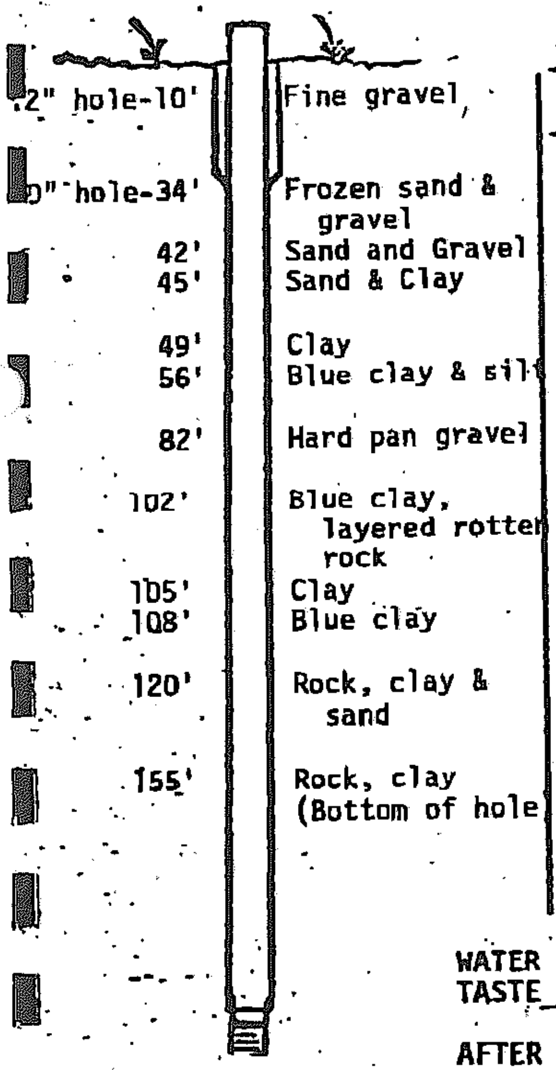
DATE COMPLETED August 28, 1976 **CREW** Bordner & Horner

TOTAL DEPTH OF WELL 155 **FT.** **CASING INSTALLED** 97' **DIAMETER** 8" & 6"

GROUT Bentonite **SCREEN SIZE** #40 **MFG.** Johnson **LENGTH** 10'

STATIC WATER LEVEL 25'-6" **HRS. PUMPED** 20 @ 50 **GPM** **DRAWDOWN** ______ **FT.**

DEVELOPMENT PROCEDURES Run surge blocks 8 hrs



DATE	DEPTH FROM - TO	FORMATION
	0-10'	Fine gravel
	10-34'	Frozen sand & gravel
	34-42'	Sand & gravel
	42-45'	Sand & gray clay
	45-49'	Gray clay
	49-56'	Blue clay silt
	56-82'	Hard pan gravel
	82-102'	Blue clay, layered rotten rock
	102-105'	Clay (purplish color)
	105-108'	Blue clay
	108-120'	Rock, clay (gray) & sand
	120-155'	Rock, clay (bottom of hole)

WATER DATA FIELD TEST

TASTE Good **APPEARANCE** **FRESH** Good

AFTER 24 HOURS ______ **IRON** ______ **CHLORIDES** ______

TDS ______ **ALKALINITY** ______ **pH** ______

SPECIAL NOTES:

See attached drawing. *

In 1970 Well rehabilitated. In well house, east of Garden St. Can be used.
Well #2 (actually #1)

City Well #2

LOG OF DRILLING by A & L DRILLING COMPANY 52

OWNER OF LAND Community Well
ADDRESS Front Street
WELL—SITE Tanana, Alaska
DATE—STARTED August 28, 1967
DATE—ENDED August 28, 1967

DEPTH OF WELL 49 feet
STATIC LEVEL OF WATER FT. 22
DRAW DOWN FT. 10
GALS. PER HR. 360
KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM	0	FT. TO	1	FT.	Over Burden	FROM FT. TO	FT.
FROM	1	FT. TO	8	FT.	Sand	FROM FT. TO	FT.
FROM	8	FT. TO	18	FT.	Sand & Gravel	FROM FT. TO	FT.
FROM	18	FT. TO	22	FT.	Coarse Sand & Gravel	FROM FT. TO	FT.
FROM		FT. TO		FT.		FROM FT. TO	FT.
FROM	22	FT. TO	23	FT.	Large Gravel, Sand	FROM FT. TO	FT.
FROM	23	FT. TO	31	FT.	Coarse Sand & Gravel	FROM FT. TO	FT.
FROM		FT. TO		FT.		FROM FT. TO	FT.
FROM	31	FT. TO	36	FT.	Water Sand & Gravel	FROM FT. TO	FT.
FROM		FT. TO		FT.		FROM FT. TO	FT.
FROM	36	FT. TO	42	FT.	Water Sand, Fine	FROM FT. TO	FT.
FROM	42	FT. TO	49	FT.	Rock	FROM FT. TO	FT.

MISCL. INFORMATION:

Well cased to 42 feet 6 inches. Casing perforated from 34'6" to 39'6". Well grouted to 10 feet.

PROJECT ENGINEER
DRILLER'S NAME

1 of 2

CITY WELL #3 (NEW)
In use. 200' from well house.

Project # NOD-2-91 JOB # AN-70-050

ICE WATER WELL, INC.

P.O. Box 10529
FAIRBANKS, ALASKA 99710
(907) 457-6444

(1991)

P.H.S.

WELL LOG

Well Owner City of tanana 9-6-91 Date Started 9-11-91 Date Finished

Well Location Tanana AK Driller Ice Water Well Inc.

Mailing Address P.H.S. Anch. AK Tac Time N/A To N/A

Size of Casing 6" Steel Depth of Hole 50 Cased To 38'

Static Water Level 27' 11" Drawdown to 33' 6" Finish of Well Screen

Well Pump Test at 15 fifteen Gallons per minute for Ten Hours

Formations Encountered:

0 to 10 Silt

10 to 25 Silty Gravel

25 to 36 Sandy Gravel

36 to 46 Large water Bearing Gravel

46 to 50 Bed Rock

to

to Well Screened 38 to 50

to #40 Slot Stainless Steel

to Well Capped w/steel plate 9-11-91

Pump Installation:

Date Installed *Test Pump* Type Goulds 18EM Size 1 1/2 HP

Removed after test pumping was complete

Material Used:

6" pipe

6" Shoe

10' #40 Slot Screen + 2' Blank 5' Stinger

K packer Neo Pream

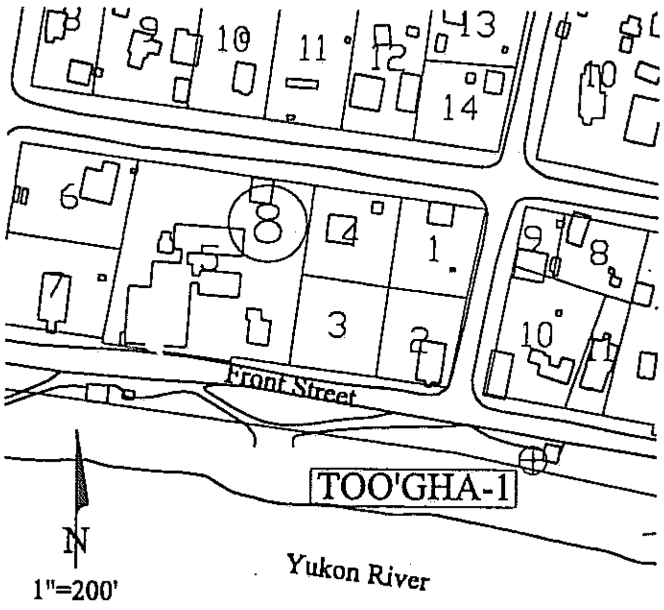
Bentonite Seal

New City Well #3

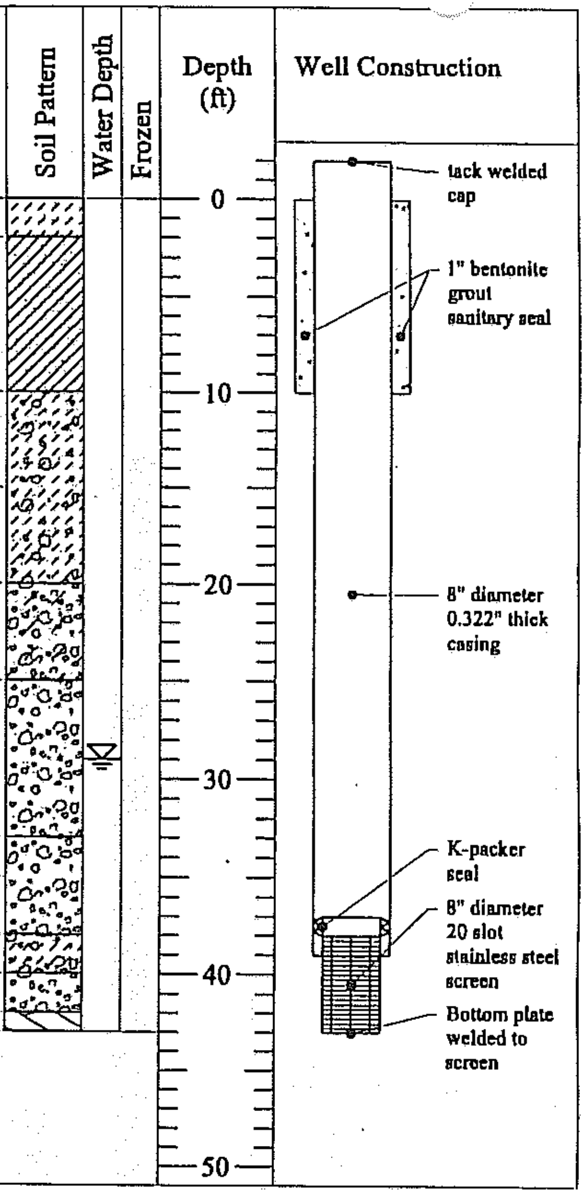
WELL LOG TOO'GHA-1

Project:	Too'gha Water Source		
Location:	Tanana, Alaska		
Site:	Adjacent to existing city well		
Date:	27/28 June 1998		
Client:	Too'gha Inc.		
Engineer:	Eric Gropp PE , Montgomery Watson		
Driller:	Alpine Drilling		
Rig Type:	Air Rotary		
Boring Size:	8"	Elevation:	96 ft

Site Map



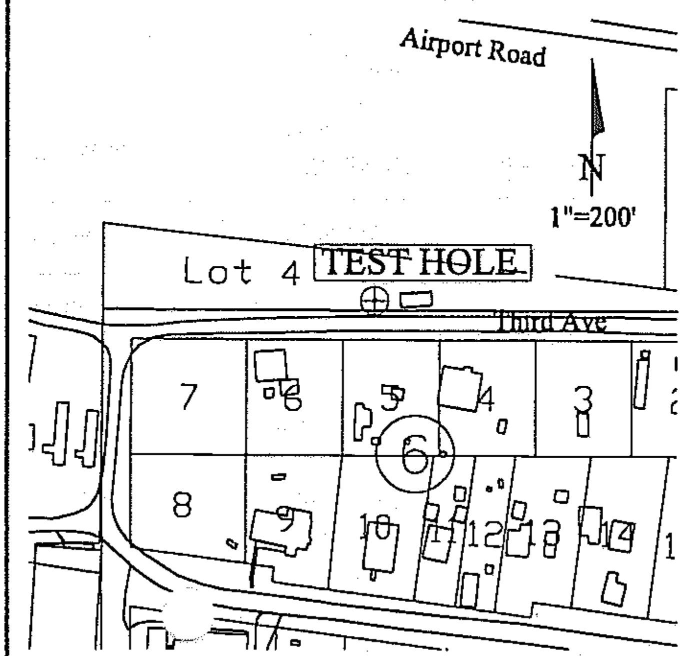
% Gravel	% Sand	% Fines	Max. Size (in)	Soil Class	Soil Description
					Silty sand
0	50	50	-	ML	Brown Sandy Silt, dry
30	40	30	1/4"	SM	Silty Sand with Gravel, dry
30	50	20	1/2	SM	Silty Sand with Gravel, dry
50	40	10	1/4	GW-GM	Well Graded Gravel with silt and sand, dry
80	20	0	1-1/2	GW	Well Graded Gravel with sand, moist
95	5	0	1	GW	Well Graded Gravel, moist
95	5	0	3/4	GW	Well Graded Gravel, water bearing
90	5	5	1 3/4	GW	Well Graded Gravel with trace silt and sand
35	65	0	3/4	SW	Well Graded Sand with gravel, significant water production
					Bedrock
					Bottom of hole



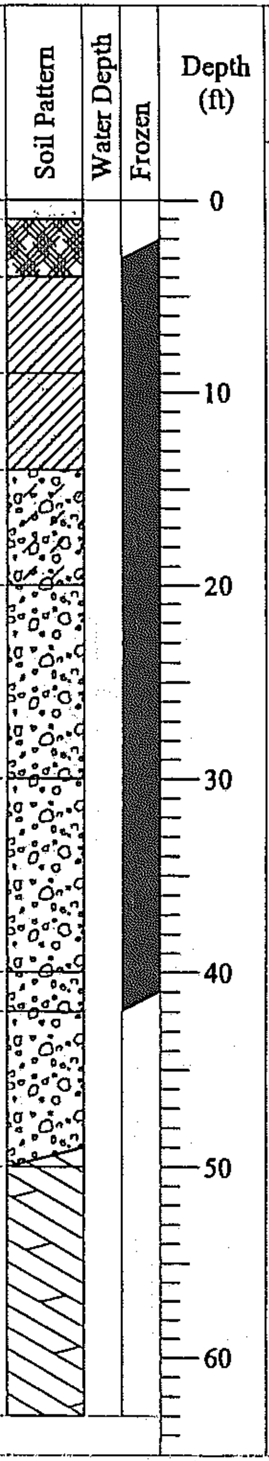
WELL LOG TH-3

Project:	Too'gha Water Source		
Location:	Tanana, Alaska		
Site:	West end of Third Avenue		
Date:	27 June 1998		
Client:	Too'gha Inc.		
Engineer:	Eric Gropp PE , Montgomery Watson		
Driller:	Alpine Drilling		
Rig Type:	Air Rotary		
Boring Size:	6"	Elevation:	96 ft

Site Map



% Gravel	% Sand	% Fines	Max. Size (in)	Soil Class	Soil Description
					Sand & Gravel Fill
					Organics
5	5	90	1/2	ML	Brown Silt, ice rich
25	25	50	1	ML	Brown Sandy Silt with Gravel
50	30	20	1/2	GM	Silty Gravel with sand
70	30	0	3/4	GW	Well Graded Gravel with sand
85	15	0	1 1/4	GW	Well Graded Gravel with sand and trace silt
100	0	0	1	GW	Gravel
100	0	0	2	GW	Gravel
					Bedrock Bottom of hole No water encountered



Well Construction

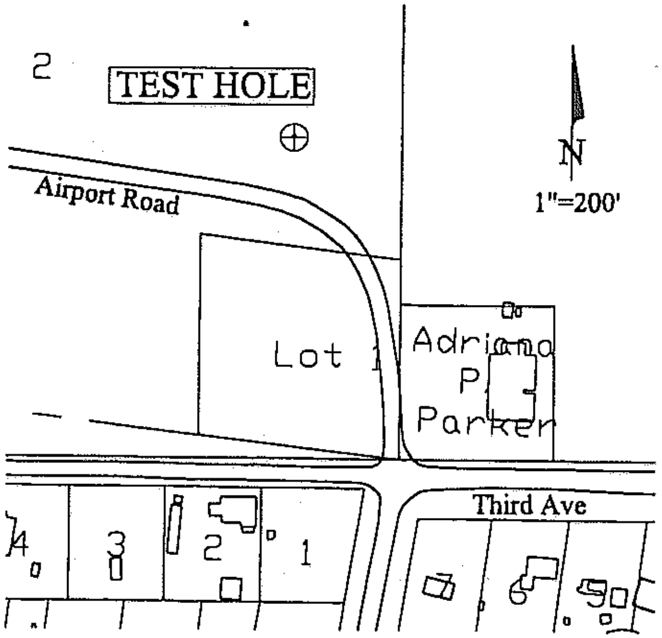
Dry hole.
Well not constructed.

Hole abandoned with bentonite grout.

WELL LOG TH-2

Project:	Too'gha Water Source
Location:	Tanana, Alaska
Site:	SE Corner of Water Plant Lot
Date:	26 June 1998
Client:	Too'gha Inc.
Engineer:	Eric Gropp PE , Montgomery Watson
Driller:	Alpine Drilling
Rig Type:	Air Rotary
Boring Size:	6"
Elevation:	100 ft

Site Map



% Gravel	% Sand	% Fines	Max. Size (in)	Soil Clas	Soil Description
					Sand & Gravel Fill
					Organics, woody
0	0	100	1/4	ML	Brown Silt, some organics, ice rich, <5% sub-angular gravel
0	0	100	1/4	ML	Grey-brown Silt, ice rich
0	0	100	1/4	ML	Grey-brown Silt
70	15	15	1/4	GM	Silty Gravel with sand
95	5	0	1/2	GW	Well Graded Gravel with few sands and trace silt
95	5	0	1/2	GW	Well Graded Gravel with few sands and trace silt
95	5	0	1/2	GW	Well Graded Gravel with few sands and trace silt
95	5	0	1/2	GW	Well Graded Gravel with few sands and trace silt
					Bedrock Bottom of hole No water encountered

Soil Pattern | Water Depth | Frozen

Depth (ft): 0, 10, 20, 30, 40, 50, 60

Well Constructi

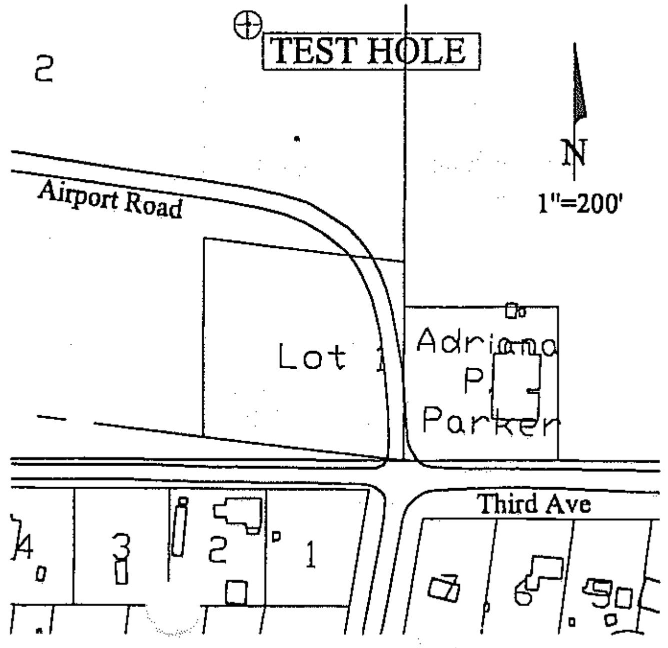
Frozen, dry hole.
Well not constructed.

Hole abandoned with bentonite grout.

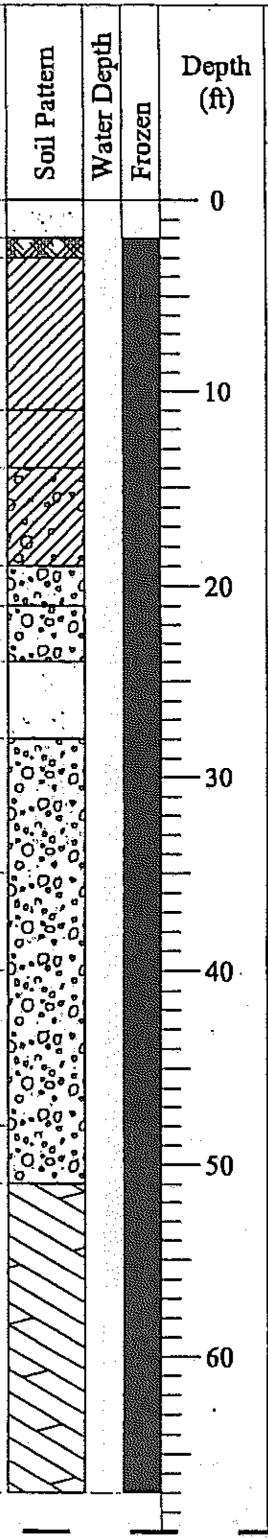
WELL LOG TH-1

Project:	Too'gha Water Source		
Location:	Tanana, Alaska		
Site:	Adjacent to proposed water plant		
Date:	25 June 1998		
Client:	Too'gha Inc.		
Engineer:	Eric Gropp PE , Montgomery Watson		
Driller:	Alpine Drilling		
Rig Type:	Air Rotary		
Boring Size:	8"	Elevation:	100 ft

Site Map



% Gravel	% Sand	% Fines	Max. Size (in)	Soil Class	Soil Description
					Sand & Gravel Fill
					Organics
5	15	80	1/2	ML	Brown Silt, some organics, ice rich, <5% sub-angular gravel
5	5	90	1/2	ML	Grey Silt, ice rich, <5% sub-angular gravel
25	15	60	3/8	ML	Gravelly Silt with sand
50	30	20	1/2	GM	Silty Gravel with sand
70	15	15	1/2	GM-GW	Well Graded Gravel with silt and sand
30	40	30	1/4	SM	Silty Sand with gravel
70	20	10	1/2	GM-GW	Well Graded Gravel with silt and sand
60	30	10	1/2	GW-GM	Well Graded Fravel with silt and sand
65	30	5	1/2	GW	Well Graded Gravel with sand and trace silt
75	20	5	1/2	GW	Well Graded Gravel with sand and trace silt
					Bedrock Bottom of hole No water encountered



Well Construction

Frozen, dry hole.
Well not constructed.

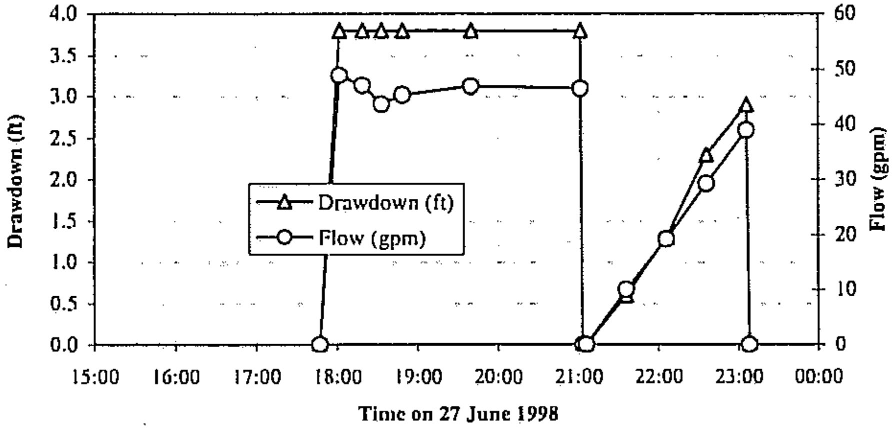
Casing installed, but could not be pulled. Hole abandoned with bentonite grout.

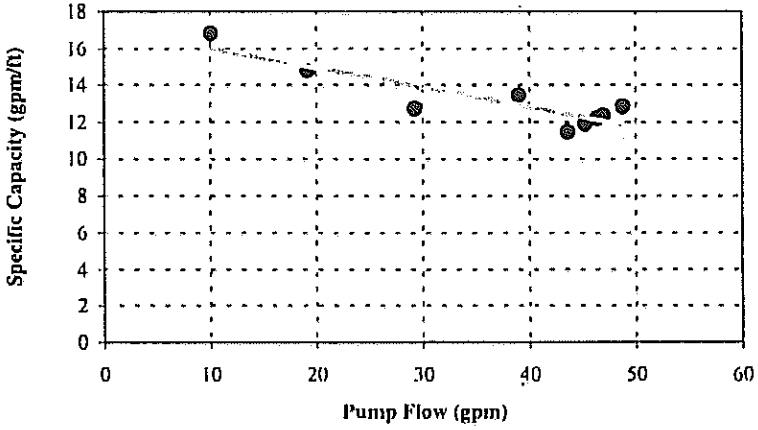
WELL TEST LOG

Project	Too'gha Water Source
Client	Too'gha Inc.
Engineer	Eric Gropp PE
Driller	Alpine Drilling

Date:	06/28/98
Location	Tanana, Alaska
Well	New community water supply, adjacent to existing city well

	Time	Meter	Water Level			Flow			
	27-Jun-98	gal	Below Top Of Casing (ft)	Below Ground (ft)	Drawdown (ft)	Volume (gal)	Time Elapsed (min)	Flow (gpm)	Specific Capacity (gpm/ft)
Long Term Drawdown Test	17:47	201975	25.3	23.3	0.0			0.00	
	18:02	202707	29.1	27.1	3.8	732	15	48.8	12.8
	18:19	203505	29.1	27.1	3.8	798	17	46.9	12.4
	18:33	204115	29.1	27.1	3.8	610	14	43.6	11.5
	18:49	204839	29.1	27.1	3.8	724	16	45.3	11.9
	19:40	207227	29.1	27.1	3.8	2388	51	46.8	12.3
	21:02	211030	29.1	27.1	3.8	3803	82	46.4	12.2
Step Drawdown Test	21:03	211030	25.3	23.3	0.0	0	1	0.0	
	21:06	211030	25.3	23.3	0.0	0	3	0.0	
	21:36	211333	25.9	23.9	0.6	303	30	10.1	16.8
	22:06	211909	26.6	24.6	1.3	576	30	19.2	14.8
	22:36	212786	27.6	25.6	2.3	877	30	29.2	12.7
	23:06	213956	28.2	26.2	2.9	1170	30	39.0	13.4
	23:08	213956	25.3	23.3	0.0	0	2	0.0	





LOG OF DRILLING by A & L DRILLING COMPANY

10

OWNER OF LAND Ehada

ADDRESS 10--6

WELL—SITE Tanana, Alaska

DATE—STARTED July 14, 1967

DATE—ENDED July 14, 1967

DEPTH OF WELL 51 feet

STATIC LEVEL OF WATER FT. 19

DRAW DOWN FT. 8

GALS. PER HR. 420

KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM 0	FT. TO 4	FT. Over Burden	FROM	FT. TO	FT.
FROM 4	FT. TO 33	FT. Perma Frost	FROM	FT. TO	FT.
FROM 33	FT. TO 37	FT. Gravel, Frozen	FROM	FT. TO	FT.
FROM 37	FT. TO 51	FT. Hard Pan, Frozen, Water	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM 51	FT. TO	FT. Sand, Gravel, Water, 7 gpm	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.

MISCL. INFORMATION:

Cased to 42'8"; not cased to full depth of well--water temperature--
32 degrees. Air developed 7 hours.
Well flooded to 10 feet.

PROJECT ENGINEER

DRILLER'S NAME

Block 7, Lot 1

1397

986 ✓

WELL LOG

6/27/75
CLIFF ELLER
POWER PLANT WELL TANANA, ALASKA

0' - 1'	Tundra
1' - 12'	Frozen Silt
12' - 50'	Frozen Gravel
50' - 73'	Hard White Schist & Quartz
73' - 97'	White & Gray Schist
97' - 170'	" " "
170' - 175'	Damp Schist
175' - 215'	White & Gray Schist
215' - 218'	Broken Schist & Water
218' - 223'	Gray Shhist + Water

Well cased to 52' Static water level 155'
No Pump

---

om WOLF

~~Well cased to~~

Dry Well

Well 1400.

1401

990 ✓

WELL LOG

6/25/75
N.C. Company
Well Location-Tanana, Alaska

0' - 3'	Silt & Wood
3' - 8'	Silt Frozen
8' - 34'	Gravel, Silt & Sand
34' - 45'	Water Bearing Gravel & Sand

Well cased to 45' Johnson Screen #50 slot
6" 10'long
Water static level 19' 10GPM no drawdown

LOCATED BLOC - 6
LOT 10

WELL LOG

U.S. PUBLIC HEALTH SERVICE, DIVISION OF INDIAN HEALTH

LOCATION TANANA ALASKA / JUDY SOMMERS DATE STARTED 3/22/81

DATE COMPLETED 3/24/81 DRILLER PETE ARCHIBALD / GLENN FOWLER

TOTAL DEPTH OF WELL 52 FT. CASING INSTALLED 52 DIAMETER 6"

GROUT CEMENT BENTONITE SCREEN SIZE 20 SLOT MFG. JOHNSON LENGTH 5'

STATIC WATER LEVEL 31 HRS. PUMPED 12 @ 20 GPM DRAWDOWN 72" FT.

DEPTH	HOLE DIAMETER	CASING DIAMETER	FORMATION
0 - 2'			FROZEN SILT
2' - 20'			SAND
20' - 50'			GRAVELS
0' - 52'			BLUE CLAY

SOIL DATA TO 15 FT.
FEET THAWED
BOTTOM OF FROST & MATERIAL 2'
SEASONAL OR PERMA FROST SEASONAL

WATER DATA FIELD TEST
TASTE NO IRON TASTE
APPEARANCE FRESH GOOD
AFTER 24 HOURS NO VISUAL TRACE OF IRON
IRON
CHLORIDES
TDS

PUMP TEST 31' - STATIC LEVEL
PUMPING LEVEL 49' @ 20 GPM
AFTER HRS.

HIGHEST RECOMMENDED PUMP RATE
WILL STATIC LEVEL CHANGE WITH
TIDES OR FROST

Judy Sommers We

DEVELOP PROCEDURE SURGE BLOCK

ESTIMATED MAN HOURS FOR DRILLING 40 HRS HOURS FOR TOTAL JOB 40 HRS

CREW PETE ARCHIBALD / GLENN FOWLER

Block 7, Lot 2

LOG OF DRILLING by A & L DRILLING COMPANY

45

OWNER OF LAND Episcopal Residence

ADDRESS Episcopal Residence

WELL—SITE Tanana, Alaska

DATE—STARTED August 23, 1967

DATE—ENDED August 23, 1967

DEPTH OF WELL 43 feet

STATIC LEVEL OF WATER FT. 18

DRAW DOWN FT. 10

GALS. PER HR. 1600

KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM 0 FT. TO 2 FT. Over Burden

FROM 2 FT. TO 15 FT. Sand

FROM 15 FT. TO 18 FT. Sand & Gravel

FROM 18 FT. TO 25 FT. Coarse Sand, Small Gravel

FROM FT. TO FT.

FROM 25 FT. TO 28 FT. Large Gravel, Sand

FROM FT. TO FT.

FROM 28 FT. TO 34 FT. Sand & Gravel

FROM 34 FT. TO 42 FT. Water Sand

FROM 42 FT. TO 43 FT. Clay

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

FROM FT. TO FT.

MISCL. INFORMATION:

Well cased to 42 feet 10 inches. Casing perforated from 36'10" to 39'10". No Grout.

PROJECT ENGINEER

DRILLER'S NAME

Block 7, Lot 2

17

50

Block 6, Lot 11

LOG OF DRILLIN y A & L DRILLING COMPANY

OWNER OF LAND Walter Nicholia
ADDRESS 36--13
WELL—SITE Tanana, Alaska
DATE—STARTED August 9, 1967
DATE—ENDED August 9, 1967

DEPTH OF WELL 50 feet
STATIC LEVEL OF WATER FT. 18
DRAW DOWN FT. 17
GALS. PER HR. 1800
KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM 0	FT. TO 2	FT. Over Burden		FROM	FT. TO	FT.
FROM 2	FT. TO 10	FT. Sand		FROM	FT. TO	FT.
FROM 10	FT. TO 15	FT. Small Gravel, Sand		FROM	FT. TO	FT.
FROM 15	FT. TO 20	FT. Large Gravel, Sand		FROM	FT. TO	FT.
FROM 20	FT. TO 41	FT. Small Gravel, Sand		FROM	FT. TO	FT.
FROM	FT. TO	FT.		FROM	FT. TO	FT.
FROM 41	FT. TO 47	FT. Water, Sand		FROM	FT. TO	FT.
FROM 47	FT. TO 50	FT. Sand Stone		FROM	FT. TO	FT.
FROM	FT. TO	FT.		FROM	FT. TO	FT.
FROM	FT. TO	FT.		FROM	FT. TO	FT.
FROM	FT. TO	FT.		FROM	FT. TO	FT.
FROM	FT. TO	FT.		FROM	FT. TO	FT.
				FROM	FT. TO	FT.

MISCL. INFORMATION:

Well cased to 49'9". Casing perforated from 42'9" to 46'9".
Well grouted to 10 feet.

PROJECT ENGINEER

DRILLER'S NAME

LOG OF DRILLING by A & L DRILLING COMPANY

17

OWNER OF LAND Edgar Joseph

ADDRESS 17--24

WELL—SITE Tanana, Alaska

DATE—STARTED July 21, 1967

DATE—ENDED July 21, 1967

DEPTH OF WELL 65 feet

STATIC LEVEL OF WATER FT. dry

DRAW DOWN FT. dry

GALS. PER HR. dry

KIND OF CASING ------

KIND OF FORMATION:

FROM 0	FT. TO 1	FT. Over Burdon	FROM	FT. TO	FT.
FROM 1	FT. TO 6	FT. Clay	FROM	FT. TO	FT.
FROM 6	FT. TO 21	FT. Sand & Gravel	FROM	FT. TO	FT.
FROM 21	FT. TO 25	FT. Gravel	FROM	FT. TO	FT.
FROM 25	FT. TO 50	FT. Sand & Gravel	FROM	FT. TO	FT.
FROM 50	FT. TO 52	FT. Gravel	FROM	FT. TO	FT.
FROM 52	FT. TO 65	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.
FROM	FT. TO	FT.	FROM	FT. TO	FT.

MISCL. INFORMATION:

PROJECT ENGINEER

DRILLER'S NAME

Block 5, Lot 10

LOG OF DRILLING by A & L DRILLING COMPANY 8

OWNER OF LAND Pete Nicholia

ADDRESS 3' B--29

WELL—SITE Tanana, Alaska

DATE—STARTED July 13, 1967

DATE—ENDED July 13, 1967

DEPTH OF WELL 75

STATIC LEVEL OF WATER FT. ---

DRAW DOWN FT. ----

GALS. PER HR. ----

KIND OF CASING ----

KIND OF FORMATION:

FROM	0	FT. TO	4	FT.	Over Burden	FROM		FT. TO		FT.	
FROM	4	FT. TO	75	FT.	Perma Frost--dry	FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	

MISCL. INFORMATION: Sand Gravel 44-68 ft

DRY HOLE

Sand Stone 68-75

PROJECT ENGINEER

DRILLER'S NAME

Block 5, Lot 9

LOG OF DRILLING by A & L DRILLING COMPANY

OWNER OF LAND Hudson Nicholia

ADDRESS 1 42--17

WELL—SITE Tanana, Alaska

DATE—STARTED August 20, 1967

DATE—ENDED August 20, 1967

DEPTH OF WELL 42 feet

STATIC LEVEL OF WATER FT. 8

DRAW DOWN FT. 15

GALS. PER HR. 1080

KIND OF CASING 6 5/8" O.D.

KIND OF FORMATION:

FROM	0	FT. TO	1	FT.	Over Burden	FROM		FT. TO		FT.	
FROM	1	FT. TO	5	FT.	Sand	FROM		FT. TO		FT.	
FROM	5	FT. TO	15	FT.	Sand, Gravel	FROM		FT. TO		FT.	
FROM	15	FT. TO	18	FT.	Sand, Gravel	FROM		FT. TO		FT.	
FROM	18	FT. TO	26	FT.	Sand, Gravel	FROM		FT. TO		FT.	
FROM	26	FT. TO	35	FT.	Coarse Sand, Small Gravel	FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM	35	FT. TO	36	FT.	Sand & Gravel	FROM		FT. TO		FT.	
FROM	36	FT. TO	39	FT.	Black Water, sand	FROM		FT. TO		FT.	
FROM	39	FT. TO	42	FT.	Hard Pan	FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	
FROM		FT. TO		FT.		FROM		FT. TO		FT.	

MISCL. INFORMATION:

Well cased to 41'9". Casing perforated from 35'9" to 38'9".
Well grouted to 10 feet.

PROJECT ENGINEER

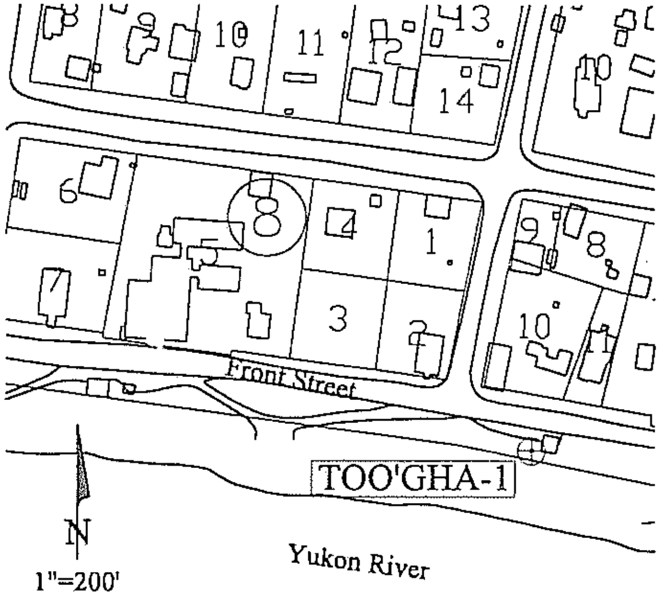
DRILLER'S NAME

Block G, Lot 14

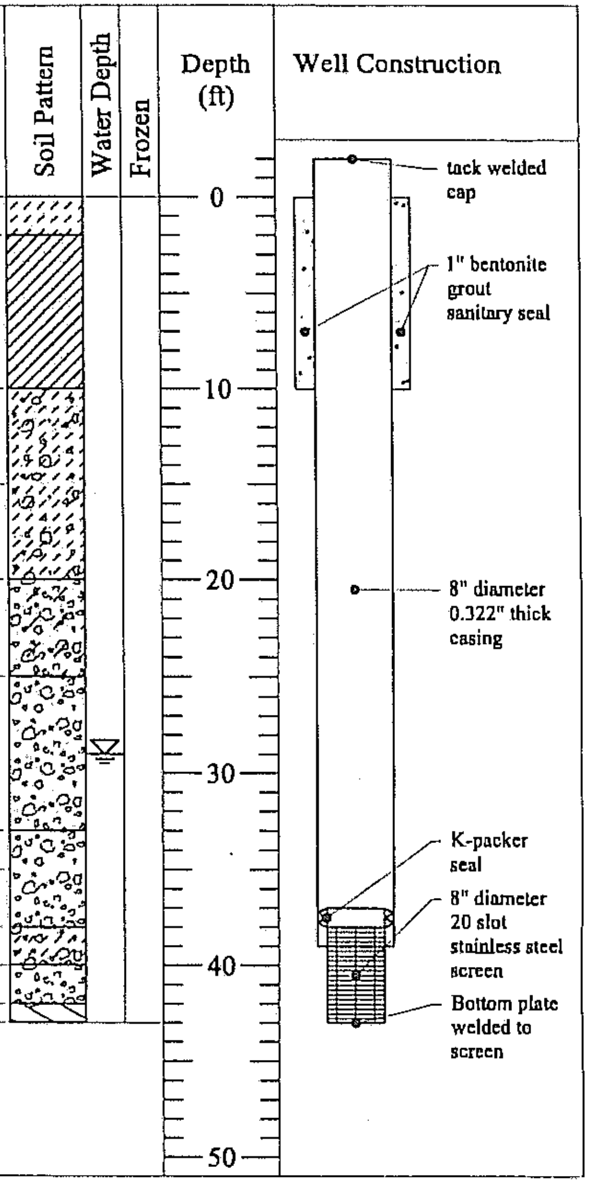
WELL LOG TOO'GHA-1

Project:	Too'gha Water Source		
Location:	Tanana, Alaska		
Site:	Adjacent to existing city well		
Date:	27/28 June 1998		
Client:	Too'gha Inc.		
Engineer:	Eric Gropp PE , Montgomery Watson		
Driller:	Alpine Drilling		
Rig Type:	Air Rotary		
Boring Size:	8"	Elevation:	96 ft

Site Map



% Gravel	% Sand	% Fines	Max. Size (in)	Soil Class	Soil Description
					Silty sand
0	50	50	-	ML	Brown Sandy Silt, dry
30	40	30	1/4"	SM	Silty Sand with Gravel, dry
30	50	20	1/2	SM	Silty Sand with Gravel, dry
50	40	10	1/4	GW-GM	Well Graded Gravel with silt and sand, dry
80	20	0	1-1/2	GW	Well Graded Gravel with sand, moist
95	5	0	1	GW	Well Graded Gravel, moist
95	5	0	3/4	GW	Well Graded Gravel, water bearing
90	5	5	1 3/4	GW	Well Graded Gravel with trace silt and sand
35	65	0	3/4	SW	Well Graded Sand with gravel, significant water production
					Bedrock Bottom of hole



Appendix B

Water Quality Laboratory Results

Table 2 - Too'gha (1st & Garden) Well
Raw Water Quality Testing Results

	MCL	Units	Date of Samples					Average
			31-Jul-98	27-Aug-98	17-Feb-00	9-Mar-00	16-Aug-00	
Inorganic Contaminants								
Antimony	0.006	mg/l	0.005			<MRL		
Arsenic	0.05	mg/l	0.005			<MRL		
Barium	2	mg/l	0.123			0.278		0.201
Beryllium	0.004	mg/l	0.0005			<MRL		
Cadmium	0.005	mg/l	0.0005			<MRL		
Chromium	0.1	mg/l	0.005			<MRL		
Cyanide	0.2	mg/l	0.01			<MRL		
Fluoride	4	mg/l	0.287					
Mercury by Cold Vapor	0.002	mg/l	0.0002			0.0002		
Nickel	0.1	mg/l	0.02			<MRL		
Nitrate as Nitrogen	10	mg/l	0.35			1.61		0.98
Nitrite as Nitrogen	1	mg/l	<MRL					
Selenium	0.05	mg/l	0.005			<MRL		
Thallium	0.002	mg/l	0.0015			<MRL		
Volatile Organic Compounds (> MRL)								
Total Petroleum Hydrocarbons		mg/l			3.03			
Benzene	5	µg/l		0.80	4.3	2.88	1.06	2.26
sec-Butylbenzene		µg/l			0.52	0.41	1.25	0.73
Dichlorodifluoromethane		µg/l		1.71	4.3	3.38		3.13
Trichlorofluoromethane		µg/l		0.98	6.29	4.13	1.88	3.32
Secondary Contaminants								
Chloride	250	mg/l	8.4			36.6		22.5
Color, Apparent	15	PCU	30			20	<5	16.7
Copper	1	mg/l	0.01			<MRL		
Fluoride	2	mg/l	0.287			0.2		0.24
Foaming Agents	2	mg/l	<MRL			<MRL		
Iron	0.3	mg/l	0.502		1.23	1.35	4.34	1.86
Manganese	0.05	mg/l	0.355			0.511	0.429	0.432
Odor (threshold odor number)	3	T.O.N.	4			2		3
pH	6.5-8.5		7.02			7.1		7.06
Sodium	250	mg/l	14.3			32.3		23.3
Sulfate	250	mg/l	31			33.6		32.3
Total Dissolved Solids	500	mg/l	348			770	350	489
Zinc	5	mg/l	0.02			<MRL		
Other Contaminants								
Turbidity	5	NTU	2.6			6.6		4.6
Total Coliform Bacteria		col/100ml	0			< 2		
Hardness as $CaCO_3$		mg/l	330		680		326	445
Alkalinity at $CaCO_3$		mg/l			636	641	292	523
Langlier Index @ 40 °F			-0.33			0.5		
Langlier Index @ 140 °F			0.75					
Total Organic Carbon								
Diesel Range Organics		mg/l				<MRL	<MRL	
Aluminum	0.2	mg/l	0.1			<MRL		
Calcium		mg/l				193		
Lead	0.015	mg/l	0.005					
Silver	0.1	mg/l	0.002			<MRL		

Above the MCL: ▨

No test conducted: ▨

Table 3 - Mill Street (3rd & Mill) Well
Raw Water Quality Testing Results

	MCL	Units	Date of Samples			Average
			4/20/00	30-Aug-00	5-Sep-00	
Inorganic Contaminants						
Antimony	0.006	mg/l	<MRL	<MRL	<MRL	
Arsenic	0.05	mg/l	0.004	<MRL	<MRL	
Barium	2	mg/l	0.364	0.318	0.331	0.34
Beryllium	0.004	mg/l	<MRL	<MRL	<MRL	
Cadmium	0.005	mg/l	<MRL	0.0001	<MRL	
Chromium	0.1	mg/l	▨	<MRL	<MRL	
Cyanide	0.2	mg/l	<MRL	<MRL	<MRL	
Mercury by Cold Vapor	0.002	mg/l	<MRL	<MRL	<MRL	
Nickel	0.1	mg/l	<MRL	0.01	<MRL	
Nitrate as Nitrogen	10	mg/l	0.98	0.66	0.24	0.63
Selenium	0.05	mg/l	<MRL	<MRL	<MRL	
Thallium	0.002	mg/l	<MRL	<MRL	<MRL	
Volatile Organic Compounds (> MRL)						
Total Petroleum Hydrocarbons		mg/l	<MRL	<MRL	<MRL	
Benzene	5	µg/l	<MRL	<MRL	<MRL	
sec-Butylbenzene		µg/l	<MRL	<MRL	<MRL	
Dichlorodifluoromethane		µg/l	<MRL	<MRL	<MRL	
Trichlorofluoromethane		µg/l	<MRL	<MRL	<MRL	
Secondary Contaminants						
Chloride	250	mg/l	5.03	4.99	4.69	4.90
Color, Apparent	15	PCU	90		70	80
Copper	1	mg/l	<MRL	<MRL	<MRL	
Fluoride	2	mg/l	0.15	0.17	0.2	0.17
Foaming Agents	2	mg/l	▨	▨	<MRL	
Iron	0.3	mg/l	3.17	3.11	3.16	3.15
Manganese	0.05	mg/l	0.708	0.965	1.03	0.90
Odor (threshold odor number)	3	T.O.N.	4	2	4	3.3
pH	6.5-8.5		7	7.2	7	7.1
Sodium	250	mg/l	11.8	▨	8.3	10.1
Sulfate	250	mg/l	39.5	38	34.6	37.4
Total Dissolved Solids	500	mg/l	610	552	534	565
Zinc	5	mg/l	0.015	0.01	0.016	0.014
Other Contaminants						
Turbidity	5	NTU	▨	26.6	6.71	16.7
Total Coliform Bacteria		col/100ml	<2	▨	▨	
Hardness as $CaCO_3$		mg/l	▨	545	518	532
Alkalinity at $CaCO_3$		mg/l	552	483	472	502
Magnesium		mg/l	▨	41	39.6	40.3
Langlier Index @ 40 °F			0.3	0.44	0.24	0.33
Diesel Range Organics		mg/l	▨	▨	▨	
Aluminum	0.2	mg/l	<MRL	<MRL	<MRL	
Calcium		mg/l	163	151	154	156
Lead	0.015	mg/l	▨	▨	▨	
Silver	0.1	mg/l	<MRL	<MRL	<MRL	

Above the MCL: ░

No test conducted: ▨

Water Quality Results

Project: **Too'gha Water Source** Sample Date: **31 Jul 1998 &**
Location: **New Too'gha Well on Front Street** **27-Aug-98 (VOC)**

Test	Parameter	Units	Result	MCL
Inorganic Contaminants				
EPA 200.9	Arsenic	mg/l	<MDL	0.05
EPA 200.9	Antimony	mg/l	<MDL	0.006
EPA 200.7	Barium	mg/l	0.123	2
EPA 200.9	Beryllium	mg/l	<MDL	0.004
EPA 200.9	Cadmium	mg/l	<MDL	0.005
EPA 200.9	Chromium	mg/l	<MDL	0.1
EPS 335.4	Cyanide	mg/l	<MDL	0.2
EPA 300.0	Fluoride	mg/l	0.287	4
EPA 245.1	Mercury by Cold Vapor	mg/l	<MDL	0.002
EPA 200.7	Nickel	mg/l	<MDL	0.1
EPA 200.9	Selenium	mg/l	<MDL	0.05
EPA 200.9	Thallium	mg/l	<MDL	0.002
Secondary Contaminants				
EPA 200.7	Aluminum	mg/l	<MDL	0.2
EPA 300.0	Chloride	mg/l	8.4	250
SM18 2120B	Color	PCU	30	15
EPA 200.7	Copper	mg/l	<MDL	1
EPA 200.0	Fluoride	mg/l	0.287	2
SM14 203	Langlier Index @ 40 °F		-0.33	
SM14 203	Langlier Index @ 140 °F		0.75	
EPA 200.7	Iron	mg/l	0.502	0.3
EPA 200.7	Manganese	mg/l	0.355	0.05
SM2150B	Odor	T.O.N.	4	3
EPA 150.1	pH		7.02	6.5-7.5
EPA 200.9	Silver	mg/l	<MDL	0.1
EPA 200.7	Sodium	mg/l	14.3	250
EPA 300.0	Sulfate	mg/l	31	250
SM 2540C	Total Dissolved Solids	mg/l	348	500
EPA 200.7	Zinc	mg/l	<MDL	5
Other Contaminants				
EPA 200.9	Lead	mg/l	<MDL	0.015
EPA 180.1	Turbidity	NTU	2.6	-
SM19 2340B	Hardness as $CaCO_3$	mg/l	330	-
SM18 9222B	Total Coliform	col/100ml	0	-
EPA 300.0	Nitrite-N	mg/l	<MRL	-
EPA 300.0	Nitrate-N	mg/l	0.35	-
SM 5440C	Foaming Agents	mg/l	<MRL	-
Volatile Organic Compounds > MRL				
EPA 524.2	Benzene	µg/l	0.80	5
EPA 524.2	Dichlorodifluoromethane	µg/l	1.71	-
EPA 524.2	Trichlorofluoromethane	µg/l	0.98	-

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Village Safe Water
555 Cordova
Anchorage, AK 99501

Attn: Lynn Marino

Phone: (907) 269-7602
Fax: (907) 269-7509

Report Date: 1/30/01
Date Arrived: 1/24/01
Date Sampled: 1/20/01
Time Sampled: 8:45:00 AM
Sampled By: RD

COC #: 23260
NTL Lab#: F201932
Sample Matrix: Water
Location/Project: Pilot Test-Tanana
Client Sample ID 01-20-TW

TW = TREATED WATER

MRL = Method Reporting Limit

Flag Definitions
B = Below Regulatory Minimum
H = Above Regulatory Maximum
M = Matrix Interference
* = Less Than Reporting Limit

Comments:
**pH was run past EPA 24 hour holding time per client request.

Method	Parameter	Result	Units	Flag	MRL	Analysis Date
SM2330-B	Langelier Index	0.410	unit			1/29/01
SM 2540-C	Total Dissolved Solids	550	mg/L	H	35.0	1/25/01
SM 4500-H-B	pH	7.22	unit			1/24/01
EPA 200.7	Calcium	146	mg/L		0.04	1/26/01
EPA 200.7	Iron	< MRL	mg/L	*	0.008	1/26/01
EPA 200.7	Manganese	< MRL	mg/L	*	0.005	1/26/01
EPA 200.9	Arsenic	0.005	mg/L		0.004	1/30/01

Jeremy Nicoll

Reported by Jeremy Nicoll
Fairbanks Chemistry Supervisor

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Village Safe Water
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Anchorage, AK 99501

Attn: Lynn Marino

Phone: (907) 269-7602
Fax: (907) 269-7509

COC #: 23260
NTL Lab#: F201932
Sample Matrix: Water
Location/Project: Pilot Test-Tanana
Client Sample ID 01-20-TW

Report Date: 1/30/01
Date Arrived: 1/24/01
Date Sampled: 1/20/01
Time Sampled: 8:45:00 AM
Sampled By: RD

MRL = Method Reporting Limit

Flag Definitions
B = Below Regulatory Minimum
H = Above Regulatory Maximum
M = Matrix Interference
* = Less Than Reporting Limit

Comments:
**pH was run past EPA 24 hour holding time per client request.

Method	Parameter	Result	Units	Flag	MRL	Analysis Date
EPA 200.7	Hardness as CaCO3	521	mg/L		0.2	1/26/01
EPA 300.0	Nitrate-N	1.79	mg/L		0.03	1/24/01
SM 2320-B	Alkalinity as CaCO3	446	mg/L		15.0	1/25/01

Jeremy Nicoll

Reported by Jeremy Nicoll
Fairbanks Chemistry Supervisor

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Village Safe Water
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Anchorage, AK 99501

Attn: Lynn Marino

Phone: (907) 269-7602
Fax: (907) 269-7509

COC #: 23259
NTL Lab#: F201933
Sample Matrix: Water
Location/Project: Pilot Test-Tanana
Client Sample ID 01-22-TW

Report Date: 1/30/01
Date Arrived: 1/24/01
Date Sampled: 1/22/01
Time Sampled: 2:30:00 PM
Sampled By: RD

MRL = Method Reporting Limit

Flag Definitions
B = Below Regulatory Minimum
H = Above Regulatory Maximum
M = Matrix Interference
* = Less Than Reporting Limit

Comments:
**pH was run past EPA 24 hour holding time per client request.

Method	Parameter	Result	Units	Flag	MRL	Analysis Date
SM2330-B	Langelier Index	0.350	unit			1/29/01
SM 2540-C	Total Dissolved Solids	522	mg/L	H	35.0	1/25/01
SM 4500-H-B	pH	7.17	unit			1/24/01
EPA 200.7	Calcium	142	mg/L		0.04	1/26/01
EPA 200.7	Iron	0.013	mg/L		0.008	1/26/01
EPA 200.7	Manganese	0.334	mg/L	H	0.005	1/26/01
EPA 200.9	Arsenic	< MRL	mg/L	*	0.004	1/30/01

Reported by Jeremy Nicoll
Fairbanks Chemistry Supervisor

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Attn: Lynn Marino

Phone: (907) 269-7602
Fax: (907) 269-7509

COC #: 23259
NTL Lab#: F201933
Sample Matrix: Water
Location/Project: Pilot Test-Tanana
Client Sample ID 01-22-TW

Report Date: 1/30/01
Date Arrived: 1/24/01
Date Sampled: 1/22/01
Time Sampled: 2:30:00 PM
Sampled By: RD

MRL = Method Reporting Limit

Flag Definitions
B = Below Regulatory Minimum
H = Above Regulatory Maximum
M = Matrix Interference
* = Less Than Reporting Limit

Comments:
**pH was run past EPA 24 hour holding time per client request.

Method	Parameter	Result	Units	Flag	MRL	Analysis Date
EPA 200.7	Hardness as CaCO3	507	mg/L		0.2	1/26/01
SM 2320-B	Alkalinity as CaCO3	442	mg/L		15.0	1/25/01

Reported by Jeremy Nicoll
Fairbanks Chemistry Supervisor

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Attn: Lynn Marino

Phone: (907) 269-7602
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COC #: 23258
NTL Lab#: F201934
Sample Matrix: Water
Location/Project: Pilot Test-Tanana
Client Sample ID 01-23-TW

Report Date: 1/30/01
Date Arrived: 1/24/01
Date Sampled: 1/23/01
Time Sampled: 10:30:00 AM
Sampled By: RD

MRL = Method Reporting Limit

Flag Definitions
B = Below Regulatory Minimum
H = Above Regulatory Maximum
M = Matrix Interference
* = Less Than Reporting Limit

Comments:
**pH and Turbidity were run past EPA 24 hour holding time per client request.

Method	Parameter	Result	Units	Flag	MRL	Analysis Date
SM2330-B	Langelier Index	0.380	unit			1/29/01
SM 2540-C	Total Dissolved Solids	522	mg/L	H	35.0	1/25/01
SM 4500-H-B	pH	7.20	unit			1/24/01
EPA 200.7	Calcium	142	mg/L		0.04	1/26/01
EPA 200.7	Iron	< MRL	mg/L	*	0.008	1/26/01
EPA 200.7	Manganese	0.191	mg/L	H	0.005	1/26/01
EPA 200.9	Arsenic	< MRL	mg/L	*	0.004	1/30/01

Reported by Jeremy Nicoll
Fairbanks Chemistry Supervisor

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Phone: (907) 269-7602
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COC #: 23258
NTL Lab#: F201934
Sample Matrix: Water
Location/Project: Pilot Test-Tanana
Client Sample ID 01-23-TW

Report Date: 1/30/01
Date Arrived: 1/24/01
Date Sampled: 1/23/01
Time Sampled: 10:30:00 AM
Sampled By: RD

MRL = Method Reporting Limit

Flag Definitions
B = Below Regulatory Minimum
H = Above Regulatory Maximum
M = Matrix Interference
* = Less Than Reporting Limit

Comments:
**pH and Turbidity were run past EPA 24 hour holding time per client request.

Method	Parameter	Result	Units	Flag	MRL	Analysis Date
EPA 200.7	Hardness as CaCO3	507	mg/L		0.2	1/26/01
SM 2320-B	Alkalinity as CaCO3	440	mg/L		15.0	1/25/01
SM 2130-B	Turbidity	0.05	NTU		0.05	1/25/01

Reported by Jeremy Nicoll
Fairbanks Chemistry Supervisor

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Attn: Lynn Marino

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COC #: 23263
NTL Lab#: F201935
Sample Matrix: Water
Location/Project: Pilot Test-Tanana
Client Sample ID 01-23-RW

RW =
RAW WATER
TOO'GHA WELL

Report Date: 1/30/01
Date Arrived: 1/24/01
Date Sampled: 1/23/01
Time Sampled: 10:45:00 AM
Sampled By: RD

MRL = Method Reporting Limit

Flag Definitions
B = Below Regulatory Minimum
H = Above Regulatory Maximum
M = Matrix Interference
* = Less Than Reporting Limit

Comments:
**pH and Turbidity were run past EPA 24 hour holding time per client request.

Method	Parameter	Result	Units	Flag	MRL	Analysis Date
SM2330-B	Langelier Index	0.700	unit			1/29/01
SM 2540-C	Total Dissolved Solids	580	mg/L	H	35.0	1/25/01
SM 4500-H-B	pH	7.49	unit			1/24/01
EPA 200.7	Calcium	141	mg/L		0.04	1/26/01
EPA 200.7	Iron	0.905	mg/L	H	0.008	1/26/01
EPA 200.7	Manganese	0.326	mg/L	H	0.005	1/26/01
EPA 200.9	Arsenic	< MRL	mg/L	*	0.004	1/30/01

Reported by Jeremy Nicoll
Fairbanks Chemistry Supervisor

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Attn: Lynn Marino

Phone: (907) 269-7602
Fax: (907) 269-7509

COC #: 23263
NTL Lab#: F201935
Sample Matrix: Water
Location/Project: Pilot Test-Tanana
Client Sample ID 01-23-RW

Report Date: 1/30/01
Date Arrived: 1/24/01
Date Sampled: 1/23/01
Time Sampled: 10:45:00 AM
Sampled By: RD

MRL = Method Reporting Limit

Flag Definitions
B = Below Regulatory Minimum
H = Above Regulatory Maximum
M = Matrix Interference
* = Less Than Reporting Limit

Comments:
**pH and Turbidity were run past EPA 24 hour holding time per client request.

Method	Parameter	Result	Units	Flag	MRL	Analysis Date
EPA 200.7	Hardness as CaCO3	500	mg/L		0.2	1/26/01
EPA 300.0	Nitrate-N	1.34	mg/L		0.03	1/24/01
SM 2320-B	Alkalinity as CaCO3	487	mg/L		15.0	1/25/01
SM 2130-B	Turbidity	16.0	NTU		0.50	1/25/01

Jeremy Nicoll

Reported by Jeremy Nicoll
Fairbanks Chemistry Supervisor

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Attn:

Client ID: 01-19-TW
Client Project #:
Source: Pilot Test-Tanana
NTL Lab#: A170652
Sample Matrix: Water
Comments:

Report Date: 1/29/01
Date Arrived: 1/24/01
Sample Date: 1/19/01
Sample Time:
Collected By: WRD

** Legend **
MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2 BTEX						
	Benzene	ug/L	<MRL	0.20		1/25/01
	Toluene	ug/L	<MRL	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	m,p-Xylene	ug/L	<MRL	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	4-Bromofluorobenzene	% Recovery	86			

wendy m mitchell

Reported By: Wendy M. Mitchell
Anchorage Chemistry Supervisor

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Attn:

BC = BEFORE CARBON FILTER

Client ID: 01-19-BC
Client Project #:
Source: Pilot Test-Tanana
NTL Lab#: A170653
Sample Matrix: Water
Comments:

Report Date: 1/29/01
Date Arrived: 1/24/01
Sample Date: 1/19/01
Sample Time:
Collected By: WRD

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2 BTEX						
	Benzene	ug/L	0.32 E	0.20		1/25/01
	Toluene	ug/L	<MRL	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	m,p-Xylene	ug/L	<MRL	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	4-Bromofluorobenzene	% Recovery	91			

Wendy M Mitchell

Reported By: Wendy M. Mitchell
Anchorage Chemistry Supervisor

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Attn:

Client ID: 01-20-TW
Client Project #:
Source: Pilot Test-Tanana
NTL Lab#: A170654
Sample Matrix: Water
Comments:

Report Date: 1/29/01
Date Arrived: 1/24/01
Sample Date: 1/20/01
Sample Time:
Collected By: WRD

** Legend **
MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2 BTEX						
	Benzene	ug/L	<MRL	0.20		1/25/01
	Toluene	ug/L	<MRL	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	m,p-Xylene	ug/L	<MRL	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	4-Bromofluorobenzene	% Recovery	85			

wendy m mitchell

Reported By: Wendy M. Mitchell
Anchorage Chemistry Supervisor

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555 Cordova St.
Anchorage, AK 99501

Report Date: 1/29/01
Date Arrived: 1/24/01
Sample Date: 1/22/01
Sample Time:
Collected By: WRD

Attn:

Client ID: 01-22-RW
Client Project #:
Source: Pilot Test-Tanana
NTL Lab#: A170655
Sample Matrix: Water
Comments:

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2 BTEX						
	Benzene	ug/L	0.69	0.20		1/25/01
	Toluene	ug/L	0.61	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	m,p-Xylene	ug/L	0.28 E	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	4-Bromofluorobenzene	% Recovery	89			

Wendy M Mitchell

Reported By: Wendy M. Mitchell
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Village Safe Water
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Anchorage, AK 99501

Attn:

Client ID: 01-22-TW
Client Project #:
Source: Pilot Test-Tanana
NTL Lab#: A170656
Sample Matrix: Water
Comments:

Report Date: 1/29/01
Date Arrived: 1/24/01
Sample Date: 1/22/01
Sample Time:
Collected By: WRD

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2 BTEX						
	Benzene	ug/L	<MRL	0.20		1/25/01
	Toluene	ug/L	<MRL	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	m,p-Xylene	ug/L	<MRL	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	4-Bromofluorobenzene	% Recovery	89			

Wendy M Mitchell

Reported By: Wendy M. Mitchell
Anchorage Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

3330 INDUSTRIAL AVENUE
8005 SCHOON STREET
POUCH 340043

FAIRBANKS, ALASKA 99701
ANCHORAGE, ALASKA 99518
PRUDHOE BAY, ALASKA 99734

(907) 456-3116 • FAX 456-3125
(907) 349-1000 • FAX 349-1016
(907) 659-2145 • FAX 659-2146

Village Safe Water
555 Cordova St.
Anchorage, AK 99501

Attn:

Client ID: 01-23-TW
Client Project #:
Source: Pilot Test-Tanana
NTL Lab#: A170657
Sample Matrix: Water
Comments:

Report Date: 1/29/01
Date Arrived: 1/24/01
Sample Date: 1/23/01
Sample Time:
Collected By: WRD

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2 BTEX						
	Benzene	ug/L	<MRL	0.20		1/25/01
	Toluene	ug/L	<MRL	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	m,p-Xylene	ug/L	<MRL	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	4-Bromofluorobenzene	% Recovery	84			

wendy m mitchell

Reported By: Wendy M. Mitchell
Anchorage Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

3330 INDUSTRIAL AVENUE FAIRBANKS, ALASKA 99701 (907) 456-3116 • FAX 456-3125
8005 SCHOON STREET ANCHORAGE, ALASKA 99518 (907) 349-1000 • FAX 349-1016
POUCH 340043 PRUDHOE BAY, ALASKA 99734 (907) 659-2145 • FAX 659-2146

Village Safe Water
555 Cordova St.
Anchorage, AK 99501

Attn:
Client ID: Travel Blank
Client Project #:
Source:
NTL Lab#: A170658
Sample Matrix: Water
Comments:

Report Date: 1/29/01
Date Arrived: 1/24/01
Sample Date:
Sample Time:
Collected By:

** Legend **
MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2 BTEX						
	Benzene	ug/L	<MRL	0.20		1/25/01
	Toluene	ug/L	<MRL	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	m,p-Xylene	ug/L	<MRL	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	4-Bromofluorobenzene	% Recovery	86			

wendy m mitchell

Reported By: Wendy M. Mitchell
Anchorage Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

3330 INDUSTRIAL AVENUE
8005 SCHOON STREET
POUCH 340043

FAIRBANKS, ALASKA 99701
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(907) 456-3116 • FAX 456-3125
(907) 349-1000 • FAX 349-1016
(907) 659-2145 • FAX 659-2146

CT&E Environmental Services, Inc.
200 West Potter Drive
Anchorage, AK 99518

Attn: Heather Hall

Client ID: 98.4292-1
Client Project #:
Source:
NTL Lab#: A157959
Sample Matrix: Water
Comments: Trip Blank

Report Date: 9/9/98
Date Arrived: 9/1/98
Sample Date:
Sample Time:
Collected By:

** Legend **
MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2						
	Benzene	ug/L	<MRL	0.20		9/3/98
	Bromobenzene	ug/L	<MRL	0.20		
	Bromochloromethane	ug/L	<MRL	0.20		
	Bromodichloromethane	ug/L	<MRL	0.20		
	Bromoform	ug/L	<MRL	0.50		
	Bromomethane	ug/L	<MRL	1.00		
	n-Butylbenzene	ug/L	<MRL	0.20		
	sec-Butylbenzene	ug/L	<MRL	0.20		
	tert-Butylbenzene	ug/L	<MRL	0.20		
	Carbon Tetrachloride	ug/L	<MRL	0.20		
	Chlorobenzene	ug/L	<MRL	0.20		
	Chloroethane	ug/L	<MRL	1.00		
	Chloroform	ug/L	<MRL	0.30		
	Chloromethane	ug/L	<MRL	0.50		
	2-Chlorotoluene	ug/L	<MRL	0.20		
	4-Chlorotoluene	ug/L	<MRL	0.20		
	Dibromochloromethane	ug/L	<MRL	0.20		
	Dibromomethane	ug/L	<MRL	0.20		
	1,2-Dichlorobenzene	ug/L	<MRL	0.20		
	1,3-Dichlorobenzene	ug/L	<MRL	0.20		
	1,4-Dichlorobenzene	ug/L	<MRL	0.20		
	Dichlorodifluoromethane	ug/L	<MRL	0.50		
	1,1-Dichloroethane	ug/L	<MRL	0.20		

Reported By: Jorma K. Kuusisto
Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

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POUCH 340043 · PRUDHOE BAY, ALASKA 99734 · (907) 659-2145 • FAX 659-2146

CT&E Environmental Services, Inc.
200 West Potter Drive
Anchorage, AK 99518

Attn: Heather Hall

Client ID: 98.4292-1
Client Project #:
Source:
NTL Lab#: A157959
Sample Matrix: Water
Comments: Trip Blank

Report Date: 9/9/98
Date Arrived: 9/1/98
Sample Date:
Sample Time:
Collected By:

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
	1,2-Dichloroethane	ug/L	<MRL	0.20		9/3/98
	1,1-Dichloroethene	ug/L	<MRL	0.20		
	cis-1,2-Dichloroethene	ug/L	<MRL	0.20		
	trans-1,2-Dichloroethene	ug/L	<MRL	0.20		
	1,2-Dichloropropane	ug/L	<MRL	0.20		
	1,3-Dichloropropane	ug/L	<MRL	0.20		
	2,2-Dichloropropane	ug/L	<MRL	0.20		
	1,1-Dichloropropene	ug/L	<MRL	0.20		
	cis-1,3-Dichloropropene	ug/L	<MRL	0.20		
	trans-1,3-Dichloropropene	ug/L	<MRL	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	Hexachlorobutadiene	ug/L	<MRL	0.20		
	Isopropylbenzene	ug/L	<MRL	0.20		
	p-Isopropyltoluene	ug/L	<MRL	0.20		
	Methylene Chloride	ug/L	<MRL	0.50		
	Naphthalene	ug/L	<MRL	0.20		
	n-Propylbenzene	ug/L	<MRL	0.20		
	Styrene	ug/L	<MRL	0.20		
	1,1,1,2-Tetrachloroethane	ug/L	<MRL	0.20		
	1,1,2,2-Tetrachloroethane	ug/L	<MRL	0.20		
	Tetrachloroethene	ug/L	<MRL	0.20		
	Toluene	ug/L	<MRL	0.20		
	1,2,3-Trichlorobenzene	ug/L	<MRL	0.20		
	1,2,4-Trichlorobenzene	ug/L	<MRL	0.20		

Reported By: Jorma K. Kuusisto
Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

3330 INDUSTRIAL AVENUE · FAIRBANKS, ALASKA 99701 · (907) 456-3116 • FAX 456-3125
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POUCH 340043 · PRUDHOE BAY, ALASKA 99734 · (907) 659-2145 • FAX 659-2146

CT&E Environmental Services, Inc.
200 West Potter Drive
Anchorage, AK 99518

Attn: Heather Hall
Client ID: 98.4292-1
Client Project #:
Source:
NTL Lab#: A157959
Sample Matrix: Water
Comments: Trip Blank

Report Date: 9/9/98
Date Arrived: 9/1/98
Sample Date:
Sample Time:
Collected By:

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
	1,1,1-Trichloroethane	ug/L	<MRL	0.20		9/3/98
	1,1,2-Trichloroethane	ug/L	<MRL	0.20		
	Trichloroethene	ug/L	<MRL	0.20		
	Trichlorofluoromethane	ug/L	<MRL	0.50		
	1,2,3-Trichloropropane	ug/L	<MRL	0.20		
	1,2,4-Trimethylbenzene	ug/L	<MRL	0.20		
	1,3,5-Trimethylbenzene	ug/L	<MRL	0.20		
	Vinyl Chloride	ug/L	<MRL	0.50		
	m,p-Xylene	ug/L	<MRL	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	Total Trihalomethanes	ug/L	<MRL	0.50		
	4-Bromofluorobenzene	% Recovery	85			
	1,2-Dichlorobenzene-d4	% Recovery	82			

Reported By: Jorma K. Kuusisto
Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

3330 INDUSTRIAL AVENUE
8005 SCHOON STREET
POUCH 340043

FAIRBANKS, ALASKA 99701
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PRUDHOE BAY, ALASKA 99734

(907) 456-3116 • FAX 456-3125
(907) 349-1000 • FAX 349-1016
(907) 659-2145 • FAX 659-2146

CT&E Environmental Services, Inc.
200 West Potter Drive
Anchorage, AK 99518

Attn: Heather Hall

Client ID: 98.4292-2
Client Project #:
Source: New Tanana Well
NTL Lab#: A157960
Sample Matrix: Water
Comments:

Report Date: 9/9/98
Date Arrived: 9/1/98
Sample Date: 8/27/98
Sample Time: 10:00
Collected By:

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
EPA 524.2						
	Benzene	ug/L	0.80	0.20		9/3/98
	Bromobenzene	ug/L	<MRL	0.20		
	Bromochloromethane	ug/L	<MRL	0.20		
	Bromodichloromethane	ug/L	<MRL	0.20		
	Bromoform	ug/L	<MRL	0.50		
	Bromomethane	ug/L	<MRL	1.00		
	n-Butylbenzene	ug/L	<MRL	0.20		
	sec-Butylbenzene	ug/L	<MRL	0.20		
	tert-Butylbenzene	ug/L	<MRL	0.20		
	Carbon Tetrachloride	ug/L	<MRL	0.20		
	Chlorobenzene	ug/L	<MRL	0.20		
	Chloroethane	ug/L	<MRL	1.00		
	Chloroform	ug/L	<MRL	0.30		
	Chloromethane	ug/L	<MRL	0.50		
	2-Chlorotoluene	ug/L	<MRL	0.20		
	4-Chlorotoluene	ug/L	<MRL	0.20		
	Dibromochloromethane	ug/L	<MRL	0.20		
	Dibromomethane	ug/L	<MRL	0.20		
	1,2-Dichlorobenzene	ug/L	<MRL	0.20		
	1,3-Dichlorobenzene	ug/L	<MRL	0.20		
	1,4-Dichlorobenzene	ug/L	<MRL	0.20		
	Dichlorodifluoromethane	ug/L	0.98	0.50		
	1,1-Dichloroethane	ug/L	<MRL	0.20		

Reported By: Jorma K. Kuusisto
Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

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POUCH 340043 PRUDHOE BAY, ALASKA 99734 (907) 659-2145 • FAX 659-2146

CT&E Environmental Services, Inc.
200 West Potter Drive
Anchorage, AK 99518

Attn: Heather Hall

Client ID: 98.4292-2
Client Project #:
Source: New Tanana Well
NTL Lab#: A157960
Sample Matrix: Water
Comments:

Report Date: 9/9/98
Date Arrived: 9/1/98
Sample Date: 8/27/98
Sample Time: 10:00
Collected By:

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
	1,2-Dichloroethane	ug/L	<MRL	0.20		9/3/98
	1,1-Dichloroethene	ug/L	<MRL	0.20		
	cis-1,2-Dichloroethene	ug/L	<MRL	0.20		
	trans-1,2-Dichloroethene	ug/L	<MRL	0.20		
	1,2-Dichloropropane	ug/L	<MRL	0.20		
	1,3-Dichloropropane	ug/L	<MRL	0.20		
	2,2-Dichloropropane	ug/L	<MRL	0.20		
	1,1-Dichloropropene	ug/L	<MRL	0.20		
	cis-1,3-Dichloropropene	ug/L	<MRL	0.20		
	trans-1,3-Dichloropropene	ug/L	<MRL	0.20		
	Ethylbenzene	ug/L	<MRL	0.20		
	Hexachlorobutadiene	ug/L	<MRL	0.20		
	Isopropylbenzene	ug/L	<MRL	0.20		
	p-Isopropyltoluene	ug/L	<MRL	0.20		
	Methylene Chloride	ug/L	<MRL	0.50		
	Naphthalene	ug/L	<MRL	0.20		
	n-Propylbenzene	ug/L	<MRL	0.20		
	Styrene	ug/L	<MRL	0.20		
	1,1,1,2-Tetrachloroethane	ug/L	<MRL	0.20		
	1,1,2,2-Tetrachloroethane	ug/L	<MRL	0.20		
	Tetrachloroethene	ug/L	<MRL	0.20		
	Toluene	ug/L	<MRL	0.20		
	1,2,3-Trichlorobenzene	ug/L	<MRL	0.20		
	1,2,4-Trichlorobenzene	ug/L	<MRL	0.20		

Reported By: Jorma K. Kuusisto
Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

3330 INDUSTRIAL AVENUE FAIRBANKS, ALASKA 99701 (907) 456-3116 • FAX 456-3125
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POUCH 340043 PRUDHOE BAY, ALASKA 99734 (907) 659-2145 • FAX 659-2146

CT&E Environmental Services, Inc.
200 West Potter Drive
Anchorage, AK 99518

Attn: Heather Hall

Client ID: 98.4292-2
Client Project #:
Source: New Tanana Well
NTL Lab#: A157960
Sample Matrix: Water
Comments:

Report Date: 9/9/98
Date Arrived: 9/1/98
Sample Date: 8/27/98
Sample Time: 10:00
Collected By:

** Legend **

MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
	1,1,1-Trichloroethane	ug/L	<MRL	0.20		9/3/98
	1,1,2-Trichloroethane	ug/L	<MRL	0.20		
	Trichloroethene	ug/L	<MRL	0.20		
	Trichlorofluoromethane	ug/L	1.71	0.50		
	1,2,3-Trichloropropane	ug/L	<MRL	0.20		
	1,2,4-Trimethylbenzene	ug/L	<MRL	0.20		
	1,3,5-Trimethylbenzene	ug/L	<MRL	0.20		
	Vinyl Chloride	ug/L	<MRL	0.50		
	m,p-Xylene	ug/L	<MRL	0.20		
	o-Xylene	ug/L	<MRL	0.20		
	Total Trihalomethanes	ug/L	<MRL	0.50		
	4-Bromofluorobenzene	% Recovery	85			
	1,2-Dichlorobenzene-d4	% Recovery	83			

Reported By: Jorma K. Kuusisto
Chemistry Supervisor

Montgomery Wat
4100 Spenard Road
Anchorage AK 99517
(907)248-8883 Fax
(907) 248-8884 ATTN:
Eric Gropp

Too'gha

Laboratory: CT&E Environmental

984292

Samplers: Wilbur Jerome

Date	Time	Sample ID	Total Containers	Volatile Organics 18AAC80.070	Trip Blank								
				40 ml Amber w/ HCL	40 ml								
12-Aug-98	10:00 AM	Trip Blank ✓	2		X								
27 Aug	4 PM	New Tanana Well ✓	2	X									

Relinquished by:	Date 8·28·98 Time 1200	Hand Delivered [✓ Y] N	Shipped Via Hand Carried	Airbill Number	Date Time
Received for Laboratory by: Rhonda Strucha	Date 8·28·98 Time 1200	Cooler Temperature Upon Arrival	2.3°C	°C	Laboratory Notified Faxed

Relinquished By: Kelley Hatch 8/28/98 1630 Received: Sara Howell 8/29/98 1420

MONTGOMERY WATSON LABORATORIES

555 East Walnut Street
Pasadena, California 91101
818 568 6400; Fax: 818 568 6324;
1 800 566 LABS (1 800 566 5227)

Laboratory Report #47498

Commercial Testing & Engineering Co
Heather Hall
200 W. Potter Drive
Anchorage , AK 99518

Samples Received
23-sep-1998 19:21:33

.3469-1 TANANA (980923500) Sampled on 07/31/98

Gross Alpha and Beta Radiation

repared	Analyzed	QC Batch#	Method	Analyte	Result	Units	MDL	Dilution
	09/24/98	84654	(ML/EPA 900.0)	Alpha, Gross	1.3	pCi/l	1.3	1
	09/24/98	84656	(ML/EPA 900.0)	Alpha, Two Sigma Error	0.7	pCi/l	0.0000	1
	09/24/98	84654	(ML/EPA 900.0)	Alpha, Min Detectable Activity	1.3	pCi/l	1.3	1
	09/24/98	84654	(ML/EPA 900.0)	Beta, Gross	2.4	pCi/l	1.6	1
	09/24/98	84654	(ML/EPA 900.0)	Beta, Two Sigma Error	0.9	pCi/l	0.0000	1
	09/24/98	84654	(ML/EPA 900.0)	Beta, Min Detectable Activity	1.6	pCi/l	1.6	1

MONTGOMERY WATSON LABORATORIES
555 East Walnut Street
Pasadena, California 91101
818 568 6400; Fax: 818 568 6324
1 800 566 LABS (1 800 566 5227)

Laboratory
QC Report
#47498

Commercial Testing & Engineering Co

QC Batch #84654

Gross Alpha and Beta Radiation

QC	Analyte	Spiked	Recovered	Yield (%)	Limits (%)	RPD (%)
LCS1	Alpha, Gross	38.3	35.0	91.4	(80.00 - 120.00)	
LCS2	Alpha, Gross	38.3	37.8	98.7	(80.00 - 120.00)	7.7
MS	Alpha, Gross	76.6	68.0	88.8	(70.00 - 130.00)	
MSD	Alpha, Gross	76.6	74.6	97.4	(70.00 - 130.00)	9.3
LCS1	Beta, Gross	31.9	34.6	108.5	(80.00 - 120.00)	
LCS2	Beta, Gross	31.9	34.2	107.2	(80.00 - 120.00)	1.2
MS	Beta, Gross	63.8	58.8	92.2	(70.00 - 130.00)	
MSD	Beta, Gross	63.8	64.6	101.3	(70.00 - 130.00)	9.4

Spikes which exceed Limits and Method Blanks with positive results are highlighted by Underlining.
Criteria for MS and DUP are advisory only and not applicable for ICR monitoring.

CT&E Environmental Services Inc.
Laboratory Division

Laboratory Analysis Report

August 24, 1998

Eric Gropp
Montgomery Watson Americas Inc
4100 Spenard Rd
Anchorage, AK 99517-2901

Client Name	Montgomery Watson Americas Inc
Project ID	New Tanana Water Well [983469]
Printed	August 24, 1998

Enclosed are the analytical results associated with the above project.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by CT&E. A copy of our Quality Control Manual that outlines this program is available at your request.

Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth in our Quality Assurance Program Plan.

If you have any questions regarding this report or if we can be of any other assistance, please call your CT&E Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

U - Indicates the compound was analyzed for but not detected.
J - Indicates an estimated value that falls below PQL, but is greater than the MDL.
B - Indicates the analyte is found in the blank associated with the sample.
* - The analyte has exceeded allowable limits.
GT - Greater Than
D - Secondary Dilution
LT - Less Than
! - Surrogate out of range

CT&E Environmental Services Inc.

CT&E Ref.#	983469001
Client Name	Montgomery Watson Americas Inc
Project Name/#	New Tanana Water Well
Client Sample ID	New Tanana Water Well
Matrix	Water (Surface, Eff., Ground)
Ordered By	
PWSID	

Client PO#	1189078.010103
Printed Date/Time	08/24/98 15:00
Collected Date/Time	07/31/98 07:55
Received Date/Time	07/31/98 11:30
Technical Director:	Stephen C. Ede
Released By	

Sample Remarks:
Nitrate/Nitrite (EPA 300) analyzed by Northern Testing Laboratories of Fairbanks, AK.
MBAS (SM 5540C) analyzed by Northern Testing Laboratories of Anchorage, AK.
Gross Alpha (EPA 900) analyzed by Montgomery Watson Laboratories of Pasadena, CA.

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Inorganic Contaminants								
Arsenic	0.00500 U	0.00500	mg/L	EPA 200.9	.05 max		08/17/98	JMO
Antimony	0.00500 U	0.00500	mg/L	EPA 200.9	.006 max		08/07/98	KGF
Barium	0.123	0.0100	mg/L	EPA 200.7	2 max		08/07/98	WTA
Beryllium	0.000500 U	0.000500	mg/L	EPA 200.9	.004 max		08/06/98	KGF
Cadmium	0.000500 U	0.000500	mg/L	EPA 200.9	.005 max		08/06/98	KGF
Chromium	0.00500 U	0.00500	mg/L	EPA 200.9	.1 max		08/07/98	KGF
Cyanide	0.0100 U	0.0100	mg/L	EPA 335.4	.2 max	08/04/98	08/13/98	JMP
Fluoride	0.287	0.100	mg/L	EPA 300.0	4 max	08/06/98	08/06/98	RMV
Mercury by Cold vapor	0.000200 U	0.000200	mg/L	EPA 245.1	.002 max	08/10/98	08/10/98	NTB
Nickel	0.0200 U	0.0200	mg/L	EPA 200.7	.1 max		08/07/98	WTA
Selenium	0.00500 U	0.00500	mg/L	EPA 200.9	.05 max		08/12/98	KGF
Thallium	0.00150 U	0.00150	mg/L	EPA 200.9	.002 max		08/07/98	KGF
Secondary Contaminants								
Aluminum	0.100 U	0.100	mg/L	EPA 200.7	.2 max		08/07/98	WTA
hloride	8.40	0.200	mg/L	EPA 300.0	250 max		08/06/98	GCP
olor	* 30.0	5.00	PCU	SM18 2120B	15 max		08/05/98	JMP
opper	0.0100 U	0.0100	mg/L	EPA 200.7	1 max		08/07/98	WTA
luoride	0.287	0.100	mg/L	EPA 300.0	2 max		08/06/98	GCP
anglier Index @ 40 degree F	-.33			SM14 203			08/24/98	GCP
anglier Index @ 140 degree F	0.750			SM14 203			08/24/98	GCP
ron	* 0.502	0.0500	mg/L	EPA 200.7	.3 max		08/07/98	WTA
angenose	* 0.355	0.0200	mg/L	EPA 200.7	.05 max		08/07/98	WTA

CT&E Environmental Services Inc.

CT&E Ref.# 983469001
Client Name Montgomery Watson Americas Inc
Project Name/# New Tanana Water Well
Client Sample ID New Tanana Water Well
Matrix Water (Surface, Eff., Ground)
Ordered By
PWSID

Client PO# 1189078.010103
Printed Date/Time 08/24/98 15:00
Collected Date/Time 07/31/98 07:55
Received Date/Time 07/31/98 11:30
Technical Director: Stephen C. Ede

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Odor (TON)	* 4.00	1.00	T.O.N.	SM 2150B	3 max		08/10/98	JMP
pH	7.02		pH units	EPA 150.1	6.5-8.5		08/04/98	JMP
Silver	0.00200 U	0.00200	mg/L	EPA 200.9	.1 max		08/06/98	KGF
Sodium	14.3	1.00	mg/L	EPA 200.7	250 max		08/07/98	WTA
Sulfate	31.0	0.200	mg/L	EPA 300.0	250 max		08/06/98	GCP
Total Dissolved Solids	348	20.0	mg/L	SM 2540C	500 max		08/06/98	JMP
Zinc	0.0200 U	0.0200	mg/L	EPA 200.7	5 max		08/07/98	WTA
Copper/Lead Rule								
Lead	0.00500 U	0.00500	mg/L	EPA 200.9	.015 max		08/07/98	KGF
Metals by Graphite Furnace								
Turbidity	2.60	0.100	NTU	EPA 180.1			08/04/98	JMP
Hardness as CaCO3	330	5.00	mg/L	SM19 2340B			08/07/98	WTA
Waters Department Analyses								
Total Coliform	0		col/100mL	SM18 9222B			07/31/98	THW

CT&E Environmental Services Inc

Montgomery Watson
attention: Eric Gropp
4100 Spenard Rd.
Anchorage, AK 99517

Account: Montgomery Watson
Contact: Eric Gropp

Project: New Tanana Water Well
Received: 08/03/98 8:55

CT&E Ref#: 98.3469
Print Date: 08/24/98 14:46

Work order 98.3469 was analyzed for Nitrate/Nitrite and MBAS by Northern Testing Laboratories, Inc. of Fairbanks, AK 99701

NORTHERN TESTING LABORATORIES, INC.

3330 INDUSTRIAL AVENUE FAIRBANKS, ALASKA 99701 (907) 456-3116 • FAX 456-3125
8005 SCHOON STREET ANCHORAGE, ALASKA 99518 (907) 349-1000 • FAX 349-1016
POUCH 340043 PRUDHOE BAY, ALASKA 99734 (907) 659-2145 • FAX 659-2146

CT&E Environmental Services Inc.
200 W. Potter Drive
Anchorage AK 99518

Attn: Heather Hall

Report Date: 08/04/98

Date Arrived: 07/31/98
Date Sampled: 07/31/98
Time Sampled: 0751
Collected By: -

MRL = Method Reporting Limit

Our Lab #: F179489
Location/Project: -
Your Sample ID: 983469001
Sample Matrix: Water
Comments:

* Flag Definitions
B = Below Regulatory Min.
H = Above Regulatory Max.

Lab#	Method	Parameter	Units	Results *	MRL	Digest Prepared	Date Analyze
F179489	EPA 300.0	Nitrite-N	mg/L	<MRL	0.03		07/31/9
		Nitrate-N	mg/L	0.35	0.03		07/31/9

Reported By: Cindy L. Christian
Laboratory Director

NORTHERN TESTING LABORATORIES, INC.

3330 INDUSTRIAL AVENUE FAIRBANKS, ALASKA 99701 (907) 456-3116 • FAX 456-3125
8005 SCHOON STREET ANCHORAGE, ALASKA 99518 (907) 349-1000 • FAX 349-1016
POUCH 340043 PRUDHOE BAY, ALASKA 99734 (907) 659-2145 • FAX 659-2146

CT&E Environmental Services, Inc.
200 West Potter Drive
Anchorage, AK 99518

Attn: Heather Hall

Client ID: 98.3469-1
Client Project #:
Source:
NTL Lab#: A156879
Sample Matrix: Water
Comments: Tanana Water Well

Report Date: 8/12/98
Date Arrived: 7/31/98
Sample Date: 7/31/98
Sample Time: 7:51
Collected By:

** Legend **
MRL = Method Report Level
MCL = Max. Contaminant Level
B = Present In Method Blank
E = Estimated Value
M = Matrix Interference
H = Above MCL
D = Lost To Dilution

Method	Parameter	Units	Result	MRL	Date Prepared	Date Analyzed
SM 5540 C						
	Foaming Agents (MBAS)	mg/L	<MRL	0.10		7/31/98

Reported By: Jorma K. Kuusisto
Chemistry Supervisor

NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A FAIRBANKS, ALASKA 99709 907-479-3115
6957 OLD SEWARD HWY., SUITE 101 ANCHORAGE, ALASKA 99518 907-349-8623

lient: Tanana Chiefs
ddress: Public Health Service
201 1st Ave.
Fairbanks, Alaska 99701
ttn: Mike Gillenwater

Date Arrived : 04-24-86
Time Arrived : 1145
Date Sampled : 04-24-86
Time Sampled : 0930
Date Completed: 05-13-86

ource: New Well (Well #4 – Sunshine SubDiv.)

Sample ID #: 042486-3

arameter	Unit	Result	Standard Deviation	ADEC MCC*
NORGANIC CHEMICAL CONTAMINANTS:				
Arsenic	mg/l	0.002	0.001	0.05
Barium	mg/l	0.18	0.05	1
Cadmium	mg/l	<0.005	-	0.010
Chromium	mg/l	<0.05	-	0.05
Fluoride	mg/l	0.14	-	2.4
Lead	mg/l	<0.001	-	0.05
Mercury	mg/l	<0.0002	-	0.002
Nitrate-N	mg/l	<0.10	-	10
Selenium	mg/l	<0.002	-	0.01
ilver	mg/l	<0.01	-	0.05
ONDARY CONTAMINANTS:				
Chloride	mg/l	1.4	-	250
Color	C.U. @ pH	100 @ 7.2 @ 22 deg. C		15
Copper	mg/l	<0.02	-	1
Corrosivity				
Langelier Index		0.2 (Scaling)		Noncorrosive
Alkalinity	mg/l as CaCO3	320	-	
Calcium	mg/l	91	3	
pH	pH Units	7.2 @ 22 deg. C		6.5-8.5
Hardness	mg/l as CaCO3	342	-	
Foaming Agents	mg/l	<0.025	-	0.5
Iron	mg/l	2.19	0.02	0.3
Manganese	mg/l	0.30	0.00	0.05
Odor	T.O.N.	<1	-	3
Sodium	mg/l	4.1	0.1	250
Sulfate	mg/l	20	-	250
Total Dissolved Solids	mg/l	316	-	500
Zinc	mg/l	0.005	0.001	5
SCELLANEOUS:				
Turbidity	NTU	34	-	1

PORTED BY: Kathleen Siftar DATE: 5-16-86
Kathleen Siftar, Asst. Chemistry Supervisor

* MCC = Maximum Contaminant Concentration

NORTHERN TESTING LABORATORIES, INC.

600 UNIVERSITY PLAZA WEST, SUITE A FAIRBANKS, ALASKA 99701 907-479-3115
6957 OLD SEWARD HWY., SUITE 101 ANCHORAGE, ALASKA 99518 907-349-8623

ent: City of Tanana
ress: Box 181
Tanana, Alaska 99777

n: Harold Gillam

rce: Old and New Wells

Date Arrived : 12-10-85
Time Arrived : 1530
Date Sampled : 12-09-85
Time Sampled : --
Date Completed: 12-13-85

Sample ID #: 121085-7&8

ample Identification and Parameter	Unit	Result	Standard Deviation	ADEC MCC*
21085-7 Old Well Well #1				
Alkalinity	mg/l as CaCO3	240	--	--
Hardness	mg/l as CaCO3	290	--	--
Iron	mg/l	0.52	0.03	0.3
Manganese	mg/l	0.67	0.00	0.05
21085-8 New Well Well #3				
Alkalinity	mg/l as CaCO3	410	--	--
Hardness	mg/l as CaCO3	550	--	--
Iron	mg/l	0.85	0.03	0.3
Manganese	mg/l	0.54	0.00	0.05

* MCC = Maximum Contaminant Concentration

Quality Control Report

ed below are quality control assurance reference samples with a known
entration prior to analysis. The acceptable limits represent
5% confidence interval established by the Environmental Protection
cy or by our laboratory through repetitive analyses of the
rence sample. The reference samples indicated below were analyzed
the same time as your sample, ensuring the accuracy of your results.

le #	Parameter	Unit	Result	Acceptable Limit
4-2	Alkalinity	mg/l as CaCO3	17	14 - 20
-2	Hardness	mg/l as CaCO3	24	16 - 24
-6	Iron	mg/l	0.90	0.82 - 0.97
5-6	Manganese	mg/l	0.44	0.42 - 0.56

ted By: Thomas Benjamin
Thomas Benjamin, Chemistry Supervisor

Date: Dec 17, 1985

COPY

CHEMICAL & GEOLOGICAL LABORATORIES OF ALASKA, INC.
TELEPHONE (907)-279-4014
274-3364
ANCHORAGE INDUSTRIAL CENTER
5633 B Street

ANALYTICAL REPORT

Alaska Area Native Health Service SAMPLE LOCATION: Tanana, Alaska

ECTED 3-23-81 TIME COLLECTED: —

BY P.Archibald SOURCE City Well No. 2

Well Located on River Bank in Front of Store

FOR LAB USE ONLY
RECVD.BY GY LAB # 7126
DATE RECEIVED 4-3-81
DATE COMPLETED 4-10-81
DATE REPORTED 4-10-81
SIGNED Archie L Green

	mg/l		mg/l		mg/l
lver	<0.05	[]P,Phosphorous	<0.05	[]Cyanide	
minum	<0.05	[]Pb,Lead	<0.05	[]Sulfate	14
enic	<0.10	[]Pt,Platinum	<0.05	[]Phenol	
d	<0.05	[]Sb,Antimony	<0.10	[]Total Dissolved Solids	185
	<0.05	[]Se,Selenium	<0.10	[]Total Volatile Solids	
rium	0.29	[]Si,Silicon	5.0	[]Suspended Solids	
muth	<0.05	[]Sn,Tin	<0.10	[]Volatile Suspended Solids	
cium	56	[]Sr,Strontium	0.19	[]Hardness as $CaCO_3$	
mium	<0.01	[]Ti,Titanium	<0.05	[]Alkalinity as $CaCO_3$	170
alt	<0.05	[]W,Tungsten	<1	[]	
romium	<0.05	[]V,Vanadium	<0.05	[]	
per	<0.05	[]Zn,Zinc	<0.05	[]	
on	0.14	[]Zr,Zirconium	<0.05	[]	
				* * * * * *	
cury	<0.10	[]Ammonia Nitrogen-N		[]mmhos Conductivity	300
ssium	<1	[]Kjedahl Nitrogen-N		[]pH Units	7.3
gnesium	14	[]Nitrate-N		[]Turbidity NTU	
anese	0.38	[]Nitrite-N		[]Color Units	
ybdenum	<0.05	[]Phosphorus (Ortho)-P		[]T.Coliform/100ml	
ium	3.0	[]Chloride	8	[]	
kel	<0.05	[]Fluoride		[]	

TELEPHONE (907) 279-4014 P.O.BOX [illegible]
ANCHORAGE, ALASKA 99509

PHS Hospital Well

ANALYTICAL REPORT

er Analysis(Facility) Alaska Area Native Health Service

te Collected: 8-30-76 Time Collected: ---- By: ---

ource of Sample: Tanana (4-621R)

hysical Observations, Remarks:

---

mg/l Aluminum
mg/l Arsenic
mg/l Barium
mg/l Boron
mg/l Cadmium
6 mg/l Calcium
mg/l Copper
mg/l Chromium-Total
mg/l Chromium-Tri
mg/l Chromium-Hex
<0.1 mg/l Iron-Total
mg/l Iron-Dissolved
mg/l Lead
10 mg/l Magnesium
mg/l Manganese
mg/l Mercury
mg/l Nickel
2 mg/l Potassium
mg/l Selenium
3 mg/l Sodium
mg/l Silver
mg/l Zinc

☒ 410 mmhos Conductivity
☒ 7.3 units pH
☐ mg/l Ammonia Nitrogen-N
☐ mg/l Kjedahl Nitrogen-N
☐ mg/l Organic Nitrogen-N
☐ mg/l Nitrate(N)
☐ mg/l Nitrite(N)
☐ mg/l Phosphorus (Ortho)-P
☐ mg/l Phosphorus (Total)-P
☒ 4 mg/l Chloride
☐ mg/l Fluoride
☐ mg/l Cyanide
☒ Trace mg/l Sulfate
☐ mg/l Phenol
☐ mg/l MBSA
☐ mg/l BOD
☐ mg/l COD
☒ 149 mg/l TD Solids
☐ mg/l TV Solids
☐ mg/l Suspended Solids
☐ mg/l SV Solids
☐ JTU Turbidity

☒ 56 mg/l Hardness a. $CaCO_3$
☒ 240 mg/l Alkalinity $CaCO_3$
☐ mg/l Acidity-T a $CaCO_3$
☐ mg/l Acidity Fre as $CaCO_3$
☐ /100ml Coliform-T
☐ /100ml Coliform-F
☐ /100ml Strep-F
☐ units Color
☒ <0.1 mg/l Oil and Gr
☐

Transported by:
Received by:

Transported by:
Received by:

FOR LAB USE ONLY

Lab# 4704 Rec'd by: Se

Date sample rec'd: 8-30-76

Date analysis completed: 8-30-

Date results reported: 8-31-

Signed:

Date: September 3, 1976

Appendix C
Community Survey Results

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

RECEIVED
OCT 14 2004

HDR Alaska is under contract to Too'gha, Inc. to prepare a Water and Sewer Feasibility Study Update, to provide a plan for the orderly expansion of water and sewer services in Tanana (beyond the current construction of a piped system between school and Eamole Streets), to look at upgrades to the existing facilities, and to address any problems that the current facilities are experiencing. We are asking you to respond to the following survey to assist us in compiling information regarding the existing system and to tell us your opinion about future water/sewer development.

Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Ruth & Charlie Campbell

Which best describes where your home is located?

____ Front Street	____ Koyukuk Street
____ Circle Subdivision	____ Outlying area (Site or Mission Rd.)

Other East end of village

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 4

Number of bathrooms: 0

Number of people living in the house: 2 adults

Number of children: 5

How long have you lived in the house: 8 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point

____ Individual well

Other river

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) Needs everything.

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

no

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
___X___ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other river water taste better in winter.

________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
___X___ Other would like a well.

________ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ $35 - $55
________ $66 - $75

________ $56 - $65
________ Other ________________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service

________ On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
___X___ Outhouse

________ On-site septic system and drainfield
________ Other ________________

If you are using a septic system and drainfield, what problems are you expierencing, if any? ________________

no

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

___X___ $10 - $25
________ $35 - $50

________ $25 - $35
________ Other ________________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ________________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) odor

If the lagoon were relocated, where would you like to see it relocated to? north west of airport

Additional Comments

Do you have any suggestions or comments? Be nice to have the option of getting a well. The people of edge of town.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

HDR Alaska is under contract to Too'gha, Inc. to prepare a Water and Sewer Feasibility Study Update, to provide a plan for the orderly expansion of water and sewer services in Tanana (beyond the current construction of a piped system between school and Eamole Streets), to look at upgrades to the existing facilities, and to address any problems that the current facilities are experiencing. We are asking you to respond to the following survey to assist us in compiling information regarding the existing system and to tell us your opinion about future water/sewer development.

Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Patrick Moore

Which best describes where your home is located?

_____ Front Street
✓ Koyukuk Street
_____ Circle Subdivision
_____ Outlying area (Site or Mission Rd.)
Other _____

Do you live there full time? ☑ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 0 spot for a new one?

Number of people living in the house: 2

Number of children: 0

How long have you lived in the house: 27 yrs

Water

What is your primary means of water service?

_____ Haul from Too'gha watering point
✓ Individual well
Other river bearcreek or springs

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) no

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Toogha water not fit to drink

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water

✓ Taste problems (especially chlorine)

✓ Staining on fixtures or clothes

____ Other ____

____ No service

____ Odor problems

What would you like to improve about your water service?

____ Increased supply

____ Better Taste

____ Other Can use toogha water for other things other than drinking

✓ Obtain water service for the first time

____ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☑ Yes ☐ No

a well would be nice

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain thc operation of the haul service.)

____ \$35 - \$55

____ \$66 - \$75

____ \$56 - \$65

____ Other the price of the haul a monthly bill should be based on use not just a monthly billed service

Would you prefer that water be deliverd on a regularly scheduled basis or as nceded by an on-call service?

____ Regularly scheduled service

____ On-call service

both

Sewer

What is your primary means of sewer disposal?

✓ Honey bucket

✓ Outhouse

____ On-site septic system and drainfield

____ Other ____

If you are using a septic system and drainfield, what problems are you expierencing, if any? ____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☑ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

____ \$10 - \$25

✓ \$35 - \$50

____ \$25 - \$35

____ Other ____

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

A well would be nice and a septic haul

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_____ $35 - $55

__✓__ $66 - $75

_____ $56 - $65

_____ Other _____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_____ Regularly scheduled service _____ On-call service

both

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) operator or design error it should not smell when dumped

If the lagoon were relocated, where would you like to see it relocated to? _____

Additional Comments

Do you have any suggestions or comments? A well with a septic haul or a treatment like what the city installed for the city office and fire station would be my prefered choice

Togha the managment has not been very good with water deliveries so far, and when you need water you don't need or want excuses you want water

Survey should have included the options I wanted. therefore it is flawed no opertunity to respond to my options it looks as though a haul system is being rammed down our throats.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

HDR Alaska is under contract to Too'gha, Inc. to prepare a Water and Sewer Feasibility Study Update, to provide a plan for the orderly expansion of water and sewer services in Tanana (beyond the current construction of a piped system between school and Eamole Streets), to look at upgrades to the existing facilities, and to address any problems that the current facilities are experiencing. We are asking you to respond to the following survey to assist us in compiling information regarding the existing system and to tell us your opinion about future water/sewer development.

Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Ray Krosky

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
____ Circle Subdivision
X Outlying area (Site or [✓ Mission Rd.])
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1

Number of bathrooms: 1

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 32yrs.

Water

What is your primary means of water service?

____ Haul from Too'gha watering point
____ Individual well
Other Spring, river water

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) NONE

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water

________ Taste problems (especially chlorine)

________ Staining on fixtures or clothes

________ Other ____________________

[✓ No service]

________ Odor problems

What would you like to improve about your water service?

________ Increased supply

________ Better Taste

________ Other N/A

________ Obtain water service for the first time

________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ \$35 - \$55

________ \$66 - \$75

________ \$56 - \$65

________ Other will haul own water

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service

________ On-call service

Sewer

What is your primary means of sewer disposal?

[✓ Honey bucket]

[✓ Outhouse]

________ On-site septic system and drainfield

________ Other ____________________

If you are using a septic system and drainfield, what problems are you expiercncing, if any? NONE

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ \$10 - \$25

________ \$35 - \$50

________ \$25 - \$35

________ Other ____________________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

______ $35 - $55 ______ $56 - $65
______ $66 - $75 ______ Other ______

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
______ Regularly scheduled service ______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? down wind.

Additional Comments

Do you have any suggestions or comments? Build a well house, by the spring. Wants a new outhouse. will pay.

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2004 Water and Sewer Feasibility Study Update
Survey Questions

Interial Regional
Housing Authority
put in septic
House was rehabbed
since
the —
elders funding

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ANHS
? HOW DO HAUL?

Please assist us by filling out the information below to the best of your abilities. NOT ON TOOGHA.

General Questions

Homeowner's name: Lester Erhart

Which best describes where your home is located?

X Front Street
___ Koyukuk Street
___ Circle Subdivision
___ Outlying area (Site or Mission Rd.)
Other ___

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1

Number of bathrooms: 0

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 100yrs

Water

What is your primary means of water service?

___ Haul from Too'gha watering point
X Individual well
Other ___

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) nothing

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other no problem

________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
________ Other No

________ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wiliing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ $35 - $55
________ $66 - $75

________ $56 - $65
________ Other ________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service

________ On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
X Outhouse

________ On-site septic system and drainfield
________ Other ________

If you are using a septic system and drainfield, what problems are you expierencing, if any? ________

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ $10 - $25
________ $35 - $50

________ $25 - $35
________ Other ________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ____________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) odor

If the lagoon were relocated, where would you like to see it relocated to? behind the old one.

Additional Comments

Do you have any suggestions or comments? ____________

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Survey Questions

septic
Did himself. Missie is
way out of town.
He & Julie live at
the circle.

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Tom Hyslop

Which best describes where your home is located?

______ Front Street

______ Koyukuk Street

______ Circle Subdivision

X Outlying area (Site or [✓ Mission Rd.]) BUILDING IT. LIVES AT THE CIRCLE.

Other ______

Do you live there full time? ☐ Yes ☒ No Will move in.

Number of bedrooms: 3

Number of bathrooms: 2

Number of people living in the house: 3

Number of children: 1

How long have you lived in the house: 2005

Water

What is your primary means of water service?

______ Haul from Too'gha watering point

X Individual well

Other ______

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☒ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) has 1 tub, 1 sink

need everything else

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

no

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water
____ Taste problems (especially chlorine)
X Staining on fixtures or clothes
____ Other ____
____ No service
X Odor problems

What would you like to improve about your water service?

____ Increased supply
____ Better Taste
____ Other ____
X Obtain water service for the first time
____ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

____ $35 - $55
____ $66 - $75
____ $56 - $65
$100.00 Other X

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

____ Regularly scheduled service
X On-call service

Sewer

What is your primary means of sewer disposal?

____ Honey bucket
____ Outhouse
X On-site septic system and drainfield
____ Other ____

If you are using a septic system and drainfield, what problems are you expierencing, if any? ____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No has own

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

____ $10 - $25
____ $35 - $50
____ $25 - $35
____ Other ____

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ____________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) odor, location

If the lagoon were relocated, where would you like to see it relocated to? around airport further back

Additional Comments

Do you have any suggestions or comments? would like help putting in sewer system, and help with indoor water & sewer line.

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Ken Lilley

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
____ Circle Subdivision
X Outlying area ([✓ Site] or Mission Rd.)
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 2

Number of bathrooms: 0

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 38 yrs

Water

What is your primary means of water service?

____ Haul from Too'gha watering point
____ Individual well
Other Springs

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) none needs all

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

NO

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water
Taste problems (especially chlorine)
Staining on fixtures or clothes
Other none
No service
Odor problems

What would you like to improve about your water service?

Increased supply
[✓ Better Taste]
Other
Obtain water service for the first time
I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

[✓ $35 - $55]
$66 - $75
$56 - $65
Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

Regularly scheduled service
[✓ On-call service]

Sewer

What is your primary means of scwer disposal?

[✓ Honey bucket]
[✓ Outhouse]
On-site septic system and drainfield
Other

If you arc using a septic system and drainfield, what problems are you expiercncing, if any? none

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

$10 - $25
$35 - $50
[✓ $25 - $35]
Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓] \$35 - \$55 ____ \$56 - \$65
____ \$66 - \$75 ____ Other ____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
____ Regularly scheduled service [✓] On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of \$100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) none

If the lagoon were relocated, where would you like to see it relocated to? N/A

Additional Comments

Do you have any suggestions or comments?

HOME NOW VACANT.

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Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Ken : Judy Carlo

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
____ Circle Subdivision
X Outlying area ([✓ Site] or Mission Rd.) 2.5 mi.
Other ________

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 2

Number of children: 1

How long have you lived in the house: 25yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other ________

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) Septic tank

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Yes

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water　　X No service
____ Taste problems (especially chlorine)　　____ Odor problems
____ Staining on fixtures or clothes
____ Other. ____

What would you like to improve about your water service?

____ Increased supply　　____ Obtain water service for the first time
____ Better Taste　　____ I wouldn't change anything
X Other maybe toogha can haul water.

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

X $35 - $55　　____ $56 - $65
____ $66 - $75　　____ Other ____

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

X Regularly scheduled service　　____ On-call service

Sewer

What is your primary means of sewer disposal?

____ Honey bucket　　____ On-site septic system and drainfield
X Outhouse　　X Other indoor bathroom

If you are using a septic system and drainfield, what problems are you expierencing, if any?

pipes freezing

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

____ $10 - $25　　____ $25 - $35
____ $35 - $50　　____ Other ____

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

X $35 - $55 ____ $56 - $65
____ $66 - $75 ____ Other ____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
X Regularly scheduled service ____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) odor / [illegible]

If the lagoon were relocated, where would you like to see it relocated to? latest plan

Additional Comments

Do you have any suggestions or comments? Would be nice if every on pay their bills, so we can keep it going.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Pat White

Which best describes where your home is located?

______ Front Street

______ Koyukuk Street

______ Circle Subdivision

X Outlying area (Site or Mission Rd.) Mission Hill

Other ______

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 2

Number of bathrooms: 0

Number of people living in the house: 2

Number of children: 1

How long have you lived in the house: 13yrs

Water

What is your primary means of water service?

Never!!!!... Haul from Too'gha watering point – awful water

______ Individual well

Other Mission springs Bear Creek

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.)

Needs everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

NO

Do you have any of the following problems with your water service (please check all that apply)?

______ Not enough water ______ No service
__X__ Taste problems (especially chlorine) ______ Odor problems
______ Staining on fixtures or clothes
__X__ Other too much calcium (too soft)

What would you like to improve about your water service?

______ Increased supply ______ Obtain water service for the first time
______ Better Taste ______ I wouldn't change anything
______ Other ______

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

__X__ $35 - $55 ______ $56 - $65
______ $66 - $75 ______ Other ______

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

______ Regularly scheduled service __X__ On-call service

Sewer

What is your primary means of sewer disposal?

__X__ Honey bucket ______ On-site septic system and drainfield
__X__ Outhouse ______ Other ______

If you are using a septic system and drainfield, what problems are you expierencing, if any? none

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

______ $10 - $25 ______ $25 - $35
______ $35 - $50 ______ Other ______

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ________________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: [✓ location], [✓ odor]) ________________

If the lagoon were relocated, where would you like to see it relocated to? NO idea

Additional Comments

Do you have any suggestions or comments? NONE

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: FRANK Curuthers

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
____ Circle Subdivision
X Outlying area (Site or [✓ Mission Rd.])
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: open

Number of bathrooms: 0

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 13 yrs

Water

What is your primary means of water service?

____ Haul from Too'gha watering point
____ Individual well
Other creeks by rapids river

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) needs everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
[✓ Other] no problem
________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
________ Other ________
________ Obtain water service for the first time
[✓ I wouldn't change anything]

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ \$35 - \$55
________ \$66 - \$75
________ \$56 - \$65
________ Other ________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call serviee?

________ Regularly scheduled service
________ On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
[✓ Outhouse]
________ On-site septic system and drainfield
________ Other ________

If you are using a septic system and drainfield, what problems are you expierencing, if any? none.

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ \$10 - \$25
________ \$35 - \$50
________ \$25 - \$35
________ Other ________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_______ $35 - $55 _______ $56 - $65

_______ $66 - $75 _______ Other _______________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service _______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) Odor

If the lagoon were relocated, where would you like to see it relocated to? I dont know

Additional Comments

Do you have any suggestions or comments? _______________

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Ada Jordon

Which best describes where your home is located?

_____ Front Street

_____ Koyukuk Street

_____ Circle Subdivision

X Outlying area (Site or [✓ Mission Rd.])

Other _____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 2

Number of bathrooms: 0

Number of people living in the house: 2

Number of children: 1

How long have you lived in the house: 22yrs

Water

What is your primary means of water service?

_____ Haul from Too'gha watering point

_____ Individual well

Other Springs, river

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) needs everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Yes

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water
X Taste problems (especially chlorine)
✓ Staining on fixtures or clothes
____ Other ____________

____ No service
X Odor problems

What would you like to improve about your water service?

____ Increased supply
____ Better Taste
____ Other ____________

X Obtain water service for the first time
____ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

____ $35 - $55
____ $66 - $75

____ $56 - $65
____ Other ____________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

____ Regularly scheduled service

____ On-call service

Sewer

What is your primary means of sewer disposal?

X Honey bucket
X Outhouse

____ On-site septic system and drainfield
____ Other ____________

If you are using a septic system and drainfield, what problems are you expiercncing, if any? none

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

X $10 - $25
____ $35 - $50

____ $25 - $35
____ Other ____________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_______ $35 - $55 _______ $56 - $65

_______ $66 - $75 _______ Other _______________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service _______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) odor

If the lagoon were relocated, where would you like to see it relocated to? back in flats

Additional Comments

Do you have any suggestions or comments? I want water

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Robert Erhart

Which best describes where your home is located?

X Front Street below circle

____ Koyukuk Street

____ Circle Subdivision

____ Outlying area (Site or Mission Rd.)

Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 2

Number of bathrooms: 1

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 2 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point

____ Individual well

Other ____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) needs everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other No problem

________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
X Other stronger pressure at laundromat

________ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ \$35 - \$55
________ \$66 - \$75

________ \$56 - \$65
$100-150^{00}$ Other ________________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service

X On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
X Outhouse

________ On-site septic system and drainfield
________ Other ________________

If you are using a septic system and drainfield, what problems are you expierencing, if any? none

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ \$10 - \$25
________ \$35 - \$50

________ \$25 - \$35
________ Other ________________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_____ $35 - $55 _____ $56 - $65

_____ $66 - $75 _____ Other _____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_____ Regularly scheduled service _____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) ador

If the lagoon were relocated, where would you like to see it relocated to? down by airport

Additional Comments

Do you have any suggestions or comments? Hurry up w/the water

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Dennis & Mary Edwin

Which best describes where your home is located?

___ Front Street
X Circle Subdivision
___ Koyukuk Street
___ Outlying area (Site or Mission Rd.)
Other ___

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 7

Number of children: 1

How long have you lived in the house: 8 [illegible] yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
___ Individual well
Other ___

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

has tub

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything else.

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Yes

Do you have any of the following problems with your water service (please check all that apply)?

_____ Not enough water
_____ Taste problems (especially chlorine)
_____ Staining on fixtures or clothes
_____ Other no problem
_____ No service
_____ Odor problems

What would you like to improve about your water service?

_____ Increased supply
_____ Better Taste
_____ Other _____
__X__ Obtain water service for the first time
_____ I wouldn't change anything

If a piped water system could not be installed to your arca due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

__X__ $35 - $55
_____ $66 - $75
_____ $56 - $65
_____ Other _____

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

__X__ Regularly scheduled service
_____ On-call service

Sewer

What is your primary means of sewer disposal?

__X__ Honey bucket
__X__ Outhouse
_____ On-site septic system and drainfield
_____ Other _____

If you are using a septic system and drainfield, what problems are you expierencing, if any? None

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_____ $10 - $25
_____ $35 - $50
_____ $25 - $35
_____ Other _____

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓ $35 - $55] ____ $56 - $65

____ $66 - $75 ____ Other ____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

[✓ Regularly scheduled service] ____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) No problem

If the lagoon were relocated, where would you like to see it relocated to? on land treatment System.

Additional Comments

Do you have any suggestions or comments? Sure Would like to have Water.

Too'gha, Inc.
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Survey Questions

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General Questions

Homeowner's name: Ava Edwardsen

Which best describes where your home is located?

2004
1995
9

_____ Front Street
_____ Koyukuk Street
_____ Circle Subdivision
X Outlying area (Site or [✓ Mission Rd.])
Other _____

Do you live there full time? ☑ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 5

Number of children: 4

How long have you lived in the house: 9yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
_____ Individual well
Other Spring

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

need toilet

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) has everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

only from spring

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water
____ Taste problems (especially chlorine)
_X_ Staining on fixtures or clothes
____ Other white deposit
____ No service
____ Odor problems

What would you like to improve about your water service?

____ Increased supply
____ Better Taste
____ Other
_X_ Obtain water service for the first time
____ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

____ $35 - $55
____ $66 - $75
____ $56 - $65
____ Other ________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

____ Regularly scheduled service
____ On-call service

Sewer

What is your primary means of sewer disposal?

____ Honey bucket
_X_ Outhouse
____ On-site septic system and drainfield
____ Other ________

If you are using a septic system and drainfield, what problems are you expierencing, if any? none

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

____ $10 - $25
____ $35 - $50
____ $25 - $35
_X_ Other depending on the cost.

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ____________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No no applicable

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) both / plants growing though the membrane

If the lagoon were relocated, where would you like to see it relocated to? North of old one

Additional Comments

Do you have any suggestions or comments? no comments

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Blanche Edwin

Which best describes where your home is located?

_____ Front Street
_____ Koyukuk Street
_____ Circle Subdivision
__X__ Outlying area (Site or [✓ Mission Rd.])
Other _____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 1

Number of children: 2

How long have you lived in the house: _____

Water

What is your primary means of water service?

__X__ Haul from Too'gha watering point
_____ Individual well
Other Mission Spring

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

only

Are there interior plumbing/fixtures ([✓ sink,] toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need the heat

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

no

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water

[✓ Taste problems (especially chlorine)]

[✓ Staining on fixtures or clothes]

Other

No service

Odor problems

What would you like to improve about your water service?

Increased supply

[✓ Better Taste]

[✓ Other deposits]

[✓ Obtain water service for the first time]

I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul systcm? (Note: user fees must be able to sustain the operation of the haul service.)

$35 - $55

[✓ $66 - $75]

$56 - $65

Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

Regularly scheduled service

[✓ On-call service]

Sewer

What is your primary means of sewer disposal?

Honey bucket

[✓ Outhouse]

On-site septic system and drainfield

Other

If you are using a septic system and drainfield, what problems are you expierencing, if any? none

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

[✓ $10 - $25]

$35 - $50

$25 - $35

Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

______ $35 - $55
______ $56 - $65
______ $66 - $75
______ Other ______

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

______ Regularly scheduled service
______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) no

If the lagoon were relocated, where would you like to see it relocated to? Unknown

Additional Comments

Do you have any suggestions or comments? Residents & visitors, etc. doesn't come here, or move here because of no running water.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Lavern Hyslop

Which best describes where your home is located?

________ Front Street

________ Koyukuk Street

________ Circle Subdivision

X Outlying area (Site or [✓ Mission Rd.])

Other ________

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1

Number of bathrooms: 0

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 24 yrs.

Water

What is your primary means of water service?

________ Haul from Too'gha watering point

________ Individual well

Other Spring or river

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) needs everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water — No service
Taste problems (especially chlorine) — Odor problems
Staining on fixtures or clothes
Other no problem

What would you like to improve about your water service?

Increased supply — [✓ Obtain water service for the first time]
Better Taste — I wouldn't change anything
Other

If a piped water system could not bc installed to your area due to costs, would a haul system bc acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must bc able to sustain the operation of the haul service.)

\$35 - \$55 — \$56 - \$65
[✓ \$66 - \$75] — Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

[✓ Regularly scheduled service] — On-call service

Sewer

What is your primary means of sewer disposal?

Honey bucket — On-site septic system and drainfield
[✓ Outhouse] — Otber

If you are using a septic systcm and drainfield, what problcms are you expierencing, if any? none

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

[✓ \$10 - \$25] — \$25 - \$35
\$35 - \$50 — Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_______ $35 - $55 _______ $56 - $65

_______ $66 - $75 _______ Other _______

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service _______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) oder

If the lagoon were relocated, where would you like to see it relocated to? north of existing location

Additional Comments

Do you have any suggestions or comments? none

Too'gha, Inc.
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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Curtis Sommer

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
____ Circle Subdivision
X Outlying area (Site of [✓ Mission Rd.])
Other ____

Do you live there full time? ☐ Yes ☒ No

Number of bedrooms: 4

Number of bathrooms: 1

Number of people living in the house: 6

Number of children: 4

How long have you lived in the house: Going to build

Water

What is your primary means of water service?

✓ Haul from Too'gha watering point
____ Individual well
Other ____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) ____

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

____

Do you have any of the following problems with your water service (please check all that apply)?

_______ Not enough water
_______ Taste problems (especially chlorine)
_______ Staining on fixtures or clothes
_______ Other _______________________
_______ No service
_______ Odor problems

What would you like to improve about your water service?

_______ Increased supply
_______ Better Taste
_______ Other _______________________
_______ Obtain water service for the first time
_______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

_______ \$35 - \$55
_______ \$66 - \$75
_______ \$56 - \$65
_______ Other _______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service
_______ On-call service

Sewer

What is your primary means of sewer disposal?

_______ Honey bucket
_______ Outhouse
_______ On-site septic system and drainfield
_______ Other _______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? _______________

____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_______ \$10 - \$25
_______ \$35 - \$50
_______ \$25 - \$35
_______ Other _______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________	$35 - $55	________	$56 - $65
________	$66 - $75	________	Other ____________________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) ____________________

____

If the lagoon were relocated, where would you like to see it relocated to? ____________________

Additional Comments

Do you have any suggestions or comments? ____________________

____

____

____

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Harry Nicholia

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
____ Circle Subdivision
X Outlying area ([✓ Site] or Mission Rd.)
Other ____

Do you live there full time? ☐ Yes ☒ No

Number of bedrooms: 0

Number of bathrooms: 0

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 34yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other ____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) needs everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water
No service
Taste problems (especially chlorine)
Odor problems
Staining on fixtures or clothes
Other No problem

What would you like to improve about your water service?

Increased supply
[✓ Obtain water service for the first time]
Better Taste
I wouldn't change anything
Other

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

$35 - $55
[✓ $56 - $65]
$66 - $75
Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

Regularly scheduled service
[✓ On-call service]

Sewer

What is your primary means of sewer disposal?

Honey bucket
On-site septic system and drainfield
[✓ Outhouse]
Other

If you are using a septic system and drainfield, what problems are you expierencing, if any? NONE

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

$10 - $25
[✓ $25 - $35]
$35 - $50
Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65
________ $66 - $75 ________ Other ____________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) No problem

If the lagoon were relocated, where would you like to see it relocated to? leave it there.

Additional Comments

Do you have any suggestions or comments? ____________

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: M. Andon

Which best describes where your home is located?

_______ Front Street
___✓___ Circle Subdivision
Other _______________
_______ Koyukuk Street
_______ Outlying area (Site or Mission Rd.)

Do you live there full time? ☑ Yes ☐ No

Number of bedrooms: 4

Number of bathrooms: 1

Number of people living in the house: 4

Number of children: _______

How long have you lived in the house: 25yrs

Water

What is your primary means of water service?

___✓___ Haul from Too'gha watering point
_______ Individual well
Other River in Winter months

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) HUD home Sinks, Tub have been installed but no water. 100gal holding tank has been removed.

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Yes

Do you have any of the following problems with your water service (please check all that apply)?

_______ Not enough water
_______ Taste problems (especially chlorine)
_______ Staining on fixtures or clothes
___✓___ Other Tired of hauling water
___✓___ No service
_______ Odor problems

What would you like to improve about your water service?

___✓___ Increased supply
___✓___ Better Taste
___✓___ Other Build facility for future growth
_______ Obtain water service for the first time
_______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

_______ $35 - $55
_______ $66 - $75
_______ $56 - $65
_______ Other _______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service
_______ On-call service

Sewer

What is your primary means of sewer disposal?

___✓___ Honey bucket
___✓___ Outhouse
_______ On-site septic system and drainfield
_______ Other _______________

If you are using a septic system and drainfield, what problems are you expiercncing, if any? _______________

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☑ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_______ $10 - $25
___✓___ $35 - $50
_______ $25 - $35
_______ Other _______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

$35 - $55 [✓ $56 - $65]

$66 - $75 Other

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

[✓ Regularly scheduled service] On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☑ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☑ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) Yes! the size (Too small) Location (town is growing around it)

If the lagoon were relocated, where would you like to see it relocated to? North side of the run way (Airport)

Additional Comments

Do you have any suggestions or comments? Include plans for future growth

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Tom Roberts Sr.

Which best describes where your home is located?

X Front Street
___ Koyukuk Street
___ Circle Subdivision
___ Outlying area (Site or Mission Rd.)
Other ___

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 0

Number of people living in the house: 3

Number of children: 0

How long have you lived in the house: 34 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
___ Individual well
Other ___

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

_______ Not enough water
_______ Taste problems (especially chlorine)
_______ Staining on fixtures or clothes
_______ Other no problem

_______ No service
_______ Odor problems

What would you like to improve about your water service?

_______ Increased supply
_______ Better Taste
_______ Other

_______ Obtain water service for the first time
___X___ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

_______ $35 - $55
___X___ $66 - $75

_______ $56 - $65
_______ Other

Would you prefer that water be deliverd ou a regularly scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service
___X___ On-call service

Sewer

What is your primary means of sewer disposal?

___X___ Honey bucket
___X___ Outhouse

_______ On-site septic system and drainfield
_______ Other

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_______ $10 - $25
___X___ $35 - $50

_______ $25 - $35
_______ Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

X $35 - $55
___ $56 - $65
___ $66 - $75
___ Other ___

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

___ Regularly scheduled service
X On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) odor

If the lagoon were relocated, where would you like to see it relocated to? ~~behind pow~~ further out of town.

Additional Comments

Do you have any suggestions or comments?

Hurry up w/ water.

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Thelma Starr / Ronnie Evans

Which best describes where your home is located?

X Front Street
____ Koyukuk Street
____ Circle Subdivision
____ Outlying area (Site or Mission Rd.)
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 5

Number of children: 3

How long have you lived in the house: 2 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other ____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need toilet Tanana Hud Home -

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Good enough for me.

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water
[✓ Taste problems (especially chlorine)]
Staining on fixtures or clothes
Other

No service
Odor problems

What would you like to improve about your water service?

Increased supply
[✓ Better Taste]
Other

[✓ Obtain water service for the first time]
I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

$35 - $55
$66 - $75

$56 - $65
[✓ Other] ?

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

[✓ Regularly scheduled service]

On-call service

Sewer

What is your primary means of sewer disposal?

[✓ Honey bucket]
[✓ Outhouse]

On-site septic system and drainfield
Other

If you are using a septic system and drainfield, what problems are you expierencing, if any?

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

$10 - $25
$35 - $50

$25 - $35
[✓ Other] ?

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_________ $35 - $55
_________ $56 - $65
_________ $66 - $75
_________ Other _______________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_________ Regularly scheduled service
_________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) _______________

If the lagoon were relocated, where would you like to see it relocated to? away from the community

Additional Comments

Do you have any suggestions or comments? Piped Water & Sewer System would be the best option, & not a septic System would do.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Julie Roberts-Hyslop

Which best describes where your home is located?

____ Front Street
✓ Circle Subdivision
Other ____
____ Koyukuk Street
____ Outlying area (Site or Mission Rd.)

Do you live there full time? ☑ Yes ☐ No

Number of bedrooms: 4

Number of bathrooms: 1

Number of people living in the house: 4

Number of children: 2

How long have you lived in the house: 20 +

Water

What is your primary means of water service?

✓ Haul from Too'gha watering point
____ Individual well
Other ____

Has a well ever been drilled on your lot? ☐ Yes ☑ No

If yes, is a well log available? ☐ Yes ☑ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) Sort of Then old fixtures

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

- No -

Do you have any of the following problems with your water service (please check all that apply)?

✓ Not enough water
____ Taste problems (especially chlorine)
____ Staining on fixtures or clothes
____ Other ____________

✓ No service
____ Odor problems

What would you like to improve about your water service?

____ Increased supply
____ Better Taste
____ Other ____________

✓ Obtain water service for the first time
____ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☑ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

____ $35 - $55
____ $66 - $75

____ $56 - $65
____ Other ____________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

____ Regularly scheduled service
____ On-call service

Absolutely not!

Sewer

What is your primary means of sewer disposal?

✓ Honey bucket
✓ Outhouse

____ On-site septic system and drainfield
____ Other ____________

If you are using a septic system and drainfield, what problems are you expierencing, if any? ____________

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

____ $10 - $25
____ $35 - $50

____ $25 - $35
____ Other ____________

Not enough information provided!

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_______ $35 - $55 _______ $56 - $65
_______ $66 - $75 _______ Other _______

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
_______ Regularly scheduled service _______ On-call service

Absolutely Not

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☑ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☑ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) _______

If the lagoon were relocated, where would you like to see it relocated to? Behind the proposed new airport Road

Additional Comments

Do you have any suggestions or comments? I would like very much to have water & sewer hooked up at the Circle via a "piped" W & S. system.

and we've been surveyed how many times now - Hopefully this is the last time.

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Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Amanda Vanderpool

Which best describes where your home is located?

✓ Front Street
___ Koyukuk Street
___ Circle Subdivision
___ Outlying area (Site or Mission Rd.)
Other ___

Do you live there full time? ☐ Yes ☐ No

Number of bedrooms: 1
Number of bathrooms: 0

Number of people living in the house: 3
Number of children: 1

How long have you lived in the house: 2 months

Water

What is your primary means of water service?

✓ Haul from Too'gha watering point
___ Individual well
Other ___

Has a well ever been drilled on your lot? ☐ Yes ☐ No Don't know
If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything in this house.

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

____

Do you have any of the following problems with your water service (please check all that apply)?

_______ Not enough water
_______ Taste problems (especially chlorine)
_______ Staining on fixtures or clothes
_______ Other _______________________
_______ No service
_______ Odor problems

What would you like to improve about your water service?

_______ Increased supply
_______ Better Taste
_______ Other _______________________
_______ Obtain water service for the first time
_______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

_______ $35 - $55
_______ $66 - $75
_______ $56 - $65
_______ Other _______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service
_______ On-call service

Sewer

What is your primary means of sewer disposal?

_______ Honey bucket
_______ Outhouse
_______ On-site septic system and drainfield
_______ Other _______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? _______________

____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_______ $10 - $25
_______ $35 - $50
_______ $25 - $35
_______ Other _______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ________________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) ________________

____

If the lagoon were relocated, where would you like to see it relocated to? ________________

Additional Comments

Do you have any suggestions or comments? ________________

____

____

____

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Bernice Aragon - Deanna Starr
5150 Electra Ave -
Fbks. Ak. 99709

Which best describes where your home is located?

____ Front Street   ____ Koyukuk Street

____ Circle Subdivision   ____ Outlying area (Site or Mission Rd.)

Other Below Circle,

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1   Number of bathrooms: 0

Number of people living in the house: 1   Number of children: 0

How long have you lived in the house: 7 or 8 years -

Water

What is your primary means of water service?

X Haul from Too'gha watering point   Other River

____ Individual well

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) NO - Out Door Toilet.

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Yes

Do you have any of the following problems with your water service (please check all that apply)?

_____ Not enough water
_____ Taste problems (especially chlorine)
_____ Staining on fixtures or clothes
X Other What's the white film / Dust like Particles that remains in left over heated water / water I warmed up But never used -

_____ No service
_____ Odor problems

What would you like to improve about your water service?

_____ Increased supply
_____ Better Taste
_____ Other _____

_____ Obtain water service for the first time
X I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

_____ $35 - $55
_____ $66 - $75

_____ $56 - $65
_____ Other Anything

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

X Regularly scheduled service
_____ On-call service

Sewer

What is your primary means of sewer disposal?

_____ Honey bucket
X Outhouse

_____ On-site septic system and drainfield
_____ Other _____

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_____ $10 - $25
_____ $35 - $50

_____ $25 - $35
_____ Other _____

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65 ?

________ $66 - $75 ________ Other ________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

__X__ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) Odor - River Drainage -

If the lagoon were relocated, where would you like to see it relocated to? ________

Additional Comments

Do you have any suggestions or comments? ________

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Albert & Ann Guthrie

Which best describes where your home is located?

_____ Front Street
X Circle Subdivision
Other _____
_____ Koyukuk Street
_____ Outlying area (Site or Mission Rd.)

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 2

Number of children: 1

How long have you lived in the house: 20+ yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point
_____ Individual well
Other _____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures ([✓ sink], bathtub, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

NO

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water
[✓ Taste problems (especially chlorine)]
[✓ Staining on fixtures or clothes]
Other hard water
[✓ No service]
[✓ Odor problems]

What would you like to improve about your water service?

Increased supply
[✓ Better Taste]
Other
[✓ Obtain water service for the first time]
I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? Yes ☒ Yes ☒ No Water Service like City

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

[✓ $35 - $55]
$66 - $75
$56 - $65
Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

Regularly scheduled service
[✓ On-call service]

Sewer

What is your primary means of sewer disposal?

[✓ Honey bucket]
[✓ Outhouse]
On-site septic system and drainfield
Other

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

$10 - $25
$35 - $50
$25 - $35
Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65
________ $66 - $75 ________ Other ________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) location

If the lagoon were relocated, where would you like to see it relocated to? by the circle sub division

Additional Comments

Do you have any suggestions or comments? I'd like to see in the plans where the "Solar Circle" is a Phase of the NEXT Plan in the immediate future. I don't go to meetings to get info as to plans or what's next ... a Web page as to plans of program.
If Circle can get wat. sewer on Phase II plan, that would be my choice, but otherwise cost is my concern.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Josephine Roberts

Which best describes where your home is located?

X Front Street　　____ Koyukuk Street

____ Circle Subdivision　　____ Outlying area (Site or Mission Rd.)

Other ____

Do you live there full time?　☒ Yes　☐ No

Number of bedrooms: 3　　Number of bathrooms: 1

Number of people living in the house: 1　　Number of children: 0

How long have you lived in the house: 10 yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point　　Other ____

____ Individual well

Has a well ever been drilled on your lot?　☒ Yes　☐ No

If yes, is a well log available?　☐ Yes　☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

_______ Not enough water
_______ Taste problems (especially chlorine)
_______ Staining on fixtures or clothes
_______ Other No problems

_______ No service
_______ Odor problems

What would you like to improve about your water service?

_______ Increased supply
_______ Better Taste
_______ Other _______________

X Obtain water service for the first time
_______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

X $35 - $55
_______ $66 - $75

_______ $56 - $65
_______ Other _______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service

X On-call service

Sewer

What is your primary means of sewer disposal?

✓ Honey bucket
X Outhouse

_______ On-site septic system and drainfield
_______ Other _______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

don't know

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_______ $10 - $25
_______ $35 - $50

_______ $25 - $35
_______ Other _______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_____ $35 - $55 _____ $56 - $65

_____ $66 - $75 _____ Other _____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_____ Regularly scheduled service _____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) No

If the lagoon were relocated, where would you like to see it relocated to? NO

Additional Comments

Do you have any suggestions or comments? Unknown about the survey. Sounds to me we will get no water.

Too'gha, Inc.
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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Rebecca Erhart

Which best describes where your home is located?

____ Front Street
X Circle Subdivision
Other ____
____ Koyukuk Street
____ Outlying area (Site or Mission Rd.)

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 5

Number of children: 3

How long have you lived in the house: 15yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other ____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Yes

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water — No service

Taste problems (especially chlorine) — Odor problems

Staining on fixtures or clothes

Other No problems

What would you like to improve about your water service?

Increased supply — Obtain water service for the first time

Better Taste — [✓ I wouldn't change anything]

[✓ Other]

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

[✓ $35 - $55] — $56 - $65

$66 - $75 — Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

Regularly scheduled service — [✓ On-call service]

Sewer

What is your primary means of sewer disposal?

[✓ Honey bucket] — On-site septic system and drainfield

[✓ Outhouse] — Other

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

[✓ $10 - $25] — $25 - $35

$35 - $50 — Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓ $35 - $55]
$56 - $65
$66 - $75
Other ______

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
Regularly scheduled service
[✓ On-call service]

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) no

If the lagoon were relocated, where would you like to see it relocated to? ______

Additional Comments

Do you have any suggestions or comments? Would like to see running water at the circle.

Too'gha, Inc.
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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Gloria Albert

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
X Circle Subdivision
____ Outlying area (Site or Mission Rd.)
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 4

Number of bathrooms: 1

Number of people living in the house: 4

Number of children: 2

How long have you lived in the house: 20 yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other rain water

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures ([✓ sink], toilet, tub holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.)

need pipes

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

NO

Do you have any of the following problems with your water service (please check all that apply)?

_____ Not enough water
_____ Taste problems (especially chlorine)
_____ Staining on fixtures or clothes
_____ Other _____________
[✓ No service]
_____ Odor problems

What would you like to improve about your water service?

_____ Increased supply
_____ Better Taste
_____ Other _____________
[✓ Obtain water service for the first time]
_____ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

[✓ $35 - $55]
_____ $66 - $75
_____ $56 - $65
_____ Other _____________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_____ Regularly scheduled service
[✓ On-call service]

Sewer

What is your primary means of sewer disposal?

[✓ Honey bucket]
[✓ Outhouse]
_____ On-site septic system and drainfield
_____ Other _____________

If you are using a septic system and drainfield, what problems are you expiencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_____ $10 - $25
[✓ $35 - $50]
_____ $25 - $35
_____ Other _____________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

__X__ $35 - $55
_____ $56 - $65
_____ $66 - $75
_____ Other _____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
_____ Regularly scheduled service
__X__ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) odor

If the lagoon were relocated, where would you like to see it relocated to? down airport road.

Additional Comments

Do you have any suggestions or comments? Install a water well house to buy water.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Dennis Charley

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
____ Circle Subdivision
X Outlying area ([✓ Site] or Mission Rd.)
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1

Number of bathrooms: 0

Number of people living in the house: 2

Number of children: 1

How long have you lived in the house: 28 yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other ____

14
+16
28

Has a well ever been drilled on yonr lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

NO

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water
Taste problems (especially chlorine)
Staining on fixtures or clothes
[✓ Other] Hard Water
No service
Odor problems

What would you like to improve about your water service?

Increased supply
Better Taste
Other
Obtain water service for the first time
[✓ I wouldn't change anything]

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wiliing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

[✓ $35 - $55]
$66 - $75
$56 - $65
Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

Regularly scheduled service
[✓ On-call service]

Sewer

What is your primary means of sewer disposal?

Honey bucket
[✓ Outhouse]
On-site septic system and drainfield
Other

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

$10 - $25
[✓ $35 - $50]
$25 - $35
Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓ $35 - $55] $56 - $65
$66 - $75 Other

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
Regularly scheduled service [✓ On-call service]

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? don't Know

Additional Comments

Do you have any suggestions or comments? None.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Gloria Albert

Which best describes where your home is located?

____ Front Street	____ Koyukuk Street
X Circle Subdivision	____ Outlying area (Site or Mission Rd.)
Other ____	

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 4

Number of bathrooms: 1

Number of people living in the house: 4

Number of children: 2

How long have you lived in the house: 22 yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point

____ Individual well

Other rain water

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

tub

Are there interior plumbing/fixtures ([✓ sink] toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.)

need pipes

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

NO

Do you have any of the following problems with your water service (please check all that apply)?

_______ Not enough water

_______ Taste problems (especially chlorine)

_______ Staining on fixtures or clothes

_______ Other _______________

___X___ No service

_______ Odor problems

What would you like to improve about your water service?

_______ Increased supply

_______ Better Taste

_______ Other _______________

___X___ Obtain water service for the first time

_______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

___X___ $35 - $55

_______ $66 - $75

_______ $56 - $65

_______ Other _______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service

___X___ On-call service

Sewer

What is your primary means of sewer disposal?

___X___ Honey bucket

___X___ Outhouse

_______ On-site septic system and drainfield

_______ Other _______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_______ $10 - $25

___X___ $35 - $50

_______ $25 - $35

_______ Other _______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓ $35 - $55] ______ $56 - $65
______ $66 - $75 ______ Other ______

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
______ Regularly scheduled service [✓ On-call service]

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) odor

If the lagoon were relocated, where would you like to see it relocated to? down airport road.

Additional Comments

Do you have any suggestions or comments? Install a water well house to buy Water.

Too'gha, Inc.
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Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Kathleen & Stan Zuray

Which best describes where your home is located?

_____ Front Street
_____ Koyukuk Street
_____ Circle Subdivision
X Outlying area (Site or [✓ Mission Rd.])
Other _____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 4
Number of bathrooms: 1

Number of people living in the house: 2
Number of children: 3

How long have you lived in the house: 20 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
_____ Individual well
Other spring water. River water in winter.

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures ([✓ sink] Kitchen toilet, [✓ holding tank], [✓ piping], etc.) that are in working order? (If not please describe the deficiencies.)

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

No - spring water Ecoli / same w/river

Do you have any of the following problems with your water service (please check all that apply)?

_____ Not enough water

__X__ Taste problems (especially chlorine)

__X__ Staining on fixtures or clothes

_____ Other _______________

_____ No service

_____ Odor problems

What would you like to improve about your water service?

_____ Increased supply

_____ Better Taste

__X__ Other Would like a personnel well.

_____ Obtain water service for the first time

_____ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

_____ $35 - $55

_____ $66 - $75

_____ $56 - $65

_____ Other _______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_____ Regularly scheduled service

_____ On-call service

Sewer

What is your primary means of sewer disposal?

__X__ Honey bucket

__X__ Outhouse

_____ On-site septic system and drainfield

_____ Other _______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_____ $10 - $25

_____ $35 - $50

_____ $25 - $35

_____ Other _______________

a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable?

☐ Yes ☐ No Not sure

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_______ $35 - $55

_______ $66 - $75

_______ $56 - $65

_______ Other _______________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service

_______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☐ No Not sure

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) bad location/odor

If the lagoon were relocated, where would you like to see it relocated to? 2 miles back from Tanana

Additional Comments

Do you have any suggestions or comments? Glad to see this survey done.

Don't agree with the annual sludge dump into yukon river, but need to petition Denali commission to upgrade all water/sewer systems along the yukon River. Thank you.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Dan Roemer

Which best describes where your home is located?

______ Front Street ______ Koyukuk Street

______ Circle Subdivision ______ Outlying area (Site or Mission Rd.)

Other ag Road

Do you live there full time? ☑ Yes ☐ No

Number of bedrooms: 1 Number of bathrooms: 0

Number of people living in the house: 1 Number of children: 0

How long have you lived in the house: 6months

Water

What is your primary means of water service?

✓ Haul from Too'gha watering point

______ Individual well

Other Spring

Has a well ever been drilled on your lot? ☐ Yes ☑ No

If yes, is a well log available? ☐ Yes ☑ No

Are there interior plumbing/fixtures ([✓ sink], toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

____

Do you have any of the following problems with your water service (please check all that apply)?

- ____ Not enough water
- __✓__ Taste problems (especially chlorine)
- ____ Staining on fixtures or clothes
- ____ Other ________________
- ____ No service
- ____ Odor problems

What would you like to improve about your water service?

- ____ Increased supply
- __✓__ Better Taste
- ____ Other ________________
- ____ Obtain water service for the first time
- ____ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☑ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

- __X__ \$35 - \$55
- ____ \$66 - \$75
- ____ \$56 - \$65
- ____ Other ________________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

- __✓__ Regularly scheduled service
- ____ On-call service

Sewer

What is your primary means of sewer disposal?

- ____ Honey bucket
- __✓__ Outhouse
- ____ On-site septic system and drainfield
- ____ Other ________________

If you are using a septic system and drainfield, what problems are you expiercncing, if any? ________________

____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

- ____ \$10 - \$25
- ____ \$35 - \$50
- ____ \$25 - \$35
- ____ Other ________________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

✓ $35 - $55
____ $56 - $65
____ $66 - $75
____ Other ____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

____ Regularly scheduled service
____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☑ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☑ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? NO

Additional Comments

Do you have any suggestions or comments?

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: BILL & CATHY FLITIS

Which best describes where your home is located?

_____ Front Street
_____ Koyukuk Street
_____ Circle Subdivision
X Outlying area (Site or Mission Rd.)
Other _____

Do you live there full time? ☒ Yes ☐ No HAVE BUT WILL BE MOVING SOON

Number of bedrooms: 2
Number of bathrooms: 1

Number of people living in the house: 2
Number of children: 2

How long have you lived in the house: 20 YEARS

Water

What is your primary means of water service?

X Haul from Too'gha watering point
_____ Individual well
Other _____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) NO

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

____

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other ______________________

___X___ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
___X___ Other WOULD LIKE A WELL

________ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ $35 - $55
________ $66 - $75

________ $56 - $65
________ Other ______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service
___X___ On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
___X___ Outhouse

________ On-site septic system and drainfield
________ Other ______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? ______________

____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

______ $10 - $25
______ $35 - $50

________ $25 - $35
________ Other ______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ~~☒~~ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_______ $35 - $55 _______ $56 - $65

_______ $66 - $75 _______ Other _______________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service _______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) _______________

If the lagoon were relocated, where would you like to see it relocated to? _______________

Additional Comments

Do you have any suggestions or comments? WOULD REALLY LIKE TO HAVE A PERSONAL WELL.

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Faith Peters

Which best describes where your home is located?

______ Front Street
______ Koyukuk Street
X Circle Subdivision
______ Outlying area (Site or Mission Rd.)
Other ______

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 0

Number of people living in the house: 2

Number of children: 1

How long have you lived in the house: 12 yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point
______ Individual well
Other ______

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures ([✓ sink] toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

NO

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Cindy Johnson

Which best describes where your home is located?

____ Front Street	____ Koyukuk Street
X Circle Subdivision	____ Outlying area (Site or Mission Rd.)
Other ____	

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 5

Number of children: 3 one on the way

How long have you lived in the house: 3yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point

____ Individual well

Other ____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures ([✓ sink] tub toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need the rest.

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

NO

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water

X No service

____ Taste problems (especially chlorine)

____ Odor problems

____ Staining on fixtures or clothes

X Other need running water

What would you like to improve about your water service?

____ Increased supply

X Obtain water service for the first time

____ Better Taste

____ I wouldn't change anything

____ Other ____

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

X $35 - $55

____ $56 - $65

____ $66 - $75

____ Other ____

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

X Regularly scheduled service

____ On-call service

Sewer

What is your primary means of sewer disposal?

X Honey bucket

____ On-site septic system and drainfield

X Outhouse

____ Other ____

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ■ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

■ $10 - $25

____ $25 - $35

____ $35 - $50

____ Other ____

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓ $35 - $55] ____ $56 - $65
____ $66 - $75 ____ Other ____________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
[✓ Regularly scheduled service] ____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) Yes / can't reach circle.

If the lagoon were relocated, where would you like to see it relocated to? 2 miles back of Tanana

Additional Comments

Do you have any suggestions or comments?

Has

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

_____ Not enough water

_____ Taste problems (especially chlorine)

_____ Staining on fixtures or clothes

__X__ Other won't drink water

_____ No service

_____ Odor problems

What would you like to improve about your water service?

_____ Increased supply

_____ Better Taste

_____ Other _____

_____ Obtain water service for the first time

__X__ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

__X__ $35 - $55

_____ $66 - $75

_____ $56 - $65

_____ Other _____

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_____ Regularly scheduled service

__X__ On-call service

Sewer

What is your primary means of sewer disposal?

__X__ Honey bucket

__X__ Outhouse

_____ On-site septic system and drainfield

_____ Other _____

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ■ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ________________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? anywhere, out of town

Additional Comments

Do you have any suggestions or comments? ________________

Too'gha, Inc.
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Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Tom Fogg

Which best describes where your home is located?

_______ Front Street
_______ Koyukuk Street
_______ Circle Subdivision
X Outlying area (Site or Mission Rd.)
Other _______________

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1
Number of bathrooms: 0

Number of people living in the house: 1
Number of children: 0

How long have you lived in the house: 12

Water

What is your primary means of water service?

_______ Haul from Too'gha watering point
_______ Individual well
Other Spring water Mission + Bear creek

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) No plumbing of any kind

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Yes

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other ______________________________
___X___ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
________ Other ______________________________
___X___ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

___X___ $35 - $55
________ $66 - $75
________ $56 - $65
________ Other ______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service
___X___ On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
___X___ Outhouse
________ On-site septic system and drainfield
________ Other ______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? ______________

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ $10 - $25
________ $35 - $50
________ $25 - $35
________ Other ______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable?

☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_______ $35 - $55
_______ $56 - $65
_______ $66 - $75
_______ Other _______

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service
_______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system?

☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service?

☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) _______

If the lagoon were relocated, where would you like to see it relocated to? _______

Additional Comments

Do you have any suggestions or comments? A well Drilled some where up in this area for water would Be the Best thing for me Don't need any sewer or water piped into the house

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name:

Which best describes where your home is located?

_____ Front Street

_____ Circle Subdivision

_____ Koyukuk Street

Other _____

✓ Outlying area ([✓ Site] or Mission Rd.)

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1 Room House

Number of bathrooms: 0

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 14 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point

_____ Individual well

Other _____

las a well ever been drilled on your lot? ☐ Yes ☒ No

yes, is a well log available? ☐ Yes ☒ No

e there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If please describe the deficiencies.) NO - None installed

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory. ~~N/A~~ yes

Do you have any of the following problems with your water service (please check all that apply)?

NO Not enough water
NO Taste problems (especially chlorine)
NO Staining on fixtures or clothes
NO Other
NO No service
NO Odor problems

What would you like to improve about your water service?

___ Increased supply
___ Better Taste
X Other Water delivered
___ Obtain water service for the first time
___ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

X $35 - $55
___ $66 - $75
___ $56 - $65
___ Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

___ Regularly scheduled service
X On-call service

Sewer

What is your primary means of sewer disposal?

___ Honey bucket
X Outhouse
___ On-site septic system and drainfield
___ Other

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

X $10 - $25
___ $35 - $50
___ $25 - $35
___ Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

X $35 - $55 ___ $56 - $65
___ $66 - $75 ___ Other ___

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
___ Regularly scheduled service ___ On-call service other ONSITE Treatment method

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Not feasible up site Road

Are there any problems with the existing lagoon?
If yes, please list? (Examples [✓ location,] [✓ odor])

If the lagoon were relocated, where would you like to see it relocated to? North of Treatment Plant

Additional Comments

Do you have any suggestions or comments?

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Lillian Folger

Which best describes where your home is located?

X Front Street
Koyukuk Street
Circle Subdivision
Outlying area (Site or Mission Rd.)
Other

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 4

Number of bathrooms: 1

Number of people living in the house: 2

Number of children: 0

How long have you lived in the house: 24yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
Individual well
Other

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures ([✓ sink], toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.)

Need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

______NO______________________________________

Do you have any of the following problems with your water service (please check all that apply)?

______ Not enough water
__X__ Taste problems (especially chlorine)
______ Staining on fixtures or clothes
______ Other ______________________
______ No service
______ Odor problems

What would you like to improve about your water service?

______ Increased supply
__X__ Better Taste
______ Other ______________________
______ Obtain water service for the first time
______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

______ $35 - $55
______ $66 - $75
______ $56 - $65
______ Other ______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

______ Regularly scheduled service
______ On-call service

Sewer

What is your primary means of sewer disposal?

______ Honey bucket
__X__ Outhouse
______ On-site septic system and drainfield
______ Other ______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A______

____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

______ $10 - $25
______ $35 - $50
______ $25 - $35
______ Other ______________

stem could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_____ $35 - $55 _____ $56 - $65

_____ $66 - $75 _____ Other _____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_____ Regularly scheduled service _____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system?

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon? ☐ Yes ☐ No

If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? unknown

Additional Comments

Do you have any suggestions or comments? No

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Christopher J. Grant

Which best describes where your home is located?

X Front Street ____ Koyukuk Street

____ Circle Subdivision ____ Outlying area (Site or Mission Rd.)

Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1 Number of bathrooms: 0

Number of people living in the house: 1 Number of children: 0

How long have you lived in the house: 8 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point Other ____

____ Individual well

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.)

need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water
____ Taste problems (especially chlorine)
____ Staining on fixtures or clothes
____ Other NO problem
__X__ No service
____ Odor problems

What would you like to improve about your water service?

____ Increased supply
____ Better Taste
____ Other ____________
____ Obtain water service for the first time
__X__ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

____ \$35 - \$55
__X__ \$66 - \$75
____ \$56 - \$65
____ Other ____________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

____ Regularly scheduled service
__X__ On-call service

Sewer

What is your primary means of sewer disposal?

____ Honey bucket
__X__ Outhouse
____ On-site septic system and drainfield
____ Other ____________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

____ \$10 - \$25
__X__ \$35 - \$50
____ \$25 - \$35
____ Other ____________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

X $35 - $55
___ $56 - $65
___ $66 - $75
___ Other ___

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
X Regularly scheduled service
___ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) No problem

If the lagoon were relocated, where would you like to see it relocated to? behind the new laundromat.

Additional Comments

Do you have any suggestions or comments? NO

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Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

HDR Alaska is under contract to Too'gha, Inc. to prepare a Water and Sewer Feasibility Study Update, to provide a plan for the orderly expansion of water and sewer services in Tanana (beyond the current construction of a piped system between school and Eamole Streets), to look at upgrades to the existing facilities, and to address any problems that the current facilities are experiencing. We are asking you to respond to the following survey to assist us in compiling information regarding the existing system and to tell us your opinion about future water/sewer development.

Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Barbara Martin

Which best describes where your home is located?

____ Front Street
____ Koyukuk Street
____ Circle Subdivision
X Outlying area (Site or Mission Rd.) Top of Mission Hill
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1 Rm House

Number of bathrooms: 0

Number of people living in the house: 3

Number of children: 2

How long have you lived in the house: 17 years

Water

What is your primary means of water service?

If I need to — I'm glad it's there Haul from Too'gha watering point
____ Individual well
Other Mission Spring / River / Snowmelt / Rain H_2O

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) NONE except Sink w/ Bucket

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

Yes

Do you have any of the following problems with your water service (please check all that apply)?

_______ Not enough water
_______ Taste problems (especially chlorine)
_______ Staining on fixtures or clothes
__X__ Other Seasonal Changes /
_______ No service
_______ Odor problems

What would you like to improve about your water service?

_______ Increased supply
_______ Better Taste
_______ Other _______________
_______ Obtain water service for the first time
__X__ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

_______ \$35 - \$55
_______ \$66 - \$75
_______ \$56 - \$65
_______ Other _______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service
_______ On-call service

Sewer

What is your primary means of sewer disposal?

_______ Honey bucket
__X__ Outhouse
_______ On-site septic system and drainfield
_______ Other _______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? _______________

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☒ No ?

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_______ \$10 - \$25
_______ \$35 - \$50
__X__ \$25 - \$35
_______ Other _______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

____	$35 - $55	X	$56 - $65
____	$66 - $75	____	Other ____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

X Regularly scheduled service ____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☒ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) Too Close to housing but does it have to be a certain distance (closeness) to be effective? Since I always think of its "turning over" seasonally strong odor as a great example

If the lagoon were relocated, where would you like to see it relocated to? ____

Additional Comments

Do you have any suggestions or comments? Although it doesn't really apply to me, it seems a haul system would be easier to maintain and sustain due to Tanana's ~~weather~~ climate and the time it takes to put in a piped system.

– Community Members should be encouraged to pursue careers in plumbing + surveying

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Francis & Kathy Parker

Which best describes where your home is located?

_____ Front Street

_____ Koyukuk Street

X Circle Subdivision

_____ Outlying area (Site or Mission Rd.)

Other _____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 4

Number of children: 2

How long have you lived in the house: 22 yrs

Water

What is your primary means of water service?

✓ Haul from Too'gha watering point

_____ Individual well

Other _____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) not working

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory. yes

Do you have any of the following problems with your water service (please check all that apply)?

______ Not enough water
______ Taste problems (especially chlorine)
______ Staining on fixtures or clothes
______ Other ______

__✓__ No service
______ Odor problems

What would you like to improve about your water service?

______ Increased supply
______ Better Taste
______ Other ______

__✓__ Obtain water service for the first time
______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? no choice ☑ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

__✓__ $35 - $55
______ $66 - $75

______ $56 - $65
______ Other whatever it cost

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

__✓__ Regularly scheduled service
______ On-call service

Sewer

What is your primary means of sewer disposal?

__✓__ Honey bucket
__✓__ Outhouse

______ On-site septic system and drainfield
______ Other ______

If you are using a septic system and drainfield, what problems are you expierencing, if any? none

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☑ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

______ $10 - $25
______ $35 - $50

______ $25 - $35
______ Other whatever

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_✓_ $35 - $55 ____ $56 - $65
____ $66 - $75 ____ Other ________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
_✓_ Regularly scheduled service ____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? NO

Additional Comments

Do you have any suggestions or comments? ________

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Gerald R. Grant

Which best describes where your home is located?

X Front Street	___ Koyukuk Street
___ Circle Subdivision	___ Outlying area (Site or Mission Rd.)
Other ______	

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1

Number of bathrooms: 1

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 44yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point

___ Individual well

Other ______

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.)

need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other No problems
________ No service
________ Odor problems

What would you like to improve about your water service?

[✓ Increased supply]
________ Better Taste
________ Other ________________________
________ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

[✓ $35 - $55]
________ $66 - $75
________ $56 - $65
________ Other ________________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service
[✓ On-call service]

Sewer

What is your primary means of sewer disposal?

[✓ Honey bucket]
[✓ Outhouse]
________ On-site septic system and drainfield
________ Other ________________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ $10 - $25
[✓ $35 - $50]
________ $25 - $35
________ Other ________________

sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓ $35 - $55]
_____ $56 - $65
_____ $66 - $75
_____ Other _____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

[✓ Regularly scheduled service]
_____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon? If yes, please list? (Examples: location, odor) No problem

If the lagoon were relocated, where would you like to see it relocated to? further back

Additional Comments

Do you have any suggestions or comments? No

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Georgeana Wallace

Which best describes where your home is located?

____ Front Street
X Koyukuk Street
____ Circle Subdivision
____ Outlying area (Site or Mission Rd.)
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 2

Number of bathrooms: 1

Number of people living in the house: 4

Number of children: 2

How long have you lived in the house: 14 yrs.

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other ____

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☒ Yes ☐ No

Are there interior plumbing/fixtures ([✓ sink], [✓ toilet] tub, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) Need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

~~No~~ Yes

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water
_X_ Taste problems (especially chlorine)
____ Staining on fixtures or clothes
____ Other ________________

____ No service
____ Odor problems

What would you like to improve about your water service?

____ Increased supply
____ Better Taste
____ Other ________________

____ Obtain water service for the first time
_X_ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

____ $35 - $55
____ $66 - $75

_X_ $56 - $65
____ Other __________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_X_ Regularly scheduled service

____ On-call service

Sewer

What is your primary means of sewer disposal?

____ Honey bucket
_X_ Outhouse

____ On-site septic system and drainfield
____ Other __________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

____ $10 - $25
_X_ $35 - $50

____ $25 - $35
____ Other __________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

X $35 - $55 ___ $56 - $65
___ $66 - $75 ___ Other ___

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
X Regularly scheduled service ___ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) odor

If the lagoon were relocated, where would you like to see it relocated to? further out of town

Additional Comments

Do you have any suggestions or comments? NO

Too'gha, Inc.
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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Lois Starr

Which best describes where your home is located?

X Front Street
____ Koyukuk Street
____ Circle Subdivision
____ Outlying area (Site or Mission Rd.)
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 2

Number of bathrooms: 1

Number of people living in the house: 2

Number of children: 1

How long have you lived in the house: 22 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other Spring Water

Has a well ever been drilled on your lot? ☒ Yes ☐ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.)

Need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

____ Not enough water
____ Taste problems (especially chlorine)
____ Staining on fixtures or clothes
____ Other No problem
____ No service
____ Odor problems

What would you like to improve about your water service?

____ Increased supply
____ Better Taste
____ Other ____
____ Obtain water service for the first time
X I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

X $35 - $55
____ $66 - $75
____ $56 - $65
____ Other ____

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

X Regularly scheduled service
____ On-call service

Sewer

What is your primary means of sewer disposal?

X Honey bucket
X Outhouse
____ On-site septic system and drainfield
____ Other ____

If you are using a septic system and drainfield, what problems are you expierencing, if any? ____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

X $10 - $25
____ $35 - $50
____ $25 - $35
____ Other ____

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

__X__ $35 - $55 ______ $56 - $65

______ $66 - $75 ______ Other ______

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

__X__ Regularly scheduled service ______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? behind new laundromat

Additional Comments

Do you have any suggestions or comments? NO

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Milton Nicholia [redacted] Jr

Which best describes where your home is located?

____ Front Street
X Koyukuk Street
____ Circle Subdivision
____ Outlying area (Site or Mission Rd.)
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 0

Number of bathrooms: 0

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: ____

Water

What is your primary means of water service?

____ Haul from Too'gha watering point
____ Individual well
Other ____

Has a well ever been drilled on your lot? ☐ Yes ☐ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) ____

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

____

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other ________________________
________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
________ Other ________________________
________ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ $35 - $55
________ $66 - $75
________ $56 - $65
________ Other ________________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service
________ On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
________ Outhouse
________ On-site septic system and drainfield
________ Other ________________

If you are using a septic system and drainfield, what problems are you expierencing, if any? ________________

____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ $10 - $25
________ $35 - $50
________ $25 - $35
________ Other ________________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ________________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) ________________

____

If the lagoon were relocated, where would you like to see it relocated to? ________________

Additional Comments

Do you have any suggestions or comments? ________________

____

____

____

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Milton Moses Sr.

Which best describes where your home is located?

_____ Front Street
_____ Koyukuk Street
_____ Circle Subdivision
__X__ Outlying area (Site or Mission Rd.)
Other Albert's Alley

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 0

Number of bathrooms: 0

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 29 yrs

Water

What is your primary means of water service?

_____ Haul from Too'gha watering point
_____ Individual well
Other Spring water

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

______ Not enough water
______ Taste problems (especially chlorine)
______ Staining on fixtures or clothes
______ Other No problems
______ No service
______ Odor problems

What would you like to improve about your water service?

______ Increased supply
______ Better Taste
______ Other ______
__X__ Obtain water service for the first time
______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

______ $35 - $55
__X__ $66 - $75
______ $56 - $65
______ Other ______

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

______ Regularly scheduled service
__X__ On-call service

Sewer

What is your primary means of sewer disposal?

______ Honey bucket
__X__ Outhouse
______ On-site septic system and drainfield
______ Other ______

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

______ $10 - $25
__X__ $35 - $50
______ $25 - $35
______ Other ______

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable?
☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

$35 - $55 [✓ $56 - $65]
$66 - $75 Other

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
[✓ Regularly scheduled service] On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system?
☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service?
☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) Odor

If the lagoon were relocated, where would you like to see it relocated to? further away

Additional Comments

Do you have any suggestions or comments? NO

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Regina Grant

Which best describes where your home is located?

X Front Street
______ Koyukuk Street
______ Circle Subdivision
______ Outlying area (Site or Mission Rd.)
Other ______

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1

Number of bathrooms: 1

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 4yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
______ Individual well
Other ______

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures ([✓ sink,] toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.)

need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

not really

Do you have any of the following problems with your water service (please check all that apply)?

Not enough water
Taste problems (especially chlorine)
Staining on fixtures or clothes
[✓ Other] hard water
No service
Odor problems

What would you like to improve about your water service?

Increased supply
Better Taste
Other
Obtain water service for the first time
[✓ I wouldn't change anything]

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☒ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

$35 - $55
$66 - $75
$56 - $65
Other

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

Regularly scheduled service
On-call service

Sewer

What is your primary means of sewer disposal?

[✓ Honey bucket]
[✓ Outhouse]
On-site septic system and drainfield
Other

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

[✓ $10 - $25]
$35 - $50
$25 - $35
Other

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

__X__ $35 - $55 _____ $56 - $65

_____ $66 - $75 _____ Other _____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

__X__ Regularly scheduled service _____ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? further away

Additional Comments

Do you have any suggestions or comments? No

Too'gha, Inc.
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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Christian Rychta

Which best describes where your home is located?

____ Front Street

__X__ Koyukuk Street 3rd Street

____ Circle Subdivision

____ Outlying area (Site or Mission Rd.)

Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 1

Number of bathrooms: 1

Number of people living in the house: 1

Number of children: 0

How long have you lived in the house: 10 yrs.

Water

What is your primary means of water service?

__X__ Haul from Too'gha watering point

____ Individual well

Other ____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures ([✓ sink] toilet [✓ holding tank] [✓ piping] etc.) that are in working order? (If not please describe the deficiencies.)

need toilet

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

yes

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other No problems
________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
________ Other ________
[✓ Obtain water service for the first time]
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

[✓ $35 - $55]
________ $66 - $75
________ $56 - $65
________ Other ________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service
[✓ On-call service]

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
[✓ Outhouse]
________ On-site septic system and drainfield
________ Other ________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

[✓ $10 - $25]
________ $35 - $50
________ $25 - $35
________ Other ________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓ $35 - $55] $56 - $65

$66 - $75 Other

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

Regularly scheduled service [✓ On-call service]

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☒ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? N/A

Additional Comments

Do you have any suggestions or comments? NO

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Jennifer R. Johnson

Which best describes where your home is located?

X Front Street
____ Koyukuk Street
____ Circle Subdivision
____ Outlying area (Site or Mission Rd.)
Other ____

Do you live there full time? ☒ Yes ☐ No

Number of bedrooms: 3

Number of bathrooms: 1

Number of people living in the house: 2

Number of children: 3

How long have you lived in the house: 12 yrs

Water

What is your primary means of water service?

X Haul from Too'gha watering point
____ Individual well
Other ____

Has a well ever been drilled on your lot? ☐ Yes ☒ No

If yes, is a well log available? ☐ Yes ☒ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) need everything

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

____Yes____

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other No problems

________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
________ Other ________

________ Obtain water service for the first time
___X___ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

___X___ $35 - $55
________ $66 - $75

________ $56 - $65
________ Other ________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service

___X___ On-call service

Sewer

What is your primary means of sewer disposal?

___X___ Honey bucket
________ Outhouse

________ On-site septic system and drainfield
________ Other ________

If you are using a septic system and drainfield, what problems are you expierencing, if any? N/A

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☒ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

___X___ $10 - $25
________ $35 - $50

________ $25 - $35
________ Other ________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☒ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

[✓ $35 - $55] ____ $56 - $65
____ $66 - $75 ____ Other ____

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
____ Regularly scheduled service [✓ On-call service]

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☒ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☒ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) NO

If the lagoon were relocated, where would you like to see it relocated to? further out of town

Additional Comments

Do you have any suggestions or comments? Need running water.

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: TINA ALBERT

Which best describes where your home is located?

______ Front Street   ______ Koyukuk Street

______ Circle Subdivision   ______ Outlying area (Site or Mission Rd.)

Other Alberts Alley

Do you live there full time? ☐ Yes ☒ No

Number of bedrooms: 0   Number of bathrooms: 0

Number of people living in the house: 2   Number of children: 1

How long have you lived in the house: ______

Water

What is your primary means of water service?

______ Haul from Too'gha watering point   Other ______

______ Individual well

Has a well ever been drilled on your lot? ☐ Yes ☐ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) ______

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

____

Do you have any of the following problems with your water service (please check all that apply)?

_______ Not enough water
_______ Taste problems (especially chlorine)
_______ Staining on fixtures or clothes
_______ Other _______________________
_______ No service
_______ Odor problems

What would you like to improve about your water service?

_______ Increased supply
_______ Better Taste
_______ Other _______________________
_______ Obtain water service for the first time
_______ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

_______ \$35 - \$55
_______ \$66 - \$75
_______ \$56 - \$65
_______ Other _______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service
_______ On-call service

Sewer

What is your primary means of sewer disposal?

_______ Honey bucket
_______ Outhouse
_______ On-site septic system and drainfield
_______ Other _______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? _______________

____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

_______ \$10 - \$25
_______ \$35 - \$50
_______ \$25 - \$35
_______ Other _______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65

________ $66 - $75 ________ Other ____________________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) ____________________

If the lagoon were relocated, where would you like to see it relocated to? ____________________

Additional Comments

Do you have any suggestions or comments? ____________________

Too'gha, Inc.
2004 Water and Sewer Feasibility Study Update
Survey Questions

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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Ray Albert

Which best describes where your home is located?

_______ Front Street
_______ Koyukuk Street
_______ Circle Subdivision
_______ Outlying area (Site or Mission Rd.)
Other _______________

Do you live there full time? ☐ Yes ☐ No

Nnmber of bedrooms: _______

Number of bathrooms: _______

Number of people living in the house: _______

Number of children: _______

How long have you lived in the house: _______

Water

What is your primary means of water service?

_______ Haul from Too'gha watering point
_______ Individual well
Other _______________

Has a well ever been drilled on your lot? ☐ Yes ☐ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) _______________

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory. ____

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other ____
________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
________ Other ____
________ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ $35 - $55
________ $66 - $75
________ $56 - $65
________ Other ____________________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service
________ On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
________ Outhouse
________ On-site septic system and drainfield
________ Other ____________________

If you are using a septic system and drainfield, what problems are you expierencing, if any? ____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ $10 - $25
________ $35 - $50
________ $25 - $35
________ Other ____________________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

________ $35 - $55 ________ $56 - $65
________ $66 - $75 ________ Other ______________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?
________ Regularly scheduled service ________ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☐ No

Are there any problems with the existing lagoon?
If yes, please list? (Examples: location, odor) ______________
____

If the lagoon were relocated, where would you like to see it relocated to? ______________

Additional Comments

Do you have any suggestions or comments? ______________
____
____
____

Too'gha, Inc.
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Please assist us by filling out the information below to the best of your abilities.

General Questions

Homeowner's name: Ralph Holmberg Loretta Luke

Which best describes where your home is located?

________ Front Street　　________ Koyukuk Street

________ Circle Subdivision　　X Outlying area (Site or Mission Rd.)

Other ________ Alberts alley

Do you live there full time? ☐ Yes ☐ No

Number of bedrooms: ________　　Number of bathrooms: ________

Number of people living in the house: ________　　Number of children: ________

How long have you lived in the house: ________

Water

What is your primary means of water service?

________ Haul from Too'gha watering point　　Other ________

________ Individual well

Has a well ever been drilled on your lot? ☐ Yes ☐ No

If yes, is a well log available? ☐ Yes ☐ No

Are there interior plumbing/fixtures (sink, toilet, holding tank, piping, etc.) that are in working order? (If not please describe the deficiencies.) ________

Are you satisfied with the quality of your water? If no, please describe what is unsatisfactory.

____

Do you have any of the following problems with your water service (please check all that apply)?

________ Not enough water
________ Taste problems (especially chlorine)
________ Staining on fixtures or clothes
________ Other ______________________________
________ No service
________ Odor problems

What would you like to improve about your water service?

________ Increased supply
________ Better Taste
________ Other ______________________________
________ Obtain water service for the first time
________ I wouldn't change anything

If a piped water system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what montly costs would you be wililng to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul service.)

________ $35 - $55
________ $66 - $75
________ $56 - $65
________ Other ______________

Would you prefer that water be deliverd on a regularly scheduled basis or as needed by an on-call service?

________ Regularly scheduled service
________ On-call service

Sewer

What is your primary means of sewer disposal?

________ Honey bucket
________ Outhouse
________ On-site septic system and drainfield
________ Other ______________

If you are using a septic system and drainfield, what problems are you expierencing, if any? ______________

____

Would you be willing to pay for the operation of an individual package treatment unit that could treat the wastewater from your home if they were installed for your use? ☐ Yes ☐ No

If yes, what montly costs would you be willing to pay for the operation of these individaul treatment units?

________ $10 - $25
________ $35 - $50
________ $25 - $35
________ Other ______________

If a piped sewer system could not be installed to your area due to costs, would a haul system be acceptable? ☐ Yes ☐ No

If yes, what monthly costs would you be willing to pay for the operation of a haul system? (Note: user fees must be able to sustain the operation of the haul servic

_______ $35 - $55 _______ $56 - $65

_______ $66 - $75 _______ Other _______________

Would you prefer that wastewater be hauled away on a scheduled basis or as needed by an on-call service?

_______ Regularly scheduled service _______ On-call service

Community System Questions

Would you like to see expansion of the public, piped water distribution and sewer collection system? ☐ Yes ☐ No

Would you be willing to pay the current monthly cost of $100 for piped water and sewer service? ☐ Yes ☐ No

Are there any problems with the existing lagoon?

If yes, please list? (Examples: location, odor) _______________

____

If the lagoon were relocated, where would you like to see it relocated to? _______________

Additional Comments

Do you have any suggestions or comments? _______________

____

____

____

Appendix D
Modeling Results

Alt A - Downtown - 6" lines w/ pitorifice

Energy Report

Pump	Percent Utilization	Average Efficiency	Kw-hr /Mgal	Average Kwatts	Peak Kwatts	Cost /day
1	100.00	75.00	638.49	3.97	3.97	37.11
Total Cost						37.11
Demand Charge						0.00

Annual Cost = $37.11/d · 365 d/yr = $13,545

Network Table - Nodes

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 1	0	0.00	14.97	6.48
Junc 2	0	0.00	167.39	72.53
Junc 3	0	0.00	163.20	70.72
Junc 4	0	0.00	159.01	68.90
Junc 5	0	0.00	154.82	67.08
Junc 111	7	7.00	150.70	65.30
Junc 7	0	0.00	150.11	65.04
Junc 8	0	0.00	149.51	64.78
Junc 9	0	0.00	148.92	64.53
Junc 10	0	0.00	148.32	64.27
Junc 555	7	7.00	147.74	64.01
Junc 999	0	0.00	147.73	64.01
Junc 25	0	0.00	147.36	63.85
Junc 26	0	0.00	146.99	63.69
Junc 27	0	0.00	146.62	63.53
Junc 28	0	0.00	146.25	63.37
Junc 29	0	0.00	145.88	63.21
Junc 30	0	0.00	145.51	63.05
Junc 31	0	0.00	145.14	62.89
Junc 666	4.5	4.50	144.92	62.80
Junc 33	0	0.00	142.50	61.75
Junc 34	0	0.00	140.08	60.69
Junc 35	0	0.00	137.65	59.64
Junc 222	7	7.00	135.08	58.53
Junc 37	0	0.00	133.01	57.63

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 38	0	0.00	130.95	56.74
Junc 39	0	0.00	128.88	55.84
Junc 40	0	0.00	126.81	54.95
Junc 41	0	0.00	124.74	54.05
Junc 42	0	0.00	122.67	53.16
Junc 43	0	0.00	120.61	52.26
Junc 333	7	7.00	117.92	51.09
Junc 444	0	0.00	116.53	50.49
Junc 46	71	71.00	114.92	49.80
Resvr 47	#N/A	-103.50	15.00	0.00

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 2	600	4	140	103.50
Pipe 3	600	4	140	103.50
Pipe 4	600	4	140	103.50
Pipe 5	590	4	140	103.50
Pipe 6	700	6	140	96.50
Pipe 7	700	6	140	96.50
Pipe 8	700	6	140	96.50
Pipe 9	700	6	140	96.50
Pipe 10	685	6	140	96.50
Pipe 24	500	6	140	89.50
Pipe 25	500	6	140	89.50
Pipe 26	500	6	140	89.50
Pipe 27	500	6	140	89.50
Pipe 28	500	6	140	89.50
Pipe 29	500	6	140	89.50
Pipe 30	500	6	140	89.50
Pipe 31	290	6	140	89.50
Pipe 32	500	4	140	85.00
Pipe 33	500	4	140	85.00
Pipe 34	500	4	140	85.00
Pipe 35	530	4	140	85.00
Pipe 36	500	4	140	78.00
Pipe 37	500	4	140	78.00
Pipe 38	500	4	140	78.00
Pipe 39	500	4	140	78.00

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 40	500	4	140	78.00
Pipe 41	500	4	140	78.00
Pipe 42	500	4	140	78.00
Pipe 43	650	4	140	78.00
Pipe 44	400	4	140	71.00
Pipe 45	462	4	140	71.00
Pipe 46	5	4	140	-103.50
Pipe 47	5	6	100	89.50
Pump 1	#N/A	#N/A	#N/A	103.50

Network Table - Links

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 2	2.64	6.98	0.021
Pipe 3	2.64	6.98	0.021
Pipe 4	2.64	6.98	0.021
Pipe 5	2.64	6.98	0.021
Pipe 6	1.10	0.85	0.023
Pipe 7	1.10	0.85	0.023
Pipe 8	1.10	0.85	0.023
Pipe 9	1.10	0.85	0.023
Pipe 10	1.10	0.85	0.023
Pipe 24	1.02	0.74	0.023
Pipe 25	1.02	0.74	0.023
Pipe 26	1.02	0.74	0.023
Pipe 27	1.02	0.74	0.023
Pipe 28	1.02	0.74	0.023
Pipe 29	1.02	0.74	0.023
Pipe 30	1.02	0.74	0.023
Pipe 31	1.02	0.74	0.023
Pipe 32	2.17	4.85	0.022
Pipe 33	2.17	4.85	0.022
Pipe 34	2.17	4.85	0.022
Pipe 35	2.17	4.85	0.022
Pipe 36	1.99	4.14	0.022
Pipe 37	1.99	4.14	0.022
Pipe 38	1.99	4.14	0.022
Pipe 39	1.99	4.14	0.022

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 40	1.99	4.14	0.022
Pipe 41	1.99	4.14	0.022
Pipe 42	1.99	4.14	0.022
Pipe 43	1.99	4.14	0.022
Pipe 44	1.81	3.47	0.023
Pipe 45	1.81	3.47	0.023
Pipe 46	2.64	6.98	0.021
Pipe 47	1.02	1.38	0.043
Pump 1	0.00	-152.43	0.000

Att A - 6" lines w/ Pt orifice

@ 71 gpm circ -

Energy Report

Pump	Percent Utilization	Average Efficiency	Kw-hr /Mgal	Average Kwatts	Peak Kwatts	Cost /day
1	100.00	75.00	757.55	5.18	5.18	48.5048
Total Cost						48.50 48
Demand Charge						0.00

Annual pumping cost = $48.48/d · 365 day = $17,695

Number of new users: 36

Projected revenue = 26 $50/mo · 12 mo/yr = $15,600/yr. of new H2O revenue

Network Table - Nodes

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 1	0	0.00	14.96	6.48
Junc 2	0	0.00	195.81	84.84
Junc 3	0	0.00	190.80	82.67
Junc 4	0	0.00	185.79	80.50
Junc 5	0	0.00	180.78	78.33
Junc 111	7	7.00	175.85	76.19
Junc 7	0	0.00	175.13	75.88
Junc 8	0	0.00	174.41	75.57
Junc 9	0	0.00	173.68	75.26
Junc 10	0	0.00	172.96	74.94
Junc 555	7	7.00	172.26	74.64
Junc 12	0	0.00	171.62	74.36
Junc 13	0	0.00	170.98	74.09
Junc 14	0	0.00	170.35	73.81
Junc 15	0	0.00	169.71	73.54
Junc 16	0	0.00	169.07	73.26
Junc 777	5.6	5.60	168.44	72.98
Junc 18	0	0.00	168.19	72.88
Junc 19	0	0.00	167.95	72.77
Junc 20	0	0.00	167.70	72.67
Junc 888	3.9	3.90	167.31	72.50
Junc 22	0	0.00	166.79	72.27
Junc 23	0	0.00	166.26	72.04
Junc 999	0	0.00	165.73	71.81
Junc 25	0	0.00	165.35	71.65

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 26	0	0.00	164.97	71.48
Junc 27	0	0.00	164.59	71.32
Junc 28	0	0.00	164.22	71.16
Junc 29	0	0.00	163.84	70.99
Junc 30	0	0.00	163.46	70.83
Junc 31	0	0.00	163.08	70.66
Junc 666	4.5	4.50	162.86	70.57
Junc 33	0	0.00	160.39	69.50
Junc 34	0	0.00	157.91	68.42
Junc 35	0	0.00	155.43	67.35
Junc 222	7	7.00	152.81	66.21
Junc 37	0	0.00	150.69	65.29
Junc 38	0	0.00	148.57	64.38
Junc 39	0	0.00	146.45	63.46
Junc 40	0	0.00	144.34	62.54
Junc 41	0	0.00	142.22	61.62
Junc 42	0	0.00	140.10	60.71
Junc 43	0	0.00	137.99	59.79
Junc 333	7	7.00	135.23	58.60
Junc 444	0	0.00	133.81	57.98
Junc 46	72	72.00	132.16	57.27
Resvr 47	#N/A	-114.00	15.00	0.00

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 2	600	4	140	114.00
Pipe 3	600	4	140	114.00
Pipe 4	600	4	140	114.00
Pipe 5	590	4	140	114.00
Pipe 6	700	6	140	107.00
Pipe 7	700	6	140	107.00
Pipe 8	700	6	140	107.00
Pipe 9	700	6	140	107.00
Pipe 10	685	6	140	107.00
Pipe 11	700	6	140	100.00
Pipe 12	700	6	140	100.00
Pipe 13	700	6	140	100.00
Pipe 14	700	6	140	100.00
Pipe 15	700	6	140	100.00
Pipe 16	700	6	140	100.00
Pipe 17	300	6	140	94.40
Pipe 18	300	6	140	94.40
Pipe 19	300	6	140	94.40
Pipe 20	475	6	140	94.40
Pipe 21	700	6	140	90.50
Pipe 22	700	6	140	90.50
Pipe 23	700	6	140	90.50
Pipe 24	500	6	140	90.50
Pipe 25	500	6	140	90.50
Pipe 26	500	6	140	90.50

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 27	500	6	140	90.50
Pipe 28	500	6	140	90.50
Pipe 29	500	6	140	90.50
Pipe 30	500	6	140	90.50
Pipe 31	290	6	140	90.50
Pipe 32	500	4	140	86.00
Pipe 33	500	4	140	86.00
Pipe 34	500	4	140	86.00
Pipe 35	530	4	140	86.00
Pipe 36	500	4	140	79.00
Pipe 37	500	4	140	79.00
Pipe 38	500	4	140	79.00
Pipe 39	500	4	140	79.00
Pipe 40	500	4	140	79.00
Pipe 41	500	4	140	79.00
Pipe 42	500	4	140	79.00
Pipe 43	650	4	140	79.00
Pipe 44	400	4	140	72.00
Pipe 45	462	4	140	72.00
Pipe 46	5	4	140	-114.00
Pump 1	#N/A	#N/A	#N/A	114.00

Network Table - Links

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 2	2.91	8.35	0.021
Pipe 3	2.91	8.35	0.021
Pipe 4	2.91	8.35	0.021
Pipe 5	2.91	8.35	0.021
Pipe 6	1.21	1.03	0.023
Pipe 7	1.21	1.03	0.023
Pipe 8	1.21	1.03	0.023
Pipe 9	1.21	1.03	0.023
Pipe 10	1.21	1.03	0.023
Pipe 11	1.13	0.91	0.023
Pipe 12	1.13	0.91	0.023
Pipe 13	1.13	0.91	0.023
Pipe 14	1.13	0.91	0.023
Pipe 15	1.13	0.91	0.023
Pipe 16	1.13	0.91	0.023
Pipe 17	1.07	0.82	0.023
Pipe 18	1.07	0.82	0.023
Pipe 19	1.07	0.82	0.023
Pipe 20	1.07	0.82	0.023
Pipe 21	1.03	0.76	0.023
Pipe 22	1.03	0.76	0.023
Pipe 23	1.03	0.76	0.023
Pipe 24	1.03	0.76	0.023
Pipe 25	1.03	0.76	0.023
Pipe 26	1.03	0.76	0.023

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 27	1.03	0.76	0.023
Pipe 28	1.03	0.76	0.023
Pipe 29	1.03	0.76	0.023
Pipe 30	1.03	0.76	0.023
Pipe 31	1.03	0.76	0.023
Pipe 32	2.20	4.96	0.022
Pipe 33	2.20	4.96	0.022
Pipe 34	2.20	4.96	0.022
Pipe 35	2.20	4.96	0.022
Pipe 36	2.02	4.23	0.022
Pipe 37	2.02	4.23	0.022
Pipe 38	2.02	4.23	0.022
Pipe 39	2.02	4.23	0.022
Pipe 40	2.02	4.23	0.022
Pipe 41	2.02	4.23	0.022
Pipe 42	2.02	4.23	0.022
Pipe 43	2.02	4.23	0.022
Pipe 44	1.84	3.57	0.023
Pipe 45	1.84	3.57	0.023
Pipe 46	2.91	8.35	0.021
Pump 1	0.00	-180.85	0.000

6" lines - Booster station no pitorifice

Energy Report

Pump	Percent Utilization	Average Efficiency	Kw-hr /Mgal	Average Kwatts	Peak Kwatts	Cost /day
1	100.00	75.00	288.79	1.42	1.42	13.30
47	100.00	75.00	338.20	1.38	1.38	12.92
Total Cost						26.21
Demand Charge						0.00

Network Table - Nodes

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 1	0	0.00	14.98	6.49
Junc 2	0	0.00	83.92	36.36
Junc 3	0	0.00	81.20	35.18
Junc 4	0	0.00	78.48	34.00
Junc 5	0	0.00	75.75	32.82
Junc 111	7	7.00	73.08	31.66
Junc 7	0	0.00	72.70	31.50
Junc 8	0	0.00	72.33	31.34
Junc 9	0	0.00	71.96	31.18
Junc 10	0	0.00	71.58	31.02
Junc 555	7	7.00	71.22	30.86
Junc 12	0	0.00	70.91	30.72
Junc 13	0	0.00	70.59	30.59
Junc 14	0	0.00	151.33	65.57
Junc 15	0	0.00	151.02	65.44
Junc 16	0	0.00	150.71	65.30
Junc 777	5.6	5.60	150.40	65.17
Junc 18	0	0.00	150.28	65.12
Junc 19	0	0.00	150.17	65.07
Junc 20	0	0.00	150.06	65.02
Junc 888	3.9	3.90	149.88	64.94
Junc 22	0	0.00	149.64	64.84
Junc 23	0	0.00	149.40	64.74
Junc 999	0	0.00	149.17	64.63
Junc 25	0	0.00	149.00	64.56

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 26	0	0.00	148.83	64.49
Junc 27	0	0.00	148.66	64.42
Junc 28	0	0.00	148.49	64.34
Junc 29	0	0.00	148.33	64.27
Junc 30	0	0.00	148.16	64.20
Junc 31	0	0.00	147.99	64.12
Junc 666	4.5	4.50	147.89	64.08
Junc 33	0	0.00	146.85	63.63
Junc 34	0	0.00	145.80	63.17
Junc 35	0	0.00	144.75	62.72
Junc 222	7	7.00	143.64	62.24
Junc 37	0	0.00	142.83	61.89
Junc 38	0	0.00	142.02	61.54
Junc 39	0	0.00	141.22	61.19
Junc 40	0	0.00	140.41	60.84
Junc 41	0	0.00	139.60	60.49
Junc 42	0	0.00	138.79	60.14
Junc 43	0	0.00	137.98	59.79
Junc 333	7	7.00	136.93	59.33
Junc 444	0	0.00	136.45	59.12
Junc 46	40	40.00	135.89	58.88
Resvr 47	#N/A	-82.00	15.00	0.00

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 2	600	4	140	82.00
Pipe 3	600	4	140	82.00
Pipe 4	600	4	140	82.00
Pipe 5	590	4	140	82.00
Pipe 6	700	6	140	75.00
Pipe 7	700	6	140	75.00
Pipe 8	700	6	140	75.00
Pipe 10	685	6	140	75.00
Pipe 11	700	6	140	68.00
Pipe 12	700	6	140	68.00
Pipe 14	700	6	140	68.00
Pipe 15	700	6	140	68.00
Pipe 16	700	6	140	68.00
Pipe 17	300	6	140	62.40
Pipe 18	300	6	140	62.40
Pipe 19	300	6	140	62.40
Pipe 20	475	6	140	62.40
Pipe 21	700	6	140	58.50
Pipe 22	700	6	140	58.50
Pipe 23	700	6	140	58.50
Pipe 24	500	6	140	58.50
Pipe 25	500	6	140	58.50
Pipe 26	500	6	140	58.50
Pipe 27	500	6	140	58.50
Pipe 28	500	6	140	58.50

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 29	500	6	140	58.50
Pipe 30	500	6	140	58.50
Pipe 32	500	4	140	54.00
Pipe 33	500	4	140	54.00
Pipe 34	500	4	140	54.00
Pipe 35	530	4	140	54.00
Pipe 36	500	4	140	47.00
Pipe 37	500	4	140	47.00
Pipe 38	500	4	140	47.00
Pipe 39	500	4	140	47.00
Pipe 40	500	4	140	47.00
Pipe 41	500	4	140	47.00
Pipe 42	500	4	140	47.00
Pipe 43	650	4	140	47.00
Pipe 44	400	4	140	40.00
Pipe 45	462	4	140	40.00
Pipe 46	5	4	140	-82.00
Pipe 9	700	6	140	75.00
Pipe 31	290	6	140	58.50
Pump 1	#N/A	#N/A	#N/A	82.00
Pump 47	#N/A	#N/A	#N/A	68.00

Network Table - Links

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 2	2.09	4.54	0.022
Pipe 3	2.09	4.54	0.022
Pipe 4	2.09	4.54	0.022
Pipe 5	2.09	4.54	0.022
Pipe 6	0.85	0.53	0.024
Pipe 7	0.85	0.53	0.024
Pipe 8	0.85	0.53	0.024
Pipe 10	0.85	0.53	0.024
Pipe 11	0.77	0.45	0.024
Pipe 12	0.77	0.45	0.024
Pipe 14	0.77	0.45	0.024
Pipe 15	0.77	0.45	0.024
Pipe 16	0.77	0.45	0.024
Pipe 17	0.71	0.38	0.024
Pipe 18	0.71	0.38	0.024
Pipe 19	0.71	0.38	0.024
Pipe 20	0.71	0.38	0.024
Pipe 21	0.66	0.34	0.025
Pipe 22	0.66	0.34	0.025
Pipe 23	0.66	0.34	0.025
Pipe 24	0.66	0.34	0.025
Pipe 25	0.66	0.34	0.025
Pipe 26	0.66	0.34	0.025
Pipe 27	0.66	0.34	0.025
Pipe 28	0.66	0.34	0.025

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 29	0.66	0.34	0.025
Pipe 30	0.66	0.34	0.025
Pipe 32	1.38	2.09	0.024
Pipe 33	1.38	2.09	0.024
Pipe 34	1.38	2.09	0.024
Pipe 35	1.38	2.09	0.024
Pipe 36	1.20	1.62	0.024
Pipe 37	1.20	1.62	0.024
Pipe 38	1.20	1.62	0.024
Pipe 39	1.20	1.62	0.024
Pipe 40	1.20	1.62	0.024
Pipe 41	1.20	1.62	0.024
Pipe 42	1.20	1.62	0.024
Pipe 43	1.20	1.62	0.024
Pipe 44	1.02	1.20	0.025
Pipe 45	1.02	1.20	0.025
Pipe 46	2.09	4.54	0.022
Pipe 9	0.85	0.53	0.024
Pipe 31	0.66	0.34	0.025
Pump 1	0.00	-68.94	0.000
Pump 47	0.00	-80.74	0.000

Alt B - Oriole 6" No pressure

Energy Report

Pump	Percent Utilization	Average Efficiency	Kw-hr /Mgal	Average Kwatts	Peak Kwatts	Cost /day
1	100.00	75.00	373.12	1.84	1.84	17.18
Total Cost						17.18
Demand Charge						0.00

Annual pump cost = \$17.18/d · 365 d/yr = \$6270

Network Table - Nodes

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 1	0	0.00	14.98	6.49
Junc 2	0	0.00	104.05	45.09
Junc 3	0	0.00	101.33	43.91
Junc 4	0	0.00	98.61	42.73
Junc 5	0	0.00	95.89	41.55
Junc 111	7	7.00	93.21	40.39
Junc 7	0	0.00	92.84	40.23
Junc 8	0	0.00	92.46	40.06
Junc 9	0	0.00	92.09	39.90
Junc 10	0	0.00	91.71	39.74
Junc 555	7	7.00	91.35	39.58
Junc 12	0	0.00	91.04	39.45
Junc 13	0	0.00	90.73	39.31
Junc 14	0	0.00	90.41	39.18
Junc 15	0	0.00	90.10	39.04
Junc 16	0	0.00	89.79	38.91
Junc 777	5.6	5.60	89.48	38.77
Junc 18	0	0.00	89.37	38.72
Junc 19	0	0.00	89.25	38.67
Junc 20	0	0.00	89.14	38.62
Junc 888	3.9	3.90	88.96	38.55
Junc 22	0	0.00	88.72	38.44
Junc 23	0	0.00	88.49	38.34
Junc 999	0	0.00	88.25	38.24
Junc 25	0	0.00	88.08	38.17

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 26	0	0.00	87.91	38.09
Junc 27	0	0.00	87.75	38.02
Junc 28	0	0.00	87.58	37.95
Junc 29	0	0.00	87.41	37.87
Junc 30	0	0.00	87.24	37.80
Junc 31	0	0.00	87.07	37.73
Junc 666	4.5	4.50	86.97	37.69
Junc 33	0	0.00	85.93	37.23
Junc 34	0	0.00	84.88	36.78
Junc 35	0	0.00	83.83	36.33
Junc 222	7	7.00	82.73	35.85
Junc 37	0	0.00	81.92	35.49
Junc 38	0	0.00	81.11	35.14
Junc 39	0	0.00	80.30	34.79
Junc 40	0	0.00	79.49	34.44
Junc 41	0	0.00	78.68	34.09
Junc 42	0	0.00	77.87	33.74
Junc 43	0	0.00	77.06	33.39
Junc 333	7	7.00	76.01	32.93
Junc 444	0	0.00	75.53	32.73
Junc 46	40	40.00	74.97	32.49
Resvr 47	#N/A	-82.00	15.00	0.00

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 2	600	4	140	82.00
Pipe 3	600	4	140	82.00
Pipe 4	600	4	140	82.00
Pipe 5	590	4	140	82.00
Pipe 6	700	6	140	75.00
Pipe 7	700	6	140	75.00
Pipe 8	700	6	140	75.00
Pipe 9	700	6	140	75.00
Pipe 10	685	6	140	75.00
Pipe 11	700	6	140	68.00
Pipe 12	700	6	140	68.00
Pipe 13	700	6	140	68.00
Pipe 14	700	6	140	68.00
Pipe 15	700	6	140	68.00
Pipe 16	700	6	140	68.00
Pipe 17	300	6	140	62.40
Pipe 18	300	6	140	62.40
Pipe 19	300	6	140	62.40
Pipe 20	475	6	140	62.40
Pipe 21	700	6	140	58.50
Pipe 22	700	6	140	58.50
Pipe 23	700	6	140	58.50
Pipe 24	500	6	140	58.50
Pipe 25	500	6	140	58.50
Pipe 26	500	6	140	58.50

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 27	500	6	140	58.50
Pipe 28	500	6	140	58.50
Pipe 29	500	6	140	58.50
Pipe 30	500	6	140	58.50
Pipe 31	290	6	140	58.50
Pipe 32	500	4	140	54.00
Pipe 33	500	4	140	54.00
Pipe 34	500	4	140	54.00
Pipe 35	530	4	140	54.00
Pipe 36	500	4	140	47.00
Pipe 37	500	4	140	47.00
Pipe 38	500	4	140	47.00
Pipe 39	500	4	140	47.00
Pipe 40	500	4	140	47.00
Pipe 41	500	4	140	47.00
Pipe 42	500	4	140	47.00
Pipe 43	650	4	140	47.00
Pipe 44	400	4	140	40.00
Pipe 45	462	4	140	40.00
Pipe 46	5	4	140	-82.00
Pump 1	#N/A	#N/A	#N/A	82.00

Network Table - Links

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 2	2.09	4.54	0.022
Pipe 3	2.09	4.54	0.022
Pipe 4	2.09	4.54	0.022
Pipe 5	2.09	4.54	0.022
Pipe 6	0.85	0.53	0.024
Pipe 7	0.85	0.53	0.024
Pipe 8	0.85	0.53	0.024
Pipe 9	0.85	0.53	0.024
Pipe 10	0.85	0.53	0.024
Pipe 11	0.77	0.45	0.024
Pipe 12	0.77	0.45	0.024
Pipe 13	0.77	0.45	0.024
Pipe 14	0.77	0.45	0.024
Pipe 15	0.77	0.45	0.024
Pipe 16	0.77	0.45	0.024
Pipe 17	0.71	0.38	0.024
Pipe 18	0.71	0.38	0.024
Pipe 19	0.71	0.38	0.024
Pipe 20	0.71	0.38	0.024
Pipe 21	0.66	0.34	0.025
Pipe 22	0.66	0.34	0.025
Pipe 23	0.66	0.34	0.025
Pipe 24	0.66	0.34	0.025
Pipe 25	0.66	0.34	0.025
Pipe 26	0.66	0.34	0.025

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 27	0.66	0.34	0.025
Pipe 28	0.66	0.34	0.025
Pipe 29	0.66	0.34	0.025
Pipe 30	0.66	0.34	0.025
Pipe 31	0.66	0.34	0.025
Pipe 32	1.38	2.09	0.024
Pipe 33	1.38	2.09	0.024
Pipe 34	1.38	2.09	0.024
Pipe 35	1.38	2.09	0.024
Pipe 36	1.20	1.62	0.024
Pipe 37	1.20	1.62	0.024
Pipe 38	1.20	1.62	0.024
Pipe 39	1.20	1.62	0.024
Pipe 40	1.20	1.62	0.024
Pipe 41	1.20	1.62	0.024
Pipe 42	1.20	1.62	0.024
Pipe 43	1.20	1.62	0.024
Pipe 44	1.02	1.20	0.025
Pipe 45	1.02	1.20	0.025
Pipe 46	2.09	4.54	0.022
Pump 1	0.00	-89.07	0.000

Alt B - Downtown - 6" lines w/ individual circ.

2 Hp pump

Circ demand = 40 gpm

Individual circs on new pipes

Energy Report

Pump	Percent Utilization	Average Efficiency	Kw-hr /Mgal	Average Kwatts	Peak Kwatts	Cost /day
1	100.00	75.00	278.83	1.21	1.21	11.35
Total Cost						11.35
Demand Charge						0.00

Annual Cost = $11.35/d · 365 d/yr = $ 4,142.75

Network Table - Nodes

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 1	0	0.00	14.98	6.49
Junc 2	0	0.00	81.55	35.33
Junc 3	0	0.00	79.38	34.40
Junc 4	0	0.00	77.21	33.46
Junc 5	0	0.00	75.05	32.52
Junc 111	7	7.00	72.92	31.59
Junc 7	0	0.00	72.62	31.47
Junc 8	0	0.00	72.33	31.34
Junc 9	0	0.00	72.04	31.22
Junc 10	0	0.00	71.75	31.09
Junc 555	7	7.00	71.47	30.97
Junc 999	0	0.00	71.47	30.97
Junc 25	0	0.00	71.30	30.89
Junc 26	0	0.00	71.13	30.82
Junc 27	0	0.00	70.96	30.75
Junc 28	0	0.00	70.79	30.67
Junc 29	0	0.00	70.62	30.60
Junc 30	0	0.00	70.46	30.53
Junc 31	0	0.00	70.29	30.46
Junc 666	4.5	4.50	70.19	30.41
Junc 33	0	0.00	69.14	29.96
Junc 34	0	0.00	68.10	29.51
Junc 35	0	0.00	67.05	29.05
Junc 222	7	7.00	65.94	28.57
Junc 37	0	0.00	65.13	28.22

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 38	0	0.00	64.32	27.87
Junc 39	0	0.00	63.51	27.52
Junc 40	0	0.00	62.70	27.17
Junc 41	0	0.00	61.90	26.82
Junc 42	0	0.00	61.09	26.47
Junc 43	0	0.00	60.28	26.12
Junc 333	7	7.00	59.22	25.66
Junc 444	0	0.00	58.74	25.45
Junc 46	40	40.00	58.19	25.21
Resvr 47	#N/A	-72.50	15.00	0.00

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 2	600	4	140	72.50
Pipe 3	600	4	140	72.50
Pipe 4	600	4	140	72.50
Pipe 5	590	4	140	72.50
Pipe 6	700	6	140	65.50
Pipe 7	700	6	140	65.50
Pipe 8	700	6	140	65.50
Pipe 9	700	6	140	65.50
Pipe 10	685	6	140	65.50
Pipe 24	500	6	140	58.50
Pipe 25	500	6	140	58.50
Pipe 26	500	6	140	58.50
Pipe 27	500	6	140	58.50
Pipe 28	500	6	140	58.50
Pipe 29	500	6	140	58.50
Pipe 30	500	6	140	58.50
Pipe 31	290	6	140	58.50
Pipe 32	500	4	140	54.00
Pipe 33	500	4	140	54.00
Pipe 34	500	4	140	54.00
Pipe 35	530	4	140	54.00
Pipe 36	500	4	140	47.00
Pipe 37	500	4	140	47.00
Pipe 38	500	4	140	47.00
Pipe 39	500	4	140	47.00

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 40	500	4	140	47.00
Pipe 41	500	4	140	47.00
Pipe 42	500	4	140	47.00
Pipe 43	650	4	140	47.00
Pipe 44	400	4	140	40.00
Pipe 45	462	4	140	40.00
Pipe 46	5	4	140	-72.50
Pipe 47	5	6	140	58.50
Pump 1	#N/A	#N/A	#N/A	72.50

Network Table - Links

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 2	1.85	3.61	0.023
Pipe 3	1.85	3.61	0.023
Pipe 4	1.85	3.61	0.023
Pipe 5	1.85	3.61	0.023
Pipe 6	0.74	0.42	0.024
Pipe 7	0.74	0.42	0.024
Pipe 8	0.74	0.42	0.024
Pipe 9	0.74	0.42	0.024
Pipe 10	0.74	0.42	0.024
Pipe 24	0.66	0.34	0.025
Pipe 25	0.66	0.34	0.025
Pipe 26	0.66	0.34	0.025
Pipe 27	0.66	0.34	0.025
Pipe 28	0.66	0.34	0.025
Pipe 29	0.66	0.34	0.025
Pipe 30	0.66	0.34	0.025
Pipe 31	0.66	0.34	0.025
Pipe 32	1.38	2.09	0.024
Pipe 33	1.38	2.09	0.024
Pipe 34	1.38	2.09	0.024
Pipe 35	1.38	2.09	0.024
Pipe 36	1.20	1.62	0.024
Pipe 37	1.20	1.62	0.024
Pipe 38	1.20	1.62	0.024
Pipe 39	1.20	1.62	0.024

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 40	1.20	1.62	0.024
Pipe 41	1.20	1.62	0.024
Pipe 42	1.20	1.62	0.024
Pipe 43	1.20	1.62	0.024
Pipe 44	1.02	1.20	0.025
Pipe 45	1.02	1.20	0.025
Pipe 46	1.85	3.61	0.023
Pipe 47	0.66	0.34	0.025
Pump 1	0.00	-66.56	0.000

Att C - Downtown 4" lines w/ orifice

Energy Report

Pump	Percent Utilization	Average Efficiency	Kw-hr /Mgal	Average Kwatts	Peak Kwatts	Cost /day
1	100.00	75.00	475.22	2.07	2.07	19.35
Total Cost						19.35
Demand Charge						0.00

Annual Cost = \$19.35/d · 365 d/y = \$7062.75/yr

Network Table - Nodes

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 1	0	0.00	14.98	6.49
Junc 2	0	0.00	128.43	55.65
Junc 3	0	0.00	126.26	54.71
Junc 4	0	0.00	124.10	53.77
Junc 5	0	0.00	121.93	52.83
Junc 111	7	7.00	119.80	51.91
Junc 7	0	0.00	117.71	51.00
Junc 8	0	0.00	115.61	50.09
Junc 9	0	0.00	113.52	49.19
Junc 10	0	0.00	111.42	48.28
Junc 555	7	7.00	109.37	47.39
Junc 999	0	0.00	109.35	47.38
Junc 25	0	0.00	108.13	46.85
Junc 26	0	0.00	106.92	46.33
Junc 27	0	0.00	105.71	45.80
Junc 28	0	0.00	104.49	45.28
Junc 29	0	0.00	103.28	44.75
Junc 30	0	0.00	102.07	44.23
Junc 31	0	0.00	100.85	43.70
Junc 666	4.5	4.50	100.15	43.39
Junc 33	0	0.00	99.10	42.94
Junc 34	0	0.00	98.06	42.49
Junc 35	0	0.00	97.01	42.03
Junc 222	7	7.00	95.90	41.55
Junc 37	0	0.00	95.09	41.20

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 38	0	0.00	94.28	40.85
Junc 39	0	0.00	93.47	40.50
Junc 40	0	0.00	92.66	40.15
Junc 41	0	0.00	91.85	39.80
Junc 42	0	0.00	91.04	39.45
Junc 43	0	0.00	90.24	39.10
Junc 333	7	7.00	89.18	38.64
Junc 444	0	0.00	88.70	38.44
Junc 46	40	40.00	88.15	38.19
Resvr 47	#N/A	-72.50	15.00	0.00

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 2	600	4	140	72.50
Pipe 3	600	4	140	72.50
Pipe 4	600	4	140	72.50
Pipe 5	590	4	140	72.50
Pipe 6	700	4	140	65.50
Pipe 7	700	4	140	65.50
Pipe 8	700	4	140	65.50
Pipe 9	700	4	140	65.50
Pipe 10	685	4	140	65.50
Pipe 24	500	4	140	58.50
Pipe 25	500	4	140	58.50
Pipe 26	500	4	140	58.50
Pipe 27	500	4	140	58.50
Pipe 28	500	4	140	58.50
Pipe 29	500	4	140	58.50
Pipe 30	500	4	140	58.50
Pipe 31	290	4	140	58.50
Pipe 32	500	4	140	54.00
Pipe 33	500	4	140	54.00
Pipe 34	500	4	140	54.00
Pipe 35	530	4	140	54.00
Pipe 36	500	4	140	47.00
Pipe 37	500	4	140	47.00
Pipe 38	500	4	140	47.00
Pipe 39	500	4	140	47.00

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 40	500	4	140	47.00
Pipe 41	500	4	140	47.00
Pipe 42	500	4	140	47.00
Pipe 43	650	4	140	47.00
Pipe 44	400	4	140	40.00
Pipe 45	462	4	140	40.00
Pipe 46	5	4	140	-72.50
Pipe 47	5	4	100	58.50
Pump 1	#N/A	#N/A	#N/A	72.50

Network Table - Links

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 2	1.85	3.61	0.023
Pipe 3	1.85	3.61	0.023
Pipe 4	1.85	3.61	0.023
Pipe 5	1.85	3.61	0.023
Pipe 6	1.67	2.99	0.023
Pipe 7	1.67	2.99	0.023
Pipe 8	1.67	2.99	0.023
Pipe 9	1.67	2.99	0.023
Pipe 10	1.67	2.99	0.023
Pipe 24	1.49	2.43	0.023
Pipe 25	1.49	2.43	0.023
Pipe 26	1.49	2.43	0.023
Pipe 27	1.49	2.43	0.023
Pipe 28	1.49	2.43	0.023
Pipe 29	1.49	2.43	0.023
Pipe 30	1.49	2.43	0.023
Pipe 31	1.49	2.43	0.023
Pipe 32	1.38	2.09	0.024
Pipe 33	1.38	2.09	0.024
Pipe 34	1.38	2.09	0.024
Pipe 35	1.38	2.09	0.024
Pipe 36	1.20	1.62	0.024
Pipe 37	1.20	1.62	0.024
Pipe 38	1.20	1.62	0.024
Pipe 39	1.20	1.62	0.024

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 40	1.20	1.62	0.024
Pipe 41	1.20	1.62	0.024
Pipe 42	1.20	1.62	0.024
Pipe 43	1.20	1.62	0.024
Pipe 44	1.02	1.20	0.025
Pipe 45	1.02	1.20	0.025
Pipe 46	1.85	3.61	0.023
Pipe 47	1.49	4.53	0.044
Pump 1	0.00	-113.45	0.000

Network Table - Nodes

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 1	0	0.00	14.98	6.49
Junc 2	0	0.00	178.59	77.38
Junc 3	0	0.00	176.17	76.33
Junc 4	0	0.00	173.74	75.28
Junc 5	0	0.00	171.32	74.23
Junc 111	7	7.00	168.94	73.20
Junc 7	0	0.00	166.57	72.17
Junc 8	0	0.00	164.20	71.15
Junc 9	0	0.00	161.83	70.12
Junc 10	0	0.00	159.46	69.09
Junc 555	7	7.00	157.14	68.09
Junc 12	0	0.00	155.19	67.25
Junc 13	0	0.00	153.25	66.40
Junc 14	0	0.00	151.30	65.56
Junc 15	0	0.00	149.35	64.71
Junc 16	0	0.00	147.40	63.87
Junc 777	5.6	5.60	145.45	63.02
Junc 18	0	0.00	144.75	62.72
Junc 19	0	0.00	144.04	62.41
Junc 20	0	0.00	143.34	62.11
Junc 888	3.9	3.90	142.23	61.63
Junc 22	0	0.00	140.79	61.00
Junc 23	0	0.00	139.35	60.38
Junc 999	0	0.00	137.91	59.75
Junc 25	0	0.00	136.88	59.31

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 26	0	0.00	135.85	58.86
Junc 27	0	0.00	134.82	58.42
Junc 28	0	0.00	133.79	57.97
Junc 29	0	0.00	132.76	57.53
Junc 30	0	0.00	131.73	57.08
Junc 31	0	0.00	130.71	56.64
Junc 666	4.5	4.50	130.11	56.38
Junc 33	0	0.00	129.24	56.00
Junc 34	0	0.00	128.36	55.62
Junc 35	0	0.00	127.49	55.24
Junc 222	7	7.00	126.56	54.84
Junc 37	0	0.00	125.90	54.55
Junc 38	0	0.00	125.25	54.27
Junc 39	0	0.00	124.59	53.98
Junc 40	0	0.00	123.93	53.70
Junc 41	0	0.00	123.28	53.42
Junc 42	0	0.00	122.62	53.13
Junc 43	0	0.00	121.96	52.85
Junc 333	7	7.00	121.11	52.48
Junc 444	0	0.00	120.73	52.31
Junc 46	35	35.00	120.30	52.13
Resvr 47	#N/A	-77.00	15.00	0.00

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 2	600	4	140	77.00
Pipe 3	600	4	140	77.00
Pipe 4	600	4	140	77.00
Pipe 5	590	4	140	77.00
Pipe 6	700	4	140	70.00
Pipe 7	700	4	140	70.00
Pipe 8	700	4	140	70.00
Pipe 9	700	4	140	70.00
Pipe 10	685	4	140	70.00
Pipe 11	700	4	140	63.00
Pipe 12	700	4	140	63.00
Pipe 13	700	4	140	63.00
Pipe 14	700	4	140	63.00
Pipe 15	700	4	140	63.00
Pipe 16	700	4	140	63.00
Pipe 17	300	4	140	57.40
Pipe 18	300	4	140	57.40
Pipe 19	300	4	140	57.40
Pipe 20	475	4	140	57.40
Pipe 21	700	4	140	53.50
Pipe 22	700	4	140	53.50
Pipe 23	700	4	140	53.50
Pipe 24	500	4	140	53.50
Pipe 25	500	4	140	53.50
Pipe 26	500	4	140	53.50

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 27	500	4	140	53.50
Pipe 28	500	4	140	53.50
Pipe 29	500	4	140	53.50
Pipe 30	500	4	140	53.50
Pipe 31	290	4	140	53.50
Pipe 32	500	4	140	49.00
Pipe 33	500	4	140	49.00
Pipe 34	500	4	140	49.00
Pipe 35	530	4	140	49.00
Pipe 36	500	4	140	42.00
Pipe 37	500	4	140	42.00
Pipe 38	500	4	140	42.00
Pipe 39	500	4	140	42.00
Pipe 40	500	4	140	42.00
Pipe 41	500	4	140	42.00
Pipe 42	500	4	140	42.00
Pipe 43	650	4	140	42.00
Pipe 44	400	4	140	35.00
Pipe 45	462	4	140	35.00
Pipe 46	5	4	140	-77.00
Pump 1	#N/A	#N/A	#N/A	77.00

Network Table - Links

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 2	1.97	4.04	0.022
Pipe 3	1.97	4.04	0.022
Pipe 4	1.97	4.04	0.022
Pipe 5	1.97	4.04	0.022
Pipe 6	1.79	3.38	0.023
Pipe 7	1.79	3.38	0.023
Pipe 8	1.79	3.38	0.023
Pipe 9	1.79	3.38	0.023
Pipe 10	1.79	3.38	0.023
Pipe 11	1.61	2.78	0.023
Pipe 12	1.61	2.78	0.023
Pipe 13	1.61	2.78	0.023
Pipe 14	1.61	2.78	0.023
Pipe 15	1.61	2.78	0.023
Pipe 16	1.61	2.78	0.023
Pipe 17	1.47	2.34	0.023
Pipe 18	1.47	2.34	0.023
Pipe 19	1.47	2.34	0.023
Pipe 20	1.47	2.34	0.023
Pipe 21	1.37	2.06	0.024
Pipe 22	1.37	2.06	0.024
Pipe 23	1.37	2.06	0.024
Pipe 24	1.37	2.06	0.024
Pipe 25	1.37	2.06	0.024
Pipe 26	1.37	2.06	0.024

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 27	1.37	2.06	0.024
Pipe 28	1.37	2.06	0.024
Pipe 29	1.37	2.06	0.024
Pipe 30	1.37	2.06	0.024
Pipe 31	1.37	2.06	0.024
Pipe 32	1.25	1.75	0.024
Pipe 33	1.25	1.75	0.024
Pipe 34	1.25	1.75	0.024
Pipe 35	1.25	1.75	0.024
Pipe 36	1.07	1.31	0.025
Pipe 37	1.07	1.31	0.025
Pipe 38	1.07	1.31	0.025
Pipe 39	1.07	1.31	0.025
Pipe 40	1.07	1.31	0.025
Pipe 41	1.07	1.31	0.025
Pipe 42	1.07	1.31	0.025
Pipe 43	1.07	1.31	0.025
Pipe 44	0.89	0.94	0.025
Pipe 45	0.89	0.94	0.025
Pipe 46	1.97	4.04	0.022
Pump 1	0.00	-163.61	0.000

Att. C - 3rds 4" w/ [illegible]

Energy Report

Pump	Percent Utilization	Average Efficiency	Kw-hr /Mgal	Average Kwatts	Peak Kwatts	Cost /day
1	100.00	75.00	668.30	3.29	3.29	30.78
Total Cost						30.78
Demand Charge						0.00

Network Table - Nodes

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 1	0	0.00	14.98	6.49
Junc 2	0	0.00	174.52	75.62
Junc 3	0	0.00	171.80	74.44
Junc 4	0	0.00	169.08	73.26
Junc 5	0	0.00	166.35	72.08
Junc 111	7	7.00	163.68	70.92
Junc 7	0	0.00	160.98	69.75
Junc 8	0	0.00	158.29	68.59
Junc 9	0	0.00	155.60	67.42
Junc 10	0	0.00	152.91	66.26
Junc 555	7	7.00	150.27	65.11
Junc 12	0	0.00	148.03	64.14
Junc 13	0	0.00	145.78	63.17
Junc 14	0	0.00	143.54	62.20
Junc 15	0	0.00	141.29	61.22
Junc 16	0	0.00	139.05	60.25
Junc 777	5.6	5.60	136.80	59.28
Junc 18	0	0.00	135.98	58.92
Junc 19	0	0.00	135.16	58.57
Junc 20	0	0.00	134.34	58.21
Junc 888	3.9	3.90	133.04	57.65
Junc 22	0	0.00	131.34	56.91
Junc 23	0	0.00	129.64	56.17
Junc 999	0	0.00	127.94	55.44
Junc 25	0	0.00	126.73	54.91

Node ID	Base Demand GPM	Demand GPM	Head ft	Pressure psi
Junc 26	0	0.00	125.52	54.39
Junc 27	0	0.00	124.30	53.86
Junc 28	0	0.00	123.09	53.33
Junc 29	0	0.00	121.88	52.81
Junc 30	0	0.00	120.66	52.28
Junc 31	0	0.00	119.45	51.76
Junc 666	4.5	4.50	118.74	51.45
Junc 33	0	0.00	117.70	51.00
Junc 34	0	0.00	116.65	50.55
Junc 35	0	0.00	115.61	50.09
Junc 222	7	7.00	114.50	49.61
Junc 37	0	0.00	113.69	49.26
Junc 38	0	0.00	112.88	48.91
Junc 39	0	0.00	112.07	48.56
Junc 40	0	0.00	111.26	48.21
Junc 41	0	0.00	110.45	47.86
Junc 42	0	0.00	109.64	47.51
Junc 43	0	0.00	108.83	47.16
Junc 333	7	7.00	107.78	46.70
Junc 444	0	0.00	107.30	46.49
Junc 46	40	40.00	106.74	46.25
Resvr 47	#N/A	-82.00	15.00	0.00

Network Table - Links

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 2	600	4	140	82.00
Pipe 3	600	4	140	82.00
Pipe 4	600	4	140	82.00
Pipe 5	590	4	140	82.00
Pipe 6	700	4	140	75.00
Pipe 7	700	4	140	75.00
Pipe 8	700	4	140	75.00
Pipe 9	700	4	140	75.00
Pipe 10	685	4	140	75.00
Pipe 11	700	4	140	68.00
Pipe 12	700	4	140	68.00
Pipe 13	700	4	140	68.00
Pipe 14	700	4	140	68.00
Pipe 15	700	4	140	68.00
Pipe 16	700	4	140	68.00
Pipe 17	300	4	140	62.40
Pipe 18	300	4	140	62.40
Pipe 19	300	4	140	62.40
Pipe 20	475	4	140	62.40
Pipe 21	700	4	140	58.50
Pipe 22	700	4	140	58.50
Pipe 23	700	4	140	58.50
Pipe 24	500	4	140	58.50
Pipe 25	500	4	140	58.50
Pipe 26	500	4	140	58.50

Link ID	Length ft	Diameter in	Roughness	Flow GPM
Pipe 27	500	4	140	58.50
Pipe 28	500	4	140	58.50
Pipe 29	500	4	140	58.50
Pipe 30	500	4	140	58.50
Pipe 31	290	4	140	58.50
Pipe 32	500	4	140	54.00
Pipe 33	500	4	140	54.00
Pipe 34	500	4	140	54.00
Pipe 35	530	4	140	54.00
Pipe 36	500	4	140	47.00
Pipe 37	500	4	140	47.00
Pipe 38	500	4	140	47.00
Pipe 39	500	4	140	47.00
Pipe 40	500	4	140	47.00
Pipe 41	500	4	140	47.00
Pipe 42	500	4	140	47.00
Pipe 43	650	4	140	47.00
Pipe 44	400	4	140	40.00
Pipe 45	462	4	140	40.00
Pipe 46	5	4	140	-82.00
Pump 1	#N/A	#N/A	#N/A	82.00

Network Table - Links

Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 2	2.09	4.54	0.022
Pipe 3	2.09	4.54	0.022
Pipe 4	2.09	4.54	0.022
Pipe 5	2.09	4.54	0.022
Pipe 6	1.91	3.85	0.023
Pipe 7	1.91	3.85	0.023
Pipe 8	1.91	3.85	0.023
Pipe 9	1.91	3.85	0.023
Pipe 10	1.91	3.85	0.023
Pipe 11	1.74	3.21	0.023
Pipe 12	1.74	3.21	0.023
Pipe 13	1.74	3.21	0.023
Pipe 14	1.74	3.21	0.023
Pipe 15	1.74	3.21	0.023
Pipe 16	1.74	3.21	0.023
Pipe 17	1.59	2.74	0.023
Pipe 18	1.59	2.74	0.023
Pipe 19	1.59	2.74	0.023
Pipe 20	1.59	2.74	0.023
Pipe 21	1.49	2.43	0.023
Pipe 22	1.49	2.43	0.023
Pipe 23	1.49	2.43	0.023
Pipe 24	1.49	2.43	0.023
Pipe 25	1.49	2.43	0.023
Pipe 26	1.49	2.43	0.023

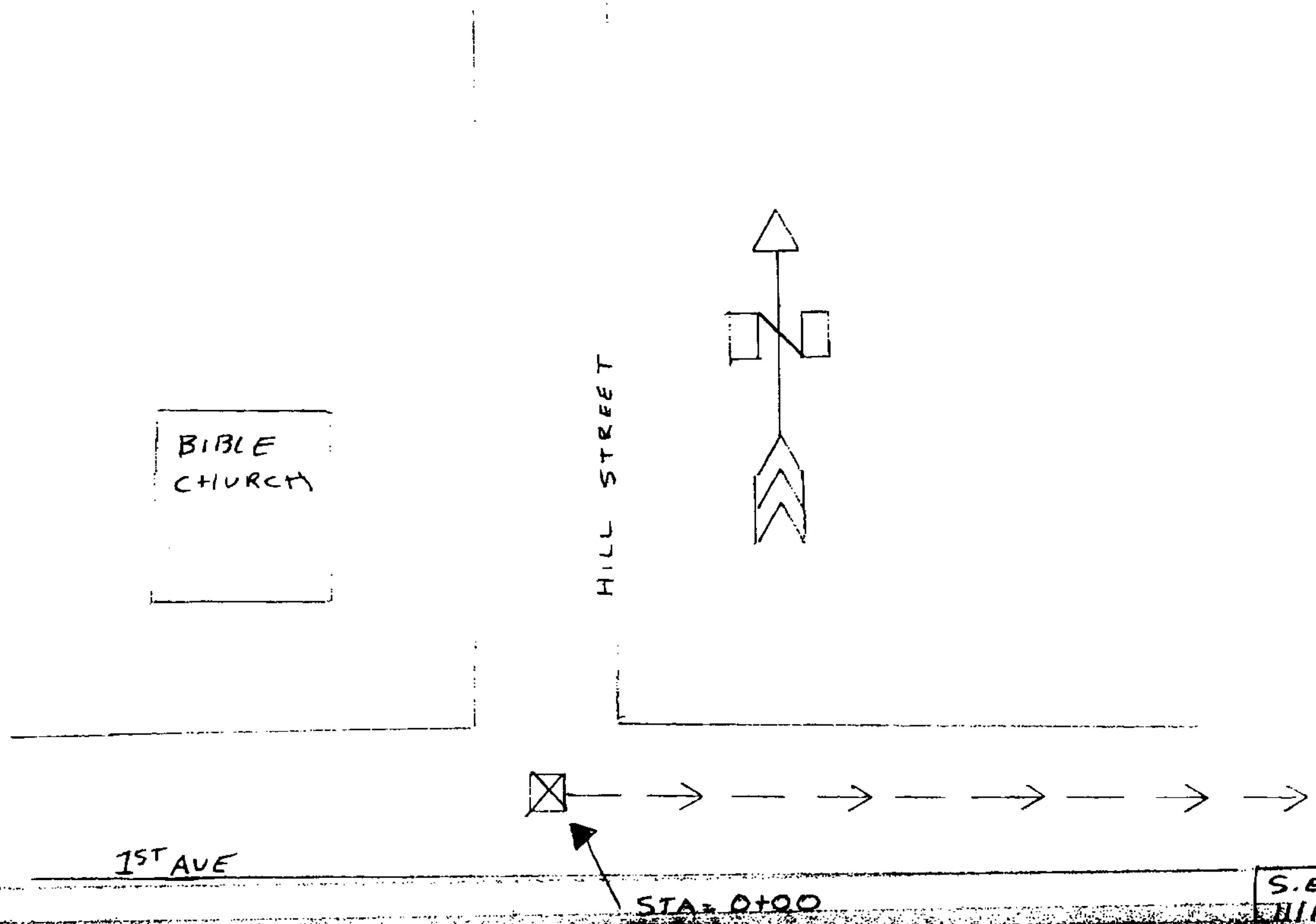
Link ID	Velocity fps	Unit Headloss ft/Kft	Friction Factor
Pipe 27	1.49	2.43	0.023
Pipe 28	1.49	2.43	0.023
Pipe 29	1.49	2.43	0.023
Pipe 30	1.49	2.43	0.023
Pipe 31	1.49	2.43	0.023
Pipe 32	1.38	2.09	0.024
Pipe 33	1.38	2.09	0.024
Pipe 34	1.38	2.09	0.024
Pipe 35	1.38	2.09	0.024
Pipe 36	1.20	1.62	0.024
Pipe 37	1.20	1.62	0.024
Pipe 38	1.20	1.62	0.024
Pipe 39	1.20	1.62	0.024
Pipe 40	1.20	1.62	0.024
Pipe 41	1.20	1.62	0.024
Pipe 42	1.20	1.62	0.024
Pipe 43	1.20	1.62	0.024
Pipe 44	1.02	1.20	0.025
Pipe 45	1.02	1.20	0.025
Pipe 46	2.09	4.54	0.022
Pump 1	0.00	-159.54	0.000

Appendix E

First Street Centerline Survey Results

TANANA WATER
SEWER PROJECT
1ST AVE & HILL ST.
CENTER LINE PROFILE
2004

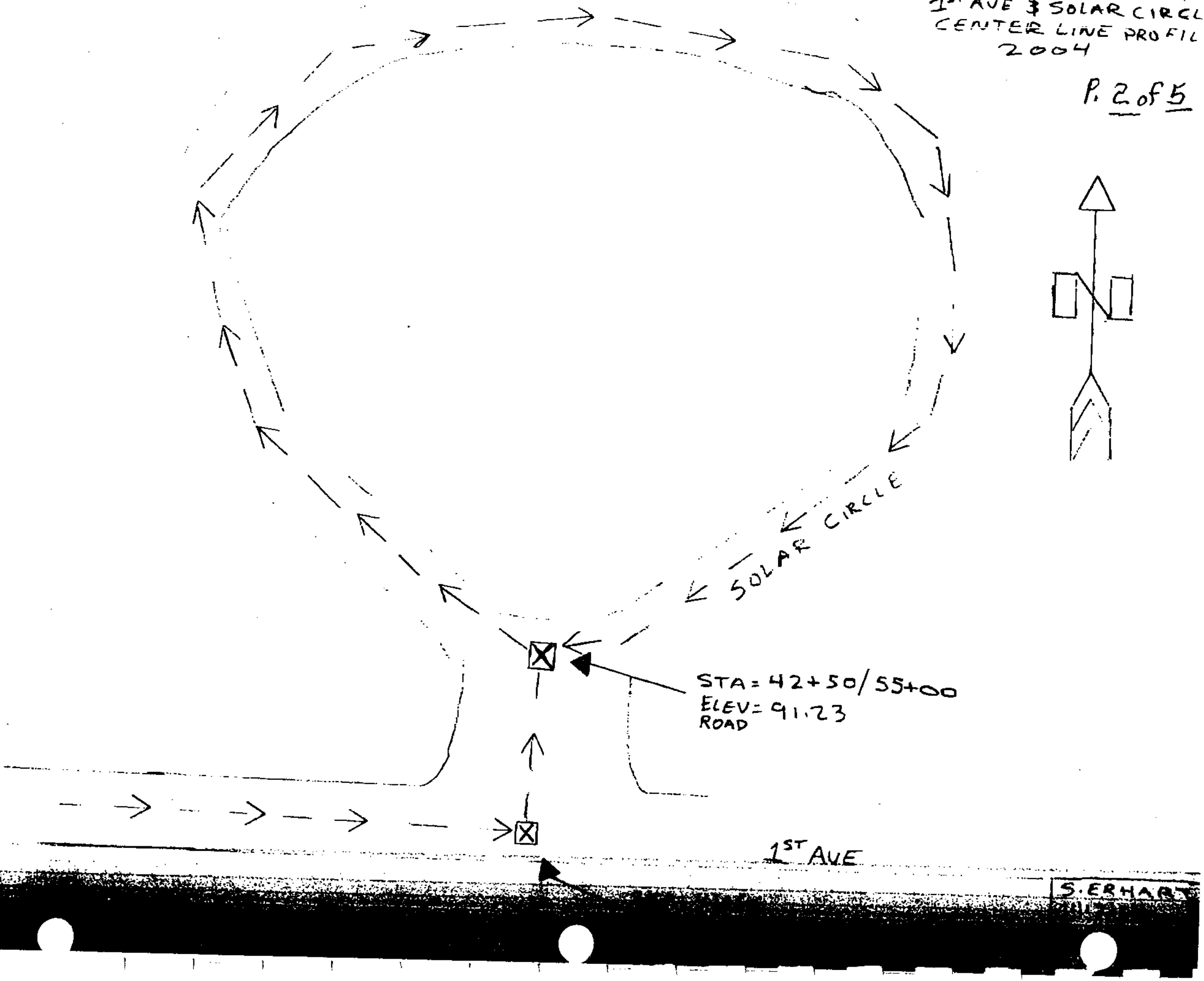
P. 1 of 5



S. ERHART
11/17/04

SEWER PROJECT
1ST AVE & SOLAR CIRCLE
CENTER LINE PROFILE
2004

P. 2 of 5



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TANANA WATER SEWER PROJECT

RIVER ROAD CENTERLINE PROFILE

STATION	ELEV.	COMMENTS
0+00	96.9	1ST AVE & HILL ST
0+50	96.1	
1+00	94.65	
1+50	93.00	
2+00	91.40	
2+50	89.85	
3+00	88.6	
3+50	88.7	
4+00	90.40	
4+50	92.92	
5+00	96.77	
5+50	97.47	
6+00	97.87	
6+50	98.02	
7+00	98.52	
7+50	98.77	
8+00	99.12	
8+50	99.67	
9+00	99.97	
9+50	100.17	
10+00	100.07	
10+50	99.77	
11+00	99.62	
11+50	99.39	
12+00	99.49	
12+50	99.39	
13+00	99.09	
13+50	98.64	
14+00	98.49	
14+50	98.99	
15+00	99.64	
15+50	99.94	
16+00	99.89	
16+50	99.89	
17+00	99.99	
17+50	99.89	
18+00	99.95	
18+50	100.45	
19+00	100.90	
19+50	101.00	
20+00	100.40	

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STATION	ELEV.	COMMENTS
20+50	98.90	
21+00	96.60	
21+50	93.75	
22+00	92.05	
22+50	91.05	
23+00	90.05	
23+50	89.95	
24+00	88.70	
24+50	88.95	
25+00	89.25	
25+50	89.55	
26+00	89.75	
26+50	89.95	
27+00	89.45	
27+50	88.77	
28+00	87.87	
28+50	87.52	
29+00	87.72	
29+50	88.27	
30+00	88.52	
30+50	88.79	
31+00	89.04	
31+50	89.34	
32+00	89.39	
32+50	89.14	
33+00	89.14	
33+50	89.14	
34+00	89.74	
34+50	90.32	
35+00	90.57	
35+50	90.67	
36+00	90.82	
36+50	91.07	
37+00	91.07	
37+50	90.93	
38+00	90.73	
38+50	90.53	
39+00	90.78	
39+50	91.08	
40+00	91.18	
40+50	91.33	
41+00	91.33	
41+50	91.23	INTERSECTION 1ST & SOLAR CIRCLE
42+00	91.13	
42+50/55+00	91.23	INTERSECTION WHERE SOLAR CIRCLE INTERSECT.
43+00	90.63	
43+50	90.23	
44+00	90.38	

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STATION	ELEV.	COMMENTS
44+50	90.83	
45+00	91,48	
45+50	91,91	
46+00	91,76	
46+50	91.76	
47+00	92,16	
47+50	92.01	
48+00	92,36	
48+50	92,36	
49+00	92,14	
49+50	91,99	
50+00	92,14	
50+50	92,39	
51+00	91.94	
51+50	91,64	
52+00	91,59	
52+50	91,54	
53+00	91,34	
53+50	90.94	
54+00	90.94	
54+50	91.09	
55+00/42+50	91,23	INTERSECTION WHERE SONAR
		CIRCLE INTERSECTS

Appendix F

Too'gha Board Resolution for Study's Recommendations

Too'gha, Inc.
P. O. Box 190
Tanana, AK 99777

Resolution 2005-03

WHEREAS, Too'gha, Inc. is the water and sewer utility for Tanana, Alaska, and

WHEREAS, Too'gha is currently constructing a piped water and sewer system between School and Eamole Streets, and between First and Third Avenues, and

WHEREAS, Too'gha wishes to provide water and sewer service to the remaining residents of Tanana, who live outside the boundaries of the current piped system, and

WHEREAS, the sewage lagoon is located across the street from houses and the sewage effluent discharges into the Yukon River, and

WHEREAS, smells from the lagoon are unpleasant and discharging effluent to the river is not acceptable to the community, and

WHEREAS, Too'gha hired HDR, Inc. to write the Tanana Water Sewer Feasibility Study Update, and

WHEREAS, HDR has completed the Feasibility Study Update and has recommended additional water and sanitation improvements, and

WHEREAS, these improvements are listed in phases because it is extremely unlikely Tanana will receive sufficient grant funds to complete all the remaining improvements at one time,

LET IT THEREFORE BE RESOLVED that Too'gha, Inc. accepts the recommendations of the Feasibility Study Update, and

LET IT BE FURTHER RESOLVED that Too'gha's sanitation priorities are, as follows:

Priority	**Description**	**Phases from the Feasibility Study Update**
1	Piped water and sewer between Eamole and East Streets	1, 2
2	New sewage lagoon with wetlands treatment	3
3	Piped water and sewer as far east as the Circle Subdivision	4, 5, 6, 7
4	Water and sewer service (wells or water haul, onsite septic) for out of town houses	8, 9

SIGNED:

Mike Andon, President

Date 8/3/05

ATTESTED BY:

Stephanie Swenson-Nichol
Secretary

HDR