

CITY OF NIGHTMUTE



SOLID WASTE MANAGEMENT PLAN/FEASIBILITY STUDY

AUGUST 2004



SUMMIT
CONSULTING SERVICES Inc.



City of Nightmute

Solid Waste Management Plan & Feasibility Study

Prepared for

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In Association with

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August 2004

Table of Contents

I.	CONCLUSIONS & RECOMMENDATIONS	1
A.	Overview of the Selected Alternative	2
1.	Stand-Alone Burn Box Option	3
B.	Conceptual Project Layout	4
C.	Project Construction Phases, Including Unit Costs of the Recommended Alternative	4
D.	Construction & O&M Cost Estimates with Suggested User Fee by Alternative	5
E.	Business Plan Summary	6
F.	Summary of Report Recommendations	7
1.	New Solid Waste Facility Design	7
2.	Community Environmental Health	7
3.	Future Grant Applications	7
4.	Community Solid Waste Management	7
II.	INTRODUCTION	9
A.	Definition	9
B.	Funding Source for this Study	9
III.	NEED FOR THE PROJECT	9
A.	Health & Safety Concerns	9
B.	Environmental Concerns	11
C.	Solid Waste Facility Growth Capacity	13
D.	Separation Distance from Airports	14
IV.	PROJECT PLANNING AREA	14
A.	Location & Access	14
1.	Airports	14
2.	Roads & Seasonal Roads	14
3.	Barge Service	15
B.	Environmental Conditions & Resources Present	15
1.	Climate	15
2.	Geology & Soil Conditions	15
3.	Flood, Erosion, & Seismic Hazards	16
4.	Historic Sites	16
5.	Endangered Species & Critical Habitats	17
C.	Economy & Financial Profile	17
D.	Potential Growth Areas	17
E.	Power Generation & Fuel Storage Facilities	18
F.	Public Facilities & Housing	18
G.	Public Administration	18
H.	Population	18
1.	Present & Projected Population	18
2.	Number of Households to be Served	19
3.	Number of People Benefiting from the Project	19
V.	LAND STATUS	19
A.	Land Owners in Proposed Project Area	19
1.	Federal	19
2.	State	19
3.	Regional Land Corporations	19
4.	Village Land Corporation	19

5.	City	19
6.	Native Allotments	20
7.	Homesteads	20
8.	Other Owners	20
9.	Existing Easements	20
B.	Traditional Use Areas	20
C.	Potential Land Conflicts	20
D.	Proposed Solutions to Land Conflicts	21
VI.	EXISTING SOLID WASTE FACILITIES & PLANNING CONDITIONS	21
A.	Project Planning Area Map	21
B.	History of Solid Waste Improvements	21
C.	Condition of Facilities	22
1.	Winter Dumpsite	22
2.	Summer Dumpsite	23
3.	Other Dumpsites	23
D.	Financial Status of Operating Facilities	24
VII.	COMMUNITY CAPACITY	24
A.	Management Status	24
B.	Financial Status	24
C.	Operation & Maintenance Status	25
VIII.	WASTESTREAM SOURCE & CHARACTERIZATION	25
A.	Households	26
B.	Schools, Clinics & Institutions	26
C.	Commercial Operations	27
D.	Power Generating Facilities & Fuel Facilities	27
1.	Power Generating Facilities	27
2.	Fuel Facilities	27
E.	Transportation Activities	27
F.	Vessel & Marine Activities	27
G.	Water & Wastewater Treatment	28
1.	Water Treatment	28
2.	Wastewater Treatment	28
3.	Construction & Demolition Activities	28
4.	Subsistence Activity Waste Products	28
5.	Household Hazardous Waste	29
IX.	SOLID WASTE MANAGEMENT ALTERNATIVES	29
A.	Waste Source Reduction	29
B.	Waste Recycling	30
C.	Special Waste Handling	31
1.	Used Oil	31
2.	Refrigerants	31
3.	Vehicle & Vessel Antifreeze	31
4.	Paints & Solvents	32
5.	Computers & Monitors	33
D.	Waste Collection	33
1.	Self Haul	33
2.	Dumpsters	34
3.	Transfer Station	34
4.	Curbside Pickup	34

5.	Regional Pickup	34
6.	Barge Haul	34
E.	Waste Treatment	35
1.	Waste Segregation & Recycling	35
2.	Composting	35
3.	Burning	35
4.	Bailing	36
5.	Decomposition	36
F.	Waste Disposal	36
1.	Out-of-State Landfill	36
2.	Regional Landfill	37
3.	Space Available for Disposal & Landfill Reconditioning / Closure in the Existing Landfill	37
4.	New Local Landfill: Calculation of Space Available for Disposal & Landfill Closure	37
G.	Cost Estimates	39
1.	Construction Cost Estimates for New Landfill	40
2.	Annual O&M Costs & Monthly User Costs	40
3.	Annual Life Cycle Costs Including Proposed Landfill Closure Costs	41
4.	Existing Landfill Closure Costs	41
5.	Household Hazardous Wastes Disposal Costs	42
6.	Review of Operational Costs for Similar Systems within the Region	42
X.	CONCLUSIONS & RECOMMENDATIONS	44
A.	Description of Recommended Alternative	44
B.	Capital Cost Estimates	45
C.	Estimated Annual Revenues & Revenue Source	45
D.	Annual Operation & Maintenance Costs	45
E.	Capital Costs & Utility Fee per Home Served	45
XI.	COMMUNITY BUSINESS PLAN FOR SELECTED ALTERNATIVE	45
XII.	PUBLIC PARTICIPATION IN THE PLANNING PROCESS	45
A.	Methods Used to Gain Community Input & Direction	45
B.	Identification of Community Goals & Objectives	46
XIII.	REFERENCES	46
XIV.	ADDENDUM	
A.	Maps & Drawings	
	Sheet 1 – Location Map	
	Sheet 2 – Contour Map I	
	Sheet 3 – Contour Map II	
	Sheet 4 – Community Map	
	Sheet 5 – Alternative Landfill Sites	
	Sheet 6 – 5,000-foot Separation Boundary from the Airport	
	Sheet 7 – Conceptual Landfill Plan View & Cross Section	
	Sheet 8 – City of Nightmute Surface Land Status Map	
	Sheet 9– Nightmute Surface Vicinity Land Status Map	
	Sheet 10– Nightmute Subsurface Vicinity Land Status Map	
B.	Community Resolution Accepting the Solid Waste Management Plan	
C.	Technical Information (Water Quality Reports, Geotechnical Information, RUBA Reports)	
D.	Community Survey Results	
E.	Community Contacts & Resources	
F.	Meeting Summaries, Public Comments & Trip Reports	
G.	Preliminary Community Ordinance	

- H. Agency Correspondence & Resources
- I. Cost Estimates
- J. Solid Waste Utility Business Plan

List of Tables

- Table 1: Summary of Examined Alternatives for Solid Waste Management
- Table 2: Capital Cost Estimate for Alternative #2A
- Table 3: Annual O&M Cost Estimate with Suggested Household User Fees for Alternative #2A
- Table 4: Construction Phases & Costs for Alternative #2A
- Table 5: Capital Cost Estimates with Suggested User Fees for All Landfill Alternatives
- Table 6: Cost Estimate with Suggested User Fees for Option 2, Alternative #2A
- Table 7: Summary of Proposed Total Revenue & Expenses / Rate of Return
- Table 8: Cost Summary of Selected Solid Waste Alternatives
- Table 9: Water Testing Results for the Summer & Winter Dumps
- Table 10: Landfill Design Assumptions
- Table 11: Current User Fees for City of Nightmute Services
- Table 12: Arctic Rural Village Solid Waste Composition
- Table 13: Burn Box Comparison
- Table 14: Annual Cost Estimate for Out-of-State Solid Waste Disposal
- Table 15: Cost Estimates with Suggested User Fees for All Landfill Alternatives
- Table 16: Annual O&M Costs for Self-Haul & Community-Haul Collection
- Table 17: User Fees for Non-Residential User, Self-Haul Collection
- Table 18: Annual Life Cycle Cost by Alternative
- Table 19: Capital Cost Summary for Closure of Previous Dumpsites
- Table 20: Regional Utility Comparison
- Table I-1: Capital Cost Estimate for Landfill Alternative #1
- Table I-2: Capital Cost Estimate for Landfill Alternative #2A
- Table I-3: Capital Cost Estimate for Landfill Alternative #2B
- Table I-4: Capital Cost Estimate for Landfill Alternative #3
- Table I-5: Capital Cost Estimate for Option 2, Phase 1 of Alternative #2A: Burn Box
- Table I-6: Capital Cost Estimate for Option 2, Phase 2 of Alternative #2A: Landfill
- Table I-7: Capital Cost Estimate for Cleanup of Dumpsites on Land
- Table I-8: Capital Cost Estimate for Winter Dump Closure
- Table I-9: Annual O&M Cost Estimate for a Self-Haul Solid Waste Utility
- Table I-10: Annual O&M Cost Estimate for a Community-Haul Solid Waste Utility
- Table J-1: Annual Revenue Estimate for a Self-Haul Community Solid Waste Utility
- Table J-2: Annual O&M Cost Estimate for a Self-Haul Community Solid Waste System
- Table J-3: Annual R&R Cost Estimate for a Self-Haul Community Solid Waste System
- Table J-4: Annual Estimated Operating Cash Flow
- Table J-5: Annual Estimated Operating Income Statement
- Table J-6: Summary of Total Revenue & Expenses / Rate of Return

List of Figures

- Figure 1: Gulls above Nightmute's Summer Dump
- Figure 2: Summer Dump before Relocation & Community Cleanup
- Figure 3: Summer Dump Adjacent to the Toksook River
- Figure 4: Tundra Pond Used as the Winter Dump
- Figure 5: Winter Dump Closure
- Figure 6: Relocation of Summer Dump

Figure 7: Winter Dump from Two Perspectives

Figure 8: Community Litter Site

Figure 9: IGAP Environmental Coordinator on the Job

Figure 10: Community Meeting in Nightmute

Abbreviations

° , ° F – degrees, degrees Fahrenheit
AAC – Alaska Administrative Code
ADCED – Alaska Department of Commerce and Economic Development
ADEC - Alaska Department of Environmental Conservation
ADNR – Alaska Department of Natural Resources
ADTPF - Alaska Department of Transportation and Public Facilities
AME – Alaska Materials Exchange
ANTHC – Alaska Native Tribal Health Consortium
ATS – Arctic Transportation Services
ATV – all-terrain vehicle
AVEC – Alaska Village Electric Corporation
BIA - Bureau of Indian Affairs
BLM – Bureau of Land Management
CC – capital cost
CESQG - Conditionally Exempt Small Quantity Generator
CGIN – Census and Geographic Information Network
CSCE – Canadian Society of Civilian Engineering
DLF – design life factor
EACC – equivalent annual capital cost
EALCC – equivalent annual life cycle cost
EPA – United States Environmental Protection Agency
FAA – Federal Aviation Administration
FTH – flush tank and haul
FTHS – flush-tank-and-haul system
ICC – International Code Council
IGAP - Indian General Assistance Program
kW – kilowatt
kWh – kilowatt hour
l – liter
mg – milligram
NRCS – National Resource Conservation Service
O&M – operation and maintenance
OHA – Office of History and Archeology, ADNR
PCE – Power Cost Equalization
PCB – polychlorinated biphenyl
ppb – parts per billion
ppm – parts per million
R&R – repairs and replacement
RUBA – Rural Utility Business Advisor
SHPO - State Historic Preservation Officer
ug – microgram
USACE - US Army Corps of Engineers
USFWS – US Fish and Wildlife Service
VSW - Village Safe Water Program, ADEC

I. CONCLUSIONS & RECOMMENDATIONS

The residents of Nightmute are strongly supportive of implementing new solid waste management programs. Community meetings have been well-attended; the main dumpsite has been moved away from the Toksook River; an Indian Environmental General Assistance Program (IGAP) employee, sponsored with funds from the Environmental Protection Agency (EPA), has expanded recycling and education programs; and the community has hosted regional environmental workshops.

As a continued effort to improve the community, the Nightmute City Council has examined four alternatives for solid waste management. (See *Sheet #5*, at the end of this report, for the location of the potential landfill sites.) *Table 1* lists the four alternatives and their general location. (Shaded sections in tables highlight the selected alternative, *Alternative #2A*.)

Table 1: Summary of Examined Alternatives for Solid Waste Management

ALTERNATIVE	LOCATION	COLLECTION METHOD	CONSTRUCTION TIMELINE		
#1	Meander West of Town	n/a	n/a	n/a	n/a
#2A	Hillside of Toksook Mountain	Self-Haul	Option 1	Phase 1	Landfill with Burn Box
		Community Haul	Option 2	Phase 1	Burn Box
				Phase 2	Landfill
#2B	Lower Hillside of Toksook Mountain	n/a	n/a	n/a	n/a
#3	Near Sewage Lagoon	n/a	n/a	n/a	n/a

A new burn box and landfill will address the following deficiencies of the existing community dumpsites:

- Existing dumpsites are too close to the airport and are a significant bird attractant.
- Trash and leachate are entering the river upstream from the community.
- Due to restrictions during break-up and freeze-up, the community lacks year-round access to the preferred community dumpsite.
- Access to cover material is limited as gravel pits are located across the Toksook River.
- The community lacks dedicated equipment to reduce, compact, or cover the waste.
- Multiple dumpsites create an eyesore for the community, especially the nearby Winter Dump.
- No utility structure manages the solid waste.

One major concern of the planners and the community is that funding for a new landfill may take several years to obtain. Because the community needs to make improvements now, a short-term solution for a stand-alone burn box has been developed as part of a phased approach to securing a community landfill. This

short-term option is identified as **Option 2** and includes **Phase 1: Burn Box Construction** and **Phase 2: Landfill Construction**. **Option 1** includes the concurrent construction of the landfill and the burn box once the landfill funding is available.

A. Overview of the Selected Alternative

During a May 7, 2004 Community Meeting, residents selected the hillside alternative, **Alternative #2A**, as the preferred landfill location. Since soil conditions on the hillside can be wet, frozen and/or unstable, and since such conditions complicate construction, the community selected two hillside areas that appear to be the most constructible. The exact layout for the landfill will need to be determined during the design phase, after a geotechnical investigation of the hillside provides an analysis and recommendation. **Table 2** summarizes the projected construction or capital costs for this alternative. (The estimated capital cost of cleaning up the waste from existing community dumpsites, \$60,000, has been included in the capital cost for all the alternatives.)

Table 2: Capital Cost Estimate for Alternative #2A

OPTION	DESIGN / CONSTRUCTION COSTS	
	Project	Per Household*
Option 1 / Phase 1 -- Landfill / Burn Box Constructed Concurrently		
Landfill Construction Only	\$2,247,575	\$41,622
Landfill in Conjunction with Lagoon Construction	\$1,857,575	\$34,400
Landfill Construction after Toksook Bay Road Constructed	\$1,747,575	\$32,363
Landfill in Conjunction with Lagoon Construction after Toksook Bay Road Constructed	\$1,357,575	\$25,140
Option 2 / Phase 1 – Burn Box Construction		
Burn Box Only	\$246,600	\$4,567
Option 2 / Phase 2 – Landfill Construction		
Landfill Construction Only	\$2,050,950	\$37,981
Landfill in Conjunction with Lagoon Construction	\$1,660,950	\$30,758
Landfill Construction after Toksook Bay Road Constructed	\$1,550,950	\$27,210
Landfill in Conjunction with Lagoon Construction after Toksook Bay Road Constructed	\$1,160,950	\$21,499

*based on 54 residential users

The City is also planning to construct a new wastewater lagoon. If the heavy equipment from the lagoon project is available for the landfill construction, there will be a cost savings of approximately \$390,000 for equipment purchasing and mobilization. If the road to Toksook Bay is built before the landfill, approximately \$500,000 will be saved in access road construction costs. **If the landfill project is**

coordinated with other construction projects and the cost of procuring some heavy equipment is paid for by other sources, the selected landfill alternative can be built for approximately \$1,400,000. Although this summary section provides some detail for this lowest-cost scenario, the analysis in this study focuses on a stand-alone effort to construct the landfill as the community needs a solid waste solution soon. (See *Tables I-2* and *Table I-6* in *Appendix I* for further details.)

Because funding for new landfills is limited, this project has been designed with minimal construction costs as the primary design parameter. The new landfill in *Option 1* will contain a burn box inside a single, 0.6-acre cell. Ash will be pushed out of the burn box and will be placed with non-burnable waste against one of the 6-foot high berms. This cell is expected to provide eight years worth of refuse storage if a burn box is used. Once this cell is full, additional cells can be constructed adjacent to the existing berms. A gravel pad will be constructed outside of the landfill for white goods (bulky, large appliances), and salvage items, such as junk snowmachines and all-terrain vehicles (ATVs).

The Nightmute City Council selected **self-haul disposal** as the **preferred solid waste collection alternative** during a conference call with project planners on December 19, 2003. With a self-haul system, residents will be responsible for transporting their garbage to the disposal site. The City will need to perform a minimal level of operation and maintenance at the landfill, including operation of the burn box, cleaning the burn box, disposing the ash from the burn box, and spreading cover material over the ash pile. Because of these necessary responsibilities, the City will need to charge households a small utility fee, approximately \$15 per month, to cover payroll and equipment expenses. *Table 3* shows the annual operation and maintenance (O&M) cost estimate, with the suggested household user, for *Alternative #2A*.

1. Stand-Alone Burn Box Option

If funding is not readily available for new landfill construction, the Nightmute City Council will pursue smaller grants for the construction of an initial burn box as noted above in *Option 2*. The burn-box design will focus on minimal operation and maintenance expense. It will have a flat floor and gates that will allow a piece of machinery to push the ash pile directly out of the burn box. The ash will be disposed of in super sacks, and the sacks will be transported in the winter to the New Summer Dump. The grant applications for the burn box will also include funding for a small to medium-sized piece of heavy machinery (for cleaning the burn box), a supply of super sacks, and material to construct a stand for the super sacks (4-foot by 4-foot polypropylene bags). The burn box will be temporarily located on an expanded gravel pad off of the road to the City sewage lagoon. When funding becomes available for a new landfill, the burn box will be moved to the landfill site. The site for this alternative is currently leased by the Alaska Village Electric Corporation (AVEC), and an agreement with AVEC will have to be made prior to implementing this alternative. This alternative will cost approximately \$247,000.

Table 3: Annual O&M Cost Estimate with Suggested Household User Fee for Alternative #2A

OPTION	PROJECT COSTS	Household User Fee	
		Monthly Fee	Annual Fee
Landfill with Self-Haul Service	\$11,924	\$15	\$180
Landfill with Community-Haul Service	\$34,375	\$50	\$600

B. Conceptual Project Layout

See *Sheet #7* for a concept-level plan view and cross-section of a proposed landfill.

C. Project Construction Phases, Including Unit Costs of the Recommended Alternative

Landfill construction for *Option 1* will occur in the following phases listed in *Table 4*. If funding for *Option 1* is unavailable, the community will pursue implementation of *Option 2* by applying for grants to fund an incremental project. *Phase 1* of *Option 2* will include procurement and mobilization, pad development, and burn box installation. When funding is available, *Phase 2* will include the design and construction of the new landfill.

Table 4: Construction Phases & Costs for Alternative #2A

OPTION	PHASE	TASKS	UNIT COST	TOTAL COST	SOURCE	
1	1	Engineering and permitting	\$204,325	\$2,247,575	Table I-2	
		Construction management	\$280,750			
		Procurement and mobilization	\$825,000			
		Access road construction	\$500,000			
		Pad development	\$80,000			
		Berm development	\$40,000			
		Storage building construction	\$175,000			
		Burn box installation	\$82,500			
	Waste disposal from dumpsites	\$60,000				
2	1	Engineering and permitting	\$4,350	\$246,600	Table I-5	
		Construction management	\$24,750			
		Procurement and mobilization	\$80,000			
		Pad development	\$40,000			
		Burn box installation with hopper	\$97,500			
	2	2	Engineering and permitting	\$186,450	\$2,050,950	Table I-6
			Construction management	\$264,500		
			Procurement and mobilization	\$745,000		
			Access road construction	\$500,000		
			Pad development	\$80,000		
Berm development			\$40,000			
	Storage building construction	\$175,000				
	Waste disposal from dumpsites	\$60,000				
			\$2,297,550			

D. Construction & O&M Cost Estimates with Suggested User Fee by Alternative

Table 5 summarizes the projected costs and user fees for the four alternatives considered in this study. *Table 6* shows differences between *Option 1* and *Option 2* of the selected alternative, *Alternative #2A*.

Table 5: Cost Estimates with Suggested User Fees for All Landfill Alternatives

ITEM	ALTERNATIVE				SOURCE
	#1	#2A	#2B	#3	
Design / Construction Costs	\$1,479,000	\$2,247,575	\$2,005,575	\$1,430,825	Tables I-1 thru I-4
Self-Haul: Operation / Maintenance Costs	\$11,924	\$11,924	\$11,924	\$11,924	Table I-9
Self-Haul: Household User Fee	\$15 per month	\$15 per month	\$15 per month	\$15 per month	Appendix J
Community Haul: Operation / Maintenance Costs	\$34,375	\$34,375	\$34,375	\$34,375	Table I-10
Community Haul: Household User Fee	\$50 per month	\$50 per month	\$50 per month	\$50 per month	Section VIII G B

User fees support the O&M costs of the utility. For all alternatives, an Operator will need to push cover material on the working face of the garbage pile every week. In order to cover the Operator's wages and miscellaneous equipment expenses, a \$15 monthly charge will be billed to each household.

Table 6: Cost Estimate with Suggested User Fees for Alternative #2A

ITEM	OPTION 1	OPTION 2		SOURCE
		PHASE 1	PHASE 2	
		Burn Box	Landfill	
Design / Construction Costs	\$2,247,575	\$246,600	\$2,050,950	Tables I-2, I-5, I-6
Self-Haul: Operation / Maintenance Costs	\$11,924	\$11,924	\$11,924	Table I-9
Self-Haul: Household User Fee	\$15 per month	\$15 per month	\$11,924	Appendix J
Community Haul: Operation / Maintenance Costs	\$34,375	\$34,375	\$34,375	Table I-10
Community Haul: Household User Fee	\$50 per month	\$60	\$60	Section VIII G B

For *Phase 1* of *Option 2*, the Operator will be burning the community's solid waste as well as bagging and transporting the ash to the community disposal site until funds for a new landfill are available. The assumption is being made that the Operator's labor cost for *Option 2* will be nearly equivalent to the labor cost for *Option 1*. The O&M costs for both options of *Alternative #2A* and the other three landfill alternatives are considered equal for a self-haul utility.

E. Business Plan Summary

The City Council will provide the City Administrator with the responsibility and authority to manage the community solid waste utility. Annual revenue, estimated at \$13,260, will be generated from monthly user fees for a self-haul disposal service. Because the utility will be self-haul, operation and maintenance expenses will be limited to covering the trash with soil on a weekly basis, operating the burn box, and maintaining equipment. The annual operation and maintenance expense estimate runs \$8,420, and the annual repair and replacement (R&R) expense estimate for equipment is \$1,800, for a total annual expense of \$10,220. An annual profit margin of \$3,040, or 30 percent, will be generated by the utility. The revenue will be placed in a reserve account to cover any future, unforeseen expenses. The equivalent annual capital cost, or EACC, which is based on a life-cycle of eight years, runs \$333,833. The equivalent annual life cycle cost, or EALCC, is \$344,053. *Table 7* and *Table 8* below provide summary information from the *Solid Waste Utility Business Plan* in *Appendix J*.

Table 7: Summary of Proposed Total Revenue & Expenses / Rate of Return

Revenue	
Residential User Fees (54 customers @ \$15/month)	\$9,720
Government Offices (3 @ \$15 per month)	\$540
Commercial: (5 @ \$35 per month)	\$3,000
Annualized Non-Local Capital Replacement Subsidy	\$333,833
	\$347,093
Expenses / Rate of Return	
Annualized Operations and Maintenance Costs	\$8,420
Repair and Replacement Fund	\$1,800
Equivalent Annual Replacement Costs	\$333,833
Rate of Return	\$3,040
	\$347,093

Table 8: Cost Summary for Selected Solid Waste Alternative

COST TYPE		ALTERNATIVE #2A (SELECTED)	SOURCE
CAPITAL COSTS - INITIAL		\$2,247,575	Appendix I
CAPITAL COSTS - ANNUAL	Major Equipment R&R	\$1,800	Appendix J
	EACC (8-year life)	\$333,833	Appendix J
O&M COSTS - ANNUAL		\$8,420	Appendix I
EALCC (EACC + O&M + R&R)		\$344,053	Appendix J

F. Summary of Report Recommendations

Throughout this report a number of recommendations are made, which are summarized below.

1. New Solid Waste Facility Design

- **Recommendation #1:** Any new solid waste facility should be located on the same side of the Toksook River as Toksook Mountain (borrow source) and should include development of a borrow source and access road that connects the source to the landfill. A new landfill should include an area to stockpile cover material. A front-end loader needs to be available to spread the cover material on a weekly basis.
- **Recommendation #4:** In order to reduce hazardous wildlife attractants, this report recommends using a burn box in conjunction with a new landfill.
- **Recommendation #5:** If the hillside alternative has the highest winds of the alternatives but has been identified as the best location, mitigative actions, such as fences and/or burning times based on wind-patterns to reduce smoke in the community, should be developed.
- **Recommendation #17:** During a community meeting on May 5, 2004, the community selected the two hillside sites for a landfill. These sites are referred to as ***Alternative #2A*** and ***Alternative #2B***. The two areas are located on ***Sheet #5***. Because of the poor soils along the hillside, a geotechnical investigation needs to be conducted during the design phase in order to locate the most cost-effective site.
- **Recommendation #21:** If only limited funding is available, a stand-alone burn box should be set-up off of the road to the sewage lagoon. Any grant application for this phase should include funds for a dedicated piece of equipment, pad development, and a supply of super sacks. Ash will be emptied into the super sacks, and the sacks will be moved to the New Summer Dump during the winter.

2. Community Environmental Health

- **Recommendation #2:** The community should consider undertaking an extensive water sampling effort to investigate the quality of water in the Toksook River, a major source of their subsistence livelihood.
- **Recommendation #3:** If construction funding for a new landfill becomes available, several remedial activities for the existing dumpsites are recommended. The trash from the Summer Dump, the New Summer Dump, the Winter Dump, and the other scattered dumpsites in the community should be consolidated and moved to the proposed new landfill facility for proper disposal.
- **Recommendation #7:** As part of a landfill construction project, the village should be swept clean of scattered waste sites. Establishing a local solid waste utility, with a weekly haul service throughout the year, will help reduce the occurrence of additional scattered waste sites.

3. Future Grant Applications

- **Recommendation #6:** When State and Federal agencies review applications for infrastructure improvements, community involvement and commitment are often important factors in the scoring process. From the improvements made at Nightmute's Summer Dump, the community has clearly demonstrated involvement and commitment. Efforts to obtain funding for the construction of a new landfill should emphasize this success, demonstrating Nightmute's commitment to improving solid waste management.

4. Community Solid Waste Management

- **Recommendation #8:** New construction projects should contain provisions for solid waste management. If a large structure is scheduled for demolition, a project landfill may need to be constructed. If construction or demolition projects use the community landfill, they should be required to pay a commercial rate for disposal.

- **Recommendation #9:** No potentially hazardous materials should be disposed of in the landfill. Contaminated wastes should be treated on-site, contained, or shipped off-site. Any questions about which materials should be accepted at the City solid waste site should be directed to the Alaska Department of Environmental Conservation Solid Waste Program in Anchorage (see contact information in *Appendix E.*)
- **Recommendation #10:** A used oil burner should only be purchased if the local utility can afford its high operation and maintenance costs.
- **Recommendation #11:** In order to reduce costs, a minimum of 20 units should be accumulated and stored, and be ready for Freon collection. Barge service companies sometimes offer to transport hazardous waste free-of-charge for remote villages, as long as the waste is properly containerized, and the shipper has arranged for transport at the dock in Anchorage.
- **Recommendation #12:** Used antifreeze should be stored in a contained and secure hazardous waste storage area. The antifreeze should be consolidated into plastic over-packs or bung-type drums, and properly labeled. Antifreeze must be kept separate from other waste streams as the cost of disposal increases significantly when it becomes mixed with another waste.
- **Recommendation #13:** In order to properly recycle antifreeze off-site, Nightmute should store antifreeze in a lined collection area and ship the containers during a regional collection day. Shipping from the dock to a recycling center or landfill will need to be arranged through a private courier or recycler.
- **Recommendation #14:** To reduce the toxicity of antifreeze, Nightmute should consider alternatives to ethylene-glycol-based antifreeze. Even with the use of an alternative antifreeze product such as propylene glycol, due to the potential for the used product to be contaminated with heavy metals or used oil or fuel, the used product should be shipped to a treatment facility in Anchorage.
- **Recommendation #15:** If Nightmute is interested in disposing their solid waste at an off-site location, regional pickup should be considered. Considering that few landfills are currently being funded, regional pickup may be a feasible option and should be closely evaluated if the road to Toksook Bay is constructed.
- **Recommendation #16:** The following items should be separated and shipped out of the community for recycling and disposal: paints, contaminated fuels, antifreeze, and solvents. This waste should be properly stored in a secure facility near the barge landing, labeled, and back-hauled to an environmental services company in Anchorage or Fairbanks.
- **Recommendation #18:** All construction projects should be required to pay the City to use the landfill. If a large demolition project is planned, such as the power plant or the school, the project may need to construct its own landfill or monofill instead of filling up the City's landfill.
- **Recommendation #19:** While Nightmute currently recycles lead-acid batteries, this program should be expanded to include paint thinners, varnishes, paints, cleaning products, and antifreeze. The hazardous waste can be stored in the same building at the barge landing that is currently holding the lead-acid batteries.
- **Recommendation #20:** Source reduction should be the foundation of any solid waste program and begins with the choices consumers make when purchasing goods. Residents should be encouraged to buy items that contain minimal packaging and to buy goods in bulk. Residents should also be encouraged to use tote bags instead of plastic store bags.

II. INTRODUCTION

A. Definition

A solid waste management plan / feasibility study is a discussion of the comprehensive waste management system in a community that includes characterization, transport, storage, treatment, and disposal options.

B. Funding Source for this Study

On May 12, 2003, *Summit Consulting Services, Inc.*, was retained by the City of Nightmute, Alaska, by way of Amendment #5 to the contract for professional services (signed July 1, 1996), to provide an engineering study for a new solid waste site, and a separate study for a new washeteria and a school wastewater disposal area. The financial resources available for this contract were \$175,000. This report addresses solid waste only and is funded through *Alaska House Bill 337*. The washeteria and school wastewater lagoon have been addressed in a separate document, the *City of Nightmute Water and Sewer Improvements Feasibility Study*. The Environmental Protection Agency (EPA), the State of Alaska, and the Lower Kuskokwim School District contributed funding for this project. The State of Alaska Village Safe Water (VSW) Program administers this project funding.

III. NEED FOR THE PROJECT

A. Health & Safety Concerns

Currently, there is no facility or utility management for the safe disposal of solid waste in Nightmute. Solid waste is disposed of at several locations near the village, with most of the waste being deposited at the New Summer Dump. This dump is located on the southern bank of the Toksook River, across from the village school.

The Summer Dump, which is located near the airport, is considered a hazardous wildlife attractant by the Federal Aviation Administration (FAA). (*Sheet #6* shows the proximity of the airport to the existing dumpsites and the alternative locations for a new landfill.) According to FAA statistics, gulls and waterfowl cause the most strikes to aircraft in the United States. (FAA, ND) During a site visit in June 2003, *Summit* staff observed over 60 adult gulls at the Summer Dump.

Although the FAA recommends that solid waste disposal facilities be at least 10,000 feet away from airports serving jet and turbine-type aircraft and 5,000 feet from airports serving piston-type aircraft, the Summer Dump is currently located less than 4,700 feet from the existing airport. *Caravans* and *Skyvans* are the largest aircraft that serve Nightmute, and these planes are considered piston-type planes. The FAA is currently planning to expand the length of the Nightmute Airport to 3,200 feet. Once this improvement is in place, the recommended separation distance between the proposed new solid waste disposal facility and the expanded airport will be less than 4,300 feet.



Figure 1: Gulls above Nightmute's Summer Dump. Birds represent a significant threat to air traffic, especially if they roost near an airport. The dumpsites in Nightmute do not meet current FAA requirements for separation distances between airports and landfills.

Putrescible solid waste can also be an attractant for disease vectors such as insects, rodents, and birds unless mitigative action is taken. The Alaska Department of Environmental Conservation (ADEC) regulates the disposal and storage of solid waste in order to protect public health and the environment. ADEC regulations for Class III Landfills, found in *Chapter 18* of the *Alaska Administrative Code (AAC)* require grading cover material over inactive portions of a landfill. (ADEC, 2003) *18 AAC 60.2423* states that 12 inches of fresh cover material must be placed over the inactive area within seven days of waste deposition, and the soil must be graded to prevent water from ponding.

Most of the communities in the lower Yukon-Kuskokwim region lack cover at their dumps and landfills because suitable borrow material is unavailable in the region. Although Nightmute's dumpsites also lack cover material, the village is an exception to this geographical trend because there are several gravel pits located behind the community. Unfortunately, the borrow material sources are located on the opposite side of the Toksook River from the dumps, and the City has no practical means to haul material across the river, stockpile it, and/or move it with heavy machinery. Consequently, the dumpsites are fully exposed to the elements and potential disease vectors.



Figure 2: Summer Dump before Relocation & Community Cleanup. Although cover material is unavailable at the existing dumpsites, borrow sources exist across the Toksook River. Any new landfill should be constructed on the same side of the river as the borrow source to ensure reasonable access to cover material.

Recommendation #1: Any new solid waste facility should be located on the same side of the Toksook River as Toksook Mountain (borrow source) and should include development of a borrow source and access road that connects the source to the landfill. A new landfill should include an area to stockpile cover material. A front-end loader needs to be available to spread the cover material on a weekly basis.

B. Environmental Concerns

The main dumpsite, the Summer Dump was, until recently, located on the southern bank of the Toksook River and across from the school. Trash had been deposited on the riverbank, and as the bank eroded, trash sloughed directly into the river. During a site visit in June 2003, hazardous materials such as marine batteries, fire extinguishers, computer monitors, televisions, and animal carcasses were observed at this site.

In addition to the Summer Dump, there are several other dumpsites located near the Toksook River that are no longer in use, but continue to pose a threat to the local environment. The most significant site, the Winter Dump, is the original dumpsite for the village. It is located in a tundra pond that drains through a short slough to the Toksook River.



Figure 3: Summer Dump Adjacent to the Toksook River. Prior to the recent project to move the Summer Dump, the dumpsite was located on an eroding bank of the Toksook River.

The Toksook River has been used historically for subsistence purposes, and today residents continue to fish the river. Jimmy George, an IGAP Environmental Coordinator for Nightmute, reported 15 species of fish inhabit the river, including king, red, silver, and chum salmon; four species of whitefish; two species of trout; burbot; needlenose; and blackfish. (George, 2003) Local residents are very concerned about the dumpsites and the impact these sites may be having on their health and/or subsistence foods.

Preliminary water testing of the Toksook River indicates high levels of some contaminants. On May 14, 2003, the IGAP Environmental Coordinator collected two water samples, and VSW had the samples analyzed at an Anchorage laboratory for mercury, lead, and cadmium (see results in *Table 9*). One sample was collected next to the Summer Dump, and the other was taken in the tundra pond that contains the Winter Dump.



Figure 4: Tundra Pond Used as the Winter Dump. The pond has been almost entirely filled in with solid waste. The waterbody drains through a slough into the Toksook River. Local residents have listed 15 species of fish that inhabit the Toksook River including king salmon, red salmon, trout, and whitefish.

Table 9: Water Testing Results for the Summer & Winter Dumps

SAMPLE LOCATION	CONTAMINANT	RESULT	ADEC MAXIMUM CONTAMINANT LEVEL FOR DRINKING WATER
Summer Dump	Mercury	Not detected	.002 ppm*
	Cadmium	1.28 ppb	5 ppb
	Lead	21.1 ppb	15 ppb**
Winter Dump Outlet	Mercury	Not detected	.002 ppm
	Cadmium	0.117 ppb	5 ppb
	Lead	0.734 ppb	15 ppb**

* 1 mg/l = 1 ppm, 1 ug/l = 1 ppb; ** EPA National Primary Drinking Water Standard

These preliminary results indicate that the Summer Dump and the Winter Dump may have been contaminating the Toksook River with cadmium and lead. Sources of lead in the environment include marine batteries, old plumbing fixtures and piping, electrical solder, ink pigments, and stabilizers in plastics. Cadmium is found in batteries, plastics, pigments, metal coatings, and some metal alloys, and food and smoking can also be sources of human cadmium exposure.

These two metals have the potential to negatively impact the health status of a community. Low levels of exposure to lead may interfere with red blood cell chemistry; delays in physical and mental development in infants and children; slight deficits in attention span, hearing and learning abilities in children; and slight increases in the blood pressure of some adults. Because of these concerns, the EPA has set a standard of 15 parts per billion (ppb) for public drinking water systems that serve fewer than 50,000 people. High levels of cadmium exposure over a lifetime have been shown to cause kidney damage in rats and mice. The EPA set a drinking water standard for cadmium at 5 ppb.

These results do not answer the concern of the Nightmute residents: *Are contaminants from the dumpsites affecting the health of the residents or their subsistence foods?* In order to address this question, a sampling plan will need to be written and submitted to ADEC for review, and an extensive sampling effort will need to be conducted.

Recommendation #2: The community should consider undertaking an extensive water sampling effort to investigate the quality of water in the Toksook River, a major source of their subsistence livelihood.

Recommendation #3: If construction funding for a new landfill becomes available, several remedial activities for the existing dumpsites are recommended. The trash from the Summer Dump, the New Summer Dump, the Winter Dump, and the other scattered dumpsites in the community should be consolidated and moved to the proposed new landfill facility for proper disposal.

This effort will involve two phases; a summer cleanup phase and a winter transportation phase. During the first phase, a local labor crew will consolidate the trash at each site and place the trash in super sacks. The second phase will occur during the late winter or early spring when frozen ground will support heavy machinery. A front-end loader or similar piece of equipment will haul the trash to the landfill site. A preliminary cost estimate for consolidating the trash and hauling it to a new landfill has been provided in **Section IX.G.**

C. Solid Waste Facility Growth Capacity

According to the Alaska Department of Community and Economic Development (ADCED), the State Demographer has estimated the 2002 population at 224 persons. The population of Nightmute has grown at a rate of 2.8 percent per year over the past 20 years, and this rate has been used to project the future population during the design life of the project (eight years). At the end of the design life, in 2012, Nightmute is projected to have 280 residents. The average population between 2003 and 2012 is projected at 253 residents. This value has been used as the design population for this study.

It is commonly estimated that residents in western Alaska produce approximately 5 pounds of trash per person per day. At this rate, Nightmute produces approximately 461,725 pounds of trash per year, or approximately 1,153 cubic yards of solid waste per year. Over eight years Nightmute is expected to produce approximately 3,693,800 pounds of trash, or 9,235 cubic yards of trash. If the refuse is separated into burnable and non-burnable waste, the waste volume will be reduced by approximately 50 percent to 4,617 cubic yards. After including an additional 400 cubic yards from the old dumpsites, the total volume of waste after eight years is estimated at 5,519 cubic yards. This is enough trash to fill 0.6 acres of landfill space if the landfill is 6 feet deep. If the gravel pad is constructed for this cell and space for a future cell, the footprint will cover 1.5 acres. An allowance of 10 percent for cover material has been included with this estimate. Because of the minimal nature of the landfill design and the short design life, an allowance for construction and demolition waste has not been included. See *Table 10* below for a list of the design assumptions.

Table 10: Landfill Design Assumptions

PARAMETER	VALUE
Design life	8 years
Population (average during design life)	252 persons
Waste generation rate	5 pounds per person per day
Total weight	3,693,800 pounds in 8 years
In-place density	400 pounds per cubic yard
Construction and demolition waste	0 cubic yards
Volume	9,235 cubic yards
Assume 50% reduction in trash volume due to burning	4,617 cubic yards
Volume of waste from old dumpsites	400 cubic yards
Interim cover	10 percent of volume
Total Volume	5,519 cubic yards
Size of concept landfill cell (approximately 0.6 acres)	120 feet x 212 feet x 6 feet
Volume of concept landfill cell	6,653 cubic yards

D. Separation Distance from Airports

The FAA requires a 5,000-foot separation distance between airports that serve piston-type aircraft and solid waste disposal facilities. The Nightmute airport currently serves only piston-type planes.

Sheet #6 shows the 5,000-foot boundary from the airport, the existing dumpsites, and the proposed landfill alternatives. Currently, the Summer Dump, the New Summer Dump, and several old dumps are located less than 5,000 feet from the airport. These sites create a safety hazard to air navigation because they are an attractant for birds (primarily gulls).

Siting a new landfill more than 5,000 feet from the airport will meet current FAA requirements. However, it is likely that birds will continue to be attracted to the waste and will also continue to roost along the Toksook River. Floatplanes land on the Toksook River, and they will continue to be at-risk. Siting alone may not be a completely effective method for reducing hazards to air traffic.

Recommendation #4: *In order to reduce hazardous wildlife attractants, this report recommends using a burn box in conjunction with a new landfill. (See Section IX.E.)*

IV. PROJECT PLANNING AREA

A. Location & Access

Nightmute is located on Nelson Island in Western Alaska. It is approximately 18 miles east of Toksook Bay, 100 miles west of Bethel, and 510 miles west of Anchorage. Nightmute's location is shown on *Sheet #1*. The project location is listed below:

- Longitude: 60° 28' 43'' N
- Latitude: 164° 43' 34'' W
- Section 33, Township 5 North, Range 88 West, Seward Meridian

1. Airports

The Nightmute Airport is located approximately one mile east of the village. The gravel landing strip is 1,650 feet long and does not meet FAA minimum requirements for runway length. The Alaska Department of Transportation and Public Facilities (ADTPF) is currently in the planning stages to expand the runway to 3,200 feet.

2. Roads & Seasonal Roads

There are four main roads in Nightmute and three boardwalks. The airport access road, which has the legal description Tract II Parcel B, runs parallel to the Toksook River from the Chinuruk Store to the airport. Kaugia Street extends from this road west to connect the Chinuruk Store to the barge landing. At the intersection of these two roads, the road to the sewage lagoon runs south and the road to the power plant runs north. The boardwalks connect the majority of the buildings. The main boardwalk, Changtak Street, runs west to east and forks into Chufak Street and Amaralrina Street. The roads and boardwalks are shown on *Sheet #4*.

Currently, the Nightmute Traditional Council is working on the *Nelson Island Subregional Transportation Plan* with Toksook Bay, Tununak, the seasonal village of Umkumiut, and the Bureau

of Indian Affairs. This plan is investigating the feasibility of a new road that will connect the four villages and develop a harbor at Umkumiut.

The Nightmute Traditional Council is also planning a Winter Trail Marking Project to connect Nightmute to Toksook Bay. Residents also use winter trails to travel to Chefornek and Newtok. The Council also has plans for a trail-marking project to Bethel.

3. Barge Service

Northland Services, Inc. provides barge freight from Seattle and Anchorage to the Kuskokwim Bay. Freight is off-loaded to a subcontracted lighterage barge and shipped up the Toksook River. The barge off-loading area is located near the school. *Northland Services, Inc.* scheduled two barges for the 2003 season. *Yukon Fuel* delivers diesel and gasoline to Nightmute once a season, typically in August. Both freight and fuel barges experience difficulty navigating the Toksook River. Large boulders are located in the river approximately 2.5 miles downstream of the off-loading area.

B. Environmental Conditions & Resources Present

1. Climate

Nightmute has a marine climate with summer temperatures ranging from 41 to 57°F and winter temperatures typically between 6 and 24°F. Although average annual snowfall is only 43 inches, strong winds blow from the north to scour the hill behind the village and deposit snow in the community. Snow drifts greater than 10 feet deep are not uncommon. Consequently, wind deposited snow will have to be a serious consideration while planning and constructing a new landfill.

Nightmute's high winds can impact the community in other ways. Blowing trash and smoke from the future landfill and burn box are two factors that need to be consideration in site selection and project design.

Recommendation #5: If the hillside alternative has the highest winds of the alternatives but has been identified as the best location, mitigative actions, such as fences and/or burning times based on wind-patterns to reduce smoke in the community, should be developed.

2. Geology & Soil Conditions

Nightmute is located at the contact point between the folded basalt hills to the north and the flat tidal plain to the south. The hills that form the upper Toksook River catchment are a series of anticline and syncline terrain. The tidal flat is composed of interbedded marine deposits and fluvial sediments deposited by the Yukon-Kuskokwim River deltas. Additional details can be found in the trip report by Natural Resources Conservation Service (NRCS) Geologist Terril Stevenson (see *Appendix F*).

Several geotechnical reports describe the soils, especially on the flat plain where development such as the airport, road, school, and lagoon has occurred. In October 1994, Duane Miller and Associates probed the soil in four locations along the alignment of the then proposed road to the lagoon and at the lagoon. The soils were found to be fine grained, with low-to-moderate salinity, and with a temperature close to the thaw point. The salinities measured in the soil samples could depress the freezing point by approximately 0.5° F. Although no massive ice was discovered, the report advises that thaw settlement will occur where the natural ground cover is disturbed because the annual thaw depth will deepen.

In November 2003, ADTPF performed a geotechnical survey of the proposed road alignment to Toksook Bay. The test holes were located above the bluff at the base of Toksook Mountain, and test holes TH03-503 through TH03-505 are located near the proposed location for *Alternative Landfill Site #2*. The test-hole results indicate that landfill construction on the hillside could be complicated by frozen soils with high moisture contents. An analysis for moisture content at TH03-503 and from two depths at TH03-505 reported values of 350 percent, 64 percent, and 46 percent respectively. (TH03-502 and TH03-504 were not analyzed.)

3. Flood, Erosion, & Seismic Hazards

The US Army Corps of Engineers (USACE) maintains a flood information database for most Alaskan communities. The two highest floods of record occurred in 1979 and 1985. Based on local information about these events, USACE has recommended a building elevation of 93 feet. The benchmark for this datum is located on the village powerhouse (100-foot, local vertical control).

As part of this project new photography and mapping has been produced by *McClintock Land Associates, Inc.* The vertical datum used in the mapping is the National Geodetic Survey control station *Toksook* on the hill north of the community. The 100-foot, local vertical control used by the USACE corresponds to approximately 20 feet in the new mapping. The USACE recommended building elevation translates to 13 feet.

The elevations at the alternative sites are listed below:

- *Alternative #1: Meander West of Town* – 12- 14 feet
- *Alternative #2: Hillside of Toksook Mt.* – At least 80 feet
- *Alternative #3: Near Sewage Lagoon* - 12 feet
- Existing Dump – 12 feet

Based on this information, every alternative location except for *Alternative #2* is potentially at-risk of flooding. To mitigate the flood risk a 3-foot gravel pad has been included in the preliminary design for *Alternative #1* and *Alternative #3*.

If *Alternative #1* is selected by the community, a gravel trail connecting the village to the landfill will also be necessary. This trail will be constructed above the 100-year flood level to ensure year-round access to the landfill. Alternatively, the trail can be designed to withstand a 100-year flood and access to the landfill will be unavailable during a major flood event. The riverbank near *Alternative #1* is potentially at-risk from erosion, although the bank currently appears stable on the aerial photography. If erosion becomes a concern in the future, riprap can be extracted from the new gravel pit that will be developed on the bluff adjacent to the landfill site.

Nightmute is located in the least active seismic zone, Zone 1, according to the *Uniform Building Code*. (ICC, 1997) Any structures, such as an equipment storage building or solid waste storage building, must be designed to the standards for this zone.

4. Historic Sites

On August 13, 2003, a representative from *Summit Consulting Services, Inc.* conducted preliminary records research at the Alaska Department of Natural Resources (ADNR), Office of History and Archeology (OHA). The OHA files contain three records for Nightmute and the nearby vicinity. There was no record of any historic buildings or historic sites near the proposed alternatives.

Although historic sites should not interfere with the selected alternative, the State Historic Preservation Officer (SHPO) must still be consulted prior to beginning any federally-funded construction projects.

5. Endangered Species & Critical Habitats

Endangered species will be further investigated after an alternative is selected. The US Fish and Wildlife Service (USFWS) prefers to review specific projects after the concept-level plans have been created. Nightmute is located within the Yukon Delta National Wildlife Refuge, and the community is near habitat for Spectacled and Stellar's Eiders.

All of the alternative sites are located on wetlands and any new construction project will need to be reviewed by the US Army Corps of Engineers. If the total area of impact is less than five acres, the Corps will be able to issue a general permit. The review process for a general permit typically takes 30 days. However, if the total area is greater than five acres, the Corps may be required to issue an individual permit. Individual permits can take up to six months to obtain, and there is often a more extensive comment period than with general permits.

Additional environmental compliance for a new landfill may include:

- Completion of a Coastal Zone Questionnaire through the ADNR,
- Production of a Storm Water Pollution Prevention Plan for the EPA,
- Consultation with the Alaska Department of Fish and Game (in association with ADNR),
- Materials Sale Contract for the borrow pit (likely through Calista, depending on pit location)
- Determination of No Impact to Air Navigation through the FAA,
- Plans Review through the ADEC, and
- Permit to Construct and Permit to Operate through the ADEC.

C. Economy & Financial Profile

Subsistence activities are integral to the lifestyle of most residents. Many families spend the summer at Umkumiut, a fish camp located near Toksook Bay. Employment within the community is limited to the school, the two stores, the City and Village governments, and the clinic. A small commercial fishery is also available locally. During the 2003 summer, at least two fish processors were anchored in Toksook Bay.

Data from the *2000 Census* shows that 10.7 percent of the community was below the poverty level. (CGIN, 2004) The unemployment rate was 16 percent. The median household income was \$35,938.

D. Potential Growth Areas

Developed land in Nightmute can be divided into two areas, the original townsite located west of AVEC power plant, and the newer development located to the east of the power plant. The oldest portion of the community was built along a narrow strip of flat land situated between the base of Toksook Mountain and the Toksook River. The minimal amount of land available in this area is low-lying and flood-susceptible.

Most of the future growth will likely occur to the east of the power plant. In recent years, a new water treatment plant, clinic, and store have been constructed in this area. Additional growth is likely to occur along the road to the airport.

E. Power Generation & Fuel Storage Facilities

AVEC operates two, 100-kW and one, 148-kW diesel generators. Electricity is subsidized by Power Cost Equalization (PCE) and residents pay \$0.257 per kWh. Currently, AVEC is in the planning stage for a new power plant and a consolidated tank farm.

Bulk fuel storage facilities are owned and operated by *Chinuruk Inc.* The fuel storage facilities for the entire community include: four 40,400-gallon tanks owned by *Chinurak*; eleven 89,900-gallon tanks owned by AVEC; one 3,000-gallon tank owned by the Army National Guard; four 27,500-gallon tanks owned by the Kuskokwim School District; and two 1,650-gallon tanks owned by the Catholic Church. The total bulk fuel storage capacity approaches 1.27 million gallons.

F. Public Facilities & Housing

The City operates a water treatment plant and a sewage haul service. Well water is chlorinated and distributed at a watering point. Water delivery is also available to residents who are unable to haul water. The City water and wastewater utility operates this service for \$15 per haul. Because of the expense and the close proximity of the houses, this service is infrequently used. Residents generally haul their water, and there is no water utility fee. Each house is plumbed to an individual wastewater storage tank. When the tank is full, residents call the wastewater operator to pump the tank and transport the wastewater to the wastewater lagoon. The fee for this service is \$25 per haul.

Nightmute does not currently have a washeteria. Many residents travel by boat, snowmachine, or plane to Toksook Bay, approximately 18 miles to the west, to do laundry. *The Nightmute Water & Sewer Improvements Feasibility Study*, a sister study to this report, examines the feasibility of a local washeteria (see *Section II.B.*). There are showers at the school, but they are not intended for public use.

There are 54 housing units. Most of the homes are located between the base of Toksook Mountain and the Toksook River. Many of the houses are connected by a boardwalk that parallels the river. During the 2003 summer the School District constructed two new houses. Areas for future housing development are limited and may develop toward the airport.

G. Public Administration

The City government is responsible for the operation of the water and sewer utility, management of Village Safe Water projects, and community bingo. An organizational flow chart of the City's administrative positions has been included in the *Solid Waste Utility Business Plan* (see *Appendix J*).

Currently, the Nightmute Traditional Council, the Traditional Council recognized by the Bureau of Indian Affairs (BIA), is actively planning new projects. The Nightmute Traditional Council houses an office for an EPA-sponsored IGAP employee, who focuses on solid waste issues. The Nightmute Traditional Council is also actively pursuing construction of a new road to Toksook Bay and is leading a BIA-sponsored subregional transportation plan. See *Appendix E* for a comprehensive listing of community agencies and contacts.

H. Population

1. Present & Projected Population

The State Demographer in the Alaska Department of Labor and Workforce Development has estimated the 2003 population for Nightmute at 228 persons. (ADOL, 2004) The population of Nightmute has grown at a rate of 2.8 percent per year over the past 20 years, and this rate has been

used to project the future population during the design life of the project (eight years). At the end of the design life, in 2012, Nightmute is projected to have 280 residents.

2. Number of Households to be Served

A projected 54 households, the number of housing units currently in the community will be served by a new solid waste management system, and this number has been used as a design parameter.

3. Number of People Benefiting from the Project

A population of 228 residents will benefit from the project immediately. In 2012, it is estimated that approximately 280 residents will benefit from the project. The average population during the design life is 253.

V. LAND STATUS

A. Land Owners in Proposed Project Area

Land ownership was researched at ADNRR, the Bureau of Land Management (BLM), the BIA, and the City of Nightmute. See *Appendix A* for three land status maps. *Sheet #8* is a land status map of the City of Nightmute. *Sheet #9* shows the surface land status map for the vicinity around Nightmute, and *Sheet #10* is a map of the subsurface owners. The subsurface owners have claim to sand and gravel. *Sheet #10* does not describe oil and gas ownership.

1. Federal

The USFWS owns the subsurface rights below a portion of the site for *Alternative #3*. However, this alternative is considered the least feasible because it is located too close to the airport.

2. State

There are no state land claims that conflict with landfill locations for *Alternative #1*, *Alternative #2*, or *Alternative #3*.

3. Regional Land Corporations

Calista Corporation owns the subsurface rights for the gravel pits for all of the alternatives. A Materials Sale Contract must be signed with Calista before using the existing gravel pits or developing new pits.

4. Village Land Corporation

Chinuruk Inc. owns the surface rights for *Alternative #1* and *Alternative #2*, and they own part of the surface rights to *Alternative #3*.

5. City

A landfill access road for *Alternative #1* would leave the community from the City-owned property that is located on the western end of town. This property currently contains the tank farm and is identified as Lot 1, Block 3, of US Survey #4423.

6. Native Allotments

Ella Tulik owns a Native allotment adjacent to the main gravel pit behind the clinic. The most recent aerial photography shows that the pit may be encroaching on the allotment. If this pit is used, the location of the allotment and pit should be confirmed, and Calista Corporation may need to make arrangements to compensate Ella Tulik for surface disturbance.

Alternative #3 is partially located on a Native allotment that is also owned by Ella Tulik. *Alternative #1* and *Alternative #2* do not conflict with any Native allotments. Land transfer of the allotment will work if the allottee is willing to sell or lease. If *Alternative #3* were selected, purchase or lease of the allotment will be handled through the BIA Realty Office. The BIA coordinates a title status check, both land and archeological surveys, and an appraisal of the property. The BIA acknowledges that this process can be lengthy and advises potential buyers to submit their application one-and-a-half years prior to needing site control.

7. Homesteads

There are no homesteads that conflict with landfill locations for *Alternative #1*, *Alternative #2*, or *Alternative #3*.

8. Other Owners

Nanakauiak Yupik Corporation, a village corporation based in Toksook Bay, owns surface rights to a portion of the site for *Alternative #3*. (See *Appendix E* for contact information.)

9. Existing Easements

Alternative #1 will require a summer access trail or boardwalk to connect the community with the landfill. The route would start at the western edge of town, and run along the base of the mountain, parallel to the Toksook River. According to the available information, this route is located entirely on *Chinuruk Inc.* property. An easement will need to be established for the access route during the design phase of the project. *Alternative #2*, which is located off of the proposed Toksook Bay Road, is more viable financially if the road is constructed before the new landfill. Currently, the alignment for this road has not been established. *Alternative #3* is located near the City's wastewater lagoon, which already has an access road although the right-of-way has not been recorded. This alternative will require construction of a short spur road. If this alternative is developed, right-of-ways will need to be established for both the existing road and the new road to the landfill.

B. Traditional Use Areas

A winter trail runs through the site for *Alternative #1*. Residents have expressed concern about this trail, and it was one of the factors why they favored a landfill on the hillside.

C. Potential Land Conflicts

Alternative #3 and *Phase I, Option 2* of *Alternative #2A* will be located on property that is currently leased by AVEC. AVEC intends to purchase the property from *Chinuruk Inc.*, the local village corporation. If either of these alternatives is selected, the property will need to be purchased from AVEC or *Chinuruk Inc.* *Alternative #3* will require purchasing property from three distinct owners: AVEC or *Chinuruk Inc.*, a Native allotment, and *Nanakauiak Yupik Corporation*. The BIA has advised that the purchase of Native allotments can take up to one-and-a-half years to complete. *Alternative #3* is also complicated because the USFWS owns the subsurface rights to a portion of the property below the site. During correspondence, this agency has expressed concern about having a landfill above their subsurface

property. *Alternative #1* and *Alternative #2* will be located on land that is owned by the local village corporation, *Chinuruk Inc. Calista Corporation* owns the subsurface rights for the gravel pits that will need to be developed for these alternatives. *Calista* will need to issue a Material Sale Agreement prior to construction.

D. Proposed Solutions to Land Conflicts

Alternative #3 is the least desirable alternative because it is too close to the airport. There are no apparent land conflicts with *Alternative #1* and *Alternative #2*. If a new landfill is the selected alternative, and funding is eventually obtained, the design scope of work will need to include property ownership research by a licensed professional land surveyor and easements will need to be obtained for any access roads or boardwalks.

VI. EXISTING SOLID WASTE FACILITIES & PLANNING CONDITIONS

A. Project Planning Area Map

Please refer to *Sheet #5*, which shows the alternative landfill sites, and *Sheet #6*, which shows the existing dumpsites.

B. History of Solid Waste Improvements

Trash has historically been dumped in several locations along the southern bank of the Toksook River. During the 2002–2003 winter, the community decided to close the Winter Dump, which was located in a tundra pond. Announcements were made during community meetings and signs were erected at the site to inform residents that the Winter Dump was permanently closed. Correspondence with the current mayor and IGAP Environmental Coordinator, Jimmy George, revealed that Nightmute has effectively closed the use of the dump, even though funding has not been obtained to cap the site. When a new landfill is constructed, the project will need to include funding to close both this site and the other dumpsites in accordance with ADEC regulations.

Additional improvements were recently made to the Summer Dump in July 2003. The ADCED, EPA, and the community of Nightmute cooperatively funded a project, of about \$30,000, to move the Summer Dump away from the eroding bank of the Toksook River. The Village organized and managed the project, and local residents were hired to bag and move the waste, clean the burn box, erect fences, and build a boardwalk from the riverbank to the new dumpsite. To address the problem of people dumping trash along the riverside, fences were erected along the riverbank to funnel people toward the new dumpsite.

Recommendation #6: *When State and Federal agencies review applications for infrastructure improvements, community involvement and commitment are often important factors in the scoring*

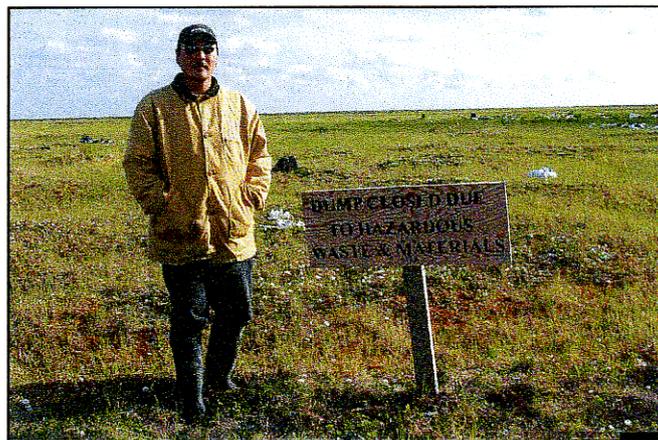


Figure 5: Winter Dump Closure. IGAP Environmental Coordinator Jimmy George stands next to a sign used to close the Winter Dump.

process. From the improvements made at Nightmute's Summer Dump, the community has clearly demonstrated involvement and commitment. Efforts to obtain funding for the construction of a new landfill should emphasize this success, demonstrating Nightmute's commitment to improving solid waste management.



Figure 6: Relocation of Summer Dump. Photographs were taken after the community moved the Summer Dump away from the Toksook River. Although Nightmute still needs a permitted landfill, this project made a significant short-term improvement to the local solid waste problem.

C. Condition of Facilities

1. Winter Dumpsite

The Winter Dump has been closed by the community, although funding has not become available to close the site according to ADEC regulations. The site, which is located within a tundra pond, has nearly been filled with waste. The surface water is stained orange, likely from the oxidization of iron in tin cans. It is also possible that hydrocarbons, heavy metals, and other pollutants are present in the water.

To formally close dumpsites, ADEC typically requires covering the site with 2 feet of clean fill. The first 18 inches need to have a low permeability (silt) and to be compacted and graded to a 2-4 percent slope. The top 6 inches must be able to support plant growth. The ADEC considers tundra-pond dumpsites as atypical sites, and closure is often handled on a case-by-case basis.

A closure plan was verbally presented to Jennifer Donnell of the ADEC Solid Waste Program on November 11, 2003. ADEC will make a decision on the closure plan during the design phase of this landfill. The proposed closure of the Winter Dump will involve removing as much of the solid waste as possible and placing it in the new, proposed landfill. During the winter, a 3-foot lift of fill will be placed on top of the ice. As the Winter Dump thaws, the site will be covered by clean material, and the remaining trash or water will be contained by the imported soil. Assuming that the tundra pond is approximately 2.2 acres in area and that material will cost \$50 per cubic yard to excavate, transport, and place, this closure plan will cost approximately \$527,550. (See *Table I-8* in *Appendix I* for a preliminary cost estimate for capping the Winter Dump.)



Figure 7: The Winter Dump from Two Perspectives (aerial and ground-level views). The original tundra pond is nearly filled with trash. Nightmute officially closed the Winter Dump during the winter of 2002 - 2003. Part of a new landfill project should include removing waste from this site and disposing of it in the new land fill. The site should then be capped and closed according to ADEC regulations.

2. Summer Dumpsite

The Summer Dump was relocated several hundred feet away from the Toksook River in July 2003. Currently, all other dumpsites are closed to residents, and this site is the only location where solid waste can be disposed. This site is locally referred to as the New Summer Dump. This dump includes a boardwalk to the Toksook River and fencing along both the river and the boardwalk. An inexpensive burn box, constructed from a used, 5,000-gallon fuel storage tank, is located near the dump. The site is separated from the community by the Toksook River, and cover material is unavailable. A new landfill construction project needs to include removing the waste from this site, consolidating the waste in one location, and closing the site according to ADEC regulations.

3. Other Dumpsites

During freeze-up and break-up, residents are unable to cross the Toksook River to dispose of their trash at the existing dumpsites. Small piles of trash have been observed at the barge landing, in several of the gravel pits, near the school burn box, along the road to the sewage lagoon, and along the Toksook River, approximately 800 feet southeast of the City sewage lagoon. (**Figure 8** shows a litter site.) This unsightly dumping will be reduced by establishing a local solid waste utility with a weekly haul service.



Figure 8: Community Litter Site. The existing solid waste dumps are separated from the community by the river and are inaccessible during freeze-up and break-up. Consequently, litter sites, such as this one, are scattered around the village.

Recommendation #7: As part of a landfill construction project, the village should be swept clean of scattered waste sites. Establishing a local solid waste utility, with a weekly haul service throughout the year, will help reduce the occurrence of additional scattered waste sites.

D. Financial Status of Operating Facilities

Currently, there is no solid waste utility, service fee, or operation and maintenance.

VII. COMMUNITY CAPACITY

The term *community capacity* is used to describe how successful a community is at managing its existing utilities and the resources and technical ability that community has to *manage, finance* and *support* adding new utilities or public facilities such as a landfill or a washeteria. An understanding of community capacity helps funding agencies decide whether or not a village can operate and maintain new infrastructure. Communities with strong capacity (competent management, sound financial standing and practices, and technically trained staff) are more likely to receive funding for projects.

Management capacity is the community's ability to administer their utilities. Communities with strong management capacity have a business structure, clearly defined job positions, an active policymaking body, and appropriate rules and regulations. Communities with strong financial capacity maintain a balanced budget, collect user fees, pay bills on time, and regularly submit financial reports to the policymaking body. Communities with strong technical capacity have trained employees who possess the technical skills and certification necessary for fulfilling their job descriptions, and operating and maintaining the utility.

Like many small villages, the City of Nightmute has experienced managerial and financial difficulties in the past. However, it appears that the City is currently at a turning point with new management and new financial policies. In their first quarterly report for fiscal year 2004, the Rural Utility Business Advisor (RUBA) frequently commented that the new management in Nightmute is actively implementing changes to improve its administration. (ADCED, 2004) In this report, RUBA stated that the City of Nightmute Bookkeeper is correcting old payroll and other accounting mistakes, preparing quarterly reports, and requesting additional job training. The report also states that the City Administrator is conserving revenue and has restricted spending in order to balance the utility budget. (See *Appendix C* for the complete report.) The following sections will describe Nightmute's managerial, financial, and technical capacity in greater detail.

A. Management Status

The City of Nightmute has seven Council Members including a Mayor, Vice-Mayor, Secretary, and Treasurer. The City Council meets twice a month and is responsible for the day-to-day operations of the City. The City Council sets the rates and policy for the flush-tank-and-haul system (FTHS) utility. Mayor Jimmy George, who is also an IGAP Environmental Coordinator, oversees City operations and employees. City Administrator Paul Joe carries out the duties set forth by the City Council and applies for grants, produces financial statements, and monitors the budget. City Clerk Denise Martin supports the City Administrator in these efforts. Bookkeeper Elizabeth Joe is responsible for tracking the City revenue and expenses. *Appendix E* contains a comprehensive list of City Council Members and City employees. *Appendix J* contains an organizational chart (see *page 3* of the *Solid Waste Utility Business Plan*).

B. Financial Status

Separate budgets are prepared for the City operations and the FTHS utility. The Bookkeeper produces monthly financial statements for the City Council and the Administrator. The City provides two services that generate revenue: the FTHS utility and water delivery. *Table 11* shows the current rates for these services. Residents and public facilities pay the same rate.

Table 11: Current User Fees for City of Nightmute Services

Service	Quantity	Cost
Water Delivery	100 gallons per delivery	\$15 per delivery
FTHS Service	100 gallons per haul	\$25 per haul
Residential FTHS Repairs	Labor	\$15 per hour
	Parts	Actual cost

The City Administrator mails billings to customers for water delivery and sewage haul services based on each work order turned in by the Operator following completion of service. Payments received are deposited into the City of Nightmute FTHS bank account by the Bookkeeper. According to the City Administrator, 75 percent of the bills are paid on time. The City's policy for enforcing payment is to stop service when an outstanding bill reaches \$200. Service will not resume until the bill has been reduced to \$100. All checks for expense payments of any kind must be approved by the City Council before release. Two signatures are required for each check, and four of the Council Members have check signing authority. Recently, the City has transitioned from a hard-copy bookkeeping format to the use of *Microsoft Excel* for all revenue / expense tracking and budget management activities. In addition, there are no past tax liabilities.

C. Operation & Maintenance Status

The City's two water system operators have Operator-in-Training (OIT) level certification. George Joe is OIT-certified for both water treatment and distribution, and Brian Bosco is certified for water distribution. (ADEC, 2004) Foster Wallace is the wastewater operator for the FTHS. Several O&M deficiencies were noted by RUBA in a Fall 2003 Quarterly Report. (ADCED, 2003) These deficiencies include:

- Lack of a preventative maintenance plan for the existing utilities;
- No monthly O&M reports provided to City Administrator;
- Utility operation below the level-of-service proposed; and
- Lack of a critical, spare-parts list.

VIII. WASTESTREAM SOURCE & CHARACTERIZATION

A solid waste management plan / feasibility study must identify where waste is generated in a community (residential, commercial, industrial or other sources) and what types of wastes are produced by the community (paper, plastics, scrap metal, hazardous materials, etc). Although waste characterization data specific to Nightmute is unavailable, reference data can be used. The ADEC authorizes the use of reference data in the *Solid Waste Disposal Regulations, 18 AAC 60.205 (h)(3)*.

Cold Regions Utility Monograph and *Integrated Solid Waste Management, Engineering Principles and Management Issues* are both regularly accepted sources on Alaskan infrastructure and solid waste management. (Smith et al., 1996) (Tchobanoglous et al., 1993) Data from these sources has been compiled in **Table 12** below.

Table 12: Arctic Rural Village Solid Waste Composition (Uncompacted)

WASTE COMPONENT	MASS (lbs per yd ³)	PERCENT OF COMPONENT	MASS OF COMPONENT (lbs per yd ³)	PERCENT OF COMPONENT
	PER CUBIC YARD OF WASTE			
	*Typical	**Average	Average	**Range
Food	490	19.6	96	21.4 to 15.9
Cardboard	85	10.9	9.3	14.4 to 8.6
Newsprint	150	2.1	3.2	6.0 to 0.3
Other Paper Products	150	15.3	23	18.5 to 10.2
Cans	150	4.8	7.2	6.7 to 2.5
Other Metal Products	540	5.5	29.7	7.4 to 3.9
Plastic, Rubber, Leather	200	12.2	24.4	14.3 to 8.8
Glass, Ceramics	330	4.1	13.5	6.5 to 1.7
Textiles	110	3.7	4.07	4.4 to 2.8
Wood	400	11.3	45.2	20.0 to 4.5
Dirt	810	3.8	30.8	4.8 to 2.5
Diapers	300	6.7	20.1	11.6 to 3.5
Average Bulk Density	310			

*Integrated Solid Waste Management; **Cold Regions Utilities Monograph

According to the information provided in *Table 12*, the largest components of solid waste in northern communities are food, other paper products, plastics, rubber and leather, and wood. However, the solid waste in Nightmute is probably slightly different from this reference information. Experience in villages similar to Nightmute has shown that cardboard and other packaging products constitute a large percentage of solid waste because of the high volume of air freight that is delivered to the villages. Additionally, large salvage items and white goods (appliances such as freezers, washing machines, etc.) are bulky and can fill large volumes of landfill space. In general, however, the values listed above are likely to be reasonably accurate for Nightmute.

The various sources of solid waste have been listed below. Much of the information for this section was derived from the ADCED, from conversations with community members, and from experience in similar Alaskan Villages.

A. Households

- **Source:** Nightmute has 54 housing units and 47 occupied households with a total population of 224 residents.
- **Characterization:** Typically, households dispose of paper, cardboard, plastic, packaging materials, cans, food scraps, subsistence waste, and household hazardous waste (paints, pesticides, solvents, and batteries). Household also dispose of fishnets, appliances, ATVs, snowmachines, and other bulk items.

B. Schools, Clinics & Institutions

- **Source:** The **Nightmute School** provides instruction for kindergarten through 12th grade. Annual enrollment averages 67 students and five teachers. The newly constructed **Nightmute Clinic** has

one health aide, one clerk, and one traveling health aide, who regularly visits the clinic. A traveling doctor and dentist visit the town annually. The **City of Nightmute** has seven employees and maintains the City Administration Building and the Community Hall. The **Traditional Council** employs six people and maintains the Tribal Office Building.

- **Characterization:** This waste stream is composed primarily of paper, cardboard, packaging materials, plastic and food scraps. Medical waste from the clinic is safely packaged and sent to Bethel for disposal. Other wastes include paper, cardboard and packaging. The City and Native Corporation governments produce mostly paper, cardboard, packaging, plastic, computer equipment, and small amounts of hazardous waste such as used oil, batteries, paints, solvents.

C. Commercial Operations

- **Source:** Commercial activities in the community include: two village stores, commercial fishing, trapping, and artwork and crafts.
- **Characterization:** These operations produce paper, plastic, cans, packaging, fish netting, waste oil, paints, solvents, lead-acid batteries, and household hazardous waste. Fish remains are usually disposed of at sea or in the river.

D. Power Generating Facilities & Fuel Facilities

1. Power Generating Facilities

- **Source:** The Alaska Village Electric Corporation generates power for Nightmute. Electricity is produced by two 100-kW and one 148-kW diesel generator.
- **Characterization:** Waste from the power facility includes used oil, absorbent pads, oily rags, and solvents.

2. Fuel Facilities

- **Source:** The *Chinuruk Inc. Store* has 40,400 gallons of heating oil. AVEC has 89,900 gallons of heating oil. Army National Guard has 3,000 gallons. Lower Kuskokwim Schools have 27,500 gallons of heating oil, and the local Catholic Church has 1,650-gallons of heating oil.
- **Characterization:** Waste from the fuel facility may include petroleum-contaminated soils, absorbent pads, scrap metal from salvaged tanks, and used diesel. The proposed AVEC power facility will include a consolidated tank farm, and there will be a large quantity of bulk steel when the old tanks are demolished.

E. Transportation Activities

- **Source:** Existing transportation includes the state-owned airport, trails, boardwalks, and dirt roads. A road to Toksook Bay (and eventually Tununak and Umkumiut) is currently being surveyed. If this road is constructed, local transportation will change. As a result of the road, more scrap vehicles, used oil, antifreeze, and other hazardous fluids will need to be disposed.
- **Characterization:** Waste from existing and future transportation activities includes salvaged boats, ATVs, and snowmachines; waste oil; lead-acid batteries; tires; and petroleum-contaminated soil.

F. Vessel & Marine Activities

- **Source:** Marine activities include barge freight, commercial fishing, and subsistence.

- **Characterization:** These activities produce waste such as wooden pallets, dunnage, shrink wrap, visqueen and other packaging materials. (Commercial fishing and subsistence are addressed in related sections of this report.)

G. Water & Wastewater Treatment

1. Water Treatment

- **Source:** Nightmute's treated water system includes a well and a water treatment plant with chlorination and public water-point distribution activities.
- **Characterization:** This facility produces a minimal amount of miscellaneous waste such as packaging material.

2. Wastewater Treatment

- **Source:** The City provides sewage disposal with a FTWS. The sewage is hauled by the City to a facultative lagoon. The City utility system has 37 residential units, 5 commercial/residential, and 6 commercial units. The Nightmute School has its own facultative lagoon.
- **Characterization:** Eventually, the sewage lagoon will begin to fill in with sewage sludge. There are several methods for either treating or disposing sewage sludge including overland treatment, disposal in a landfill, and disposal in a monofill. Although a monofill could be constructed in a new landfill, it may be more cost-effective to create a monofill in one of the exhausted gravel pits.

3. Construction & Demolition Activities

Construction Activities

- **Source:** Residential, municipal, tribal, and commercial construction. Potential future construction projects may include a new AVEC power plant and consolidated tank farm, new homes, a net loft, and a new washeteria.
- **Characterization:** Non-burnable construction waste includes insulation, sheetrock, piping, scrap metal, equipment parts, wire, hardware, and glass.

Demolition Activities

- **Source:** Demolition activities could encompass old buildings, homes, tank farms, and utilities.
- **Characterization:** Demolition can produce a staggering amount of solid waste and can shorten the useful life of a landfill. Additionally, some of the waste may contain contaminants such as asbestos, polychlorinated biphenyls (PCBs), and fuel-contaminated soil.

Recommendation #8: New construction projects should contain provisions for solid waste management. If a large structure is scheduled for demolition, a project landfill may need to be constructed. If construction or demolition projects use the community landfill, they should be required to pay a commercial rate for disposal.

Recommendation #9: No potentially hazardous materials should be disposed of in the landfill. Contaminated wastes should be treated on-site, contained, or shipped off-site. Any questions about which materials should be accepted at the City solid waste site should be directed to the ADEC Solid Waste Program in Anchorage (see Appendix E).

4. Subsistence Activity Waste Products

- **Source:** Nightmute residents indicated that most subsistence waste is disposed of in the river.

5. Household Hazardous Waste

- **Source:** Household hazardous wastes are typically from residential sources.
- **Characterization:** Household hazardous wastes consist of solvents, latex paints, oil-based paints, paint thinners, herbicides, and pesticides.

IX. SOLID WASTE MANAGEMENT ALTERNATIVES

A. Waste Source Reduction

One of the major goals of any solid waste management program is to implement a plan that reduces the production of waste, reuses waste and, when possible, recycles waste. Based on information obtained from the EPA, waste generated per person in the United States has increased from 2.6 to 4.6 pounds per day in the past 35 years. In rural Alaskan communities, more waste is produced per person and a value of 5 pounds per person per day is commonly assumed.

Source reduction is the most effective way to reduce the amount of waste that a community produces. Source reduction is defined as any change in design, manufacture, purchase, and use of materials or products to reduce the amount, volume or toxicity before they are placed in a landfill for final disposal. Reusing and recycling are additional methods to minimize the amount of waste that ends up in a landfill.

Source reduction, including reuse, can help reduce waste disposal and handling costs (operation and maintenance costs) because less waste is produced. Source reduction helps conserve resources and reduces pollution. It also reduces the formation of leachate, the liquid which contains potentially hazardous chemicals that form when waste decomposes in a landfill.

The following methods can be used to reduce the source of waste in Nightmute:

- Encourage residents to purchase items in bulk, because bulk items contain less packaging.
- Recycle gill nets.
- Organize annual, community garage sales at the community hall so residents can sell unwanted clothes and other household items.
- Discourage the use of disposable items such as paper plates, plastic forks and knives, and paper towels. (When water and sewer improvements are in place and community members are no longer disposing of gray water throughout the community, encourage the use of cloth diapers instead of disposable ones.)
- Encourage consumers to buy more durable goods and products with less packaging.
- Promote the use of reusable tote bags or returning used plastic bags to the store for reuse. (Some Alaskan communities have passed local ordinances that prevent grocery stores from using plastic bags and require the use of reusable tote bags. Some European communities charge customers \$0.25 per plastic bag as a way to encourage people to reuse bags.)
- Help supply charities, low-income residents, food banks, and schools with reusable equipment and materials.
- Create a *drop-and-swap* station at the landfill or in a centrally located community building. This is a place to donate old clothes or other household items.
- Organize local and regional material exchanges.

- Include source reduction topics in the school and provide information to the public. (The EPA has materials available such as *The Consumer's Handbook for Reducing Solid Waste*, Document ID EPA 530-H-96-003).
- Coordinate with organizations such as AmeriCorps to obtain a volunteer who works in the AmeriCorps recycling program, such as RAVEN. The AmeriCorps volunteer can focus on organizing the community to begin or enhance its efforts to reduce, reuse, and recycle. Many Alaskan communities participate in this program.
- Talk with other communities who have implemented successful Pollution Prevention Programs, such as the Kenai Peninsula Borough. The Kenai Peninsula Borough has developed a Household Hazardous Waste Collection Program for remote communities in the Kenai Peninsula Borough (see *Appendix E* for contact information and website link).

B. Waste Recycling

Recycling in Nightmute is currently limited to aluminum cans and lead-acid batteries. Local air services, specifically *Hageland*, *Frontier*, *ERA*, and *Arctic Transportation Services (ATS)*, will backhaul aluminum cans for free, and ATS will backhaul lead-acid batteries.

Recycling takes considerable time and the likelihood that it will continue in the community may depend on continuing grant support. The local, EPA grant-supported, IGAP Environmental Coordinator is responsible for coordination efforts to collect, compress, bag, store, and backhaul recyclable materials, such as cans and batteries. Aluminum cans are collected from households, placed in plastic garbage bags, and stored in the Traditional Council Office. In order for the cans to be backhauled to Bethel, arrangements must be made with one of the airlines that offers the free backhauling service. Because the service is free, it is not always consistent and it is common for bags of cans to pile up at the airport.



Figure 9: IGAP Environmental Coordinator on the Job. This position implements a local aluminum can and a lead-acid battery recycling programs. Lead-acid batteries are stored in the blue shed, shown in the above photo, until they can be backhauled by a lighterage barge. The white container, shown in the second photo, is used to store additional hazardous waste.

C. Special Waste Handling

1. Used Oil

Used oil in Nightmute is currently used to start fires. Used oil is a hazardous material that contains carcinogens. Used oil burners can be used effectively to heat buildings, but they require a high degree of operation and maintenance.

Recommendation #10: A used oil burner should only be purchased if the local utility can afford its high operation and maintenance costs.

Used Oil Management Practices:

- Teach the staff about the used oil regulations.
- Do not mix hazardous waste or antifreeze with used oil.
- Employ and enforce good housekeeping procedures to avoid spills or releases to the environment.
- Immediately report and clean up any spills of used oil.

2. Refrigerants

Freon, a substance used in refrigerators, freezers, and other cooling units, is an environmental toxin that contributes to ozone depletion. Freon must be removed from the unit and properly shipped for recycling by a certified professional prior to landfilling the unit. The cost of collection is expensive, but can be reduced if a regional collection day or days are coordinated with other communities. As of June 2003, cost estimates for contracting with professional refrigeration companies were \$1,500 to \$2,500, depending on the remoteness of the community. The average cost in Anchorage for Freon collection is \$35 per refrigerator.

Recommendation #11: In order to reduce costs, a minimum of 20 units should be accumulated and stored, and be ready for Freon collection. Barge service companies sometimes offer to transport hazardous waste free-of-charge for remote villages, as long as the waste is properly containerized, and the shipper has arranged for transport at the dock in Anchorage.

3. Vehicle & Vessel Antifreeze

Heavy equipment and automobiles contain antifreeze. Currently, Nightmute produces only a minimal amount of used antifreeze. If the road to Toksook Bay is constructed, significantly more used antifreeze will be produced.

Recommendation #12: Used antifreeze should be stored in a contained and secure hazardous waste storage area. The antifreeze should be consolidated into plastic over-packs or bung-type drums, and properly labeled. Antifreeze must be kept separate from other waste streams as the cost of disposal increases significantly when it becomes mixed with another waste.

Options for Antifreeze Disposal

- **Options #1 -- On-Site Recycling:** Several types of antifreeze recycling systems are available for purchase. However, it is likely that a low volume of antifreeze, less than 55 gallons per year, will be generated in Nightmute. The purchase of a recycling system for \$2,650 and the added cost to operate the system is not justifiable.

- **Option #2 – Off-Site Recycling:** As stated previously, some barge companies may offer free transport of salvage vehicles, antifreeze, and hazardous waste from the village to the dock in Anchorage.

Recommendation #13: In order to properly recycle antifreeze off-site, Nightmute should store antifreeze in a lined collection area and ship the containers during a regional collection day. Shipping from the dock to a recycling center or landfill will need to be arranged through a private courier or recycler.

Antifreeze can be recycled in Anchorage with Emerald Alaska for \$4.50 per gallon. One gallon of antifreeze is returned to the client for each gallon sent in for recycling. This reduces the cost of disposal to approximately \$3 per gallon in Anchorage.

Option #3 – Alternatives to Ethylene Glycol: Many businesses are using propylene glycol as an alternative to ethylene glycol. Although propylene glycol costs more, it is less toxic to humans and animals. Propylene glycol appears to perform similarly to ethylene glycol for freeze protection and may even offer better corrosion inhibition for heavy equipment.

Recommendation #14: To reduce the toxicity of antifreeze, Nightmute should consider alternatives to ethylene-glycol-based antifreeze. Even with the use of an alternative antifreeze product such as propylene glycol, due to the potential for the used product to be contaminated with heavy metals or used oil or fuel, the used product should be shipped to a treatment facility in Anchorage.

4. Paints & Solvents

Paints: The best and least expensive method of disposing of excess paint is to use the paint for painting. Paint comes in two different types, latex-based and oil-based. Oil-based and latex-based paint must not be mixed. Oil-based paints can be mixed with other oil-based paints and, likewise, latex paints can be mixed with other latex paints. Normally, the result of mixing is a brown-tan colored paint. This mixture can then be used to paint buildings or other structures.

Disposal Options: If disposal is the only option, it is important that oil-based and latex paints are not mixed since the cost of disposal of oil-based paint is higher than that of latex paints. Latex-based paints can be harmlessly disposed of if the lid is taken off the can and the paint is allowed to dry completely. Latex paints can also be mixed with bentonite before being placed in a landfill. If solidification is not possible for latex paints, then the paint must be containerized and properly stored. Once a sufficient quantity is collected it can be shipped with the assistance of an environmental services company to a disposal facility. For shipping purposes, there is a cost savings if the liquid paint is transferred from 1-gallon or 5-gallon cans into a 55-gallon drum. As mentioned previously, it is important that the latex and oil-based paints are stored separately. If disposal is the only option for oil-based paints, they must be properly stored and disposed of with the assistance of an environmental services company.

Solvents: A solvent is typically a petroleum-based chemical that can dissolve another chemical. Solvents are commonly used as degreasers, paint strippers, and paint and lacquer thinners. They also are used in the dry cleaning industry and can be found in household products. Some common solvents are acetone, toluene, xylene, kerosene, methylene chloride, tetrachloroethylene, ethanol and methanol. It is very important that solvents are not placed in the landfill due to their toxicity and ability to impact ground water and surface water. A small quantity of solvent can impact a large volume of water. Solvent-contaminated water is usually toxic to fish, birds, and other wildlife and can remain present in the water for years. Some solvents are known to cause or

suspected to cause cancer in animals and people. Solvents must be properly stored, labeled as a hazardous waste, and shipped to a disposal site arranged with the assistance of an environmental services company.

5. Computers & Monitors

As mentioned previously, the community can organize a community or regional swap meet to exchange used office equipment. In addition, the Alaska Materials Exchange (AME) can be utilized to find an interested party for computers or monitors. Old computers can also be shipped to Anchorage for recycling. The non-profit agency *Green Star* has an annual electronics-recycling event that takes old computers and monitors for a small fee and sends them to a recycler. The cost of shipping the computer to Anchorage is the responsibility of the computer owner, but a barge company may be willing to backhaul the material for free. (See *Appendix E* for additional information.)

Computers and monitors do fall under EPA's Household Waste Exemption regulation, *40 CFR 261.4b1*, which indicates computers from a household source can be disposed of in a landfill. This is not a recommended option since computers contain lead and mercury. It is recommended that attempts be made to reuse or recycle the computer when possible.

Non-household computers and monitors are not exempt under the Household Hazardous Waste Exemption regulation and cannot be disposed of in a Class III Landfill. If the generator qualifies as a Conditionally Exempt Small Quantity Generator (CESQG) by generating less than 220 pounds per month or 2,200 pounds per year of qualified hazardous waste, then the computers and monitors can be disposed of in a Class II or Class III Landfill. (The Class II or Class III Landfill must be willing to accept computers and monitors). Based on a limited assessment of the waste stream, it is assumed that the businesses in Nightmute will qualify as CESQGs. (EPA provides additional assessment information at the following link: www.epa.gov/epaoswer/hazwaste/sqg/handbook/k01005.pdf)

D. Waste Collection

1. Self Haul

Self-haul systems are the simplest and least expensive systems to operate because individual residents and households are entirely responsible for taking their trash to the disposal site. Often there are no utility fees because there is a minimal level of service provided. However, if a new landfill is constructed, there will continue to be a minimal amount of operation and maintenance expenses regardless of how the garbage is collected. An operator will need to place cover material over the trash on a weekly basis, maintain the landfill berms and fencing, maintain the equipment, and operate the burn box. Without a small monthly utility fee, the City will need to subsidize the operations and maintenance expenses with money generated from another source. In some communities, excess revenue from the laundromat, bingo, and cable television is used to subsidize the utilities.

Self-haul systems can have problems. Self-haul can be dangerous in the winter, depending on weather conditions. Regular snowplowing of the access road will likely be required or snowmobiles with sleds will need to be used for self-haul in the winter. Given Nightmute's high winds, there is more risk of trash blowing around the community and onto the tundra from a self-haul system. Community-haul will result in fewer trips to the landfill, and the equipment will include a caged trailer to prevent trash from blowing away.

2. Dumpsters

Traditional steel dumpsters, such as the models seen in Anchorage and Bethel, are inappropriate for Nightmute because there are few roads. An alternative to the steel dumpster is a trailer mounted cage. Several of these trailers can be placed throughout the community, and residents can bring bags of trash to the trailers. The Landfill Operator would use an ATV or snowmachine to tow the trailers to the landfill. The Utility Manager would need to charge a moderate monthly fee to pay for an Operator, and operation and maintenance expenses.

3. Transfer Station

Transfer stations are not used in Nightmute and are not needed due to the close proximity of the community to the dumpsites and potential Class III Landfill. A transfer station may be an appropriate alternative to a landfill if garbage is trucked to Toksook Bay. However, the Toksook Bay Landfill will have to be willing to accept Nightmute's garbage over a long period.

4. Curbside Pickup

Curbside pickup provides the highest level of service and requires a monthly user fee. If community-haul is selected for Nightmute, an Operator will pick-up the trash from each house once a week. There are several advantages to curbside pick-up. First, every household is served, including elders and other people who are unable to transport their trash to the landfill. Second, trash spends a minimal amount of time outside before being taken to the landfill. This reduces odors, rodents, birds, and other disease vectors. Curbside pickup also reduces blowing trash being introduced into the community from high winds as the caged transport trailer used in the community-haul system keeps trash in place. Curbside pickup requires an operator, an ATV, and/or snowmachine, and a trailer to secure and transport the waste to the landfill.

5. Regional Pickup

Regional pickup could become a feasible alternative if the road to Toksook Bay is constructed. In this scenario, no landfill will be constructed in Nightmute. Instead, trash will be consolidated at a smaller facility, such as a transfer station, and then trucked to the Toksook Bay Landfill. The City of Toksook Bay, the operator of the community landfill, will have to agree to accept Nightmute's solid waste, and they will likely charge the City of Nightmute a fee per truckload of solid waste. A utility fee will be required to offset the cost of transporting the waste to Toksook Bay and maintaining the vehicle. The fee amount is likely to be similar to the fee for curbside pickup. The major advantage of this alternative is the reduced project capital cost because a landfill will not be constructed in Nightmute.

6. Barge Haul

Barge hauling is unfeasible for removal of solid waste and shipment to other landfills. Although barges do deliver freight and fuel to Nightmute, lighterage companies prefer not to travel up the Toksook River because one of the meanders in the river contains boulders. This spot has repeatedly damaged barges.

Even if this hazard is mitigated, there are several other challenges making barging unfeasible, as specified below.

- A storage facility needs to be constructed to store the garbage. Because of the short barge season, the facility needs to be large enough to store the garbage for 10 months.
- The facility needs heavy equipment to move and bail the trash.
- Equipment needs to be purchased to transport the bailed garbage to the barge.

- Once the garbage arrives at the receiving port, it needs to be transferred to a landfill.

Recommendation #15: *If Nightmute is interested in disposing their solid waste at an off-site location, regional pickup should be considered. Considering that few landfills are currently being funded, regional pickup may be a feasible option and should be closely evaluated if the road to Toksook Bay is constructed.*

E. Waste Treatment

1. Waste Segregation & Recycling

Waste Segregation: Attempts are currently being made to remove lead-acid batteries and aluminum cans from the waste stream.

Recycling: Aluminum can be recycled with the assistance of ALPAR or the Bethel Recycling Center, *Cash for Cans* Program. (See *Appendix E* for contact information.)

Recommendation #16: *The following items should be separated and shipped out of the community for recycling and disposal: paints, contaminated fuels, antifreeze, and solvents. This waste should be properly stored in a secure facility near the barge landing, labeled, and back-hauled to an environmental services company in Anchorage or Fairbanks.*

2. Composting

Due to the high amount of labor, cold temperatures, and added management responsibilities, composting is not being considered as an alternative method.

3. Burning

Burning can reduce the volume of solid waste by 50 to 90 percent and can be an effective tool for solid waste management in communities where landfill space is limited, trash production is high, and wildlife is a significant threat to human health and safety. Burn boxes can be constructed from old 5,000 or 10,000-gallon fuel tanks and are a cheap method for burning trash. However, these units quickly fill up with ash and can be difficult to clean. Typically, fuel-tank burn boxes have short, useful lives and quickly become a community eyesore. Custom burn boxes are more expensive, but are usually more durable and more effective over the long-term. A well-designed burn box can be emptied with the blade of a bulldozer or a front-end loader and can last for ten or more years. Custom burn boxes are most feasible when their cost can be absorbed into the construction cost of a new landfill. Incinerators produce the fewest emissions, but they are also the most expensive to build, operate, and maintain. Electricity, fuel, and a building are required. Because of the high operation and maintenance expense, incinerators are not recommended for Nightmute.

Table 13: Burn Box Comparison

BURN DEVICE	ADVANTAGES	DISADVANTAGES	CAPITAL COST	ANNUAL O&M COST
Fuel Tank Style Burn Box	<ul style="list-style-type: none"> • Low initial cost • Materials may already be on-site • No fuel required 	<ul style="list-style-type: none"> • Short life span (2-5 years) • Difficult to empty and clean • Minimal long-term effectiveness 	\$10,000	\$15,000
Custom Burn Box	<ul style="list-style-type: none"> • Low maintenance. • Cleaner burn than the above • Easy to empty and clean • No fuel required • High durability • Cage top prevents wind-blown trash 	<ul style="list-style-type: none"> • Higher capital cost 	\$60,000 to \$85,000	\$10,000
Incinerator	<ul style="list-style-type: none"> • Lowest emissions 	<ul style="list-style-type: none"> • Highest capital cost • Requires a building • Difficult to clean • Often requires electricity and fuel 	\$150,000	\$25,000

4. Bailing

Bailing garbage is similar to bailing hay; the garbage is wrapped by tight bands into a box shape that is easier to move and transport than loose material. Because the trash is tightly compacted, leachate is reduced. Bailing requires specialty equipment, a waste storage building, and heavy equipment to transport the bales. In Nightmute, baling will increase operations and maintenance costs without adding a significant level-of-service.

5. Decomposition

As solid waste decomposes in the landfill, trash volume will reduce and leachate will be produced. Leachate is a potentially hazardous material containing heavy metals, solvents, and hydrocarbons. The best way to control leachate in Class III Landfills is to prohibit the disposal of any hazardous materials in the dumpsite. ADEC does not require monitoring or treatment of leachate for Class III Landfills.

F. Waste Disposal

1. Out-of-State Landfill

As mentioned previously, barge services companies are reluctant to make additional trips to Nightmute because of the rock hazards in the Toksook River. Out-of-state disposal is, therefore, considered unfeasible for Nightmute. For comparison, *Table 14* contains a preliminary cost-estimate for annual out-of-state disposal. (Barging costs were supplied by Northland Services.)

Table 14: Annual Cost Estimate for Out-of-State Solid Waste Disposal

ITEM	RATE	COST
Solid Waste Pickup	\$34.70 per yd ³	\$50,000
Operation and Maintenance of Storage Area	\$17.35 per yd ³	\$25,000
Loading and Hauling to the Barge	\$8.33 per yd ³	\$12,000
Barge Shipping	\$ 0.63 per lb	\$360,000
Off Loading & Hauling to the Landfill	\$2.64 per yd ³	\$4,000
Landfill Charge	\$70.00 per ton \$0.35 per lb	\$20,000
Total		\$480,000

An additional cost to consider is the capital cost for a solid waste storage area. The building will have to be large enough to store garbage for 10 months, when barge service is unavailable. The estimated capital cost for a solid waste storage facility in Nightmute is \$1,080,000.

2. Regional Landfill

If the road to Toksook Bay is constructed, trucking solid waste to the Toksook Bay Landfill is an option. (See *Section IX.5.D.* for a review of this option.)

3. Space Available for Disposal & Landfill Reconditioning / Closure in the Existing Landfill

Currently, the only solid waste disposal facility in Nightmute is the New Summer Dump that is located near the Toksook River. This site is considered to be a short-term solution until funding becomes available for a more environmentally appropriate solution, such as a new landfill or shipment to a regional landfill. If funding does become available for a new system, the project needs to include clean-up and closure of the existing dumpsites. The location of the New Summer Dump is shown on *Sheet #6*.

4. New Local Landfill: Calculation of Space Available for Disposal & Landfill Closure

Four alternative locations exist for construction of a landfill. Each alternative is based on the same conceptual landfill design. (See *Table 10: Landfill Design Assumptions.*) The design includes space for a burn box and one 0.6-acre cell for the solid waste. The cell will be 6 feet deep and will have approximate dimensions of 120 feet by 212 feet, for a volume of 5,653 cubic yards.

In order to comply with ADEC regulations, the Class III Landfills need to be closed as follows:

- Smooth out the top of the refuse so that voids are filled in and that there is a 2-4 percent grade for drainage.
- Final cover material should be placed over the cell within 180 days after the last refuse was disposed.
- The first layer of cover material should include 18 inches of low permeability soil that is compacted to 85 percent of maximum dry density and graded to prevent ponding and erosion.

- The final layer of cover material must be a minimum of 6 inches of organic soil (5-15 percent organic content). This layer should be covered with an erosion control mat, seeded, and fertilized. This layer should promote adequate water retention to allow for the growth of native plants or compatible grasses. (For assistance with selecting the proper seed mixture, contact the University of Alaska Cooperative Extension or the Alaska Plant Material Center of the Alaska Department of Natural Resources.)

Alternative Site #1 – Located on the River Meander West of the Village

This alternative landfill site is located on the first river meander downstream from the community. Approximately 6 acres of land are available for landfill construction. A gravel pit will need to be developed along the bluff to provide material for the pad, berms, and access trail. An advantage of this alternative is the nearby pit location. The existing ground elevation is between 12 - 14 feet, and the Corps of Engineers recommends building elevation at 13 feet. A 3-foot lift of gravel will raise the landfill above the flood level, protect the permafrost, and provide a drivable surface for landfill operations. An existing winter trail, which crosses a wetland at the base of the bluff, runs parallel to the river and provides summer access to the landfill. During the winter, residents will access the area with snowmachines from either the river or from above the bluff. Of the four alternatives that are located more than 5,000 feet from the airport (*Alternative #1*, *Alternative #2A*, and *Alternative #2B*), this is the least expensive option. Construction will be easier at this site than at *Alternative #2* because the site is mostly level, and the landfill can be built directly on top of the existing grade. The disadvantages of this site include low topography, and the potential to be affected by river erosion. (Erosion could be mitigated by using rip rap from the pit that will be developed for the project.) Additionally, community members have expressed concern about this alternative because there is a winter trail that runs through the site.

Alternative Site #2A / #2B – Located on the Hillside of Toksook Mountain West of Nightmute

This alternative involves cutting a landfill into the hillside of Toksook Mountain. Construction could be difficult at this site because geological information suggests that the soils contain high moisture content in some locations. Test holes analyzed by ADTPF indicate moisture contents above 40 percent are common along the hillside. The wet soil conditions will complicate construction and increase capital costs. If the road to Toksook Bay is constructed before the landfill, then the landfill could be built near this road and the cost to construct an access road will be eliminated from the construction cost estimate. However, this alternative will be more expensive to construct than *Alternative #1* and *Alternative #3* because of poor soil conditions.

Recommendation #17: During a community meeting on May 5, 2004, the community selected the two hillside sites for a landfill. These sites are referred to as Alternative #2A and Alternative #2B. The two areas are located on Sheet #5. Because of the poor soils along the hillside, a geotechnical investigation should be conducted during the design phase in order to locate the most cost-effective site.

Alternative Site #3 – Located near the Sewage Lagoon

This alternative is located near the sewage lagoon. It is in close proximity to the airport and will not be permitted by the ADEC unless a waiver is granted for the airport separation distance. Construction will be complicated because the site is partially located on a Native allotment. Access to this site is convenient because a road already extends to the sewage lagoon, although this road needs to be upgraded before heavy equipment could use it to transport fill material.

Alternative #2A, Phase 2 - Custom Burn Box & Super Sack Disposal

This alternative consists of a short-term improvement until funding becomes available for construction of a landfill. A custom built burn box will be located on the gravel pad on the road to the sewage lagoon. The existing pad will need to be expanded for the burn box. The ash will be scooped out of the burn box with a *Bobcat* or a small front-end loader, and dumped into a *super sack*. (A super sack is a tightly woven Mylar or cloth bag version of a cubic yard box, which is usually made of *Tyvek* material.) The filled super sacks will be stacked on the pad adjacent to the burn box until the Toksook River freezes and the sacks can be moved to the New Summer Dump. An Operator will burn the trash, empty the burn box, and haul the super sacks across the river. The City will charge residents a small monthly utility fee even if residents self-haul their waste.

G. Cost Estimates

Detailed construction cost estimates are provided in *Appendix I*. The resources in this appendix include:

Table I-1: Capital Cost Estimate for Landfill Alternative #1

Table I-2: Capital Cost Estimate for Landfill Alternative #2A

Table I-3: Capital Cost Estimate for Landfill Alternative #2B

Table I-4: Capital Cost Estimate for Landfill Alternative #3

Table I-5: Capital Cost Estimate for Option 2, Phase 1 of Alternative #2A: Burn Box

Table I-6: Capital Cost Estimate for Option 2, Phase 2 of Alternative #2A: Landfill

Table I-7: Capital Cost Estimate for Cleanup of Dumpsites on Land

Table I-8: Capital Cost Estimate for Winter Dump Closure

Table I-9: Annual O&M Costs for a Self-Haul Solid Waste Utility

Table I-10: Annual O&M Cost Estimate for Winter Dump Closure

Table 15 below (which is the same as *Table 5* in *Section I.D.*) contains summary information for *Tables I-1* through *I-4*, and *I-9* and *I-10*.

Table 15: Cost Estimates with Suggested User Fees for All Landfill Alternatives

ITEM	ALTERNATIVE				SOURCE
	#1	#2A	#2B	#3	
Design / Construction Costs	\$1,479,000	\$2,247,575	\$2,000,575	\$1,430,825	Tables I-1 thru I-4
Self-Haul: Operation / Maintenance Costs	\$11,924	\$11,924	\$11,924	\$11,924	Table I-9
Community Haul: Operation / Maintenance Costs	\$34,375	\$34,375	\$34,375	\$34,375	Table I-10
Self-Haul: Household and Government Offices User Fees	\$15 per month	\$15 per month	\$15 per month	\$15 per month	Appendix J
Self Haul: Stores, Clinic, Post Office and School User Fees	\$50 per month	\$50 per month	\$50 per month	\$50 per month	Appendix J
Community Haul: Household User Fee	\$60 per month	\$60 per month	\$60 per month	\$60 per month	Section VIII G B

1. Construction Cost Estimates for New Landfill

Detailed construction cost estimates for the alternatives have been provided in tables in *Appendix I*. In addition to the construction cost estimates, a site-specific estimate for the disposal of the refuse at the old dumpsites has also been prepared. *Table 15* provides a summary of the construction costs for each landfill alternative.

2. Annual O&M Costs & Monthly User Costs

Self-Haul Service: Annual O&M costs and monthly utility service fees will depend on the type of service that the community selects. **A self-haul system will be the least expensive, approximately \$15 per household per month.** Although residents will be taking their trash to the landfill if a self-haul system is selected, they will be required to pay a fee for landfill maintenance. An Operator will be needed for about 4 hours a week to place clean cover material over the trash and to operate the burn box. Monthly O&M costs for a self-haul service have been determined (see *Appendix I, Table I-8*). *Table 16* below summarizes O&M costs for the self-haul and the community-haul options.

Community-Haul Service: A community-haul system will employ an operator for about 16 hours per week and an office clerk for about two hours per week. The operator will pick up trash from each residence on a weekly basis. An ATV or snowmachine will be used to tow a caged trailer full of garbage to the landfill. **This is the more expensive service and will cost each household about \$60 per month.** The community may be able to reduce this fee by subsidizing the utility. Other communities have successfully used the revenue from bingo, the washeteria, and cable television to subsidize utilities. The O&M costs for this alternative are provided in *Appendix I, Table I-9*. *Table 16* summarizes O&M costs for the self-haul and the community-haul options. This cost is based on weekly pickup to the 65 buildings in the community.

Table 16: Annual O&M Costs for Self Haul & Community Haul

BUDGET CATEGORY	SOLID WASTE COLLECTION SYSTEM		DIFFERENCE
	Self-Haul Cost	Community-Haul Cost	
Labor	\$3,240	\$14,130	\$10,890
Administration	\$72	\$1,320	\$1,248
Payroll Expense	\$1,652	\$7,725	\$6,073
Fuel / Transportation	\$3,456	\$4,200	\$744
R&R Expense	\$1,800	\$5,300	\$3,500
TOTAL	\$10,220	\$32,675	\$22,455

Utility Fees for Non-Residential Users: Non-residential users can add a significant amount of solid waste to landfills, and they should also be charged to use the facility. Construction and

demolition activities can consume landfill space and reduce the life of a landfill. A summary of utility fees for non-residential users has been provided in *Table 17* below.

Recommendation #18: All construction projects should be required to pay the City to use the landfill. If a large demolition project is planned, such as the power plant or the school, the project may need to construct its own landfill or monofill instead of filling up the City's landfill.

Table 17: User Fees for Non-Residential Users, Self-Haul System

USER CATEGORY	FEE RATE	NUMBER OF USERS IN COMMUNITY
Stores, Clinic, Post Office, and School	\$50 per month	5
Governmental Offices	\$15 per month	3
Construction and Demolition	\$15 per cubic yard \$150 per dump truck load (10 yd ³ truck)	variable

3. Annual Life Cycle Costs Including Proposed Landfill Closure Costs

The annual life cycle cost of a new landfill has been estimated over an 8-year design life with a 4 percent compound interest rate factor of 0.14853. *Table 18* shows the annual life cycle costs for the three alternatives.

Table 18: Annual Life Cycle Cost by Alternative

ALTERNATIVE	COLLECTION TYPE	COST
Alternative #1	With self-haul O&M	\$229,896
	With community-haul O&M	\$252,351
Alternative #2A	With self-haul O&M	\$344,053
	With community-haul O&M	\$366,508
Alternative #2B	With self-haul O&M	\$308,108
	With community-haul O&M	\$330,563
Alternative #3	With self-haul O&M	\$222,740
	With community-haul O&M	\$245,195

4. Existing Landfill Closure Costs

The existing solid waste facilities consist of the New Summer Dump. If a new landfill is constructed, the solid waste from this site and the other dumpsites needs to be consolidated during the summer and transported to the new landfill during the winter. *Table I-7* in *Appendix I* details a preliminary cost

estimate of \$60,000 for consolidating and transporting this waste to one of the four landfill alternatives.

Table 19: Capital Cost Summary for Closure of Previous Dumpsites

SITE ACTIVITY	ESTIMATED COST
All Dumpsites / Collection of Solid Waste	\$60,000
Winter Dump / Mitigation of Tundra Pond	\$527,550
TOTAL	\$587,550

However, because the Winter Dump contains *potentially* contaminated surface water, it may require special consideration and additional cost for closure. Currently the ADEC is undecided as to the requirements for closing tundra pond dumpsites. For the purpose of this report, *Summit* is presenting a method of closure and a cost estimate with the understanding that the ADEC may create new closure requirements in the future. The proposed closure of the Winter Dump will involve removing as much of the solid waste as possible and placing it in the new landfill. During the winter, a 3-foot lift of fill will be placed on top of the ice. As the Winter Dump thaws, the site will be covered by clean material, and the remaining trash or water will be contained by the imported soil. *Table I-8* in *Appendix I* details a cost estimate of \$527,550 for mitigative action to the tundra pond formerly used as the Winter Dump.

5. Household Hazardous Wastes Disposal Costs

Federal regulations allow for the disposal of household hazardous waste into landfills without special restrictions. Therefore, no household hazardous waste disposal costs have been prepared. However, disposing of such waste is discouraged because it can be harmful to the environment.

Recommendation #19: *While Nightmute currently recycles lead-acid batteries, this program should be expanded to include paint thinners, varnishes, paints, cleaning products, and antifreeze. The hazardous waste can be stored in the same building at the barge landing that is currently holding the lead-acid batteries.*

The community will be able to generate several 55-gallon drums of used oil and antifreeze, contaminated gasoline, and household hazardous waste fluids. Paint should be mixed with bentonite and disposed of at the landfill. During the annual spring clean-up, Nightmute can organize a hazardous waste collection event where residents can drop off wastes at the building. All of the waste will be backhauled to Anchorage.

6. Review of Operational Costs for Similar Systems within the Region

The following annual operational costs were gathered from solid waste management plans provided by the ADEC. Most of these estimates are based on a community-haul system. Consequently, their operational costs are significantly higher.

Table 20: Regional Utility Comparison

COMMUNITY	DEMOGRAPHICS*				WASTE TRANSPORT SYSTEM	ANNUAL O&M COSTS**
	Population 2003 Estimates	Number of Occupied Households	Median Household Income	Persons Below Poverty		
Emmonak	763	189	\$32,917	16.2%	Community Haul	\$63,000
Koyuk	340	80	\$30,417	28%		\$16,465
Lime Village	43	19	NA	NA	Self Haul	\$10,000 to \$36,000
Napaskiak	419	82	\$31,806	20.2%	Community Haul	\$43,000 to \$85,000
Nightmute	228	47	\$35,938	10.7%	Self Haul	\$11,588
					Community Haul	\$34,039
Red Devil	41	17	\$10,938	40.9%	Self Haul	\$5,000

* Source: www.dced.state.ak.us/dca/comddb/cis.cfm; **Source: VSW except Koyuk from ADCED community website

Advantages & Disadvantages

Section IX discussed solid waste management alternatives for Nightmute and included source reduction, recycling, special waste handling, waste collection, waste treatment, waste disposal, and cost estimates.

Recommendation #20: *Source reduction should be the foundation of any solid waste program and begins with the choices consumers make when purchasing goods. Residents should be encouraged to buy items that contain minimal packaging and to buy goods in bulk. Residents should also be encouraged to use tote bags instead of plastic store bags.*

A list of other recommendations has been provided in *Section IX.A*.

Nightmute is currently performing an excellent job of recycling lead-acid batteries and aluminum cans, which are backhauled to Anchorage. *Summit Consulting Services* has encouraged the community to extend this program to include hazardous wastes, such as antifreeze, used oil, paint, solvents, and computers. These items could be stored in a connex and backhauled annually. Barge companies will often backhaul these items to Anchorage free of charge. The hazardous materials mentioned above are potentially toxic to humans and the environment. Removing these items from Nightmute and sending them to Anchorage for proper disposal or recycling is the best approach.

Another way to improve solid waste management is to burn select items in a well-designed burn box. Burn boxes can reduce the volume of trash up to 50 percent (if trash is separated) and can significantly prolong the life of a landfill. If a burn box is properly operated and burnable items are separated from non-burnable items, burn boxes can produce a very clean burn. Poorly operated burn boxes without good separation can result in black smoke that contains particulates, dioxins, and even heavy metals. Burn boxes will increase capital and O&M costs of a landfill slightly, but these costs will easily be recovered by the extended life of the landfill.

A new local landfill is the most feasible waste disposal option for Nightmute. Four alternative locations were presented in *Section IX.F. Alternative #1* is the most feasible landfill site because it is less expensive than *Alternative #2*, and, unlike *Alternative #3*, there are no conflicts with Native allotments or the airport. As a material source, a borrow pit can be developed into the bluff that is adjacent to *Alternative #1*, supplying material for the landfill cells and for the access road along the river. In addition, rock material from this pit can also be used to armor the riverbank near *Alternative #1* if this portion of the river becomes unstable.

If the road to Toksook Bay is constructed before a landfill, *Alternative #2* is a reasonable site, especially with the development of gravel pit near the landfill. In this scenario, capital costs will be reduced because of the existing access road and gravel pit. The main disadvantage for this site is the prevalence of soils with high moisture contents. If this site is selected, additional soils information will be collected in order to locate the most constructible area on the hillside.

Alternative #3 is located less than the FAA's 5,000-foot minimum separation distance from the airport and could pose a threat to air traffic. Although it may be possible to obtain waivers from the FAA and ADEC, this site has other complications. First, *Alternative #3* is partially located on a Native allotment, and the land will have to be leased or purchased through a lengthy regulatory process. Second, gravel material will be hauled from an existing pit located near the well house. While a road already exists from the pit to near the landfill site, this road will require significant rebuilding in some areas to make it suitable for extensive hauling.

Two options are available for hauling waste to the new landfill: self haul and community haul. Self haul costs less, with an estimated monthly service fee of \$15 per month for each household. However, self haul provides a low level of service because residents dispose of their waste. Community haul will provide weekly service with a higher cost: about \$50 per household per month. With community haul, a consistent, high level of service is provided to residents. If the \$50 fee is too expensive, the City may need to subsidize the rate through bingo or other utilities.

X. CONCLUSIONS & RECOMMENDATIONS

A. Description of Recommended Alternative

This report recommends several alternatives for improving solid waste management in Nightmute. First, the community should encourage residents to reduce the garbage that they create. A list of suggestions has been included in *Section IX.I*. Second, *Summit* recommends expanding the recycling program to include antifreeze, used oil, and solvents. Fifty-five-gallon drums of these fluids can be backhauled to Anchorage for recycling or safe disposal.

The community has selected to construct a new landfill at along the hillside of Toksook Mountain (*Alternative #2*). Because the hillside contains frozen soils, a geotechnical investigation will need to be conducted early in the design process. The geotechnical results will determine the most feasible location on the hillside for the landfill.

Recommendation #21: If only limited funding is available, a stand-alone burn box should be set-up off of the road to the sewage lagoon. Any grant application for this phase should include funds for a dedicated piece of equipment, pad development, and a supply of super sacks. Ash will be emptied into the super sacks, and the sacks will be moved to the New Summer Dump during the winter.

For operation and maintenance, the community has selected a self-haul system. Residents will transport their garbage to the landfill, and an operator, employed by the City, will operate the burn box and place cover material over the ash pile. The City will charge each household a monthly fee of \$15. Non-residential buildings and construction projects will be charged higher fees.

B. Capital Cost Estimates

Construction cost estimates for the selected alternative and the burn box alternative are provided below.

<i>Landfill Alternative # 2A</i> – hillside west of Nightmute.....	\$2,247,575
<i>Burn Box Alternative</i>	\$246,600

C. Estimated Annual Revenues & Revenue Source

Residential billing (\$15 per month x 54 households).....	\$9,720
Government offices (\$15 per month x 3 units).....	\$540
Non-residential billing (\$50 per month x 5 units).....	\$3,000
Total estimated annual revenue.....	\$13,260

D. Annual Operation & Maintenance Costs

The City Council has selected a self-haul system. The total monthly O&M costs for this service are estimated at \$994. Each household and government office will be billed \$15 dollars per month. The stores, school, clinic, and post office will be billed \$50 per month. For additional information, refer to *Table 16* and *Tables I-9* and *I-10* in *Appendix I*.

E. Capital Costs & Utility Fee per Home Served

The self-haul utility fee is \$15 per household per month, or \$180 per year.

Summary of the capital costs per home served:

<i>Alternative #2A</i>	\$39,431
------------------------------	----------

XI. COMMUNITY BUSINESS PLAN FOR SELECTED ALTERNATIVE

See *Appendix J* for the *Solid Waste Utility Business Plan*.

XII. PUBLIC PARTICIPATION IN THE PLANNING PROCESS

A. Methods Used to Gain Community Input & Direction

Several site visits were made to Nightmute between 2002 and 2004 by VSW Engineer Debra Addie, staff from *Summit Consulting Services, Inc.* (specifically Engineer Chris Allard and Environmental Scientist Chris Wrobel); and Engineer Steve Miller of *Raven Engineering*. Site visits occurred during the following dates:

- October 18, 2002;
- June 18-20, 2003; and

- July 24-25, 2003.

Public meetings were conducted on June 18, 2003, and July 24, 2003. Due to inclement weather, the **65% Report** was presented during a conference call to the City Council on December 19, 2003. (See *Appendix F* for a list of attendees for each of these meetings.) Residents selected the preferred landfill location, **Alternative #2A** during a community meeting on May 5, 2004.

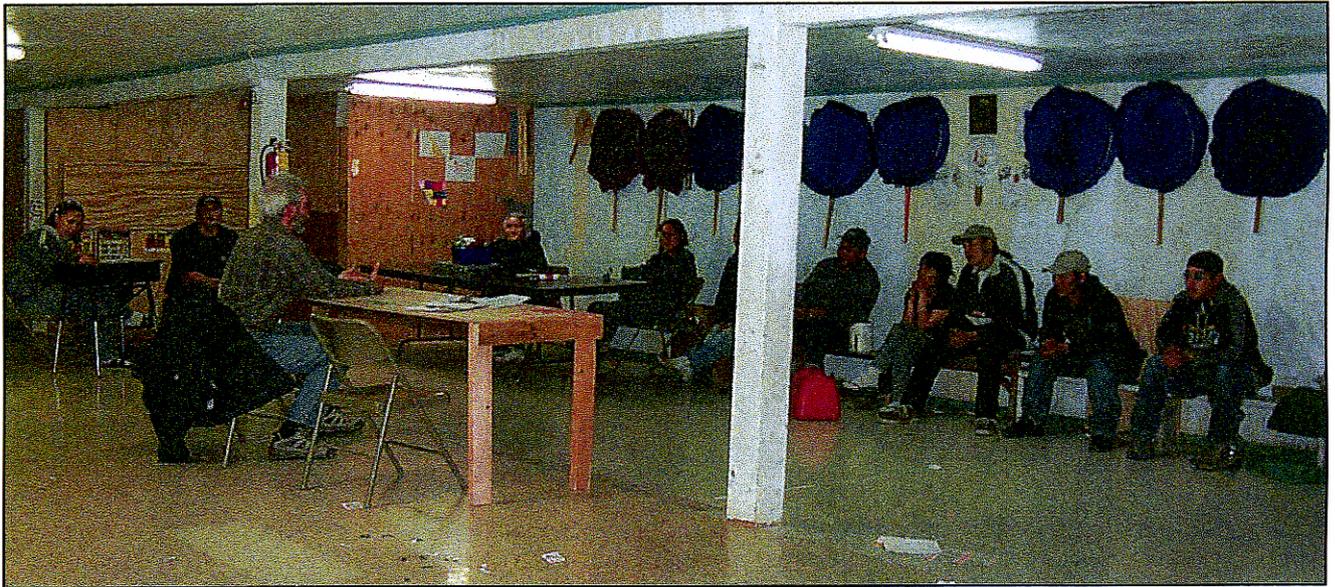


Figure 10: Community Meeting in Nightmute. During this meeting, held on June 18, 2003, the solid waste and sewer / water studies were introduced. Additional topics included the four landfill alternative locations, and community-haul service compared to self-haul service.

B. Identification of Community Goals & Objectives

The community's goals and objectives for managing solid waste include:

- Reducing the amount of waste produced by the community,
- Continuing to educate community residents,
- Continuing to support the recycling program,
- Expanding the recycling program when feasible,
- Constructing a Class III Landfill, and
- Closing the existing dumpsites according to ADEC regulations.

XIII. REFERENCES

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Websites: <http://www.labor.state.ak.us/research/cgin/cenmaps/profiles/1600253930.pdf>
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Listed Species with FWS Habitat
Website: http://edo.fws.gov/species_profile/SpeciesProfile?sPCODE=B08Z
Website: http://edo.fws.gov/species_profile/SpeciesProfile?sPCODE=B090
Threatened and Endangered Species system (TESS)
Website: <http://endangered.fws.gov/wildlife.html>

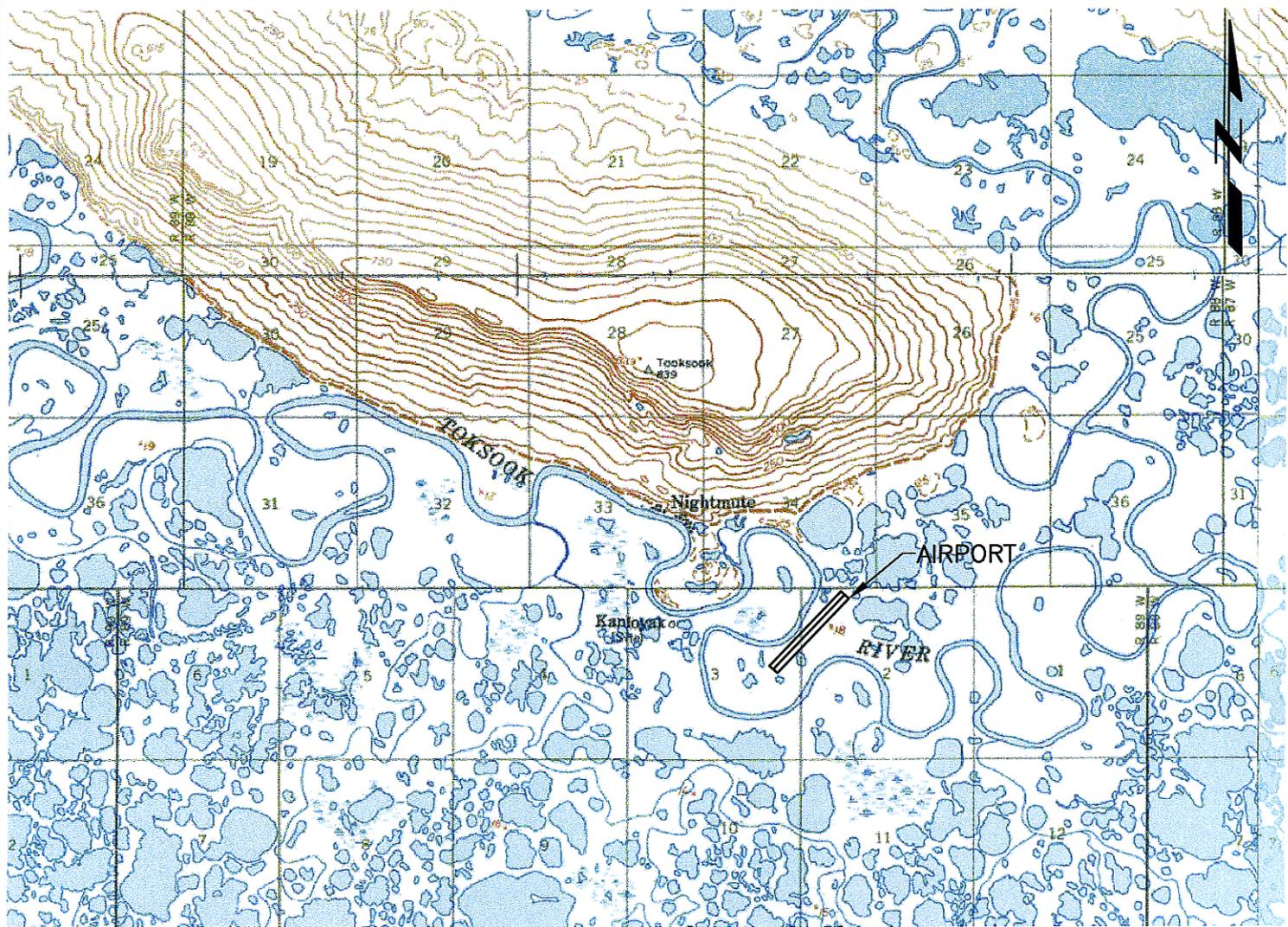
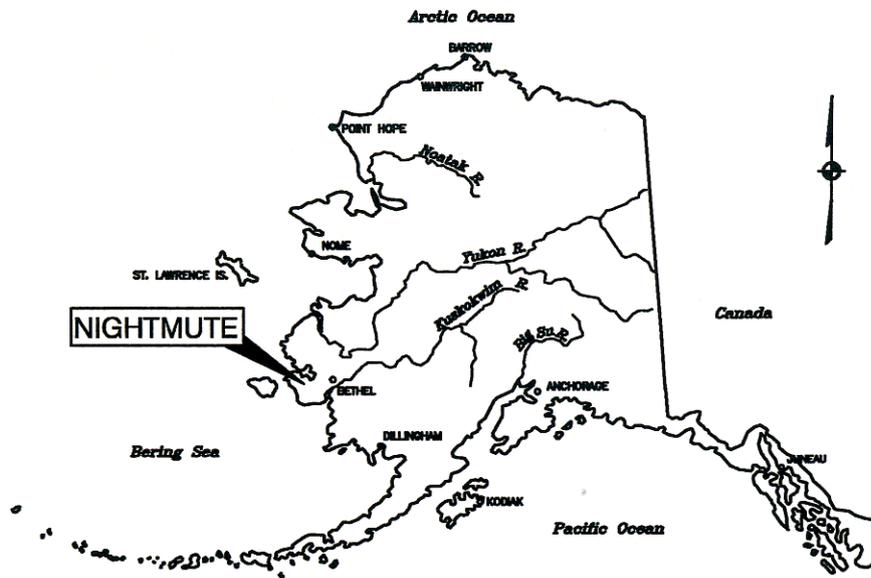
ADDENDUM

- Appendix A: Maps & Drawings
- Appendix B: Community Resolution Accepting the Solid Waste Management Plan
- Appendix C: Technical Information (Water Quality & Geotechnical Information)
- Appendix D: Community Survey Results
- Appendix E: Community Contacts & Resources
- Appendix F: Meeting Summaries, Public Comments & Trip Reports
- Appendix G: Preliminary Community Ordinance
- Appendix H: Agency Correspondence & Resources
- Appendix I: Cost Estimates
- Appendix J: Utility Business Plan

APPENDIX A

Maps & Drawings

- Sheet 1: Location Map
- Sheet 2: Contour Map I
- Sheet 3: Contour Map II
- Sheet 4: Community Map
- Sheet 5: Alternative Landfill Sites
- Sheet 6: 5,000-Foot Separation Boundary from the Airport
- Sheet 7: Conceptual Landfill Plan View & Cross Section
- Sheet 8: City of Nightmute Surface Land Status Map
- Sheet 9: Nightmute Surface Vicinity Land Status Map
- Sheet 10: Nightmute Subsurface Vicinity Land Status Map



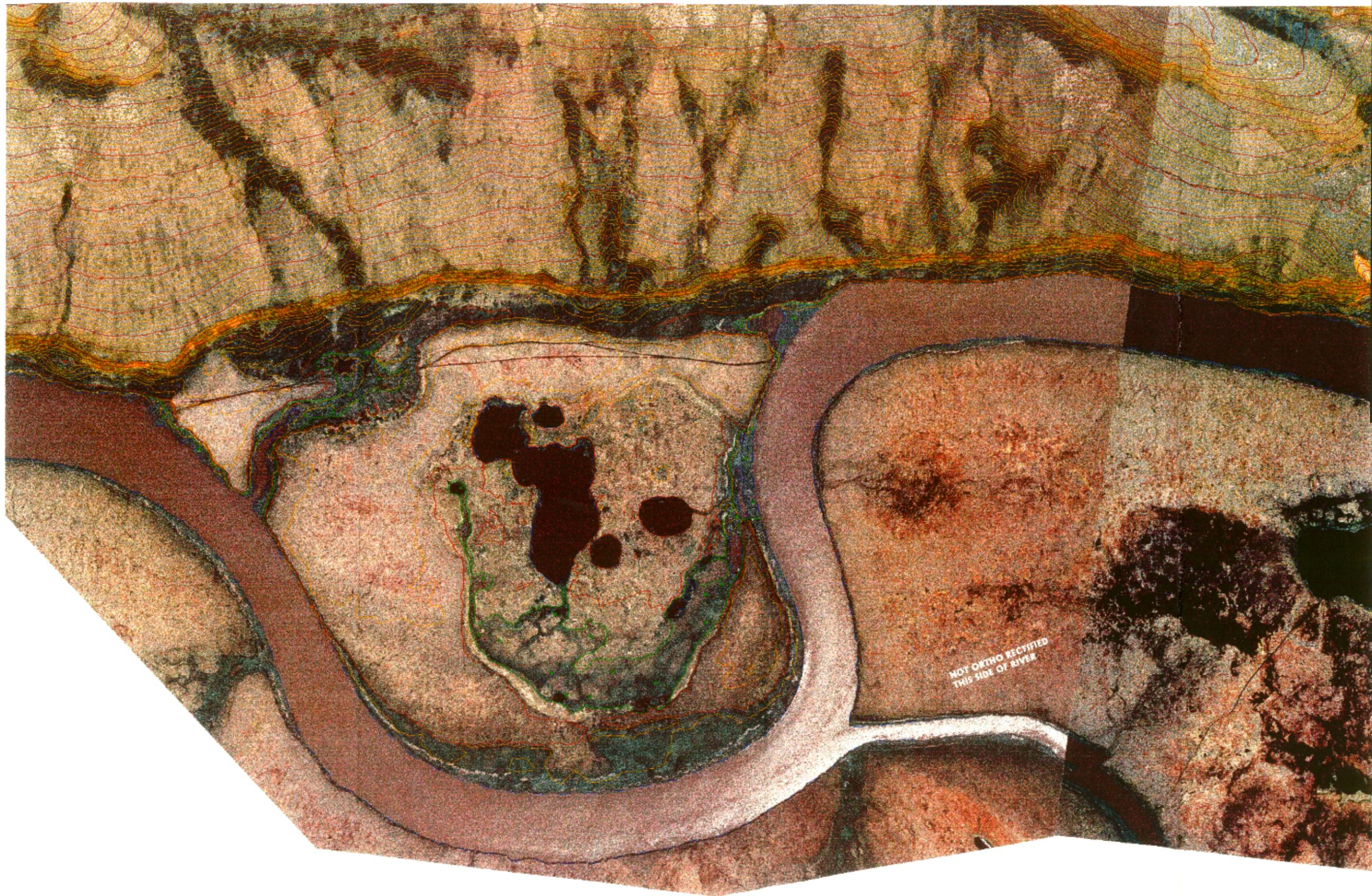
SOURCE: www.topozone.com

SHEET
1

DATE: 08/04
 DRAFTER: SMG
 CHECKED BY: R.G.
 SCALE: N.T.S.

**NIGHTMUTE SOLID WASTE
 MANAGEMENT PLAN/
 FEASIBILITY STUDY
 LOCATION MAP**





MATCHLINE-CONT. ON CONTOUR MAP 1

NOT ORTHO RECTIFIED
THIS SIDE OF RIVER



AERIAL PHOTOGRAPHY, AND TOPOGRAPHIC DATA PROVIDED BY McCLINTOCK LAND ASSOCIATES.
PROPERTY LOCATIONS COMPILED BY SUMMIT CONSULTING SERVICES INC., AND McCLINTOCK LAND ASSOCIATES.

**NIGHTMUTE SOLID WASTE MANAGEMENT PLAN/
FEASIBILITY STUDY**

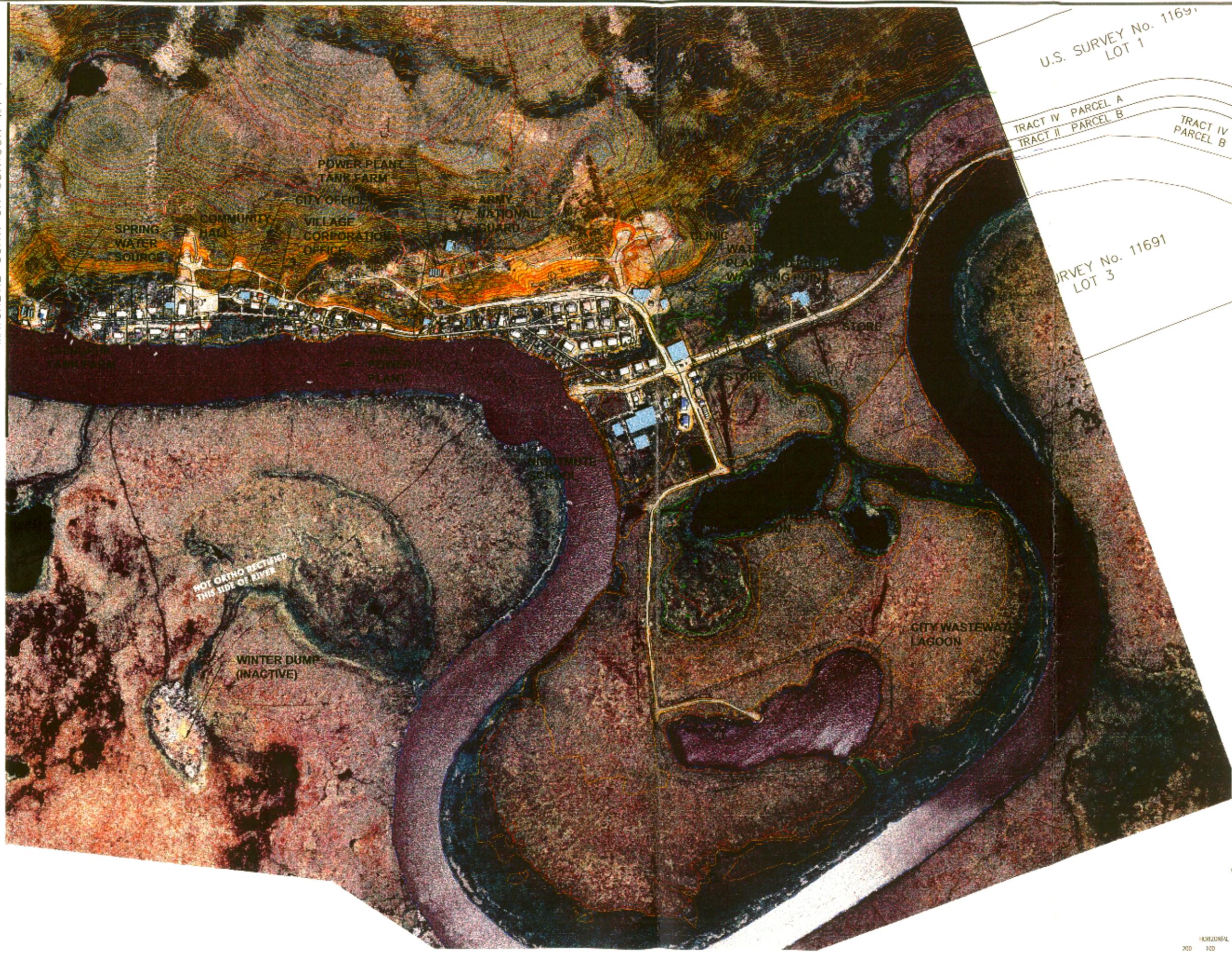
CONTOUR MAP 1



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CHECKED BY: R.G.
SCALE: AS NOTED

MATCHLINE-CONT. ON CONTOUR MAP I



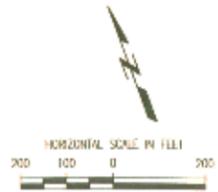
SHEET 3

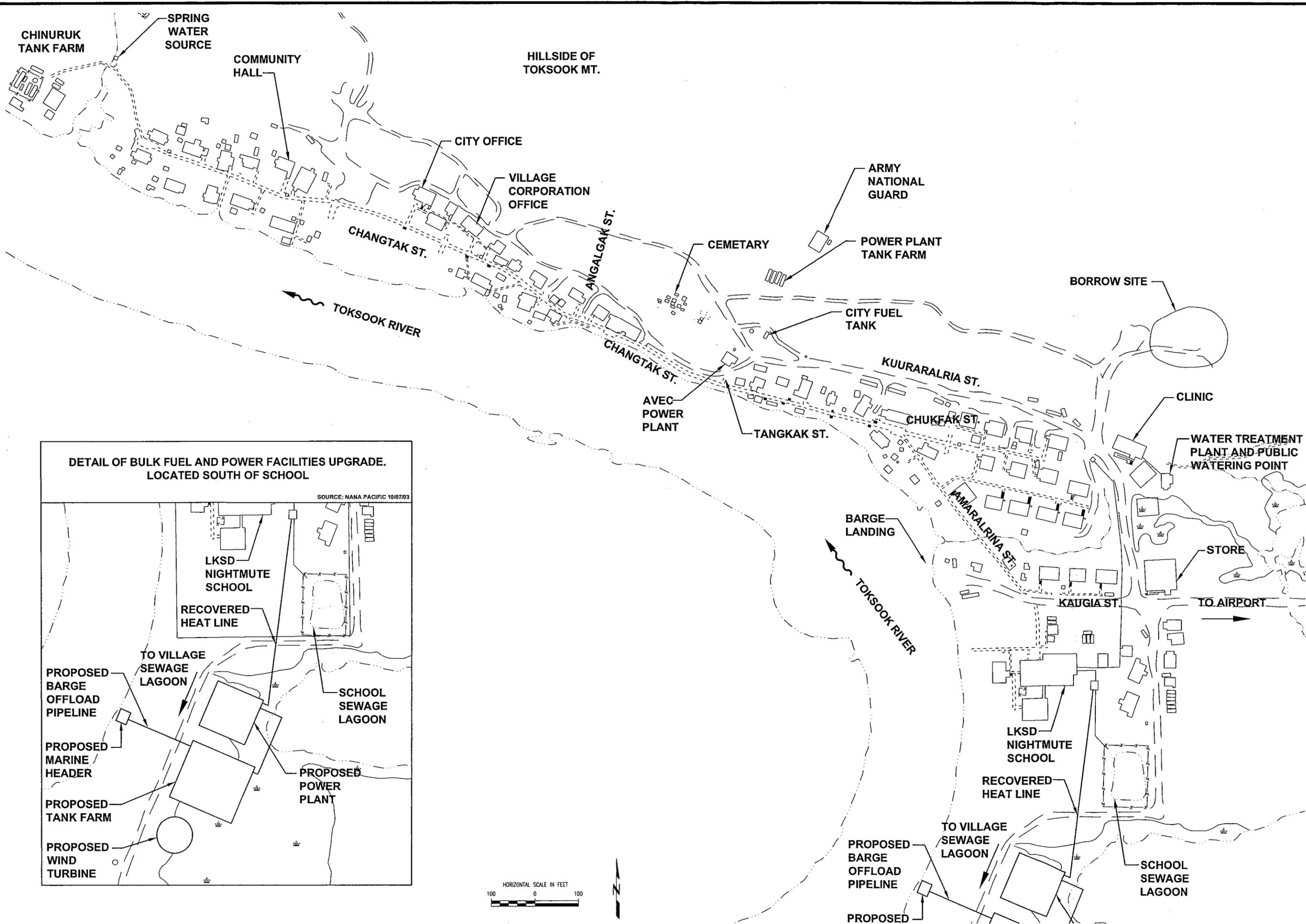
DATE: 08-04
 DRAWN BY: SVG
 CHECKED BY: RG
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**NIGHTMUTE SOLID WASTE MANAGEMENT PLAN/
 FEASIBILITY STUDY
 CONTOUR MAP II**



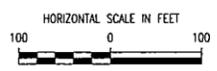
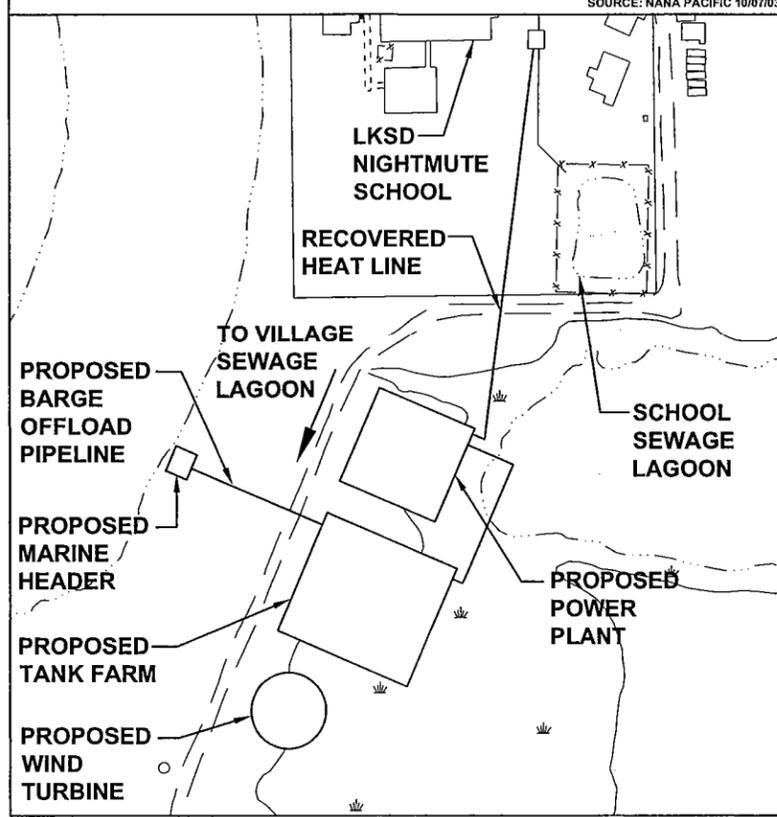
AERIAL PHOTOGRAPHY, AND TOPOGRAPHIC DATA PROVIDED BY McCLINTOCK LAND ASSOCIATES.
 PROPERTY LOCATIONS COMPILED BY SUMMIT CONSULTING SERVICES INC., AND McCLINTOCK LAND ASSOCIATES.





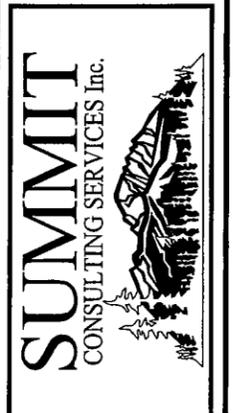
DETAIL OF BULK FUEL AND POWER FACILITIES UPGRADE. LOCATED SOUTH OF SCHOOL

SOURCE: NANA PACIFIC 10/07/03



SHEET 4
 DATE: 08-04
 DRAWN BY: SMG
 CHECKED BY: RG
 SCALE: AS NOTED

**NIGHTMUTE SOLID WASTE MANAGEMENT PLAN/
 FEASIBILITY STUDY**
 COMMUNITY MAP





**SHEET
5**

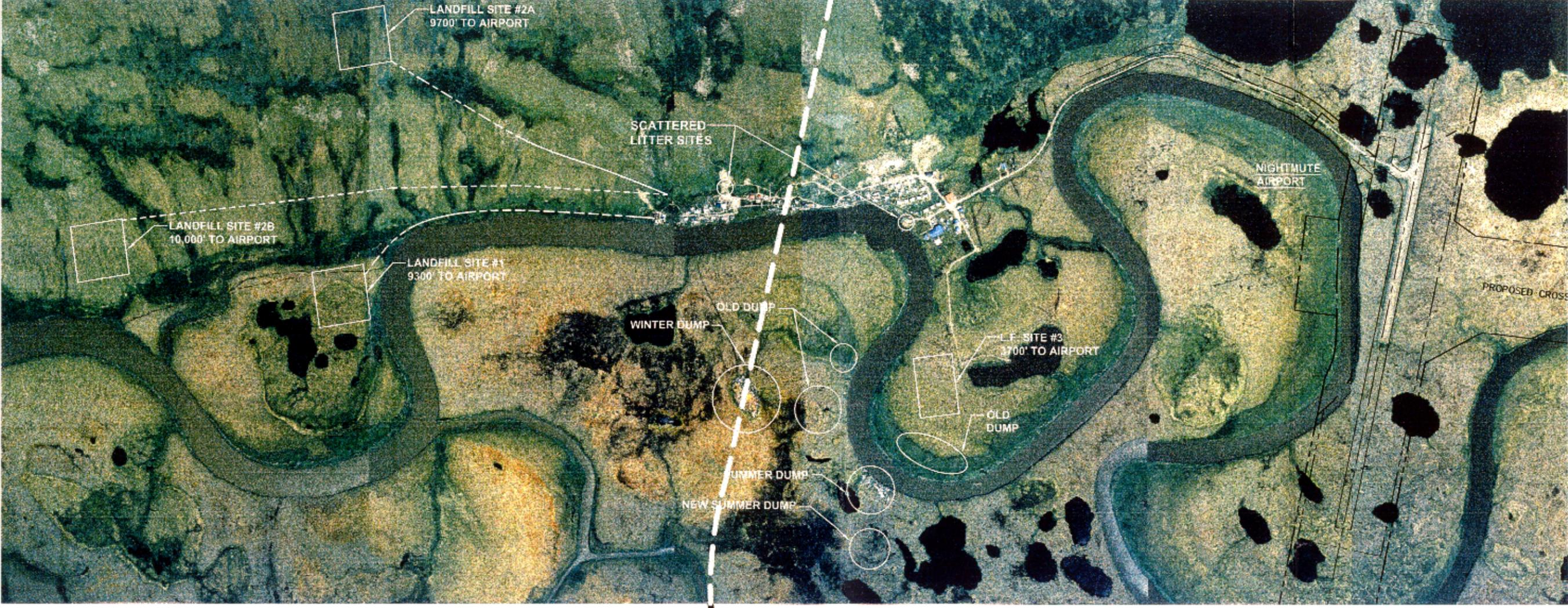
DATE: 08-04
 DRAWN BY: SVG
 CHECKED BY: RG
 SCALE: AS NOTED

**NIGHTMUTE SOLID WASTE MANAGEMENT PLAN/
 FEASIBILITY STUDY**
 ALTERNATIVE LANDFILL SITES
 WITH CONTOURS



SCALE APPROXIMATE BECAUSE OF
 STEREOSCOPIC IMAGE ERRORS

AERIAL PHOTOGRAPHY, AND TOPOGRAPHIC DATA PROVIDED BY McCLINTOCK LAND ASSOCIATES.
 PROPERTY LOCATIONS COMPILED BY SUMMIT CONSULTING SERVICES INC., AND McCLINTOCK LAND ASSOCIATES.



**5000 FEET SEPARATION
BOUNDARY FROM THE
AIRPORT**

**NIGHTMUTE SOLID WASTE MANAGEMENT PLAN/
FEASIBILITY STUDY**

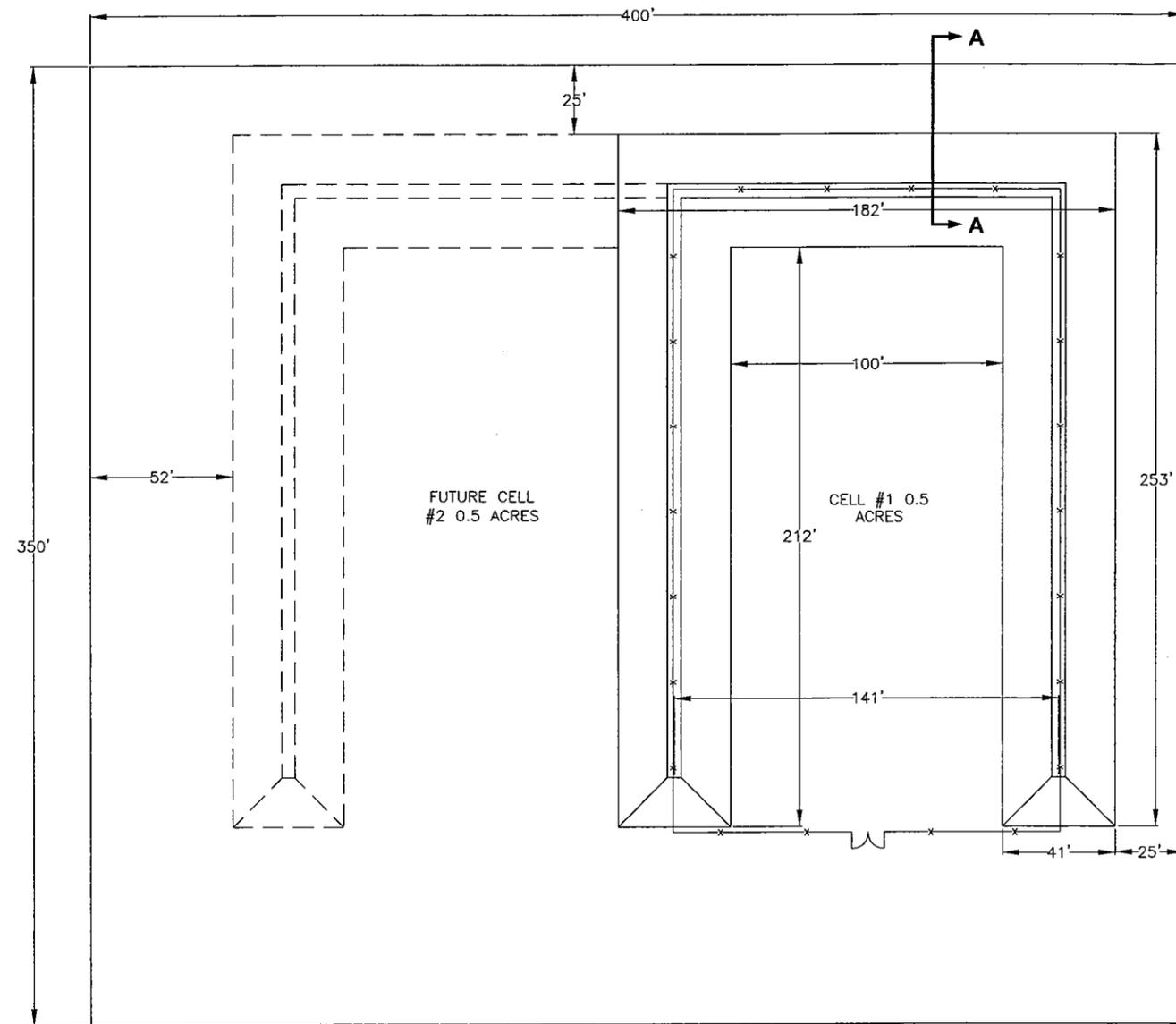
LANDFILL ALTERNATIVES, EXISTING DUMP SITES
AND 5000' SEPARATION BOUNDARY FROM THE AIRPORT



SCALE APPROXIMATE BECAUSE OF
STEREOSCOPIC IMAGE ERRORS

AERIAL PHOTOGRAPHY, AND TOPOGRAPHIC DATA PROVIDED BY McCLINTOCK LAND ASSOCIATES.
PROPERTY LOCATIONS COMPILED BY SUMMIT CONSULTING SERVICES INC., AND McCLINTOCK LAND ASSOCIATES.

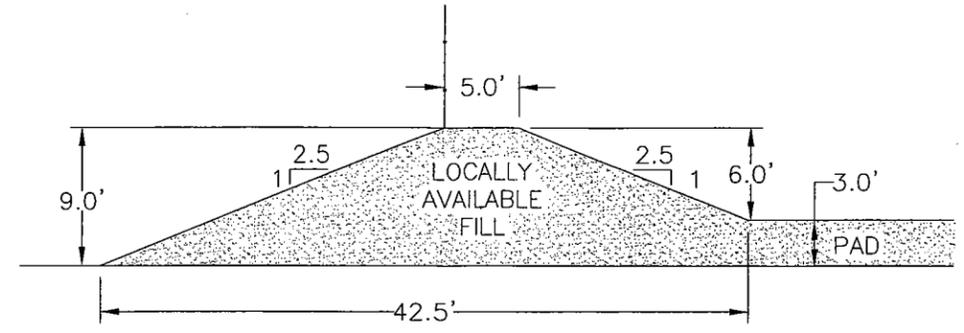
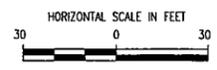
**NIGHTMUTE SOLID WASTE MANAGEMENT PLAN/
FEASIBILITY STUDY**
LANDFILL PLAN VIEW AND CROSS SECTION



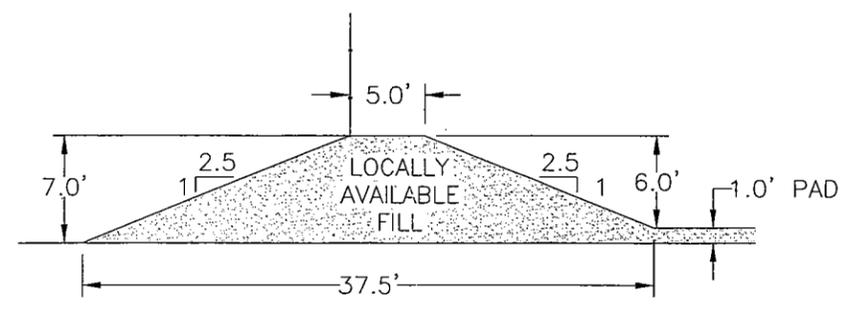
ASSUMES:
3' PAD THICKNESS
6' BERM HEIGHT

FILL QUANTITIES:
◎ BERMS—5,500 CU. YDS
◎ PAD—14,000 CU. YDS
◎ GEO—TEX—125,000 SQ. FT
◎ FENCE—1,000 LIN. FT.

1
7 **LANDFILL DETAIL**
AS NOTED



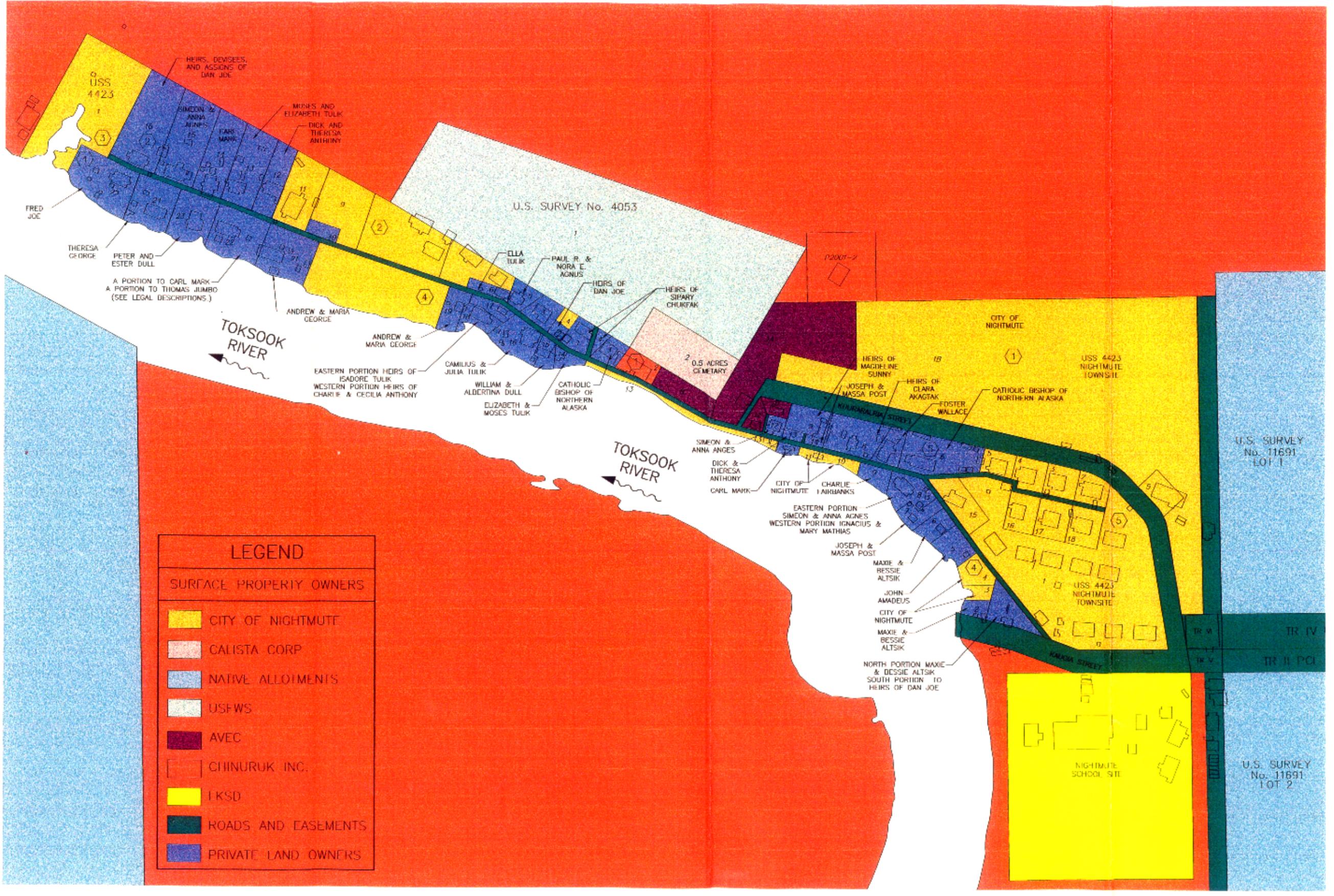
2
7 **SECTION-A
ALTERNATIVE 1 & 3**
SCALE: NTS



3
7 **ALTERNATE #2**
SCALE: NTS

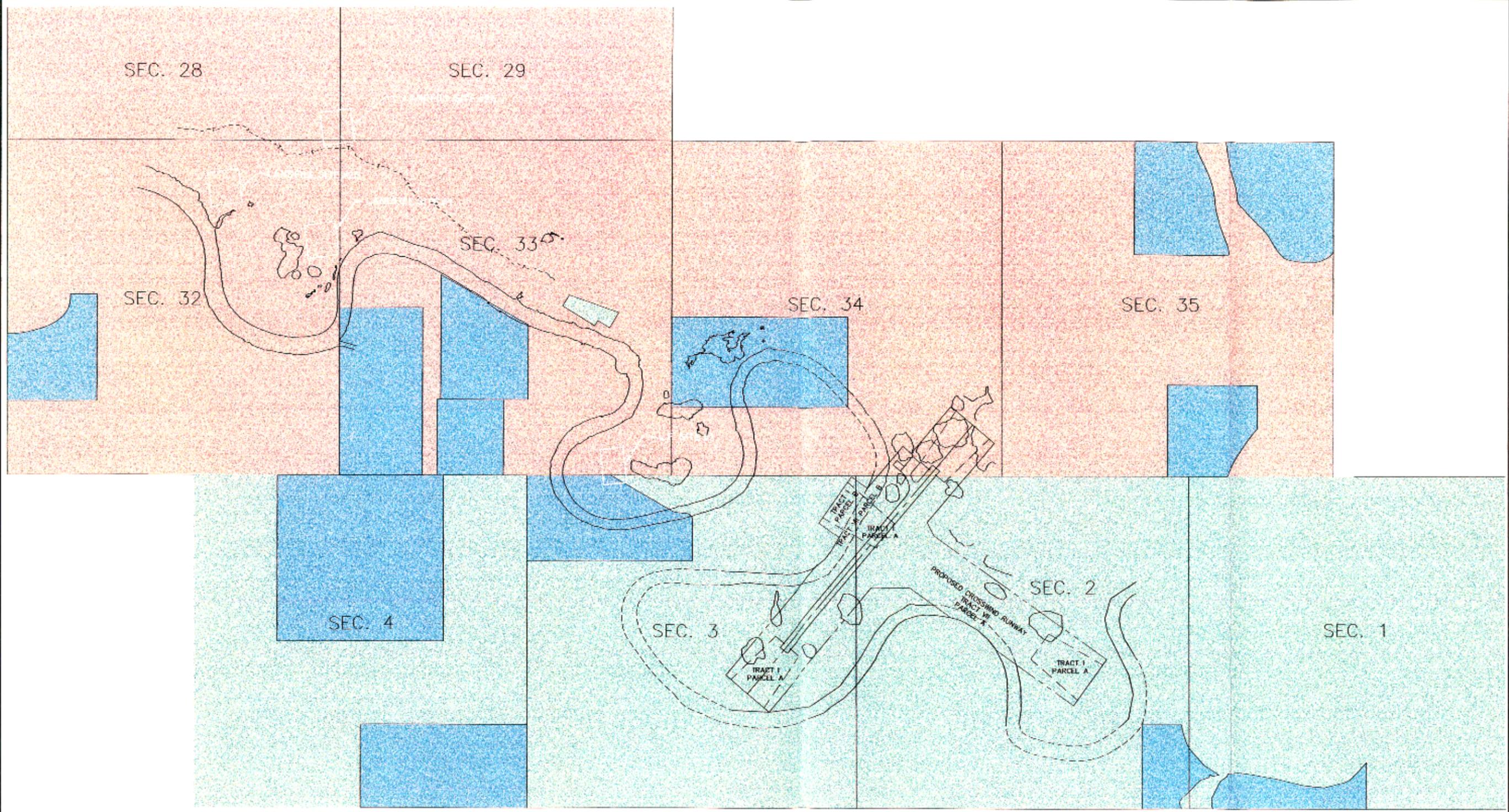
**NIGHTMUTE SOLID WASTE MANAGEMENT PLAN/
 FEASIBILITY STUDY**

SURFACE PROPERTY OWNERSHIP



LEGEND	
SURFACE PROPERTY OWNERS	
[Yellow Box]	CITY OF NIGHTMUTE
[Pink Box]	CALISTA CORP
[Light Blue Box]	NATIVE ALLOTMENTS
[White Box]	USFWS
[Dark Purple Box]	AVEC
[Light Blue Box]	CHINURUK INC.
[Yellow Box]	FKSD
[Dark Green Box]	ROADS AND EASEMENTS
[Blue Box]	PRIVATE LAND OWNERS

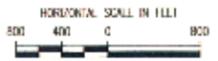




LEGEND	
SUBSURFACE PROPERTY OWNERS	
	CALISTA CORP
	NATIVE ALLOTMENTS
	USFWS

NOTES:

1. THE STRETCH OF RIVERBANK REPRESENTED BY DASHED LINES IS UNSURVEYED. LOCATION IS APPROXIMATE.
2. OWNERSHIP OF WATERBODIES IS NOT INCLUDED WITH THIS MAP. THESE FEATURES HAVE BEEN INCLUDED FOR SITE REFERENCE ONLY.



AERIAL PHOTOGRAPHY, AND TOPOGRAPHIC DATA PROVIDED BY McCLINTOCK LAND ASSOCIATES.
 PROPERTY LOCATIONS COMPILED BY SUMMIT CONSULTING SERVICES INC., AND McCLINTOCK LAND ASSOCIATES.

APPENDIX B

Community Resolution Accepting the Solid Waste Management Plan

CITY COUNCIL OF NIGHTMUTE

RESOLUTION # 04-09

A Resolution accepting the Solid Waste Feasibility Study and Solid Waste Management Plan.

WHEREAS: The Nightmute City Council, hereinafter called the Council, is the governing body of Nightmute, Alaska, and:

WHEREAS: State funds under Senate Bill 2006 (Chapter 1, SLA 02) were made available through the Alaska Department of Environmental Conservation, Village Safe Water Program for a Feasibility Study Nightmute, and;

WHEREAS: The Nightmute Council was presented the Solid Waste Feasibility Study and Solid Waste Management Plan at a Public Meeting on August 27, 2004, and;

WHEREAS: The Nightmute City Council made corrections and/or changes to the Feasibility Study;

NOW THEREFORE BE IT RESOLVED; That the Nightmute City Council accepts the Solid Waste Feasibility Study and Solid Waste Management Plan as presented and corrected and selects the preferred alternative:

Land fill at Hillside Location 2 A.

BE IT FURTHER RESOLVED; that the Council will cooperate with the provisions of needed agreements entered into between the Council and Village Safe Water, and that said provisions will be duly carried out.

I, the undersigned, hereby certify that the Council is composed of 7 members of whom 6, constituting a QUORUM, were present and that the foregoing resolution was PASSED AND APPROVED by the Council of Nightmute Alaska, on August 27, 2004.

Vote: 6 Yeas 0 Nays

Signed [Signature]
Mayor, Chief, Manager
Administrator or President

[Signature]
ATTEST: City Clerk

[Signature]
Council Member

Appendix C

Technical Information

- Water Quality Reports
- Geotechnical Information
- RUBA Reports



200 W. Potter Drive
Anchorage, AK 99518-1605
Tel: (907) 562-2343
Fax: (907) 561-5301
Web: <http://www.sgsenvironmental.com>

Debbie Addie
A D E C-Village Safewater
555 Cordova St.
Anchorage, AK 995012617

Work Order: 1032682
N/A
Client: A D E C-Village Safewater
Report Date: May 30, 2003

Enclosed are the analytical results associated with the above workorder.

As required by the state of Alaska and the USEPA, a formal Quality Assurance/Quality Control Program is maintained by SGS. 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 SGS Project Manager at (907) 562-2343.

The following descriptors may be found on your report which will serve to further qualify the data.

- PQL Practical Quantitation Limit (reporting limit).
- U Indicates the analyte was analyzed for but not detected.
- F Indicates an estimated value that falls below PQL, but is greater than the MDL.
- 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



SGS Ref.# 1032682001
Client Name A D E C-Village Safewater
Project Name/# N/A
Client Sample ID Winter Dump Outlet
Matrix Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time
Printed Date/Time 05/30/2003 14:31
Collected Date/Time 05/15/2003 11:50
Received Date/Time 05/16/2003 8:10
Technical Director Stephen C. Ede

Released By *Heather Steele*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
Metals Department								
Mercury by Cold Vapor	0.000200 U	0.000200	mg/L	EP245.1	(<=0.002)	05/21/03	05/21/03	JAI
Metals by ICP/MS								
Cadmium	0.117	0.100	ug/L	EP200.8		05/22/03	05/24/03	WAW
Lead	0.734	0.400	ug/L	EP200.8		05/22/03	05/24/03	WAW



SGS Ref.# 1032682002
 Client Name A D E C-Village Safewater
 Project Name/# N/A
 Client Sample ID Summer Dump
 Matrix Water (Surface, Eff., Ground)

All Dates/Times are Alaska Standard Time

Printed Date/Time 05/30/2003 14:31
 Collected Date/Time 05/14/2003 14:00
 Received Date/Time 05/16/2003 8:10
 Technical Director Stephen C. Fide

Released By *Weather Hall*

Sample Remarks:

Parameter	Results	PQL	Units	Method	Allowable Limits	Prep Date	Analysis Date	Init
ALS Department								
Mercury by Cold Vapor	0.000200 U	0.000200	mg/L	EP245.1	(≤0.002)	05/21/03	05/21/03	JAL
ALS by ICP/MS								
Cadmium	1.28	0.100	ug/L	EP200.8		05/22/03	05/24/03	WAW
Lead	21.1	0.400	ug/L	EP200.8		05/22/03	05/24/03	WAW

United States Department of Agriculture



Natural Resources Conservation Service
9173 W. Barnes Dr., Ste. C
Boise, Idaho 83709

**SUBJECT: Trip Report Nightmute Floodplain Management
Study, Nightmute, AK, August 19-20, 2002**

DATE: January 8, 2003

TO: Rob Sampson, SCE, Anchorage, AK

Participants:

Steve Becker, DC, NRCS, Bethel, AK
Aimee Rohner, Engineer, NRCS, Anchorage, AK
Rob Sampson, SCE, NRCS, Anchorage, AK
Chuck Dieter, USFWS, AK
Terril Stevenson, Geologist, NRCS, Boise, ID

Background:

Nightmute is a traditional Yup'ik Eskimo Village on Nelson Island in western Alaska about 100 miles west of Bethel. Nightmute is located mainly on the north side of the Toksook River about 18 miles upriver from Toksook Bay in the Bering Sea.

I visited Nightmute with the above listed participants at the request of the Alaska NRCS State Conservationist and State Conservation Engineer to provide assistance with geologic structural and geomorphic interpretation in support of a Floodplain Management Study.

The village and surrounding area were inspected on foot, by boat, and by light aircraft. Three primary resource concerns with associated impacts to local residents were discussed:

1. Flooding
 - a. Homes directly along the river, mainly on the downstream end of town.
 - b. Village Fuel Tank Farm located at the far downstream end of the townsite.
2. River Bank Erosion
 - a. Impacting summer dump site (actively eroding into the river).
 - b. Threat to the road between Nightmute and the airstrip.
 - c. Impacts to the village school property.
 - d. Barge loading and unloading area.
 - e. Sloped banks following erosion episodes creates difficult river access.
3. Subsidence/creep of village area toward river.
 - a. Impact to homes/foundation supports.
 - b. Changes in wet areas around homesites (access). *Shallow groundwater flooding.

Observations:

1. Soils

The soils along the river in the areas of bank erosion concern appear to consist mainly of sandy silt. The upper 12 to 24 inches are brown to gray silt and sand. At 12 to 24 inch depth is a layer referred to locally as "blue clay" that appears to be a compacted silt layer with a probable significant volcanic ash component. Below the compacted silt layer is a blue-gray "slick" clayey silt that also appears to contain significant amounts of ash. The compacted layer probably serves to hold water in the upper 12 to 24 inches of the soil profile (acts as an aquitard).

2. Geology

The hills behind Nightmute that form the Upper Toksook River catchment are Quaternary and Tertiary Age basalt. Pillow structures, columnar jointing development, and platy, nearly vitrophyric (glassy) rocks were observed. The upper watershed appeared from the air to be developed in a series of anticline and syncline (folds) terrain, with the main stem river occupying the valley portion of a syncline (downwarp in a fold). Slopes in the upper watershed exhibit evidence of "solifluction" – freeze-thaw creep or flow of surface materials downslope resulting in lobate min-terraced (terraces) slopes.

The Village sits at the contact point between the folded volcanics that form the hills to the north, and the flat, tidal influenced plain to the south. The tidal flat is developed in interbedded Quaternary (very recent) marine deposits (shallow sea floor) and terrestrial sediments (fluvial materials) deposited by the Yukon-Kuskokwim River deltas and lesser, distributary streams.

The contact between the basalt hills and the tidal flat area is probably fault influenced. The back-slopes of the hills and terrain in the upper watershed are flatter than the hillslope directly behind the village. The hillslope directly north of Nightmute appears to be a fault scarp with subsequent landslide or slumping. A "spring line" of flowing springs, small ponds and wet areas along the toeslope directly north of the village is further evidence that may indicate faulting in the area. The steep unstable slope and landsliding may be partially the result of tectonic activity (faulting) related to the apparent folding in the upper watershed.

The slope and the toe area on which the village sits appear to be a large rotational slump block. The boulder deposit that separates the downstream side of the village from the two "upper" sections is slumped material from the slopes above Nightmute. There is a steep escarpment that runs along the entire south face of the ridge. The escarpment is the backslope of the slide area. The entire slope appears to be active still, with numerous seeps, vertical scarps, bulging soil deposits, and disrupted shallow ground water. Sag ponds exist at the base of the escarpment. The entire ridge or hill exhibits evidence of ongoing surface creep and small-scale instability. Local active scarps or vertical separations from 1 to 4 feet were observed everywhere along the slope. Perched water is evident in small sag ponds, wet-boggy areas, springs, and seeps. The toeslope exhibits a "spring line" along most of the hill, evidenced by flowing springs and hydrophytic (wetland) vegetation. In fact, the village water is obtained from this source. The Toksook River appears to be slightly displaced at the toe of the slumped area. The river meander that intersects the toeslope is constrained on the north and flattened into a long, straight section against the toeslope. The majority of the village occupies the toeslope deposits immediately adjacent to this compressed meander.

The toeslope area is also where the majority of shallow groundwater associated with the landslide material collects. This is evidenced by wet areas along the toe and ponded water associated with any construction activity that disrupts shallow and surface flows between the slope and the river.

3. Groundwater

Deeper groundwater recharge is mainly from rain and snowmelt water in the upper watershed. Deep groundwater may contribute to the springs and village water sources as the groundwater flows intersect geologic contacts and fault zones associated with the hillslope north of Nightmute.

There is little evidence of surface water flow or developed drainage paths (streams) off the majority of the hillslope area. Most of the precipitation probably infiltrates directly into the fractured bedrock or is stored in the soil-vegetation mat. Soils are very shallow to bedrock. The bedrock appears to be moderately to highly fractured. The surface zone of fractured basalt is probably the primary reservoir for groundwater recharging the springs north of the village.

Surface recharge is associated with "Tundra" soils and vegetation that act as a "sponge" to hold dramatic volumes of water in shallow aquifers as snows melt and spring rain collects on the surface. Later in the summer and fall, water is released slowly from the "sponge". The village springs are probably also influenced and recharged in part by surface ponding (sag ponds) associated with the slumping activity along the hillslope.

Wet areas in and adjacent to the village are associated with disruption of shallow groundwater and surface flow from the slopes to the river. Construction of roads and walkways, and building pads involving fill and leveling of soil materials creates small, localized "dams", changing shallow groundwater flowpaths and resulting in wet, boggy, and ponded water areas. These wet areas become nuisance zones for travel, land use and management.

4. River Processes

Observed river banks adjacent to Nightmute were steeply sloped to nearly vertical with very little associated woody vegetation. Cracks and subsidence associated with "blocks" of bank material along the river were noted. The unstable bank areas did not coincide with outside curves in meanders, but instead were located along all sections of the river, on inside bends, outside bends and in crossovers and straight sections. The River bank erosion that is occurring does not appear to be primarily a fluvial process (not the result of river flow). It appeared that the compressed, ashy blue "clay" had a higher shrink-swell potential than the other soil layers. When exposed in the river banks it swells or "heaves" either with saturation or freeze-thaw activity. This pushes the soil up and out toward the exposed face or river bank. The newly disturbed soils fail in large wedges, sliding into the river along the ashy-compressed silt layer. These wedges look like "clumps" of bank "eroding" into the river. The clumps remain in the river along the bank areas for long periods of time. The river does not exhibit sufficient energy to break down and remove or transport the materials effectively. Storm surges associated with late-summer and fall winds off the Bering Sea destroy and transport some of the materials, but there were many blocks with multiple years of shrub growth observed. This indicates less sediment transport activity than initial appearances might indicate. The bank soil materials are highly active, but the cumulative

effects do not appear to be severe. Comparison of bank position and shapes using different aged aerial photographs does not indicate significant retreat of streambanks in the Nightmute area. The shrink-swell and soil heaving activity may be re-occurring seasonally in the same wedges rather than involving large volumes of "new" material each season.

Conclusions:

River bank erosion that is occurring does not appear to be primarily a fluvial process (not the result of river flow). It appears that heaving of exposed compressed silty clayey soil in the river banks is the dominant physical process resulting in bank instability. The river does not exhibit sufficient energy to break down and remove or transport the materials effectively. The bank soil materials are highly active, but the cumulative effects do not appear to be severe. The shrink-swell and soil heaving activity may be re-occurring seasonally in the same wedges rather than involving large volumes of "new" material each season. Treatment alternatives should focus on minimizing soil surface exposure. Since the process does not appear to be related to stream energy, treatments that alter the flow energy or transport capacity will not have much effect. Vegetation alone will probably not be very effective. Treatment should address stabilizing the soil materials as a whole – keeping "blocks" of material in-place. Treatment should address the "heaving" nature of the materials, not fluvial (river) processes.

Subsidence/creep of village area toward river is occurring. The area has been an active slump and slope creep area for a long time – probably over a period of hundreds of years. While the slope is active, there was no evidence at this time to indicate any large-scale threat to the village from catastrophic slope failure. The large-scale landsliding that has already occurred probably happened in conjunction with or in response to probable tectonic activity that formed the hills and upper Toksook River watershed. There is no treatment that will stop the observed slope creep effects. New construction should include practices and considerations to minimize the effects. Leveling and filling for construction of building pads, roadways and walkways should not be completed without providing drainage for shallow groundwater and surface water from the slope toward the river. Some of the observed "changes" in groundwater are actually new wet areas resulting from flow disruption following development of pathways, roadways, and building pads. Any construction along the toeslope should include plans for on-going maintenance to re-set and re-level building supports as movement occurs slowly over time.

Terril Stevenson
Geologist, NRCS Idaho



Duane Miller & Associates Arctic & Geotechnical Engineering

9720 Hillside Drive, Anchorage, Alaska 99516

(907) 346-1021, Facsimile No. 346-1636

February 2, 1995

Village Safe Water
3601 C St., Suite 310
Anchorage, AK 99503

Attention: Mike Wolski

Subject: Geotechnical Report
Roadway and fencing improvements
Sewage lagoon, Nightmute, Alaska
DM&A Job No. 4135.01

This letter presents the results of the geotechnical exploration we performed for the new roadway and fencing you are proposing to construct in Nightmute. The proposed roadway will be about 500 feet long and will connect the main village road with the lagoon site, an existing lake. The fence will enclose the lagoon site. The location of the proposed work is shown on Plate 1, Probe Locations.

The object of the soil investigation as outlined in our agreement dated October 10, 1994, was to explore the soil, permafrost and ground water conditions along the proposed road and fence area. Using this data you will perform the geotechnical engineering for the project.

We explored the subsurface conditions on October 17 and 18, 1994, during a trip to Nightmute for a geotechnical exploration for a housing project. The field exploration consisted of probing, logging and sampling four test probes at the locations shown on Plate 1. Because of the soft surface soils, auger drilling was not feasible because of the severe caving. A tripod and cathead system was used to drive a standard sampler in the near surface soils and to probe the deeper soils. The cathead and hammer probing was accomplished by driving "E" rod into the soil with a 140 pound hammer free-falling 24 to 30 inches.

Samples of the soils were obtained at the locations shown on the Logs of Probes, Plates 2 and 3. The soils have been classified in accordance with the Unified Soil Classification System described on Plate 4. Standard Penetration Test (SPT) samples were obtained by driving a 1.4 inch inside diameter sampler into the undisturbed soil at the bottom of the hole with a 140 pound hammer free-falling 30 inches. The number of blows required to advance the sampler the final 12 inches of an 18-inch drive is the N-Value of the soil and is presented on each log. The samples were sealed in heavy duty plastic bags to preserve their moisture and transported to the laboratory in Anchorage.

In the laboratory the samples were re-examined to verify the field classifications and tested to measure their moisture content and salinity. The results of the laboratory tests are presented on the boring logs opposite the samples tested.

The proposed roadway occupies both developed and vacant land lying between the existing, raised road to the north and the lake to the south. The northern end of the route has been filled with silty gravel to form building pads and vehicle parking areas. The rest of the route is undeveloped and vegetated with dense grass to two feet tall. A shallow drainage crosses the site from northeast to southwest. The site is relatively flat except near the lake where it slopes down to the water about three feet below the general terrain level. The area around the lake is brushy. The school's existing sewage disposal pond lies near the south end of the site near the lake. At the time of our visit, the lake was covered with ice two to three inches thick.

Relatively uniform soils were encountered with the exception of the filled area near the road where Probe 4 was made. The soils consist of a thin veneer of organic soil on the order of two to four inches thick overlying silt. At Probe 4, the fill pad consists of silty gravel 1.5 feet thick. The underlying silt is soft and wet. Permafrost was encountered at 1.5 feet in the probes except at the fill pad where it was encountered at 5 feet. The relatively low resistance to the drive probe suggests that much of the frozen soil is poorly bonded.

Moisture contents measured in the laboratory ranged from 31% to 83%. Pore water salinities ranged from 0.8 to 4.8 parts per thousand (ppt). A salinity of 5 ppt depresses the freezing point by about $1/2^{\circ}$ F. Ground temperatures measured during previous work near the school (Clarke, 1988) showed temperatures at a depth 16 feet of 31.3° F. to 30.6° F. depending on the time of winter. Obviously only slight amounts of salinity are needed to result in an unfrozen or poorly frozen condition.

Based on the probes and laboratory data, we conclude that the site is underlain by marginally frozen, fine grained soil. The soil has low to moderate salinity and a temperature close to the thaw point. The natural active layer where the vegetated ground is undisturbed is on the order of 1.5 to 2 feet thick. The placement of a gravel fill on the surface will thicken the active layer. At the thin fill we explored at Probe 4, the active layer had penetrated two feet more into the natural ground than at the undisturbed locations. Although no massive ice was observed at shallow depths, some thaw settlement will occur after construction of the roadway because of the deepening of the annual thaw depth.

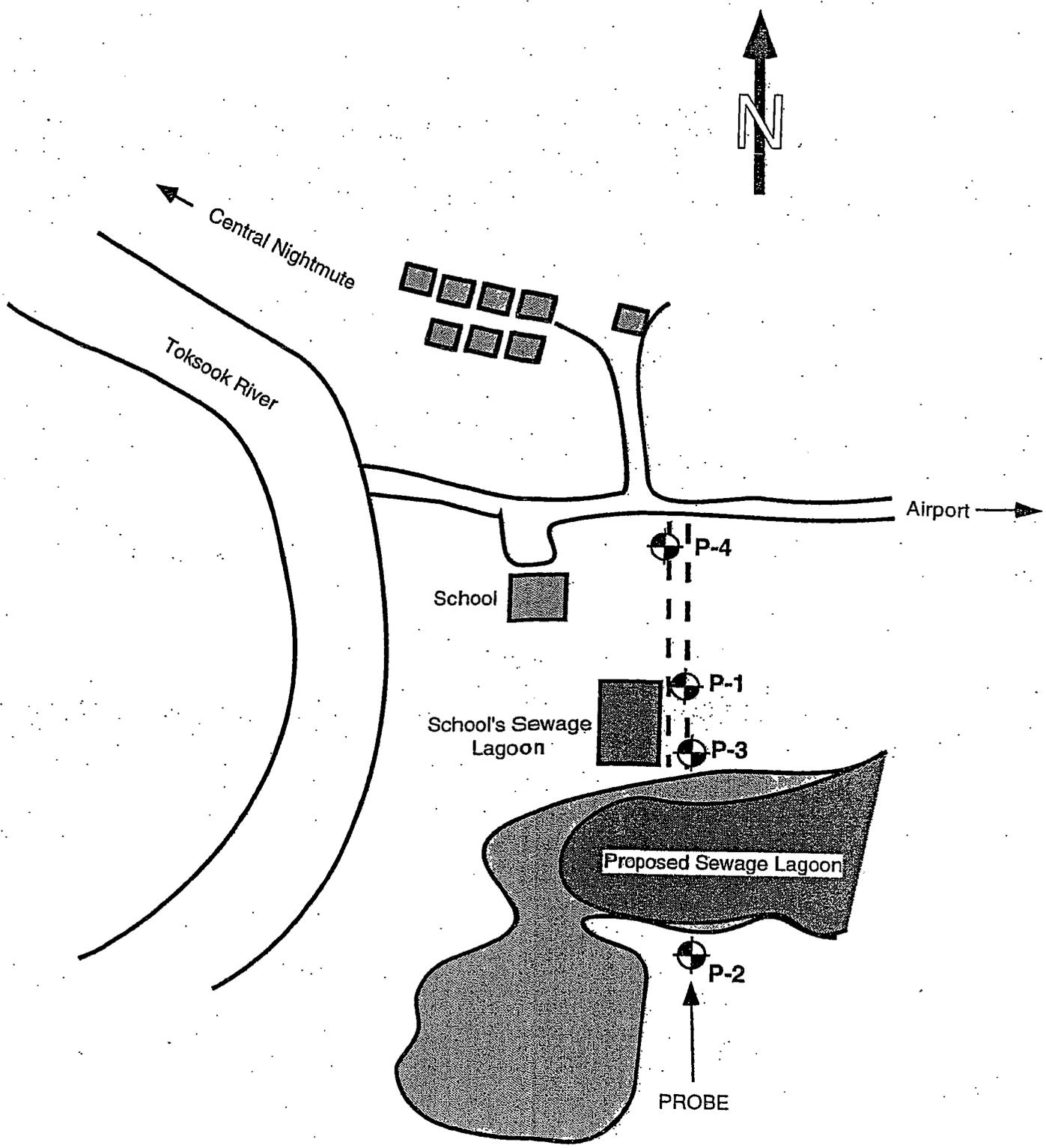
Please call me if you have questions.

Very truly yours,



Duane L. Miller, P.E.

Attachments : Plate 1, Probe Locations
 Plates 2 and 3, Logs of Probes
 Plate 4, Soil and Ice Classification System



From Aerial Photograph, 1" = 250'±



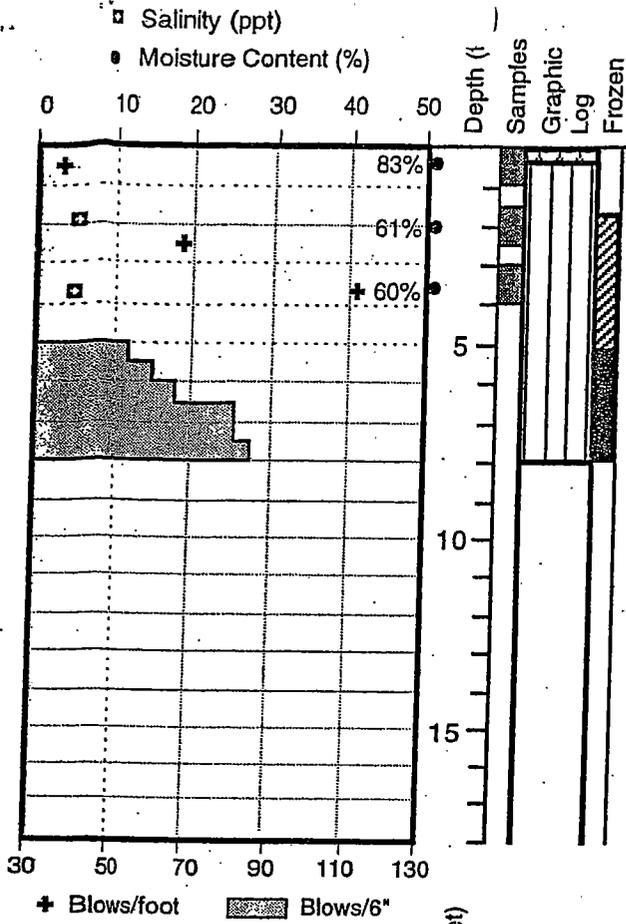
Duane Miller & Associates
 Arctic & Geotechnical Engineering
 145 North 40th Street

PROBE LOCATIONS
Sewer Pond Access Road and Fence
 & Nightmute, Alaska

Plate

LOG of PROBE 1

Drilled: 10/18/94
 Tripod & Cathead w/140# Hammer



Description

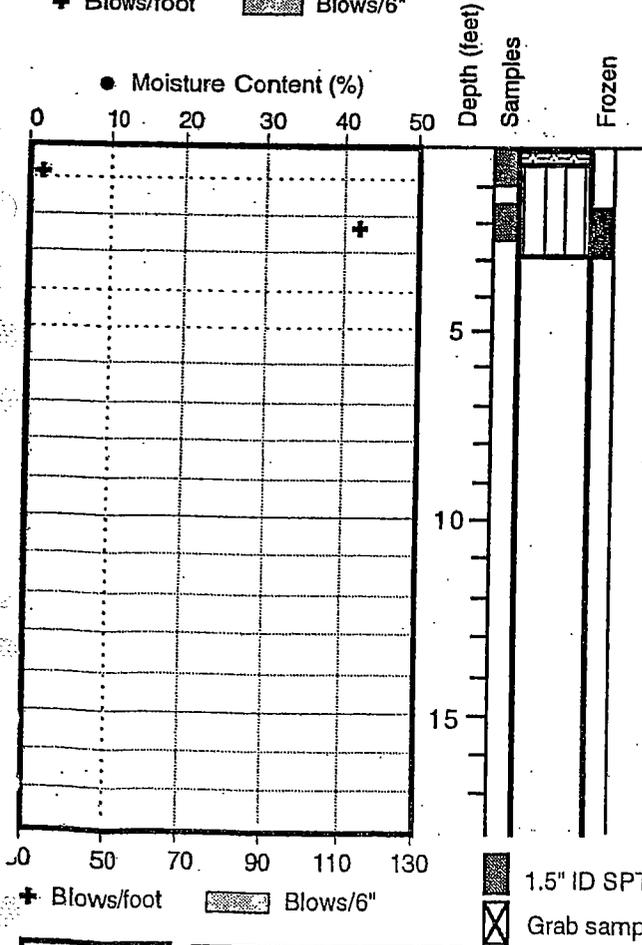
Other Testing

BROWN PEAT and ORGANIC SILT (Pt-OL) Soft, wet
GREY SILT (ML) Soft, wet
 Partially bonded (Vx) at 1.5', w/ small visible ice crystals, Well bonded (Vx) at 3'

Probe with 140 lb. drop hammer free falling 24" ±6" and "E" rod

Sampling Data

Depth	N (blows/ft.)
0-1.5'	3
1.5'-3.0'	18
3.0'-4.5'	41



Description

Other Testing

RED BROWN ORGANICS (Pt) Soft, wet
GREY SANDY SILT (ML) Soft, wet
 Frozen at 1.5'

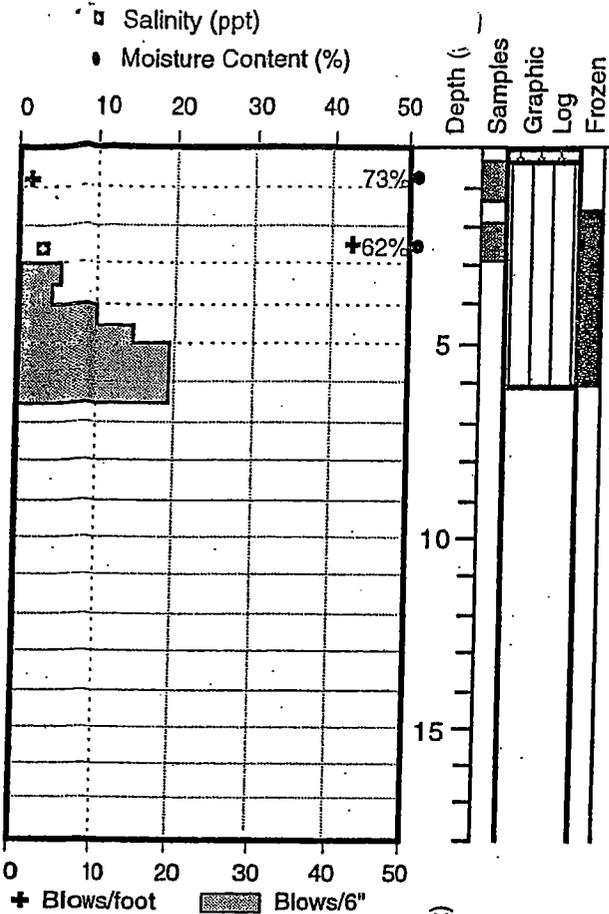
Sampling Data

Depth	N (blows/ft.)
0-1.5'	2
1.5'-3.0'	43

■ 1.5" ID SPT sample
 ⊗ Grab sample

LOG of PROBE 3

Drilled: 10/14/94
 Tripod & Cathead w/140# Hammer



Description

RED BROWN ORGANICS (Pt) Soft, wet
GREY SANDY SILT (ML) Soft, wet, Frozen (Vx) at 1.5', w/ occasional clear horizontal ice lenses to 1/8" thick, Probe with 140 lb. drop hammer free falling 24" ±6" and "E" rod

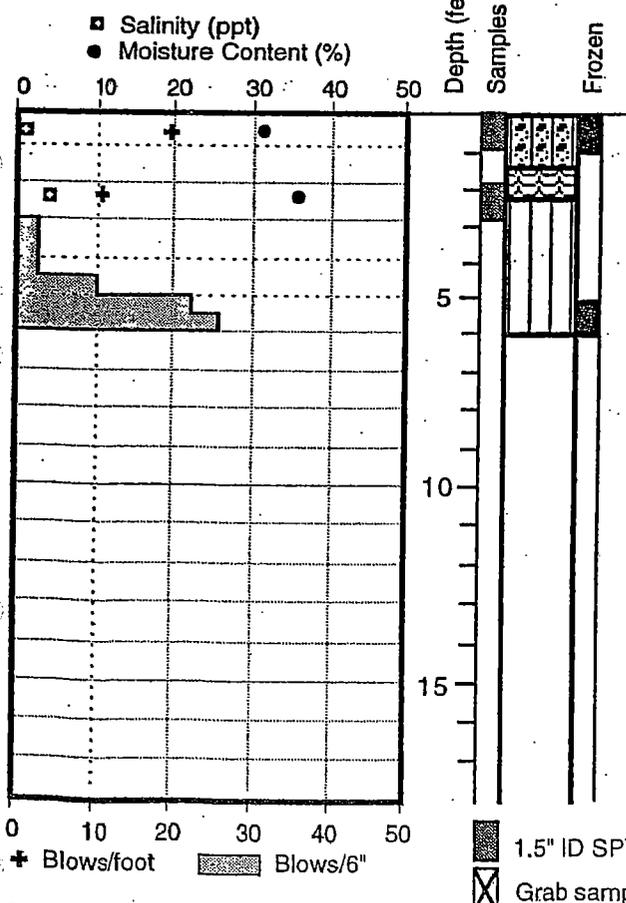
Other Testing

Sampling Data

Depth	N (blows/ft.)
0-1.5'	2
1.5'-3.0'	43

LOG of PROBE 4

Drilled: 10/18/94
 Tripod & Cathead w/140# Hammer



Description

BROWN SILTY GRAVEL (GM) Fill, Frozen to 12"
PEAT and ORGANICS (Pt-OL)

GREY SANDY SILT (ML)
 Medium dense, wet, Probe with 140 lb. drop hammer free falling 24" ±6" and "E" rod
 Frozen at 4.5'

Other Testing

Sampling Data

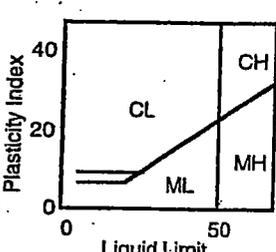
Depth	N (blows/ft.)
0-1.5'	19
1.5'-3.0'	11

1.5" ID SPT sample (shaded area)
 Grab sample (X)



Duane Miller & Associates
 Arctic & Geotechnical Engineering
 Job No.: 4135.01

LOGS of PROBES 3 and 4
Sewer Pond Access Road and Fence
 Nighthute Alaska

MAJOR DIVISIONS		SYMBOL	TYPICAL NAMES		
COARSE GRAINED SOILS More than 50% larger than #200 sieve, > 0.075 mm	GRAVELS More than half of the coarse fraction is larger than #4 sieve size, > 4.75 mm.	Clean gravels with little or no fines	GW  Well graded gravels, sandy gravel		
		Gravels with more than 12% fines	GP  Poorly graded gravels, sandy gravel		
		SANDS More than half of the coarse fraction is smaller than #4 sieve size	Clean sands with little or no fines	GM  Silty gravels, silt sand gravel mixtures	
			Sands with more than 12% fines	GC  Clayey gravels, clay sand gravel mixtures	
	FINE GRAINED SOILS >50% finer than #200 sieve, 0.075 mm	SILTS and CLAYS Liquid limit less than 50	Clean sands with little or no fines	SW  Well graded sand, gravelly sand	
			Sands with more than 12% fines	SP  Poorly graded sands, gravelly sand	
			SILTS and CLAYS Liquid limit greater than 50	Silty sand, silt gravel sand mixtures	SM  Silty sand, silt gravel sand mixtures
				Clayey sand, clay gravel sand mixtures	SC  Clayey sand, clay gravel sand mixtures
Plasticity Chart 		ML  Inorganic silt and very fine sand, rock flour			
		CL  Inorganic clay, gravelly and sandy clay, silty clay			
		OL  Organic silts and clay of low plasticity			
		MH  Inorganic silt			
CH  Inorganic clay, fat clay					
	OH  Organic silt and clay of high plasticity				
HIGHLY ORGANIC SOILS		Pt  Peat and other highly organic soil			

UNIFIED SOIL CLASSIFICATION SYSTEM

GROUP	ICE VISIBILITY	DESCRIPTION	SYMBOL	
N	Segregated ice not visible by eye	Poorly bonded or friable	Nf	
		Well bonded	No excess ice	Nb
			Excess microscopic ice	
V	Segregated ice is visible by eye and is one inch or less in thickness	Individual ice crystals or inclusions	Vx	
		Ice coatings on particles	Vc	
		Random or irregularly oriented ice	Vr	
		Stratified or distinctly oriented ice	Vs	
ICE	Ice greater than one inch in thickness	Ice with soil inclusions	ICE + soil type	
		Ice without soil inclusions	ICE	

ICE CLASSIFICATION SYSTEM



REPORT ON SUBSURFACE SOIL
AND FOUNDATION DESIGN

RECOMMENDATIONS FOR A WATER
AND SEWER SYSTEM

Prepared For:

The City of Nightmute
Nightmute, Alaska 99690

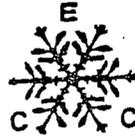
and

Meridian Engineering
P.O. Box 102695
Anchorage, Alaska 99510

Prepared By:

Clarke Engineering Company
1818 So. University Avenue, Suite 9
Fairbanks, Alaska 99709

Feb. 1988



CLARKE ENGINEERING COMPANY

1818 SOUTH UNIVERSITY AVENUE, SUITE 9 FAIRBANKS, ALASKA 99709
(907) 479-6033

February 19, 1988

Meridian Engineering
P.O. Box 102695
Anchorage, Alaska 99510

Attn: Mr. Roy Barkwell

Re: Nightmute Water and Sewer Report
Updated Nightmute Temperature Data

Dear Mr. Barkwell:

Enclosed are 3 copies of our updated Temperature Data Sheet for the Nightmute Water and Sewer Report. This sheet includes the latest temperature data obtained from Nightmute on February 5, 1988. This data confirms our conclusion in the report that the permafrost temperature is just slightly below 32 degrees Fahrenheit. Please replace this sheet with the Temperature Data sheet found on page 29 of our report.

Thank you for your assistance. Should you have any questions please contact our office.

Sincerely,

CLARKE ENGINEERING CO.

Edwin S. Clarke, P.E.
Owner

ESC/agp

Enclosures

NIGHTMUTE TEMPERATURE DATA

TB-4 INTERSECTION

Depth	January 15, 1988 Soil Temperature	February 5, 1988 Soil Temperature
Air Temp + 5.8	9.9	19.6
Air Temp + 1.8	9.6	19.4
G L		
- 2.2	32.0	29.5
- 6.2	31.7	31.6
-10.2	31.4	31.3
-14.2	31.5	31.5

TB-6 END OF TOWN

Depth	Soil Temperature	Soil Temperature
Air Temp + 1.2	9.1	18.9
G L		
- 2.8	31.7	28.7
- 6.8	32.1	32.1
-10.8	31.8	31.8
-14.8	32.0	31.9
-18.8	31.9	31.8

TB-9 EAST OF CITY HALL

Depth	Soil Temperature	Soil Temperature
Air Temp + 1.5	10.15	21.7
- 2.5	32.5	31.6
- 6.5	32.6	32.2
-10.5	31.9	30.8
-14.5	32.3	32.2
-18.5	32.0	32.0

TB-14 HIGH SCHOOL

Depth	Soil Temperature	Soil Temperature
Air Temp + 3.8	11.6	20.7
- 0.2	12.7	19.3
- 4.2	32.3	31.8
- 8.2	31.2	31.3
-12.2	31.5	30.7
-16.2	31.3	30.6

TABLE OF CONTENTS

	Page
Introduction	1
Field Program	1
Office Investigation	1
Results	2
Sewage Treatment Plant	3
Recommendations and Conclusions	3
Design Options	5
Limitations	6
References	7
Appendix A - Boring Logs and Location Maps	8
Appendix B - Thermal Data	29
Appendix C - Photos	30

INTRODUCTION

In accordance with our discussions with Mr. Roy Barkwell of Meridian Engineering and Mr. Harry Tulik of the City of Nightmute, we have performed a subsurface soils investigation. The purpose of this investigation was to assist in design of the Nightmute water and sewer system. Our proposal outlined the scope of work and the assistance needed from the City of Nightmute to accomplish this investigation. The work was authorized by the signing of a contract between the City of Nightmute and Clarke Engineering Co. dated November 19, 1987. Notice to proceed was issued by the City verbally to Mr. Roy Barkwell who forwarded it to us by telegram dated December 2, 1987.

FIELD PROGRAM

The field program was accomplished during the period December 7 through 11, 1987 and consisted of 14 augered test borings made with our skid-mounted Mobile B-24 drill. All of the borings were observed and logged by Mr. Ed Clarke of Clarke Engineering Co. and all material removed from the boring was examined by him. Drilling was performed by Mr. Benjamin Chagluak who was assisted by a number of other City employees.

The soil conditions encountered in the test borings are shown in the enclosed boring logs. Moisture samples were obtained at selected locations in the test borings and were returned to our laboratory for moisture content determination and further identification. Four selected samples were forwarded to the A.W. Murfitt Company for salinity and hydrometer analysis. The laboratory results are shown on the boring logs. The logs show specific conditions encountered at the test location. Subsurface conditions may vary in other portions of the property.

Thermistor strings manufactured by E-Tech Systems were installed in four of the test borings. We were unable to read these in December, however thermal data was obtained on January 15, 1987. The subsurface temperatures are shown in Appendix B. We anticipate that additional data will be obtained in early February of this year.

OFFICE INVESTIGATION

The first phase of the office investigation consisted of examination of aerial photography and topographic maps of the area. The air photo analysis was conducted by Dr. Richard Reger who identified the various types of land forms in the area.

This air photo examination indicated that the soils on the south side of the river were frozen with excess moisture. It also indicated that there had been significant previous modification of the hillside behind the town with both steep and shallow slope movement. There appear to be two fault zones which intersect in the vicinity of the village and are the source of the groundwater

at the base of the slope in the village. The change in land forms identified along the route of the proposed water and sewer system are shown on the enclosed plan and profile.

Thaw strain estimates were made in accordance with the procedures and data obtained in Reference 1. In general we found that frozen clays exhibited thaw strains ranging between 5% and 25% at moisture contents ranging from 20% to 60% by weight in the frozen condition.

We have examined the report prepared by A.W. Murfitt Company for Carlin Williams, Architects which consisted of several borings in the over-saturated silts in the vicinity of the school. We have examined a report by Harding-Lawson Associates which discusses the foundation design for the new housing at the east end of the village. Unfortunately no soils borings were made during the Harding-Lawson investigation and we were unable to utilize any of the information in this report.

RESULTS

During our investigation we encountered a number of soil types along the route. These are discussed below.

Sta. 0+00 to 10+00

These soils consist of surficial rock or organics underlain by frozen organics which are underlain by both thawed and frozen alluvial deposits consisting of a mixture of sand, silt and clay. The portion of the soil profile with excessive thaw strain appears to be mainly in the upper 10 feet of the soil profile and in our opinion a system which will tolerate a limited amount of differential settlement could be utilized in this area. The amount of settlement could be reduced with over-excavation of the trench and backfilled with compacted thaw stable soils. If the selected system cannot tolerate any settlement we would recommend the use of thermopiles or refrigerated burial.

Sta. 10+00 to 15+00

Thawed soils consisting of cobbles, sands, silts and clays with flowing water in one test boring, and large boulders, in the other test boring were noted in this area. There may be pockets of frozen soil included in this area. ~~It appears that the thawed soils encountered in this area are created by moving groundwater and insulation resulting from the drifted snow.~~ We are concerned that a trenching operation may encounter flowing groundwater or large rocks in this area. Hence we recommend construction on thermopiles or shallow burial in this area.

Sta. 15+00 to 26+00 and East 3+00

These soils are frozen organics, silts and clays with excess moisture and a significant potential for thaw strain. Hence we recommend the use of a chilled below ground support system to maintain the soils in a frozen condition.

SEWAGE TREATMENT PLANT

We have assumed that the treatment plant will be located on the east side of the small stream east of Station 0+00. We have further assumed that the soil conditions in the area are similar to those encountered in Test Borings 6, 7 and 8 in which the thaw strain is primarily in the upper portion of the soil column. If some settlement is acceptable in this building the upper portion of the soil column could be excavated and replaced with thaw stable backfill. If no settlement is possible in the building we would recommend the use of thermopiles to support this building.

RECOMMENDATIONS AND CONCLUSIONS

There are a number of techniques available to support a pipeline network of this nature in the alternately frozen thawed soils. The best and most conservative technique consists of an above ground pile supported system. However we understand that this system may be unacceptable to the people of Nightmute. There is a certain element of risk associated with a buried system in that soils must be maintained in their original thermal state. Cooling devices require maintenance to prevent thaw strain in the soils and thawed soils must be maintained in a thawed condition to prevent frost heave. Some of these systems are discussed below, with the most conservative at the top of the group and the least conservative at the bottom.

1. Above Ground Pile Supported Systems

This would be a system similar to the Trans Alaska Pipeline above ground pipe which would utilize thermal piles to maintain the soils around the piles in a frozen condition. We understand that the people of Nightmute have indicated that a system elevated to 1 to 6 feet above ground would be unacceptable since it would block traffic in the village. It may be feasible to design a system with higher clearances which may be acceptable.

We recommend the use of driven piles in pilot holes. These piles should be designed with self-actuating thermal devices adequate to lower the ground temperature by 1.5 degrees Fahrenheit. We also recommend that these piles be designed for axial loads on the basis of 1 psi adfreeze strength at depths 6 feet or more below the surface. Short and long term lateral loads may be designed on the basis of 0.75 psi and 0.5 psi respectively, starting at a depth 6 feet below the surface. Minimum recommended embedment length is 20

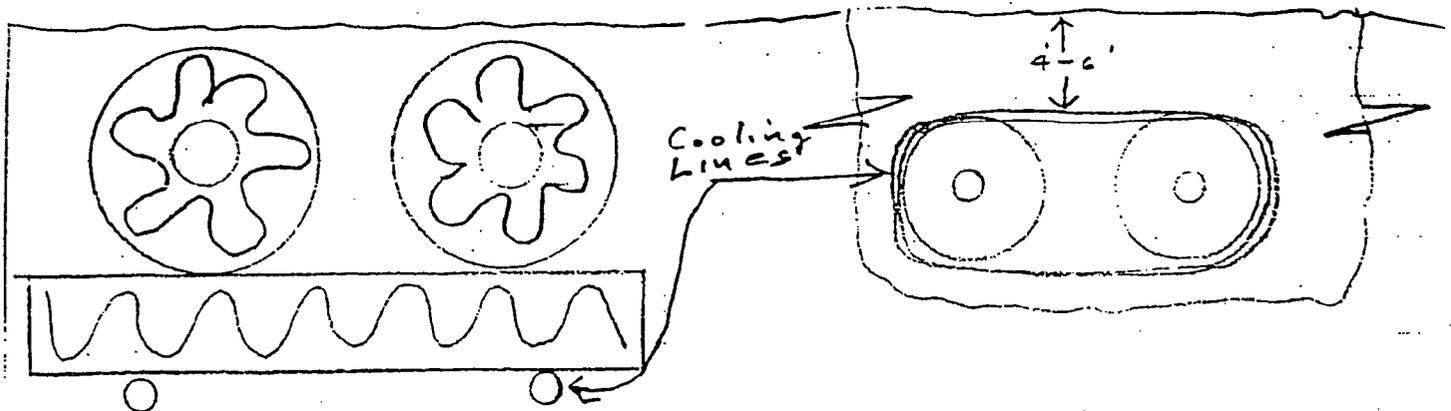
feet below the surface. These piles could be designed in accordance with the recommendations in Reference 2. This system could be utilized for all portions of the system.

2. Below Ground Pile Supported Systems

This system would have the top of the pipe at the surface of the ground and the pipe supported by piling placed at intervals along the pipe. However, melting of the ground would occur due to heat transfer from the pipe. To prevent this ground melting, insulation and chilled brine lines or self-actuated thermal devices would be required under the pipes to maintain the ground in a frozen condition. With the ground underneath the pipe in a frozen condition the frozen soil would provide suitable structural support for the pipe and the piling would not be needed. The option shown below is less costly than this system.

3. Chilled Below Ground Support System

This is similar to the aforementioned system in that the pipe is insulated from the ground and a chilled brine line or self-actuated thermal device placed between the insulation and the ground. This brine line would need to surround the pipe in a deep buried situation. In a shallow buried situation a brine coolant line would be placed at the bottom of the trench and would be covered with a synthetic foam insulation. The water and sewer lines would be placed so that the top of the pipe would be just below the surface of the ground. (See the cross sections below.)



This type of system could be utilized between Stations 0 to 10 and 15 to 26 and East 3 if it is desired to use a gravity system. If a force main is used we would recommend this system between Stations 15 to 26 and East 3.

Conversations with Dr. John Zarling indicate that self-actuating thermal devices for the brine cooling lines have a maximum run of 100 feet and must have a positive uphill slope to the radiator. Cooling equipment utilizing a circulating pump and radiator have a maximum run of 500 feet. The big source of power consumption in such a system is normally the fan on the radiator. There is a possibility that the need for a fan could be eliminated considering the strong winter winds at Nightmute.

4. Conventional Burial

The pipe is simply buried in this mode. Insulation is used only to keep the pipe from freezing and the ground around the pipe is allowed to thaw. The use of this mode will result in settlement of the ground and pipe when used in thaw unstable soils. In some areas it may be modified by over-excavation of the trench, lining the trench with a geofabric and backfilling to the desired grade with thaw stable soil. We would recommend this type of construction between Station 10 to 15 and between Station 0 to 10 if a force main is used.

DESIGN OPTIONS

Presented below are brief descriptions of two design options. A combination of the two design options or other modes suggested in this report could be used by the designer.

Option A ABOVE GROUND

This design option is the more conservative and assumes that no movement of the system is allowable after the first winter of pile installation. The sewage treatment plant and the entire water and sewer distribution system would be above ground and supported on driven thermopiles. We recommend that these thermopiles be designed in accordance with our recommendations and the procedures presented in Reference 2.

Option B

This design option involves the acceptance of a certain degree of risk by the City of Nightmute. This risk factor includes the possibility of encountering flowing ground water and large boulders during construction. Construction problems associated with trench stability resulting from over-excavation may be encountered with some of the trenches. There is also the possibility that long term settlement due to thaw strain could occur in the eastern part of the system which may require the future installation of thermoprobes and expenditures of additional maintenance

funds. In our opinion this will produce the most practical system for the City of Nightmute, however the owners must be aware of the risks.

This option would involve the construction of the sewage treatment plant on an area which has been over-excavated to remove the high thaw strain surficial soils. The excavation would then have a geofabric placed in the excavated area and would be backfilled with thaw stable soils. The force sewer and water line between Station 0+00 and 10+00 would be buried in a trench constructed in a similar manner to the sewage treatment plant. Conventional bury would be used between 10+00 and 15+00. The water and sewer service beyond 15+00 would require a chilled below ground support system. This support system could utilize either self-actuated thermo probes or heat exchanger and brine lines.

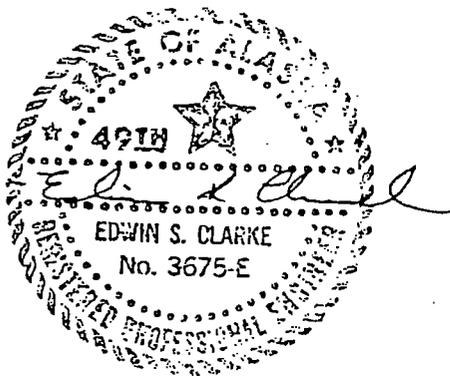
LIMITATIONS

Soil conditions and properties may vary within this area. These conditions cannot always be identified by test boring and soil sampling. Unanticipated conditions encountered during construction can effect the design of the structure. It is recommended that funds be available should extra costs arise.

In order to insure that this project is constructed in accordance with our recommendations it is suggested that we be retained to participate in the design and observe this construction. Observations made by a competent geotechnical engineer during trench excavation and piling placement can result in field design changes which could insure a quality constructed product.

Sincerely,

CLARKE ENGINEERING CO.



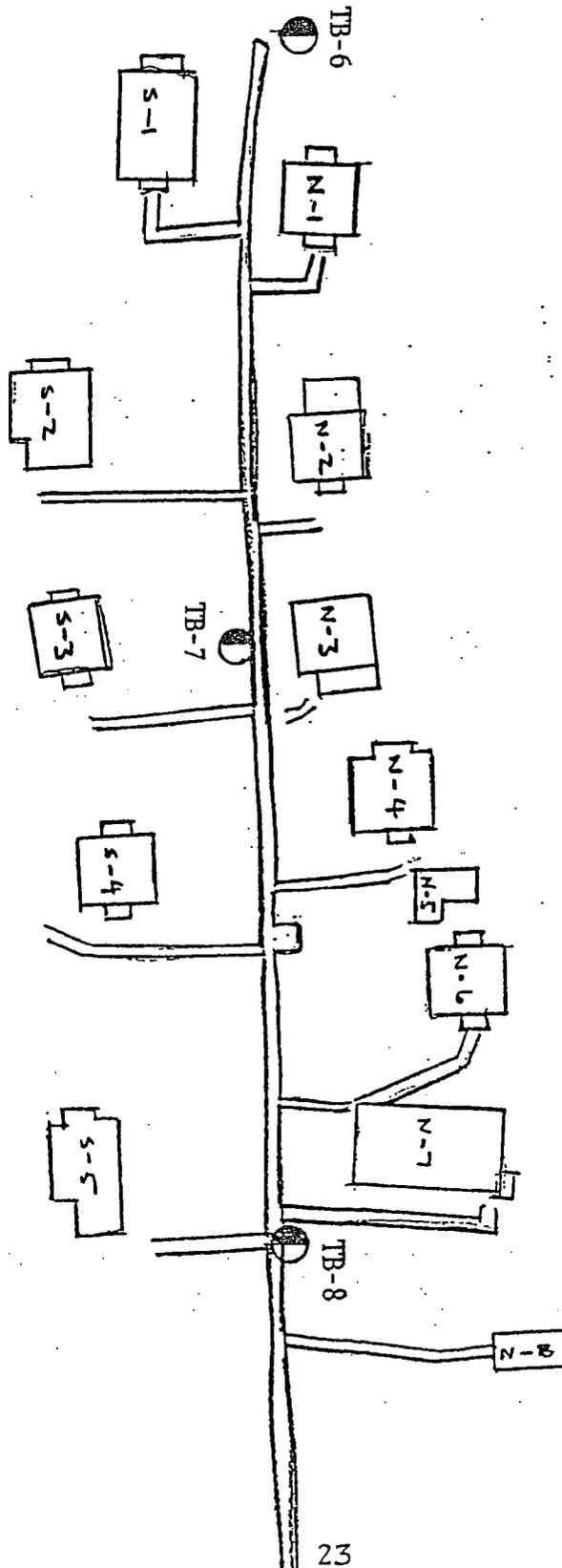
Edwin S. Clarke, P.E.

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- 1983 Nottingham, Dennis and Alan B. Christopherson, Design Criteria for Driven Piles in Permafrost. Prepared for State of Alaska Department of Transportation and Public Facilities, Division of Planning and Programming, Research Section, Fairbanks, Alaska.

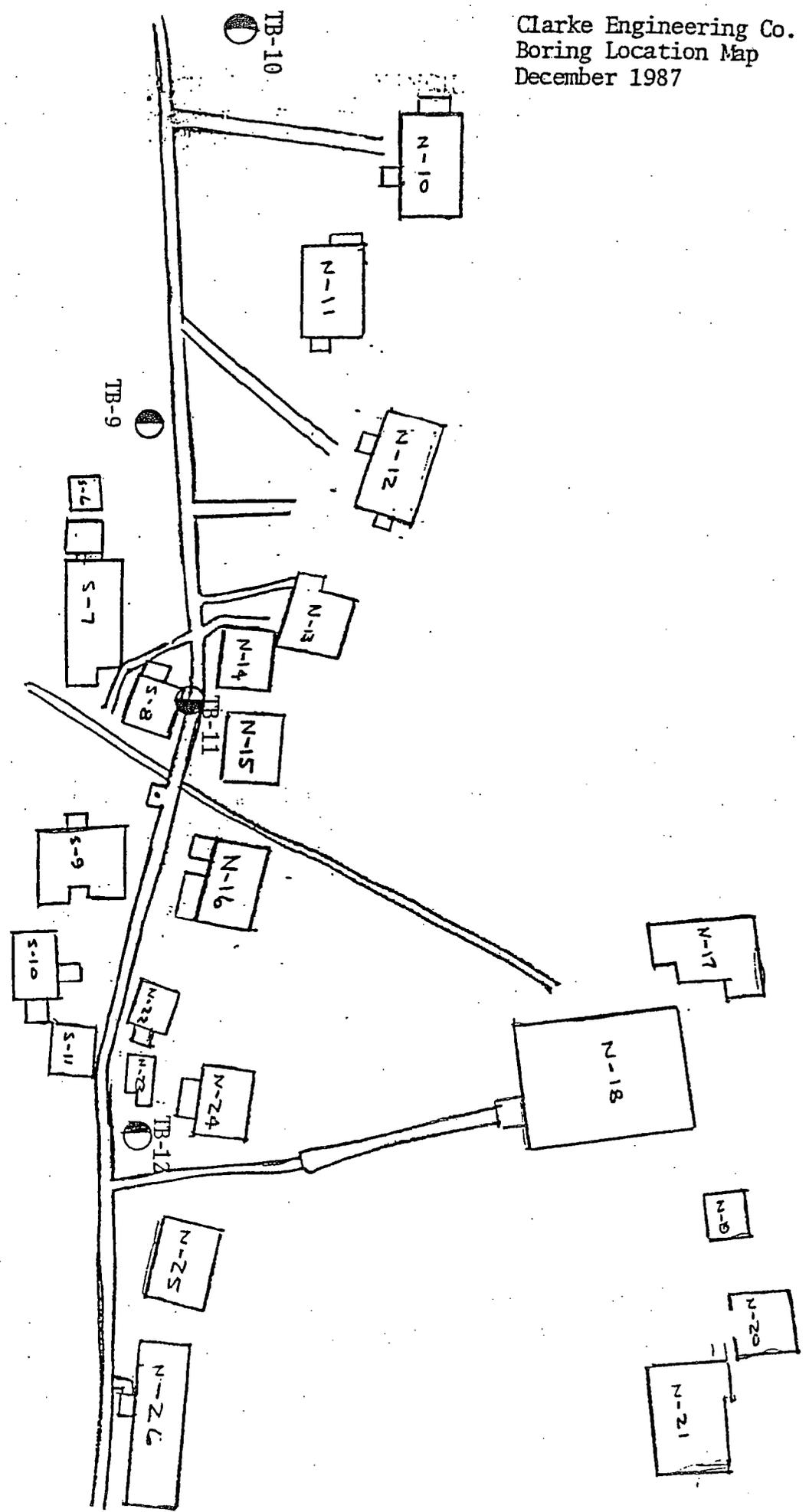
APPENDIX A

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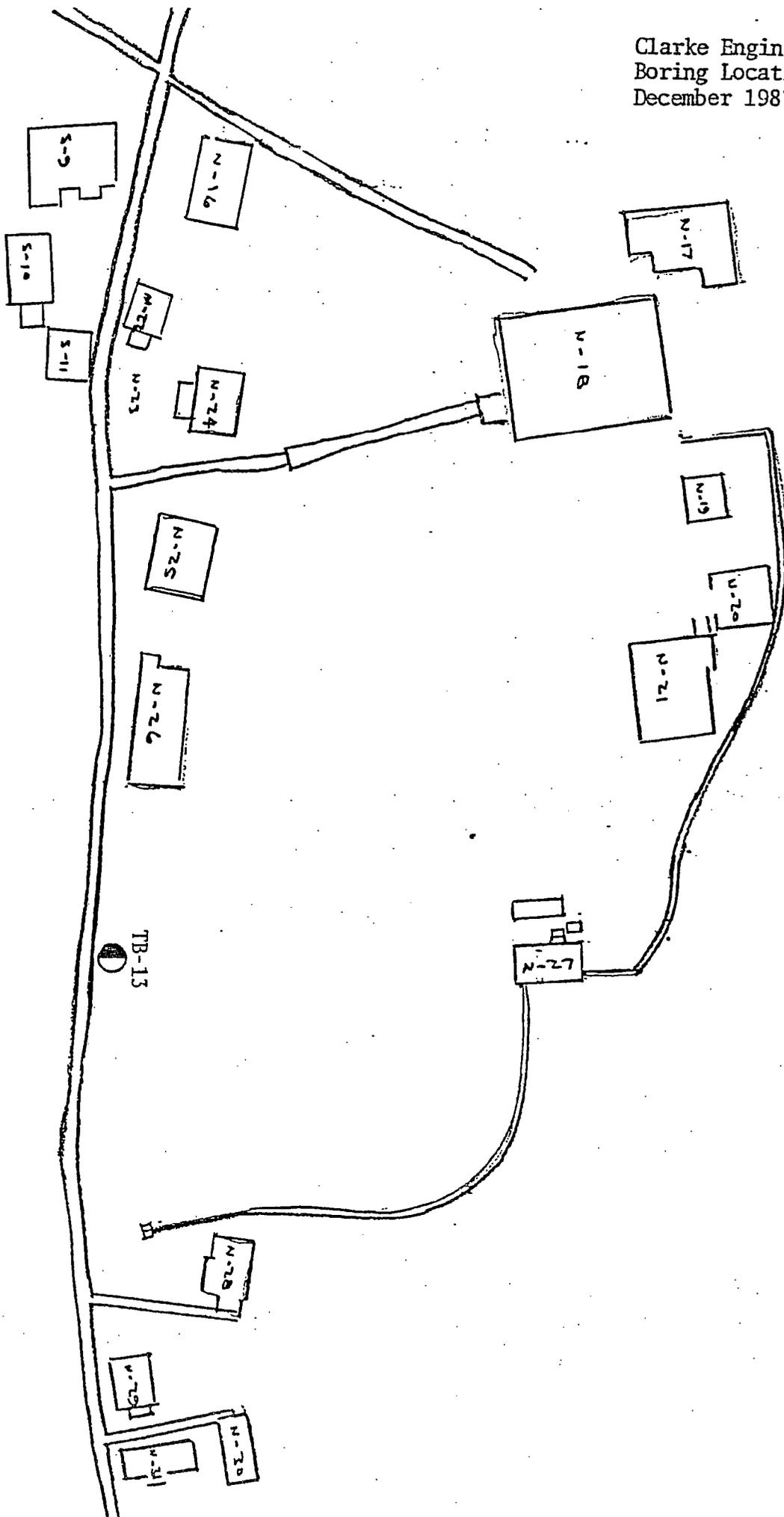
Clarke Engineering Co.
Boring Location Map
December 1987

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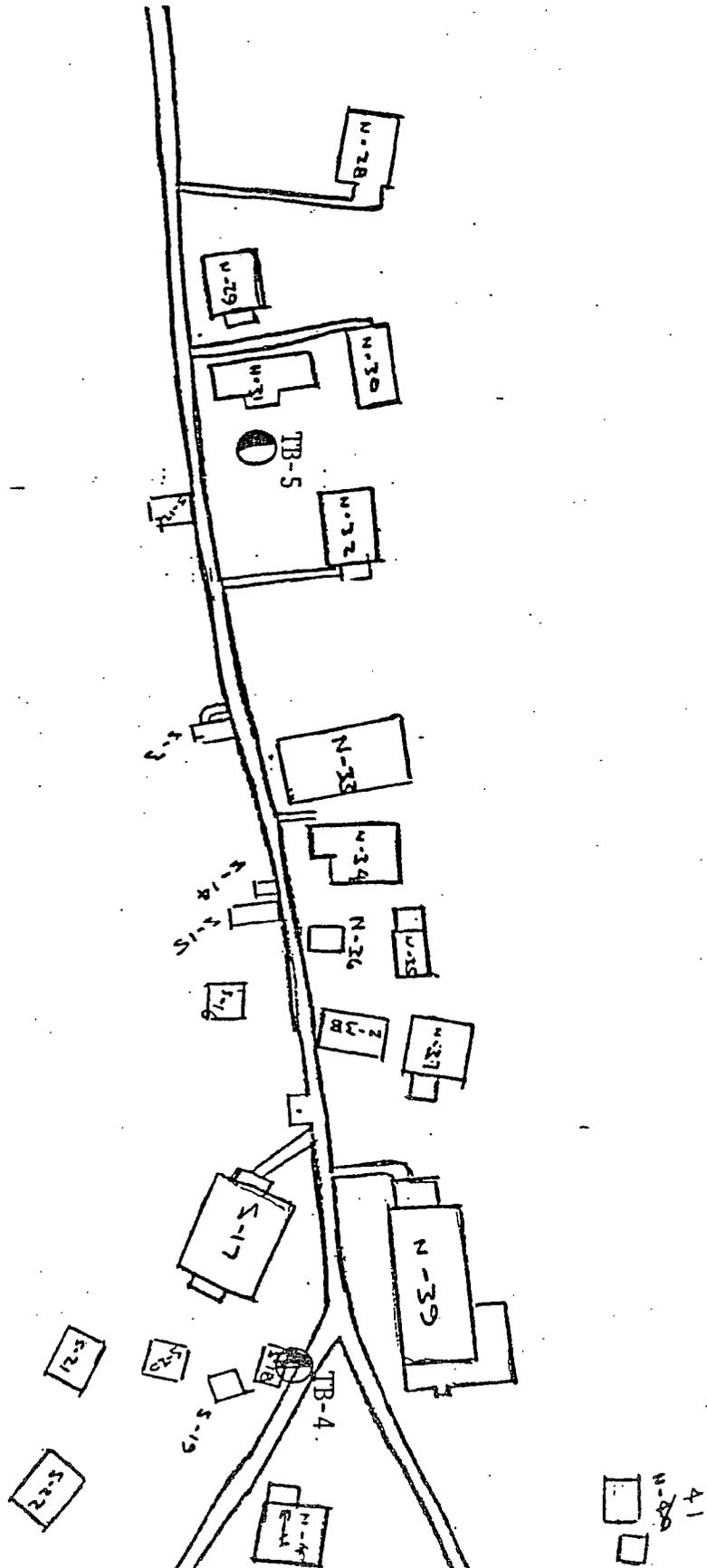


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Clarke Engineering Co.
Boring Location Map
December 1987

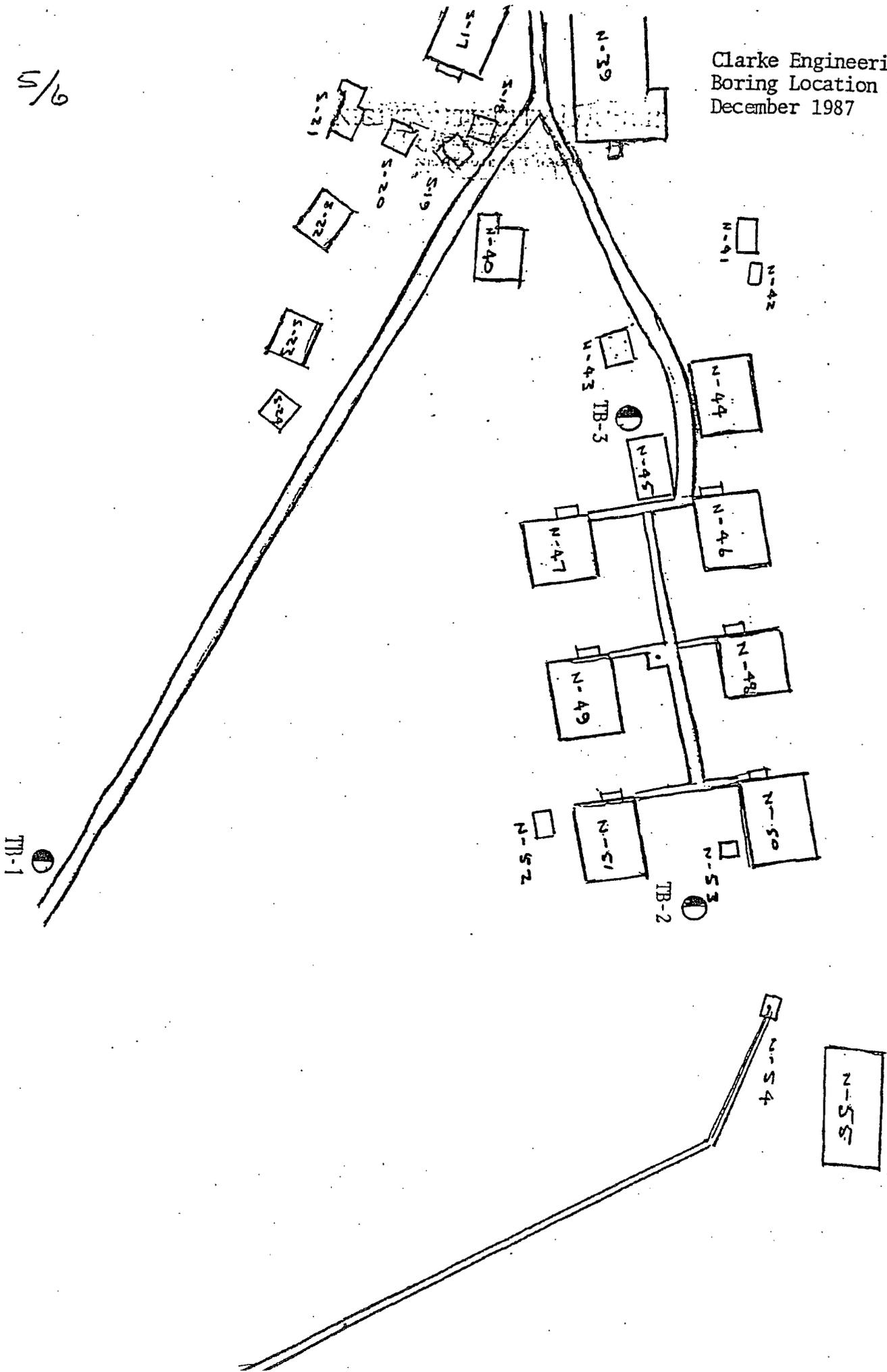


4/6



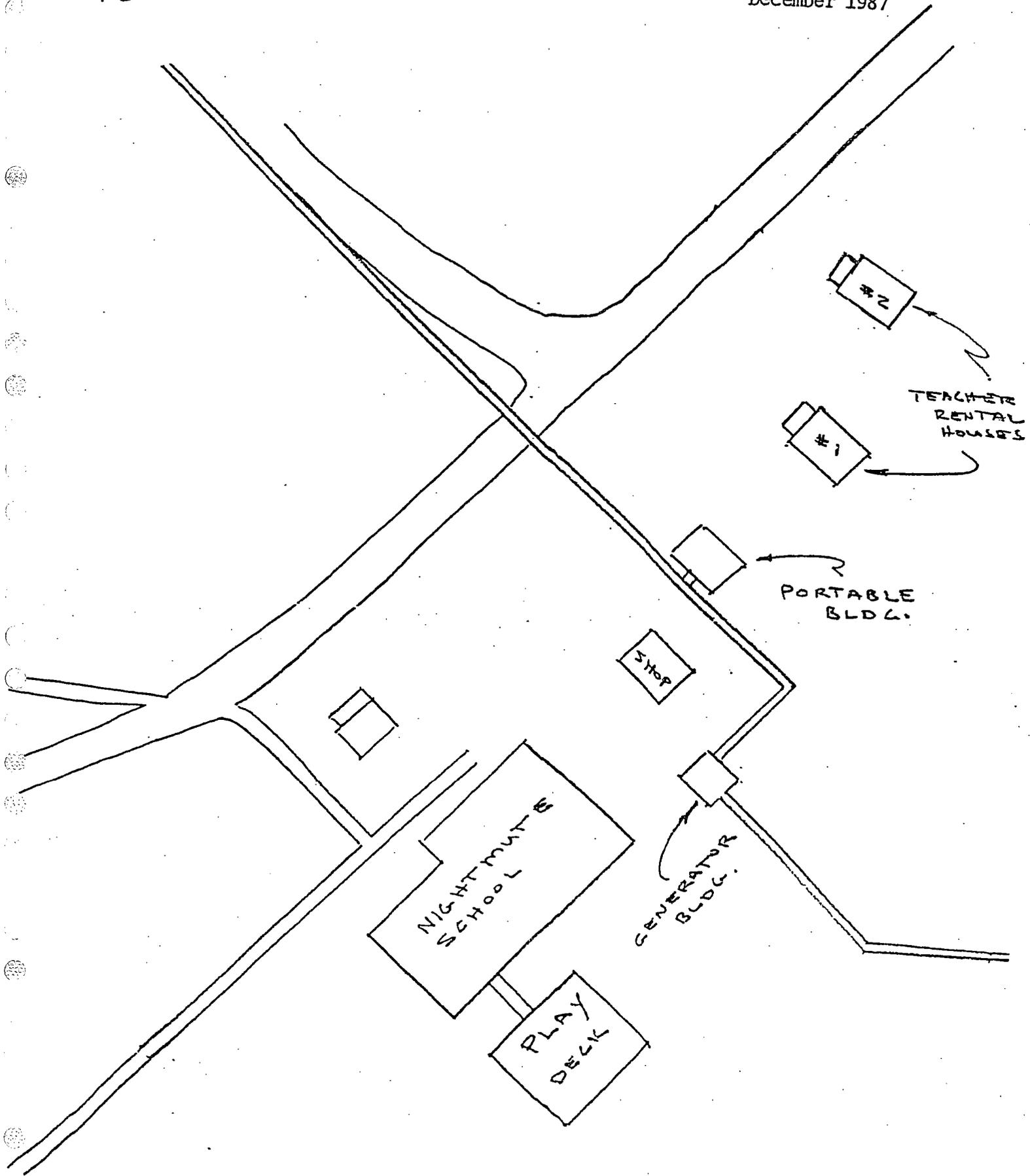
Clarke Engineering Co.
Boring Location Map
December 1987

S/6



6/6

Clarke Engineering Co.
Boring Location Map
December 1987



APPENDIX B

NIGHTMUTE TEMPERATURE DATA

January 15, 1988

TB-4 INTERSECTION

Depth	Soil Temperature
+ 5.8	9.9
+ 1.8	9.6
GL	
- 2.2	32.0 29.5
- 6.2	31.7 31.6
-10.2	31.4 31.3
-14.2	31.5 31.5

Feb 5th
Air Temp 17.6°

TB-6 END OF TOWN

Depth	Soil Temperature
+ 1.2	9.1
GL	
- 2.8	31.7 28.7
- 6.8	32.1 32.1
-10.8	31.8 31.8
-14.8	32.0 31.7
-18.8	31.9 31.8

TB-9 EAST OF CITY HALL

Depth	Soil Temperature
+ 1.5	10.15
- 2.5	32.5 31.6
- 6.5	32.6 32.2
-10.5	31.9 30.7
-14.5	32.3 32.2
-18.5	32.0 32.0

TB-14 HIGH SCHOOL

Depth	Soil Temperature
+ 3.8	11.6
- 0.2	12.7 19.3
- 4.2	32.3 31.8
- 8.2	31.2 31.3
-12.2	31.5 30.7
-16.2	31.3 30.6



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT & PF

Statewide Materials

Geology Section

Project Nelson Island Road

Project Number 57176

Test Hole Number 03-501

Total Depth 11.5 feet

Date Begin 11-15-03

Date End 11-15-03

Easting: , Northing:

Equipment Type B24 Drill Rig

Elevation Reference

Offset GPS ID 501

Weather Partly overcast, 5mps breeze; est 10°; 3-4" snow cover

Geologist B. BENKO

Field Crew Saena, Cline

Drilling Method	Depth in (Feet)	Blows / ft. Depth	Sample Data						Frozen	Soil Graph	Ground Water Data		
			Method	Field Number	Blow Count	Loc. Sampled	Recovery	N-Value			Depth in (ft.)	Time	Date
	0									SUBSURFACE MATERIAL			
	0									Veg Mat Brown, dry, <i>Organic Soil</i> - Root matter to ~0.9' depth			
	1									Brown, <i>Gravelly Silt, ML</i> Light brown, moist, <i>Sl. Clayey Silt</i>			
	2												
	3												
	4												
	5									Gray Brown, <i>Clayey Sand, (SC)</i> - low-dens volc grav			
	6												
	7												
	8												
	9									(CL) - <i>Lean Clay with Gravel</i> -			
	10									Light brownish gray, <i>Gravelly Lean Clay</i> - (CL)			
	11									BOH Bedrock?			
										Drilling Notes:			

LOG OF TEST HOLE NELSONISLAND.GPJ MANATEMPLATE.GDT 3/17/04

Note: Unless otherwise noted all samples are taken with 1.375 inch Standard Penetration Sampler driven with 140 lb hammer with 30 inch drop



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT&PF

Statewide Materials

Geology Section

Project Nelson Island Road

Project Number 57176

Test Hole Number 03-502

Total Depth 1.0 feet

Date Begin 11-15-03

Date End 11-15-03

Easting: , Northing: _____

Equipment Type B24 Drill Rig

Elevation Reference _____

Offset GPS ID 502

Weather Clearing

Geologist B. BENKO

Field Crew Cline, Saena

Drilling Method	Depth in (Feet)	Blows / ft. Depth	Sample Data					Frozen	Soil Graph	Ground Water Data		
			Method	Field Number	Blow Count	Loc. Sampled	Recovery			N-Value	Depth in (ft.)	Time
	0								SUBSURFACE MATERIAL			
	1								Veg Mat			
									Brown, Organic Soil			
									BOH @ 1'-pract. refusal on boulder			

Drilling Notes:
 Boulders: Gy, mostly aphanitic, hard, non vesic, volc.
 Loose cobb & bould @ surf-up to 2' size

LOG OF TEST HOLE NELSONISLAND.GPJ MANATEMPLATE.GDT 3/17/04

Note: Unless otherwise noted all samples are taken with 1-3/8 inch Standard Penetration Sampler driven with 140 lb. hammer with 30-inch drop



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT&PF
Statewide Materials
Geology Section

Project Nelson Island Road
Project Number 57176

Test Hole Number 03-503
Total Depth 4.8 feet
Date Begin 11-15-03
Date End 11-15-03
Elevation Reference _____

Easting: , Northing: _____
Offset GPS ID 503
Geologist B. BENKO
Equipment Type B24 Drill Rig
Weather Mostly Clear
Field Crew Saena, Cline

Drilling Method	Depth in (Feet)	Blows / ft. Depth	Sample Data					Frozen	Soil Graph	Ground Water Data		
			Method	Field Number	Blow Count	Loc. Sampled	Recovery			N-Value	Depth in (ft.)	Time
4" SSA	0								SUBSURFACE MATERIAL			
	0.5								Veg Mat			
	1								Brown, moist to wet, <i>Organic Soil</i>			
	1.5								Brown, <i>Silty Organics</i> - frozen			
	2								Gray, <i>Organic Silt</i> , frozen; est 5% free ice in granules to 1/8" size			
3									Brown, <i>Silty Organics</i> - low density, no(?) free ice			
4												
									BOH BOH @ 4.8'-Terminate, very slow cutting (in frozen soil)			

Drilling Notes:

LOG OF TEST HOLE NELSONISLAND.GPJ MANATEMPLATE.GDT 3/17/04

Note: Unless otherwise noted all samples are taken with 1-3/8 inch Standard Penetration Sampler driven with 140 lb. hammer with 30-inch drop



LOG OF TEST HOLE

STATE OF ALASKA DOT&PF
Statewide Materials
Geology Section

Project Nelson Island Road
Project Number 57176

Test Hole Number 03-504
Total Depth 8.3 feet
Date Begin 11-15-03
Date End 11-15-03
Elevation Reference _____

Easting: , Northing: _____
Offset GPS ID 504
Geologist B. BENKO
Equipment Type B24 Drill Rig
Weather _____

Drilling Method	Depth in (Feet)	Blows / ft. Depth	Sample Data					Frozen	Soil Graph	Field Crew <u>Cline</u>			Ground Water Data
			Method	Field Number	Blow Count	Loc. Sampled	Recovery			N-Value	Depth in (ft.)	Time	
4" SSA	0								SUBSURFACE MATERIAL				
	0.5								Veg (grass) mat				
	1								Brown, moist to wet, Organics				
	2												
	3								Boulder				
	4												
	5								Boulders & Cobbles				
	6								Organic Silt, appar. unfrozen				
	8								Bedrock - possibly a boulder				
									BOH				

Drilling Notes:
Located in alder-choked gully.

Note: Unless otherwise noted all samples are taken with 1-3/8 inch Standard Penetration Sampler driven with 140 lb hammer with 30 inch drop



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT&PF

Statewide Materials

Geology Section

Project Nelson Island Road

Project Number 57176

Test Hole Number 03-505

Total Depth 8.8 feet

Date Begin 11-15-03

Date End 11-15-03

Elevation Reference

Easting: , Northing:

Equipment Type B24 Drill Rig

Offset GPS ID 505

Weather Clouds building in NW

Geologist B. BENKO

Field Crew Saena, Cline

Drilling Method	Depth in (Feet)	Blows / ft. Depth	Sample Data						Frozen	Soil Graph	Ground Water Data			
			Method	Field Number	Blow Count	Loc. Sampled	Recovery	N-Value			Depth in (ft.)	Time	Date	Symbol
4" SSA	0									SUBSURFACE MATERIAL				
										Veg mat-moss-tundra				
	1									Brown, Organicsunfrozen				
	2									Light brown Gray, Silt, ice rich, est 10-20% ice @ 5'				
	3													
	4													
	5													
	6										Silt w/ Cobbles, cobbles in silt matrix			
	7													
	8										BOH @ 8.8'-Terminate ~1' into boulder or suspect bedrock			

Drilling Notes:



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT&PF

Statewide Materials

Geology Section

Project Nelson Island Road

Project Number 57176

Test Hole Number 03-501

Total Depth 11.5 feet

Date Begin 11-15-03

Date End 11-15-03

Easting: , Northing:

Equipment Type B24 Drill Rig

Elevation Reference

Offset GPS ID 501

Weather Partly overcast, 5mps breeze; est 10°; 3-4" snow cover

Geologist B. BENKO

Field Crew Saena, Cline

Drilling Method	Depth in (feet)	Blows / ft. Depth	Sample Data						Frozen	Soil Graph	Ground Water Data			
			Method	Field Number	Blow Count	Loc. Sampled	Recovery	N-Value			Depth in (ft.)	Time	Date	Symbol
SSA	0									SUBSURFACE MATERIAL				
	0									Veg Mat Brown, dry, <i>Organic Soil</i> - Root matter to ~0.9' depth				
	1									Brown, <i>Gravelly Silt, ML</i> Light brown, moist, <i>Sl. Clayey Silt</i>				
	2													
	3													
	4													
	5										Gray Brown, <i>Clayey Sand, (SC)</i> - low-dens volc grav			
	6													
	7													
	8													
	9										(CL) - <i>Lean Clay with Gravel</i> -			
	10										Light brownish gray, <i>Gravelly Lean Clay</i> - (CL)			
11										BOH Bedrock?				
										Drilling Notes:				

LOG OF TEST HOLE NELSONISLAND.GPJ MANATEMPLATE.GDT 3/17/04

Note: Unless otherwise noted all sample locations with 4 digit depth are in feet.



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT&PF

Statewide Materials
Geology Section

Project Nelson Island Road

Project Number 57176

Test Hole Number 03-502

Total Depth 1.0 feet

Date Begin 11-15-03

Date End 11-15-03

Easting: , Northing: _____

Equipment Type B24 Drill Rig

Elevation Reference _____

Offset GPS ID 502

Weather Clearing

Geologist B. BENKO

Field Crew Cline, Saena

Drilling Method	Depth in (feet)	Blows / ft. Depth	Sample Data						Frozen	Soil Graph	Ground Water Data		
			Method	Field Number	Blow Count	Loc. Sampled	Recovery	N-Value			Depth in (ft.)	Time	Date
	0									SUBSURFACE MATERIAL			
	1									Veg Mat			
										Brown, Organic Soil			
										BOH @ 1'-pract. refusal on boulder			
										Drilling Notes: Boulders: Gy, mostly aphanitic, hard, non vesic, volc. Loose cobb & bould @ surf-up to 2' size			

_LOG OF TEST HOLE NELSONISLAND.GPJ MANATEMPLATE.GDT 3/17/04

Note: Unless otherwise noted all samples are taken with 1-3/8 inch Standard Penetration Sampler driven with 140 lb. hammer with 30-inch drop



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT&PF

Statewide Materials

Geology Section

Project Nelson Island Road

Project Number 57176

Test Hole Number 03-503

Total Depth 4.8 feet

Date Begin 11-15-03

Date End 11-15-03

Elevation Reference

Easting: , Northing:

Equipment Type B24 Drill Rig

Offset GPS ID 503

Weather Mostly Clear

Geologist B. BENKO

Field Crew Saena, Cline

Drilling Method	Depth in (Feet)	Blows / ft. Depth	Sample Data						Frozen	Soil Graph	Ground Water Data			SUBSURFACE MATERIAL
			Method	Field Number	Blow Count	Loc. Sampled	Recovery	N-Value			Depth in (ft.)	Time	Date	
4" SSA	0													Veg Mat
	1													Brown, moist to wet, <i>Organic Soil</i>
	2													Brown, <i>Silty Organics</i> - frozen
	3													Gray, <i>Organic Silt</i> , frozen; est 5% free ice in granules to 1/8" size
	4													Brown, <i>Silty Organics</i> - low density, no(?) free ice
														BOH BOH @ 4.8'-Terminate, very slow cutting (in frozen soil)

Drilling Notes:

LOG OF TEST HOLE NELSONISLAND.GPJ MANATEMPLATE.GDT 3/17/04

Note: Unless otherwise noted all samples are taken with 1-3/8 inch Standard Penetration Sampler driven with 140 lb. hammer with 30 inch drop



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT&PF

Statewide Materials
Geology Section

Project Nelson Island Road

Project Number 57176

Test Hole Number 03-504

Total Depth 8.3 feet

Date Begin 11-15-03

Date End 11-15-03

Elevation Reference

Easting: , Northing:

Equipment Type B24 Drill Rig

Offset GPS ID 504

Weather

Geologist B. BENKO

Field Crew Cline

Drilling Method	Depth in (Feet)	Blows / ft. Depth	Sample Data					Frozen	Soil Graph	Ground Water Data			SUBSURFACE MATERIAL
			Method	Field Number	Blow Count	Loc. Sampled	Recovery			N-Value	Depth in (ft.)	Time	
4" SSA	0												Veg (grass) mat Brown, moist to wet, <i>Organics</i>
	1												
	2												
	3												Boulder
	4												
	5												Boulders & Cobbles
	6												Organic Silt, appar. unfrozen
	7												
	8												Bedrock - possibly a boulder

Drilling Notes:
Located in alder-choked gully.

LOG OF TEST HOLE NELSONISLAND.GPJ MANATEMPLATE.GDT 3/17/04

Note: Unless otherwise noted all samples are taken with 1-3/8 inch Standard Penetration Sampler driven with 140 lb. hammer with 30 inch drop



LOG OF TEST HOLE

Sheet Number 1 of 1

STATE OF ALASKA DOT&PF

Statewide Materials

Geology Section

Project Nelson Island Road

Project Number 57176

Test Hole Number 03-505

Total Depth 8.8 feet

Date Begin 11-15-03

Date End 11-15-03

Elevation Reference

Easting: , Northing:

Equipment Type B24 Drill Rig

Offset GPS ID 505

Weather Clouds building in NW

Geologist B. BENKO

Field Crew Saena, Cline

Drilling Method	Depth in (Feet)	Blows / ft. Depth	Sample Data						Frozen	Soil Graph	Ground Water Data			
			Method	Field Number	Blow Count	Loc. Sampled	Recovery	N-Value			Depth in (ft.)	Time	Date	Symbol
4" SSA	0									SUBSURFACE MATERIAL				
	0									Veg mat-moss-tundra				
	1									Brown, Organics unfrozen				
	1									Light brown Gray, Silt, ice rich, est 10-20% ice @ 5'				
	2													
	3													
	4													
	5													
	6										Silt w/ Cobbles, cobbles in silt matrix			
7														
8										BOH @ 8.8'-Terminate ~1' into boulder or suspect bedrock				
										BOH				
										Drilling Notes:				

LOG OF TEST HOLE NELSONISLAND.GPJ MANATEMPLATE.GDT 3/17/04

Note: Unless otherwise noted, all samples are taken with 4.25 inch Standard Penetration Sampler driven with 140 lb hammer with 30 in stroke.

Project Name Nelson Island Road

PRECONSTRUCTION SAMPLE SUMMARY

Project No. 57176 Sampled By B.Benko

Centerline Nelson Isl Rds

Station Offset (feet) Depth (feet) Test Hole No. Field No. Date Sampled Lab No.	Station Offset (feet) Depth (feet) Test Hole No. Field No. Date Sampled Lab No.	Station Offset (feet) Depth (feet) Test Hole No. Field No. Date Sampled Lab No.	Station Offset (feet) Depth (feet) Test Hole No. Field No. Date Sampled Lab No.	Station Offset (feet) Depth (feet) Test Hole No. Field No. Date Sampled Lab No.	Station Offset (feet) Depth (feet) Test Hole No. Field No. Date Sampled Lab No.
2.8'-3.0' TH 03-501 03-4500 11/15/2003 04A-0018	7.0'-7.5' TH 03-501 03-4501 11/15/2003 04A-0019	3.0'-3.5' TH 03-503 03-4502 11/15/2003 04A-0020	3.0'-3.5' TH 03-505 03-4503 11/15/2003 04A-0021	5.0'-6.0' TH 03-505 03-4504 11/15/2003 04A-0022	3.3'-3.5' TH 03-506 03-4505 11/15/2003 04A-0023
Percent 3" 2" 1" 3/4" 1/2" 3/8"	100 90 50 36				100 97
Passing #4 #10 #40 #80 #200					90.0
Sieve Size .02mm .075mm #200	26.0				
AASHTO Class FSV Class Unified Class Liquid Limit Plastic Limit Moisture Content % Organic Content % % Gravel % Sand % Silt & Clay Max. Dry Density Opt. Moisture % Degradation Value L.A. Abrasion Loss Sulfate Soundness	A-2-6(0) SC 32 11 19.7 50 24 26				A-7-5(26) OH 58 24 84.1 11.3
	23.1 6.3	350.7 52.7	64.2	46.1	10 90
	/	/	/	/	/

NOTE: Gradation Tests Based on Minus 3" Material. AASHTO class may be inappropriate if Organic Content > 5%.

PRECONSTRUCTION SAMPLE SUMMARY

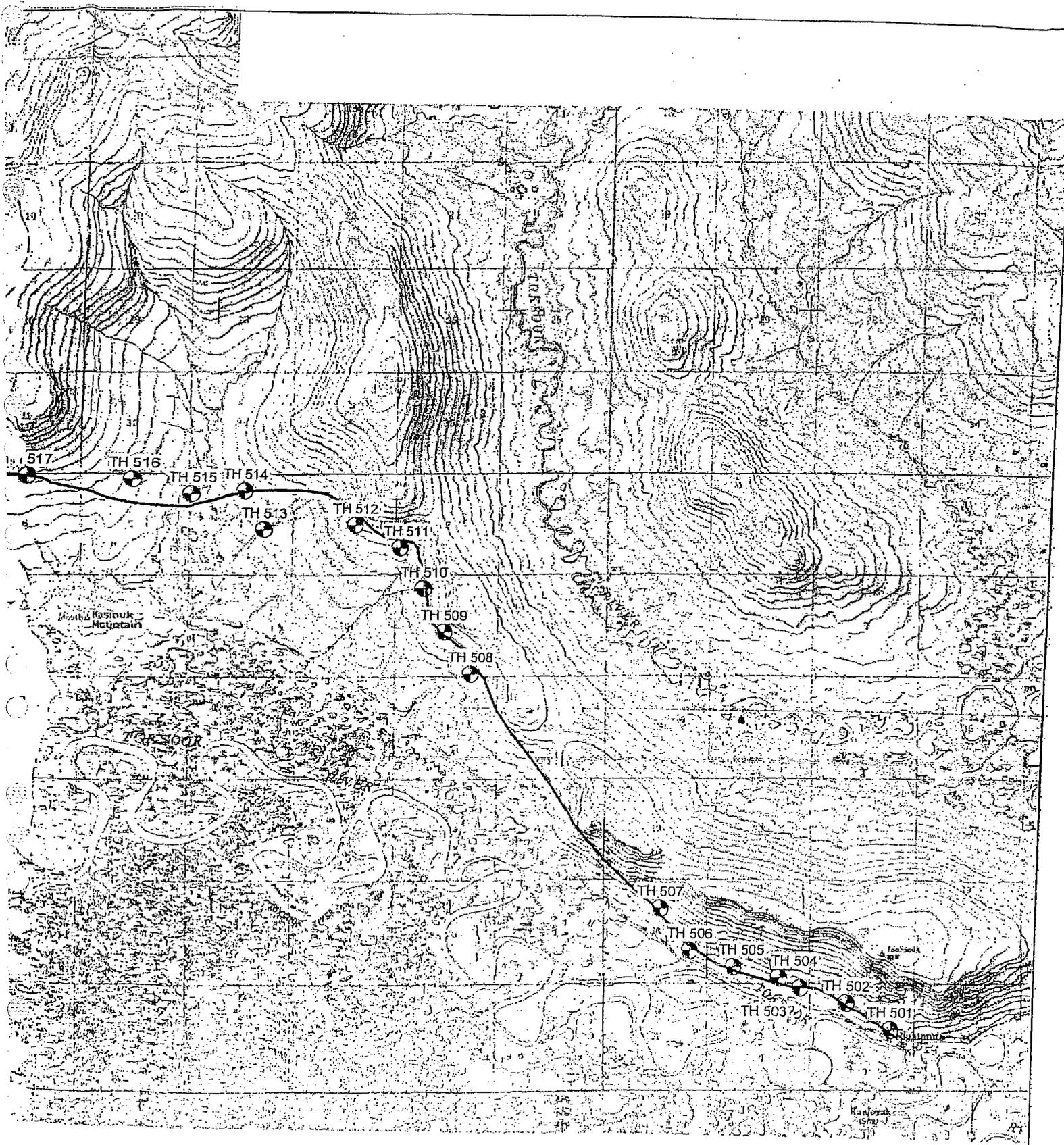
Project Name Nelson Island Road

Project No. 57176 Sampled By B. Benko

Centerline Nelson Isl Rds

Station	Offset (feet)	Depth (feet)	Test Hole No.	Field No.	Date Sampled	Lab No.
	4.0'	4.5'	TH 03-506	03-4506	11/16/2003	04A-0024
	5.0'	5.5'	TH 03-506	03-4507	11/16/2003	04A-0025
	5.5'	6.0'	TH 03-508	03-4507	11/16/2003	04A-0026
Percent	3"	2"	1"	3/4"	1/2"	3/8"
Passing	#4	#10	#40	#80	#200	.02mm
Sieve						
Size						
AASHTO Class						
FSV Class						
Unified Class						
Liquid Limit						
Plastic Index						
Moisture Content %		83.6				
Organic Content %		86.2				
% Gravel						3.6
% Sand						
% Silt & Clay						
Max. Dry Density						
Opt. Moisture %						
Degradation Value						
L.A. Abrasion Loss						
Sulfate Soundness						

NOTE: Gradation Tests Based on Minus 3" Material. AASHTO class may be inappropriate if Organic Content > 5%.



TH 517

TH 516

TH 515

TH 514

TH 513

TH 512

TH 511

TH 510

TH 509

TH 508

TH 507

TH 506

TH 505

TH 504

TH 502

TH 503

TH 501

Kasimuk Mountain

700

TANBUN

Kanjorak

D.A.

Nightmute Activity Report

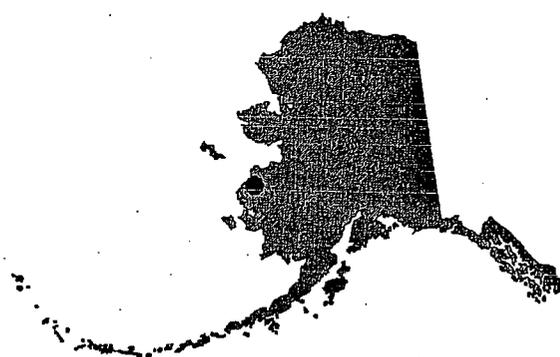
Community Overview

Lead RUBA Staff: Paul Chimiugak, Bethel Office

2002 Population: 224

Region: Lower Kuskokwim

Local Governments: Second Class City



The City of Nightmute provides a Small Water Facility, which is the central watering point for residents to haul their own water. The City of Nightmute also provides water and sewer haul service. The City Council is the policy making body for the utility.

The city utility system has 37 residential units, 5 Commercial/residential and 6 commercial units. The school has its own sewage lagoon that it discharges waste into. A washeteria is not available. The Nightmute Power Plant was acquired by AVEC in March 1998.

RUBA Activity This Quarter

The administration has changed again this quarter. The new administrator had been an administrator before. Since his departure a couple of quarters ago, the city had been on a decline both administratively and financially. Now that he's back, the operation and management of the city seems to be back on track. He is taking control of the operation by anticipating cuts to the city funding in terms of reducing hours of certain city employees. He has fired the city bookkeeper and replaced him with a more qualified employee.

Capacity Indicators

Finances

Essential Indicators

Yes	No
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>

- All revenue and expenses for the utility are listed in the utility budget.
- The utility has adopted a balanced realistic budget.
- Monthly financial reports are prepared and submitted to the policy making body.
- The utility is receiving revenues (user fees or other sources) sufficient to cover operating expenses.

Sustainable Indicators

<input type="checkbox"/>	<input checked="" type="checkbox"/>

- The utility is receiving revenues (user fees or other sources) sufficient to cover operating expenses and Repair & Replacement (R&R) costs.
- YTD revenues are at a level equal to or above those budgeted.
- YTD expenditures are at a level equal to or below those budgeted.
- A monthly manager's report is prepared.
- Budget amendments are completed and adopted as necessary.

Finances Comments: Since the administrators return he has found that the previous administration did not have control or understanding of how the operations were expending their funds including the finances of the FTMS.

Accounting Systems

Essential Indicators

Yes	No	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The utility has adopted a collection policy and actively follows it.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The utility bills customers on a regular basis.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	An accounts receivable system is in place which track customers and reports past due accounts and amounts.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	An accounts payable system is in place.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The payroll system correctly calculates payroll and keeps records.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A cash receipt system is in place that records incoming money and what it was for.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The Utility has a cash disbursement system that records how money was spent.

Sustainable Indicators

<input checked="" type="checkbox"/>	<input type="checkbox"/>	A chart of accounts is used that identifies categories in a reasonable, usable manner.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Monthly bank reconciliations have been completed for all utility accounts.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The utility has a purchasing system that requires approval prior to purchase, and the approval process compares proposed purchases to budgeted amounts.

Accounting Systems Comments: The previous bookkeeper worked as a bookkeeper in St. Mary's and has requested more training to become proficient in her position. She is now correcting a payroll mistake on one of the employees who is paid on a monthly basis; she found that his Federal withholding tax had been done on a bi-weekly basis. There had been no tax deposits made this last quarter or quarterly reports done on the previous quarter. The new bookkeeper will provide monthly financial reports as soon as she can, when she has the numbers available.

Tax Problems

Essential Indicators

Yes	No	NA	
<input checked="" type="checkbox"/>	<input type="checkbox"/>		The utility has a system to accurately calculate, track, and report payroll tax liabilities.
<input type="checkbox"/>	<input checked="" type="checkbox"/>		The utility is current on filing tax reports.
<input type="checkbox"/>	<input checked="" type="checkbox"/>		The utility is current on making tax deposits.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If there are any past tax liabilities, a repayment agreement has been signed and repayments are current.

Tax Problems Comments: The new bookkeeper has found that there had been no tax deposits since June of 2003 and this quarter. She is compiling all the payroll taxes and preparing for the quarterly report and payment of the taxes.

Personnel System

Essential Indicators

Yes No

The utility has a posted workers compensation insurance policy in effect.

Sustainable Indicators

The utility has adopted and uses a Personnel Policy, which has been reviewed by an attorney, AML, or DCED for topics and language.

The utility has adequate written job descriptions for all positions.

The utility has adopted and follows a written personnel evaluation process that ties the job description to the evaluation.

The utility has an adequate written hiring process.

The utility has personnel folders on every employee that contain at least: I-9, Job Application and Letter of Acceptance.

The utility has a probationary period for new hires that includes orientation, job-training/oversight, and evaluations.

The utility provides training opportunities to staff as needed and available.

Personnel System Comments: The city has workers compensation insurance in place for its employees. A Personnel Policy has been done but is not in effect at this time since it is still under review by the council.

Organizational Management

Essential Indicators

Yes No

The entity that owns the utility is known and the entity that will operate the utility is set.

The policy making body is active in policy making of the utility.

The policy making body enforces utility policy.

The utility has a adequately trained manager.

The utility has a adequately trained bookkeeper.

The utility has a adequately trained operator(s).

The utility has adopted the necessary ordinances (or rules and regulations) necessary to give it the authority to operate.

Sustainable Indicators

The utility has adopted an organizational chart that reflects the current structure.

The policy making body meets as required.

The utility complies with the open meetings act for all meetings.

Organizational Management Comments: The city had a problem complying with the open meetings act in which they had banned people from attending their regular meetings. This has been remedied by providing the city clerk with Title 29 information in which it states that all meetings are open to the public except for executive meetings.

Operation of Utility

Essential Indicators

Yes No

- | | | |
|-------------------------------------|-------------------------------------|---|
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | The utility operator(s) are actively working towards necessary certification. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The utility has a preventative maintenance plan developed for the existing sanitation facilities. |

Sustainable Indicators

- | | | |
|-------------------------------------|-------------------------------------|---|
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The manager receives a monthly O&M report from the utility operator and routinely "spot checks" the facilities to see that the maintenance items are being completed. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The utility has a safety manual and holds safety meetings. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | Utility facilities have not suffered any major problems/outages due to management issues that are still unresolved. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The utility is operating at the level of service that was proposed. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The operator provides status reports to the manager on a routine basis. |
| <input type="checkbox"/> | <input type="checkbox"/> | The utility has completed and distributed its <u>Consumer Confidence Report (CCR)</u> . |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | The utility is on the <u>Significant Non-Compliance (SNC)</u> list. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The utility maintains an inventory control list. |
| <input type="checkbox"/> | <input checked="" type="checkbox"/> | The utility maintains a critical spare parts list. |

Operation of Utility Comments: The new administrator is conserving revenues received in order to bring the utility funds to a comfortable operating level. He has restricted spending any funds from the utility until the deficit is corrected. The previous administration had not been keeping track of the expenditures last quarter, thus there was a deficit and checks that bounced as a result.

RUBA Activities For The Coming Quarter

The RUBA staff will continue to request monthly financial reports in order to complete the assessment of their financial status. The City loaned money to the corporation store, and there has been no payback of the loan to date. We will work with the city to enforce payback of the loan.

The last RUBA agreement with Nightmute was signed in 1996. We will be requesting a new RUBA agreement be signed by the utility.

RUBA Status Report

Community:	Nightmute	RUBA Community:	Yes
RUBA Staff:	Paul Chimiugak	Agreement:	Yes
DCA Region:	Bethel	Agreement Date:	
Region:	Yukon-Kuskokwim Delta	Expiration Date:	
Govt Type(s):	2nd Class City	RUBA Status:	Does Not Meet Indicators
Borough:	Unorganized	Essential Score:	16 of 24 (66.67%)
Population:	228	Sustainable Score:	8 of 27 (29.63%)
Reportable:	No	Total Capacity Score:	24 of 51 (47.06%)
Borough:	Unorganized	Date Updated:	7/15/2004

Community Sanitation Overview: The City of Nightmute provides a small water facility, which is the central watering point for residents to haul their own water. The City also provides water and sewer haul service. The city utility system has 37 residential units, 5 commercial/residential and 6 commercial units. The school has its own sewage lagoon. A washeteria is not available. The Nightmute Power Plant was acquired by AVEC in March 1998. Electricity is provided by AVEC. There is one school located in the community, attended by 67 students. Local hospitals or health clinics include Nightmute Health Clinic (647-6312). Nightmute is classified as an isolated village, it is found in EMS Region 7A in the Yukon/Kuskokwim Region. Emergency Services have coastal and air access. Emergency service is provided by a health aide.

RUBA Status and Activities This Quarter: The city has once again had a turnover in its administration -- a new bookkeeper and administrator were hired. The administrator has worked previously in the position. New council officers were voted in, but one incumbent resigned after considering his council position in the tribal entity, citing conflicting policies with municipal and tribal entities.

Capacity Indicator: Finances

Essential Indicators

- No All revenues and expenses for the utility are listed in the utility budget.
- No The utility has adopted a balanced realistic budget.
- No Monthly financial reports are prepared and submitted to the policy making board.
- No The utility is receiving revenues (user fees or other sources) sufficient to cover operating expenses.

Sustainable Indicators

- No The utility is receiving revenues (user fees or other sources sufficient to cover operating expenses and Repair & Replacement (R&R) costs.
- No YTD revenues are at a level equal to or above those budgeted.
- No YTD expenditures are at a level equal to or above those budgeted.
- No A monthly manager's report is prepared.
- No Budget amendments are completed and adopted as necessary.

Finance Comments: The Administrator said the utility has been operating comfortably and has not required any subsidies from the City departments. The revenues received have covered all expenses of the utility. However, there have been no monthly financial reports to the council or sent to the Bethel regional office since the previous bookkeeper resigned. Since we cannot verify the revenues, we have had to mark No to these capacity indicators. The new Bookkeeper is still working on monthly financial reports starting in April of 2002. The new administrator said that when he came to the office the financial records were not complete so he fired the bookkeeper and hired a new bookkeeper to update them.

Capacity Indicator: Accounting Systems

Essential Indicators

- Yes The utility has adopted a collection policy and actively follows it.
- Yes The utility bills customers on a regular basis.
- Yes An accounts receivable system is in place which tracks customers and reports past due accounts and amounts.
- Yes An accounts payable system is in place.
- Yes The payroll system correctly calculates payroll and keeps records.
- Yes A cash receipt system is in place that records incoming money and what it was for.

Yes The utility has a cash disbursement system that records how money was spent.

Sustainable Indicators

Yes A chart of accounts is used that identifies categories in a reasonable, usable manner.
 Yes Monthly bank reconciliations have been completed for all utility accounts.
 Yes The utility has a purchasing system that requires approval prior to purchase, and the approval process compares proposed purchases to budgeted amounts.

Accounting Comments: The utility is now following their collection policy and is billing customers regularly. All indicators are satisfactorily being followed for now. They are restricting their spending only to the necessary needs due to their budget constraint.

Capacity Indicator: Tax Problems

Essential Indicators

Yes The utility has a system to accurately calculate, track, and report payroll tax liabilities.
 Yes The utility is current on filing tax reports.
 Yes The utility is current on making tax deposits.
 Yes If there are any past due tax liabilities, a repayment agreement has been signed and repayments are current.

Tax Comments:

The administrator has found that some of the 2003 taxes have not been kept up. There is about \$9,000 in federal taxes from 2003 that are being paid at the moment. The Contribution Reports are now updated and paid off.

Capacity Indicator: Personnel System

Essential Indicators

No The utility has a posted workers compensation insurance policy in effect.

Sustainable Indicators

No The utility has adopted and uses a Personnel Policy, which has been reviewed by an attorney, AML or Commerce for topics and language.
 Yes The utility has adequate written job descriptions for all positions.
 No The utility has adopted and follows a written personnel evaluation process that ties the job description to the evaluation.
 No The utility has an adequate written hiring process.
 No The utility has personnel folders on every employee that contain at least: I-9, Job Application and Letter of Acceptance.
 Yes The utility has a probationary period for new hires that includes orientation, job training/oversight, and evaluations.
 No The utility provides training opportunities to staff as needed and available.

Personnel Comments:

The council has no workers compensation insurance in place at the moment; they are waiting for their last municipal assistance from the State before they buy one. All they need to do is pass the 2002 CFS resolution in order to get this State funding.

Capacity Indicator: Organizational Management

Essential Indicators

Yes The entity that owns the utility is known; the entity that will operate the utility is set.
 No The policy making body is active in policy making of the utility.
 No The policy making body enforces utility policy.
 Yes The utility has an adequately training manager.
 Yes The utility has an adequately trained bookkeeper.
 No The utility has an adequately trained operator or operators.
 Yes The utility has adopted the necessary ordinances (or rules and regulations) necessary to give it the authority to operate.

Sustainable Indicators

No The utility has adopted an organizational chart that reflects the current structure.
 No The policy making body meets as required.
 Yes The utility complies with the open meeting act for all meetings.

Organizational

Management Comments: There are new officers now after the elections, however one council member resigned. The rest of the council members appointed a member in his place from the roster of the last election. There have been no complaints of open meetings act since the last quarter. They have been calling the Bethel office for advice on matters that

relate to their city policies to make sure that they are not in violation of the open meetings act or their policies. The administrator has worked previously for the city and has knowledge of the operation of the utility. The bookkeeper has knowledge of bookkeeping, she has worked for a tribal entity in another community as a bookkeeper prior to moving to Nightmute.

Capacity Indicator: Operation of Utility

Essential Indicators

- Yes The utility operator(s) are actively working towards necessary certification.
- No The utility has a preventative maintenance plan developed for the existing sanitation facilities.

Sustainable Indicators

- No The manager receives a monthly O&M report from the utility operator and routinely "spot checks" the facilities to see that the maintenance items are being completed.
- No The utility has a safety manual and holds safety meetings.
- No Utility facilities have not suffered any major problems/outages due to management issues that are unresolved.
- No The utility is operating at the level of service that was proposed.
- No The operator provides status reports to the manager on a routine basis.
- Yes The utility has completed and distributed its "Community Confidence Report".
- Yes The utility is not on the "Significant Non-Compliance" (SNC) list.
- No The utility maintains an inventory control list.
- No The utility maintains a critical spare parts list.

Operation of Utility Comments:

The utility has been having equipment problems; the snowmachine is out now needing parts. There has been no water hauling done for a month due to a broken wheel on the water haul tank. They have ordered the parts and are still waiting for them to arrive. The sewage hauls are the only ones done now using an ATV 4-wheeler, but it gets stuck in the snow now and then.

RUBA Activities for the Coming Quarter:

The RUBA staff will continue to request monthly financial reports in order to complete the assessment of their financial status. The City loaned money to the corporation store and there has been no payback of the loan to date. We will work with the City to enforce payback of the loan. The last RUBA agreement with Nightmute was signed in 1996. We will be requesting a new RUBA agreement be signed by the utility.

Appendix D

Community Survey Results

Community Survey Results: Nightrmute Solid Waste Management Plan and Feasibility Study

Date of survey: 7/23/03

Number of households in the village: 54

Number of respondents: 11 (most of the residents were at fish camp during the survey)

Question: Residents were asked which sanitation deficiency they thought was the most important (1 highest, 5 lowest).

	Average rank
Results: Close the school lagoon	2.6
Build new city lagoon	2.9
Build washeteria	1.82
Build new solid waste facility	1.34

Conclusion: Amongst the residents who responded to the survey, a new solid waste facility was the most important issue.

Question: Residents were asked to suggest a location for a new solid waste facility

	Locations	Number of responses
Results:	Downriver	9
	East end of village	1
	No response	1

Conclusion: Amongst the residents who responded to the survey, most would like to see a new solid waste facility located downriver from the community.

Appendix E

Community Contacts & Resources

- **Municipal Contact Information**
- **Local, Regional & State Native Organizations**
- **Solid Waste Resources**
- **Recycling Resources**

Municipal Contact Information

City of Nightmute
 P.O. Box 90010
 Nightmute, AK 99690
 Phone: 907-647-6426
 Fax: 907-647-6427

Table E-1: Municipal Employees

TITLE	NAME
Administrator	Paul Joe
Airport Maintenance	Mark Mark and Anthony Sunny
Bingo Bookkeeper	Darlene Tulik
Bingo Bookkeeper, Sub	Theresa Joe
Bookkeeper	Elizabeth Joe
Bookkeeper, Sub	Ignace Matthias
City Clerk	Denise Martin
Electric (AVEC) Operator	Mark Mark
Janitor	Aaron Sunny and Joseph Kosbruk
Police Officer (VPO)	Ignace Matthias
Police Officer (VPO)	George Joe
Postal Worker	Catherine Mark
Postal Worker, Sub	Edwardina Dull and Katrina George
Poster Worker	Mary Herrera
Sewage Hauler	Foster Wallace
Water Operator	George Joe

Table E-2: Elected/Appointed Officials

TITLE	NAME	TERM ENDS
Mayor	The Honorable Jimmy George	2004
City Council - Mayor	Jimmy George	2006
City Council - Vice Mayor	Phillip Tulik I	2004
City Council - Treasurer	Albert Olick III	2006
City Council - Secretary	Susan Sunny	2004
City Council	Stanley Anthony	2005
City Council	Fred Joe	2004
City Council	Mark Mark	2005
Advisory School Board	Albert Olick III	2004
Advisory School Board	Bertha Kashatok	2004
Advisory School Board	Mary Matthias	2004
Advisory School Board	Simeon Sunny	2004
Advisory School Board	Andrew George	2004

Local, Regional & State Native Organizations with Local Offices

Chinuruk, Incorporated

P.O. Box 90009

Nightmute, AK 99690

Sam Anthony, Chairman

Phone: 907-647-6115

Fax: 907-647-6126

(Village Corporation, Merged corporations of Nightmute and Umkumiut; owns store and land)

Nightmute Traditional Council

P.O. Box 90021

Nightmute, AK 99690

Joseph Post, President

Phone: 907-647-6213

(Village Council, BIA-recognized Traditional Council; EPA IGAP Program and other Tribal programs)

Nunakauiak Yupik Corporation

P.O. Box 37068

Toksook Bay, AK 99637

Raymond Therchik, General Manager

Phone: 907-427-7929

Fax: 907-427-7326

(Village Corporation; owns land in area)

Umkumiut Tribal Council

P.O. Box 90062

Nightmute, AK 99690

Phone: 907-647-6145

Fax: 907-647-6112

(Village Council, BIA-recognized Traditional Council)

Recycling Contacts

Alaskans for Litter Prevention & Recycling

(ALPAR)

P.O. Box 200393

Anchorage, Alaska 99520

907.274.3266

www.alparalaska.com

▪ Flying Cans Program

The Flying Cans Program with ALPAR will carry aluminum cans from villages throughout Alaska, accessible only by air, to a recycling center in Anchorage for free. The recycling center will then send the village a check for the value of the aluminum. Other applicable ALPAR programs for villages include: Youth Litter Patrols, Volunteer Community Cleanups across Alaska, and Recycling.

America Recycles Day

1325 "G" Street, NW, Suite 1025

Washington, D.C. 20005

202.347.0450 extension 25

www.americarecycleday.org

This year America Recycles Day will be celebrated on Monday, November 15, 2004. Millions of Americans will be participating in recycling events throughout the United States. America Recycles Day (ARD) is a national all-volunteer, non-profit 501(c)(3) organization which sponsors this annual campaign with the goal of educating and encouraging Americans to recycle and buy recycled products. Since its inception seven years ago, the ARD campaign has grown substantially in participation and now encourages recycling activities throughout the U.S. and several territories. Last year residents in every state of the nation participated in America Recycles Day and pledged to recycle.

Arctic Transportation Services (ATS)

Anchorage, Alaska

907.562.2227

Bethel, Alaska

907.543.3652

www.atsak.com

Arctic Transportation Services is an all-cargo air carrier with a 46-year history of bush operations. This experience, combined with scheduled service to 70 villages in Western Alaska, allows ATS to provide unparalleled cargo service. ATS will backhaul aluminum cans (for free) and lead-acid batteries.

Battery Specialists of Alaska

Anchorage, Alaska

907.276.5251

Recycles lead-acid batteries.

Bethel Recycling Center

Bethel, Alaska

907.543.7072

▪ Cash for Cans Program

Recycles aluminum cans.

Green Star

630 East 5th Avenue, Suite 201

Anchorage, Alaska 99501

907.278.7827

907.279.5868

www.greenstarinc.org

▪ Electronics Recycling

Green Star holds an annual two-day Electronics Recycling Event in May in conjunction with the Chamber of Commerce's Citywide Cleanup. The event is for businesses and households

▪ Alaska Materials Exchange (AME)

This web-based, interactive system allows businesses, organizations and individuals to list unwanted items, including computer equipment in working order, for reuse. Anyone looking for such items can log on and identify needed items. All exchanges are made directly between users. This site allows for year-round exchange of equipment, keeping unwanted equipment that could not be stored until spring out of the landfill, and reducing the rate of new equipment purchases. Additional benefits include the ability to sell equipment with value, the immediacy of new equipment postings, and the ability for donor and recipient to make convenient arrangements for the transfer of goods.

Kenai Peninsula Borough

Solid Waste Department

47140 East Poppy Lane

Soldotna, Alaska 99669

907.262.9667

907.262.6090

www.borough.kenai.ak.us/solidwaste/default.html

NAPA Auto Parts

Anchorage, Alaska

907.563.3637

Bethel, Alaska

907.543.2673

Recycles lead-acid batteries.

Solid Waste Alaska Network (SWAN)

The Central Council of the Tlingit and Haida Indian Tribes of Alaska received funding from the US EPA's National Environmental Information Exchange Network Program to develop this extensive on-line resource. SWAN's primary goal is to address solid waste management needs of Alaska Tribes through the dissemination of information.

www.ccthita-swan.org

Contact:

Tribal Association for Solid Waste & Emergency Response (TASWER)

TASWER is a national organization dedicated to preserving the health and environment of Indian and Alaskan Native communities. Through government-to-government partnerships, TASWER seeks to ensure that environmental policies address and integrate the needs and values of the Tribal solid waste, emergency response and Superfund issues.

www.taswer.org

Contact:

Tribal Solid Waste Advisory Network (TSAWN)

TWSAN is a non-profit alliance of Native American Tribes from throughout the Pacific Northwest including Alaska. This group strives to make effective and environmentally responsible solid waste management a priority on their lands and communities.

www.tswan.org

Contact:

US Environmental Protection Agency (EPA)

- **Office of Solid Waste**

EPA is the federal regulatory and enforcement agency, but they only enforce in villages where an extreme danger to community health and environment exists and it is not being addressed. EPA can assist villages by providing: examples of solutions that have been implemented by other villages; technical support over the phone or in the village; information regarding existing funding opportunities including contacts, applications, and review and comment of funding proposals; assistance with solid waste management planning electronically or on site; and tips for public education activities. EPA funds other agencies and organizations to handle solid waste management grants, but typically has some discretionary funds and demonstration grants.

www.epa.gov/osw/

Contact:

- **Waste Management in Indian Country**

Information source for assisting with starting a Tribal waste management program, handling hazardous waste appropriately, opening a new landfill or transfer

station, or cleaning up an old dumpsite. Resources include: publications, educational materials, funding sources, federal and Tribal regulations, and links to other federal agencies, Tribal programs, and professional associations.

www.epa.gov/tribalmsw/

Contact:

- **Interagency Open Dump Cleanup Project for Tribes (Federal)**

A multi-agency effort to help tribes throughout Indian country close and prevent open dumps, to clean-up water on tribal land and develop safe solid waste management practices. EPA coordinates the program, which includes the Indian Health Service, Bureau of Indian Affairs, Department of Defense, and Rural Utility Service. Project awards are made that will result in cleaning up or closing open dumps, or providing services such as integrated solid waste management planning, regulations and training to community members to prevent illegal dumping. Annual grant cycle with applications submitted in the fall and awards announced in January.

Contact: Joe Sarcone, Region X EPA, 907.271.1316

USDA Rural Development

Rural Development is dedicated to social and economic sustainability of rural villages. Technical assistance and funding is primarily handled through grants and low-interest loans. Staff might be able to assist with locating appropriate funding, technical and planning materials, information, or contacts. If your village is near a national forest, additional resources may be available through the USFS.

www.rurdev.usda.gov

Contact:

Solid Waste Resources

Alaska Department of Environmental Conservation (ADEC)

▪ Solid Waste Program

The **Solid Waste Program** under DEC's Environmental Health Division is an excellent resource for technical assistance. ADEC is the state regulatory and enforcement agency. They set the rules for constructing, maintaining, and closing solid waste facilities, including dumps. They approve closure plans and permit new landfills.

www.state.ak.us/dec/eh/sw/

[www.state.ak.us/dec/eh/sw/What do I want to know/index page.htm](http://www.state.ak.us/dec/eh/sw/What%20do%20I%20want%20to%20know/index_page.htm)

Contact:

▪ VSW Program

Village Safe Water (VSW) is a program for rural villages in DEC's Division of Water. VSW has no regulatory or mandated assistance role. VSW is a granting agency that provides technical assistance to villages that have successfully applied for and received a VSW grant. A community usually receives a grant to study the solid waste situation first. Then VSW assists in identifying the problem and defining solutions. To obtain a grant or low-interest loan for solid waste, a village needs to give the solid waste project a high priority. Grant awards are considered in conjunction with ANTHC project awards. If a community does not receive a grant, VSW can provide some technical assistance, but has no discretionary funding.

www.state.ak.us/local/akpages/ENV.CONSERV/water/vsw/index.htm

Contact: Debra Addie, 907.269.3085

Alaska Native Health Board

Alaska Native Health Board (ANHB), an advocacy organization for native health, awards community grants for solid waste projects. The ANHB also oversees and organizes the Rural Alaska Sanitation Coalition (RASC), comprised of interested agencies and village reps.

www.anhb.org

Contact:

Alaska Native Resources

A comprehensive online resource designed specifically for Alaska Natives. Their website is an extensive source of environmental and natural resource information available pertinent to Alaska Natives.

www.alaskannativeresources.com

Contact:

Alaska Native Tribal Health Consortium (ANTHC)

ANTHC has no regulatory role in solid waste, but is mandated to assist if possible. ANTHC employs several engineers that can assist in planning, designing, and building solid waste facilities. ANTHC relies on state and federal funding, and works with Regional Health Corporations to prioritize projects. Solid waste projects are often coupled with water and sewer projects with higher priority. Regional health corporations are closely associated with ANTHC, and can offer separate assistance in landfill permitting, funding, research, on-site surveys, operation and maintenance planning and implementation, training, and other technical assistance areas.

www.anthc.org

Contact:

Bureau of Indian Affairs (BIA)

BIA has discretionary funding for some solid waste activities, including site closure and road building. They may provide technical assistance or equipment as well.

www.doi.gov/bureau-indian-affairs.html

Contact:

Denali Commission

▪ Solid Waste Program

Introduced by Congress in 1998, the Denali Commission is a federal-state partnership designed to provide critical utilities, infrastructure, and economic support throughout Alaska. Since its first meeting in 1999, the Commission is credited with providing numerous cost-shared infrastructure projects across Alaska that exemplify effective partnerships between federal and state agencies, and the private sector. The FY 2004 Omnibus Appropriation Bill (H.R. 2673 Sec. 764) appropriated \$1,000,000 from USDA Rural Development to the Denali Commission to address deficiencies in solid waste disposal sites that threaten to contaminate rural drinking water supplies. This funding provides the Denali Commission and its partner organizations an opportunity to identify innovative solutions to technical and logistical challenges of traditional handling of municipal solid waste. The Denali Commission is authorized to conduct pilot projects incorporating emerging technologies to improve local management options.

www.denali.gov

Contact:

Appendix F

Meeting Summaries, Public Comments & Trip Reports

Ferdinand Mathias, Assistant IGAP/Nightmute Tribal Council
Jimmy George, IGAP/ Nightmute Tribal Council
Katie Anthony, Umkumiut Tribal Operations
Brian Bosco, Alternate Water Operator /City of Nightmute
George Joe, Water Operator /City of Nightmute
Vincent Billy, Tununak Water Operator
Moses Bavilla, Quinhagak Water Operator
Debra Addie, VSW Engineer
Jill Maynard, Vista Volunteer/Bethel

Umkumiut is a seasonal substance village with an office in Nightmute, and is seeking solid waste and sanitation improvements.

The class covered solid waste management, chlorination of water, pathogen tracking, and wastewater. Class members were instructed in how to make community surveys to build consensus, identify and prioritize environmental issues, and how to communicate environmental issues to the community.

There is quite a bit of interest in Nightmute in starting solid waste collection and separating hazardous waste, even without a constructing a new landfill. The City has a VSW study starting for a landfill and washeteria. Jimmy George is interested in assisting with the solid waste management plan portion of the study.

Water Operators were trained regarding chlorine and watering operations during the evening.

Bill Stokes made a number of observations and recommendations regarding the watering point facility. The most crucial is to re-plumb the service line to the new clinic because the present configuration by-passes the chlorine contractor. There was no O&M manual on site, although a draft O&M manual was provided several years ago. Bill's other recommendations are attached.

Potential new service connections

ANTHC has provided funds for 3 new service connections. I visited 3 homes that need service and found the following:

John George	moved house-needs service
Lily Joe	vacant home
Stella Jackson	city-owned rental, needs service

Lagoon

In response to the IGAP's questions about the lagoon, Bill Stokes and I looked it over. It appears that water continually seeps out of the far side of the lagoon into the wetlands near the river. However, a recent lagoon sample shows that the lagoon effluent meets state

guidelines. The lagoon will probably have to be modified to receive piped sewage from the school and potentially a new washeteria.

FOLLOW-UP:

- Ask RMW to change the clinic service connection so the water doesn't by-pass the chlorine contactor. This is a minor plumbing job consisting of removing the supply line connection from the bottom of the chlorine contactor and connecting it near the clinic return line.
- Get a copy of the O&M manual to the community.
- Begin study and ensure local participation.

Cc Bill Stokes, ADEC
Paul Tulik, City of Nightmute
Jimmy George, Nightmute TC
Karl Power, YKHC Bethel
Matt Dixon, ANTHC

Allan Paukan, RMW YKHC
George Joe, City of Nightmute
Dave Cramer, Summit Consulting
Kent Knapp, RMW Program

ATTACHMENTS: Bill Stoke's Comments on Watering Point

Watering Point

- 1) Need isolation valve inside building for hose bib supply line. Hose bib is leaking. When the water is on in bunkhouse, water drips all the time outside from the hose bib.
- 2) Clinic hook-up by-passes chlorine contactor to watering point.
- 3) Watering point hose is about 8-inches off the ground; it should be 2 feet.
- 4) Cam-lock too low for water trailer fill-up.
- 5) Well is tilting due to ground movement, which puts stress on the building.
- 6) According to Bill, the exhaust fan/vent is too big and is wasting heat.
- 7) Cracks in wall result in heat loss.
- 8) No manual (a draft manual was prepared but is not onsite).
- 9) Fe removal might be a future project.
- 10) Need test kit for iron.
- 11) Chlorine color wheel is recommended as back-up tester.
- 12) Move chlorine injection point and sample point to allow for sampling before chlorine contactor.
- 13) Use a smaller vat and mix chlorine every week instead of mixing once per month. Chlorine concentration changes in vat over one month as chlorine evaporates.
- 14) No master log of daily work activities.
- 15) No clip board or filing system.
- 16) Goggles needed.
- 17) Eyewash needed.
- 18) Need a cotton cloth or tee shirt to clean lab glassware. Not paper towels.

Sewer Haul

- 1) O & M manual needed
- 2) Procedure to clean-up spill needed.

Nightmute Solid Waste Management Plan / Feasibility Study

Site Visit #1

Date: 6/18 - 6/20/03

BY: *Chris Wrobel*

Travel: Anchorage - Bethel via Alaska Airlines

Bethel - Nightmute via Hageland

Nightmute - KKH via Hageland

Accompanied by: Chris Allard, SCS

Community Contacts: Jimmy George, IGAP Coordinator
John George, Tribal Council Administrator
Mark Mark, City Administrator

Purpose: Kick-off site visit to collect information and introduce the project to the community

Accomplishments:

Chris Allard and I traveled to Nightmute to collect information and meet local representatives. A community meeting was held on the 19th, and although most of the residents were in Umkumiut, the meeting was still heavily attended. A separate summary of this meeting has been attached.

There is a local movement to establish Umkumiut as a year-round community. If this becomes a reality, we were told that up to a third of the population might move.

Field inspections included the existing dumpsites, proposed sites for a new landfill, proposed sites for a new washeteria, the school water and sewer system, and the clinic water system.

The main dumpsite is located on the southern side of the Toksook River, across from the sewage lagoon. Residents haul their trash by boat and toss it on the riverbank. The bank is eroding, and debris is sloughing into the river. Nightmute residents use the Toksook for subsistence activities. Jimmy George is aware of fifteen fish species that use the river.

Jimmy George, the local IGAP coordinator, has received about \$20,000 in EPA funding to conduct a temporary cleanup of this site. Burnable trash will be separated and burnt in an existing burn barrel. Non-burnable trash will be moved 50-100 feet away from the bank. IGAP is also working on a waste stream characterization which should be complete by the end of July.

There are several other dumpsites scattered along the river and throughout the town. The old winter site is located in a tundra pond several hundred feet east of the main dump. The pond is several acres in size and has nearly been filled with trash. Significant iron precipitation can be seen in the remaining water. The pond drains to the Toksook River via a small slough. Jimmy George collected a water sample from the slough and Village Safe Water had it tested for Mercury, Lead and Cadmium. Jimmy George also sampled water from the main dump. The sample results are attached.

Trash has also been dumped at the barge off-loading area, in one of the small gravel pits behind town, and surrounding the burn barrel near the sewage lagoon.

Signs have been put up at the winter dump stating that it is closed and Jimmy George commented that dumping has mostly stopped at this site.

IGAP is actively pursuing recycling. Lead acid batteries are collected and stored at a building near the barge. ATS will backhaul marine batteries to Bethel for free. Aluminum cans are collected, smashed, backhauled (infrequently), for approximately) \$0.20 per pound by Hagcland, ATS, Frontier, and Era.

KAE is conducting a regional roads transportation plan. Proposed roads would connect Nightmute, Toksook Bay, Tununak, and Umkumiut. Some information from the 95% draft could be incorporated into our reports.

The tribal council is working with NRCS is conducting an erosion study. The final draft is due this fall. The tribal council is also pursuing funding through CVRS for a net loft building.

The most viable landfill location appears to be at the first meander west of town. If the landfill were constructed prior to a road to Toksook, the landfill would likely be located near the base of the mountain. A boardwalk could provide summer access and residents could use snowmachines in the winter. Access to a dumpsite at this location will be complicated by a shallow but wide slough that separates the flat land inside the meander from the mountain. The slough is three to five feet below the elevation of the landfill site and it is covered with a buoyant vegetative map.

Several residents would like to locate the landfill near the sewage lagoon. The site is attractive because there is an existing road to the lagoon and area is removed from the community. However, this alternative would conflict with the proposed runway expansion.

The City wants to use Flush Tank and Haul funding for John George and Stella Jackson. They also want a new pump for the water trailer. The existing pump is unable to fill the water tanks in the "new" houses. George Joe would like to attend training for level I water operator.

Available heavy equipment includes a JD 350C, Cat 450C, Cat 953, Ford 9000 Dump truck, and a compactor. The attached photographs include pictures of each piece of equipment. There is no storage area for the equipment and it is being kept on the road near the school.

IGAP should have the waste stream characterization complete by the end of July.

Nightmute Solid Waste Management Plan / Feasibility Study and Water / Sewer Study

Community Kick-off Meeting ~ 6-18-03

Attendees:

Chris Allard, P.E., Summit Consulting Services, Inc.
Chris Wrobel, Summit Consulting Services, Inc.

(A total of 18 residents were present during the meeting. Because several people came after the sign-in sheet was collected, their names are not included in the list below).

Jimmy George (IGAP Coordinator)
Elliot Tulik
John George (Traditional Council Administrator)
Bessie Kawagley
Phillip Tulik
Darlene Tulik
Maria George
Ellie Tulik
Roseanne Joe
Janet Lawrence
Theresa George

Purpose:

Representatives from Summit Consulting Services, Inc. (SCS) visited Nightmute to collect information and to inform the public about the two studies. The Solid Waste Study focuses on alternative locations and designs for a new landfill. The water and sewer study has two main components, a new laundry facility, and connecting the school to the wastewater line from the laundry facility. The discussion was translated by Jimmy and John George.

Meeting Summary:

The Solid Waste Study will look at the current dumpsites, recommend clean-up plans, new landfill alternatives, and solid waste management tools.

The Water / Sewer study will have two parts; the laundry facility portion will investigate location, size, and laundry equipment; and the second part will focus on the school lagoon and connecting its wastewater line to the force main from the washeteria.

The community members present at the meeting were strongly in support of both projects.

A schedule was explained where SCS would collect information from this meeting and site visit, write up a draft report, present the information during another site visit, and ask the residents comments. This process would be repeated two-three times until the studies were 100 % complete. The studies are due by September in order to be included with this years grant applications.

Several people asked which of the two projects (new landfill of washeteria) was a higher priority. SCS explained that both projects were equally important, although the washeteria was more likely to be funded.

Three landfill locations were discussed: 1) Located west of the village at the base of the mountain, 2) located west of the village on the lower shelf of the mountain, and 3) located east of the village near the sewage lagoon. SCS informed residents that site 3 was probably non-feasible because the FAA required a separation distance of 5000 feet.

Residents commented that it was very important to clean-up the existing dumpsites scattered along the river bank.

Site 1 would be most feasible if the landfill were constructed before a new road to Toksook Bay. A boardwalk would provide access in the summer and snowmachines would be used in the winter. If the planned BIA road to Toksook is built before a new landfill, then alternative #2 would probably be the most feasible because the road would provide suitable access.

Community members were very concerned about management at a new landfill facility. Overall, there was strong support for creating a solid waste utility with a monthly fee. People stated that they would be comfortable paying \$15 per month for this utility. However, some residents did support a self-haul facility with a lower monthly fee.

Residents were also in strong support for a laundry building. Most of the people present supported locating the facility next to the pumphouse. Residents currently travel to Toksook Bay to do laundry and they like Toksook's facilities. Three washers and three to four dryers seemed appropriate.

Overall, there was much discussion about managing the existing flush tank and haul utility and any new facilities. Currently, many residents are not paying their bills for the sewage haul service. Many people complained that the \$25 fee (per flush) was too expensive. One resident suggested that all of the city services should be lumped into one utility with a standard, monthly fee for every household.

Several people were reluctant to voice their opinion because they thought the City Council should be planning the new facilities, and they wanted to wait until the council returned from fish camp.

Summit Consulting Services Trip Report

DATE: 6/18 – 6/20/03

REPORTER: Chris Allard

LOCATION/PROJECT: Nightmute

AIR CARRIERS/ROUTING:

**Alaska Air – Anchorage to Bethel
Hageland – Bethel to Nightmute
Hageland charter – Nightmute to Kongiganak**

PURPOSE:

- **Gather information for Solid Waste and Water & Sewer Studies**

ACCOMPANIED BY:

- **Chris Wrobel**

CONTACTS:

- **Mark Mark, City Administrator**
- **David Tulik, Susan Sunny, City Council**
- **Jimmy George, IGAP**
- **John George, Traditional Council**
- **Darlene Tulik, Bingo Bookkeeper**
- **Jeff Jackson, School Maintenance**
- **George Joe, Water Plant Operator**

MAJOR ACCOMPLISHMENTS:

- **Toured the city lagoon and the school lagoon**
- **Toured the school wastewater system and lift stations**
- **Toured the summer dump site and winter dump site with Jimmy George**
- **Toured potential solid waste site by bend in river with Jimmy**
- **Inspected water supply system in the clinic**
- **Discussed water treatment with George Joe**
- **Held community meeting and discussed this project, solid waste, and potential washeteria**

DISCUSSION:

- **As expected, many people were out of town, most at fish camp.**
- **It was helpful to meet Mark Mark and Darlene Tulik at the City.**
- **Jimmy George deserves a special thank you for taking the time to show Chris W and I around and providing boat transportation to the dump sites across the river and to the potential landfill site down the river.**

- **The IGAP program has some funding for a clean-up of the summer dump site. Trash will be moved away from the eroding bank of the river.**
- **Kuskokwim Architects and Engineers (KAE) has prepared the 95% draft of a sub-regional transportation plan for Nightmute, Toksook Bay, and Tununak. The centerpiece of the plan is a road from Nightmute to Toksook.**
- **There is some question as to whether problems with land issues will delay the planned airport improvements.**

Summit Consulting Services Trip Report

DATE: 7/24 – 7/25/03

REPORTER: Chris Allard

LOCATION/PROJECT: Nightmute

AIR CARRIERS/ROUTING:

Alaska Air – Anchorage to Bethel
Grant – Bethel to Nightmute
ERA – Nightmute to Bethel
Alaska Air – Bethel to Anchorage

PURPOSE:

- **Conduct community meeting concerning Solid Waste and Water & Sewer Studies**
- **Gather information for Studies**

ACCOMPANIED BY:

- **Debra Addie, Village Safe Water**
- **Steve Miller, Raven Engineering**

CONTACTS:

- **Paul Joe, City Administrator**
- **Ignace Methias, City Bookkeeper**
- **David Tulik, Susan Sunny, City Council**
- **Jimmy George, IGAP**
- **Ferdinand Mathias, IGAP**
- **John George, Traditional Council**
- **Darlene Tulik, Bingo Bookkeeper**
- **Jeff Jackson, School Maintenance**
- **George Joe, Water Plant Operator**
- **Foster Wallace, Sewage Hauler**
- **Stanley Anthony, resident**
- **Louise Crane, Health Aid**

MAJOR ACCOMPLISHMENTS:

- **Met with Paul Joe and discussed management of Flush Tank and Haul System (FTHS)**
- **Conducted community meeting with Steve Miller and Debra**
- **Looked at John George house and Stella Jackson house (previously identified by City as candidates for FTHS); Steve as-built these houses during an earlier phase of the project**

- **Looked at the Lillie Joe house, northwest of the school (possible candidate for FTTHS)**
- **Inspected the sewage haul tanks and trailer.**
- **Interviewed several community members and filled out household survey questionnaires**
- **Got water meter reading from clinic**

DISCUSSION:

- **Paul Joe has recently returned to the position of City Administrator**
- **FTTHS policy allows households to owe \$200 (8 sewage hauls @ \$25 each) before they are cut off from service. Most households owe money and receive a bill every month.**
- **There was not a quorum of City Council members in town but a community meeting was held.**
- **About 20 people attended the meeting where I explained the project and got input from those attending. John George translated.**
- **The IGAP program had funding for a clean-up of the summer dump site. They moved trash away from the eroding bank of the river.**
- **On Friday there was a meeting in Toksook Bay about the proposed road to Nightmute. Several people from Nightmute, including Paul Joe, went down to the meeting.**
- **The latest plan from AVEC is to locate their new plant and fuel tank farm southwest of the school lagoon. Their concept-level plan shows "waste heat" going to the school.**
- **The next scheduled trip is October 14**

- Trash should not impact the spring because it will be transported downstream of the building where residents collect water.
- The community prefers site #2, on the hillside, for a landfill.
- We will send them another contour map and they will mark good locations for a landfill on the hillside.
- A geotechnical assessment will be very important for site #2.
- Debra suggested postponing the deadline for the solid waste study until geotech can be completed for site #2
- The DOT geotechnical plan for the road should be finished this winter. We need to contact DOT for more info.
- The council asked if a tarp could be used in place of earthen cover material during the winter. We need to contact DEC to see if a tarp is acceptable.
- The council wants a basic landfill operations plan to be included in the study. They want it to focus on day to day operations.
- Debra explained that there might only be \$250,000 available in funding for solid waste.
- As an alternative to a landfill, the council asked if they could purchase a burnbox with this funding. The \$250,000 grant would be large enough to purchase the box, a piece of equipment for operating it, a stand to hold supersacks for the ash, and a supply of super sacks.
- The council suggested setting up the burn box on the pad near the sewage lagoon. This pad already has a burn barrel constructed from an old, vertical 10,000-gallon fuel tank.
- The existing burn barrel is very difficult to clean because it is mostly handwork. The council liked the Summit burn box because it is so easy to clean.
- The largest piece of equipment that the city currently owns is a 953 loader.
- The city wants our help to size a burn box, and match the box to a piece of equipment
- This alternative for a burn box should be explained in the solid waste report – 95% draft.
- For solid waste O&M, the tribal government is looking into a collection program through BIA. This will be included in their Comprehensive Community Plan. We need to learn more about this plan and if BIA is able to fund O&M for trash collection.
- The council supported self haul of solid waste and thought that \$5 per household per month was a reasonable fee. The council suggested that if they are successful with collecting the \$5 utility fee, then maybe the service could be expanded in the future. They viewed the self haul alternative as a first step toward improved solid waste management and operations.
- The council will inform us of the results from the community meeting planned for 1/10/04.

Chris Wrobel
Summit Consulting Services

To: SCS TOK
SCS Anchorage

From: CW
TWO PAGES

Nightmute Water and Sewer Study & Solid Waste Study

65% Presentation to the City Council

12/21/03

(Note: Staff from Summit, Raven Engineering and VSW attempted to travel to Nightmute on 12/16/03 in order to present the 65% reports. Due to poor weather in Nightmute the trip was cancelled. The reports were presented to the City Council on 12/19/03 during a teleconference.)

Teleconference Attendees:

Summit: Chris Wrobel, Chris Allard

VSW: Debra Addie

Nightmute City Council: Jimmy George, Stanley Anthony, Mark Mark, Fred Joe, Phillip Tulik, Susan Suny

The discussion followed the format presented in PowerPoint slides for each study. Copies of these slides were sent to the village along with a large format topographic map and a handout titled *additional information for the 65% report*. This summary will highlight the major points of discussion.

Water and Sewer Studies

- The new sewage lagoon will require an annual discharge to the Toksook River. This will be a new and necessary operational responsibility for the City. The purpose of an annual discharge is increased treatment in the lagoon.
- When the new city lagoon is built (in the footprint of the existing lagoon) the school lagoon will be disinfected and closed. Sludge may or may not be removed depending on funding. When the lagoon is closed, it will be "capped" after it is disinfected.
- Debra requested that we add the closure cost of the school lagoon to the city lagoon life cycle cost estimate.
- A lift station will be required for a piped wastewater system. The lift station will have daily operational requirements, and a budget will be needed to cover the expense of labor, parts, and new equipment. For example, a new pump could cost \$7,000.
- Planning for current and future expenses is where the business plan can be very useful for the community.
- Specific design elements, such as freeze protection, will be addressed when funding has been received for design work.
- The school contributes 1/3 of the sewage in the community. Utility fees charged to the school will help generate revenue for operation and maintenance of the new waste water system.
- Family O&M costs for a new water and sewer system are estimated at \$1000 per household per year.
- If a washeteria is built at site #1, there will be two class A water systems. Both systems would have the same sampling and regulatory requirements. Two wells will mean double the sampling expense.
- One council member was very concerned about having a secure water source on the west end of town.
- The city suggested three additional sites for a washeteria: A, B, and C. Debra added site D. After discussion, the city decided to narrow the focus of the study to sites #1, 3, and D. The sites will be narrowed down again after the community meeting scheduled for 1/10/04.
- If a site is selected for a washeteria near the clinic, we need to find the location of Ella Tulik's native allotment.
- Jimmy George suggesting building the washeteria on the pad for the existing water treatment plant in order to avoid allotments and wetlands.
- The council reached a consensus about water treatment. They do not want a package plant or wetlands treatment. The council stated that they prefer the lagoon alternative.

Landfill

- The berms should not be higher than 6 feet because it will become harder to place cover material.
- One member was very concerned about protecting the water source at the west end of town.

Appendix G
Preliminary Community Ordinance

ORDINANCE 97

AN ORDINANCE FOR WATER/SEWER SERVICES

BE IT ENACTED BY THE CITY COUNCIL OF NIGHTMUTE that there shall be a Water Sewer Department in the City of Nightmute as follows:

Section 1. Classification.

Section 2. Water Sewer Department.

Section 3. Effective date.

Section 1. Classification. This is a permanent ordinance, to be numbered and included in the City of Nightmute's Municipal Code.

Section 2. Water Sewer Department.

Water and Sewer

Sections:

1. Definitions
2. Adoption of Power
3. Administration of Utility
4. Service Area
5. Service Provided
6. Application for Service
7. Utilities and Customers Responsibilities and Ownership
8. Charges for Services
9. Billing Procedure
10. Access to Customers Property
11. Illegal Dumping
12. Penalties
13. Administration and Reporting of Utility
14. Constitutionality and Saving Clause

SECTION 1 Definitions

APPLICANT: The person or persons, firm or corporation making application for utility service from the City of NIGHTMUTE.

CITY: The City of NIGHTMUTE, Alaska, a second class city recognized under the laws of the State of Alaska.

COUNCIL: The seven-member governing body of the City of NIGHTMUTE, Alaska.

CUSTOMER: An applicant who has been accepted and who receives utility services from the City. By being accepted and receiving services, a customer or user thereby agrees to abide by the terms set forth in these regulations.

WATER/SEWAGE HAUL: Haul potable water to a customer, and haul sewage from the customer's holding tank.

HONEY BUCKET HAUL: Empty the sewage hoppers.

SECTION 2 Adoption of Power

The City shall provide a water/sewage haul system, and a honey bucket haul system, and shall be responsible for operation, management, administration, maintenance, repair, and replacement of these systems.

SECTION 3 Administration of Utility

The City shall establish a separate department for the sewer and water utility. The head of the department shall be the City Administrator. The purpose of the department shall be to operate the water/sewage haul system, and the honey bucket haul system.

SECTION 4 Service Area

The water and sewer system service area falls within the City limits. The City may provide services to customers outside the City limits on terms and conditions acceptable to the City Council.

SECTION 5 Service Provided

The sewer and water utility shall furnish and deliver potable (drinkable) water to, and pick up sewage from, customers subscribing to the water/sewage haul service, and shall haul and empty the sewage hoppers around the community. The utility will provide these services in a reliable and safe manner. The utility will not be liable for interruption of service because of the failure of the customer to provide reasonable access to the household holding tanks, customer's non-payment of fees, shortage of water, extreme weather conditions or unavoidable equipment failures.

Priority of water services will be as follows in case of water shortages:

1. Community watering point at the water plant.
2. Hauled water to the public facilities.
3. Hauled water to private residences.

SECTION 6 Application for Service

Households shall apply for service from the Utility using the provided application by the Utility. The service cannot be started until the application is signed by the applicant and a re-fundable security deposit of \$ ____ has been made.

SECTION 7 Utility and Customer Responsibilities and Ownership

Household holding tanks and plumbing (if any) within the customer's building are the responsibility of the owner and not the utility system. The utility will be responsible for the maintenance of utility haul equipment, pumps, vehicles, water plant, honey bucket hoppers, and disposal lagoon.

The utility operator will make reasonable efforts to reach a customer's holding tanks. However, it is the customer's responsibility to make access to the holding tanks available.

SECTION 8 Charges for Services

The utility will charge for the water/sewage haul services provided to customers. Rates for the service shall be based upon the costs of providing the service. Rates will be established by the City Council and approved through city resolution. The rates for service shall be reviewed by the Council annually to adjust for changes in the cost for service.

Customers shall be notified of increases in the cost of the service. The utility will provide 30 days notice of price increases.

SECTION 9 Billing Procedure

Customers shall pay for water/sewage haul services on a regular monthly basis. Unless a payment plan is established with the customer for water/sewage haul. Payment shall be made at the City office, to the administrator or utility clerk. It is the responsibility of the customer to pay all fees required for the service.

SECTION 10 Access to Customer's Property

Customers are responsible for snow removal, removing obstacles and keeping items away from the household holding tanks so that utility equipment can deliver water and remove sewage with the exception of the elderly, disabled, and residents with health problems. The Council shall determine who the elderly, disabled, and residents with health problems, and will be responsible for access to those customers' homes. Access across customer's property shall be granted through the signing of the customer agreement.

SECTION 11 Illegal Dumping

It is illegal in the City of NIGHTMUTE to dump honey buckets or otherwise dispose of human waste except in a manner approved by the Council at approved sites. It is illegal to damage or destroy any utility equipment, facilities or buildings. It is illegal to dump trash, solid waste, plastic bags, and the like into sewage hoppers. Only unbagged honey bucket waste is to be dumped into the sewage hoppers. Anyone found guilty of violating this section of the ordinance shall be responsible for the cost of replacement or repair of the damaged property as well as any fines and community service assessed by the Council under Section 12.

SECTION 12 Penalties

Anyone found guilty of violation of any provisions of this ordinance may be fined up to \$300 and/or assessed up to 5 days of community service.

SECTION 13 Administration and Reporting of Utility

The administrator shall report to the Council monthly on the activities and finances of the utility. A separate record of all revenues and expenses of the utility shall be kept.

The utility may establish a savings account to put money aside for future equipment purchases, major repairs, improvements to the system.

SECTION 14 Constitutionality and Saving Clause

If a court of law judges any clause, sentence, paragraph, section, or portion of these rules to be invalid, such judgment shall not invalidate the remainder of this document.

Section 3. Effective Date.

This ordinance takes effect upon ratification by the voters of the City of Nighthute.

Introduction. January 27, 1997

Public hearing. _____

ADOPTED by a duly constituted quorum of the Council of the City of Nighthute, Alaska, this ___ day of _____, 1997.

MAYOR

ATTEST:

CITY CLERK

Date of Election. _____

Date of Certification _____

Total votes cast. _____

Total FOR passage _____

Total AGAINST passage _____

Utility Service Agreement

This agreement is made between the City of Nightmute, Water and Sewer Utility as the Utility and _____ as the Applicant.

The applicant requests that the residence on the property described in Appendix A, be connected to the Utility's Water / Sewer system.

As part of the request, the Applicant agrees:

1. To abide by the water and sewer ordinances, rules, and policies adopted by the City and Utility.
2. To grant at no cost, a Right-of-Entry (form attached as Appendix B) to the Utility to construct the connection to the applicants residence or place of business.
3. If necessary, grant at no cost, an Easement (form attached as Appendix C) to the Utility for construction of water/sewer main lines across the Applicants property.
4. To pay the Utility, a monthly service of \$ _____, as established by the City Council.
5. To pay a security deposit of \$ _____, prior to connection of service.
6. That delinquent bills (more than 30 days past due) are subject to collection actions. These actions can include, but are not limited to interest charges, late payment fees, deposit forfeiture, suits in small claims court, refusal to provide services until bills are paid, and disconnection or removal of equipment from residence or place of business.
7. To maintain the plumbing on the Applicants property and within the residence, including the toilet, pipes, water tank, pressure pump, fill pipes, sewage tank, pump out line, and any other appurtenances intended to carry water or sewage in accordance with Uniform Plumbing Code.
8. To use the heat tape and maintain adequate insulation for the system to prevent freezing in the winter and enough heat to keep the pump from freezing. In an instance of extended periods of disuse, empty tanks and fixtures to prevent damage to the system.
9. To allow the Utility to enter the property to deliver water or to pump the sewage from the tanks.
10. To keep the access route clear of snow, vehicles, or other obstructions so the Utility personnel can have easy access for delivery of services. (The Utility will refuse to provide services if the access route is obstructed.)
11. In the event of water shortages, the Applicant agrees to work with the Utility on measures to conserve water.

12. That by signing this agreement, the Applicant grants to the Utility, Its officers, employees, agents, and assigns the right of ingress and egress to the property and residence for purposes of inspection of piping, plumbing, fixtures, and other appurtenances intended to carry water, sewage, and waste water. The ingress and egress shall be at a reasonable time, and whenever possible the Utility shall provide advance notice of inspection.

13. Be available in person to complete and sign an individual service work order. Prior to the meeting where the Work Order is completed, the Applicant should plan where they would like the fixtures located.

The Utility agrees to:

1. Provide service to paying customers if their access route is clear.
2. Bill the Applicant on a monthly basis for water / sewer services.
3. Work to continue to improve sanitary conditions in Nightmute by placing a high priority on planned capital improvements for water and waste disposal facilities, administering the operation of future improvements, and administering and enforcing the ordinances, rules, and policies designed to improve sanitation practices in Nightmute.

All bills, invoices, statements, payments, notices, or correspondence shall be sent to the respective parties at the address stated below:

Applicant

Utility

City Administrator
City of Nightmute
P.O. Box 90010
Nightmute, AK 99690

This Agreement take effect on this _____ day of _____, 199_.

Applicant

Water and Sewer Utility

- ATTACHMENTS:
- Appendix A - Legal Description
 - Appendix B - Right - of - Entry
 - Appendix C - Easement (optional)

Acknowledgment

State of Alaska

: ss

Second Judicial District

This is to certify that on this _____ day of _____, 199__ before me, the undersigned Notary Public, in and for the State of Alaska, duly commissioned and sworn as such, personally appeared _____ an individual, who acknowledged to me that (s)he executed the within and foregoing Agreement as a voluntary act and deed for the uses and purposes therein mentioned.

Notary Public in and for Alaska
My Commission expires: _____

Acknowledgment

State of Alaska

: ss

Second Judicial District

This is to certify that on this _____ day of _____, 199__ before me, the undersigned Notary Public, in and for the State of Alaska, duly commissioned and sworn as such, personally appeared _____ to me known to be Mayor, for the City of Nightmute, a Second Class City, organized and existing under the laws of the State of Alaska, and who acknowledged to me that (s)he executed the within and foregoing Agreement on behalf of the City of Nightmute, by authority of its City Council, as a voluntary act and deed for the uses and purposes therein mentioned.

Notary Public in and for Alaska
My Commission expires: _____

Appendix H

Agency Correspondence & Resources

- **Federal Aviation Administration**
- **Office of History & Archeology**
Alaska Department of Natural Resources



U.S. Department
of Transportation

Federal Aviation
Administration

Advisory Circular

**Subject: HAZARDOUS WILDLIFE ATTRACTANTS ON
OR NEAR AIRPORTS**

Date: 5/1/97

AC No: 150/5200-33

Initiated by:

Change:

AAS-310 and APP-600

1. PURPOSE. This advisory circular (AC) provides guidance on locating certain land uses having the potential to attract hazardous wildlife to or in the vicinity of public-use airports. It also provides guidance concerning the placement of new airport development projects (including airport construction, expansion, and renovation) pertaining to aircraft movement in the vicinity of hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2. APPLICATION. The standards, practices, and suggestions contained in this AC are recommended by the Federal Aviation Administration (FAA) for use by the operators and sponsors of all public-use airports. In addition, the standards, practices, and suggestions contained in this AC are recommended by the FAA as guidance for land use planners, operators, and developers of projects, facilities, and activities on or near airports.

3. BACKGROUND. Populations of many species of wildlife have increased markedly in the

last few years. Some of these species are able to adapt to human-made environments, such as exist on and around airports. The increase in wildlife populations, the use of larger turbine engines, the increased use of twin-engine aircraft, and the increase in air-traffic, all combine to increase the risk, frequency, and potential severity of wildlife-aircraft collisions.

Most public-use airports have large tracts of open, unimproved land that are desirable for added margins of safety and noise mitigation. These areas can present potential hazards to aviation because they often attract hazardous wildlife. During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives world-wide, as well as billions of dollars worth of aircraft damage. Hazardous wildlife attractants near airports could jeopardize future airport expansion because of safety considerations.

DAVID L. BENNETT
Director, Office of Airport Safety and Standards

SECTION 1. HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS.

1-1. TYPES OF HAZARDOUS WILDLIFE ATTRACTANTS ON OR NEAR AIRPORTS. Human-made or natural areas, such as poorly-drained areas, retention ponds, roosting habitats on buildings, landscaping, putrescible-waste disposal operations, wastewater treatment plants, agricultural or aquacultural activities, surface mining, or wetlands, may be used by wildlife for escape, feeding, loafing, or reproduction. Wildlife use of areas within an airport's approach or departure airspace, aircraft movement areas, loading ramps, or aircraft parking areas may cause conditions hazardous to aircraft safety.

All species of wildlife can pose a threat to aircraft safety. However, some species are more commonly involved in aircraft strikes than others. Table 1 lists the wildlife groups commonly reported as being involved in damaging strikes to U.S. aircraft from 1993 to 1995.

Table 1. Wildlife Groups Involved in Damaging Strikes to Civilian Aircraft, USA, 1993-1995.

Wildlife Groups	Percent involvement in reported damaging strikes
Gulls	28
Waterfowl	28
Raptors	11
Doves	6
Vultures	5
Blackbirds-	5
Starlings	
Corvids	3
Wading birds	3
Deer	11
Canids	1

1-2. LAND USE PRACTICES. Land use practices that attract or sustain hazardous wildlife populations on or near airports can significantly increase the potential for wildlife-aircraft collisions. FAA recommends against land use practices, within the siting criteria stated in 1-3, that attract or sustain populations of hazardous wildlife within the vicinity of airports or cause movement of hazardous wildlife onto, into, or across the approach or departure airspace, aircraft movement area, loading ramps, or aircraft parking area of airports.

Airport operators, sponsors, planners, and land use developers should consider whether proposed land uses, including new airport development projects, would increase the wildlife hazard. Caution should be exercised to ensure that land use practices on or near airports do not enhance the attractiveness of the area to hazardous wildlife.

1-3. SITING CRITERIA. FAA recommends separations when siting any of the wildlife attractants mentioned in Section 2 or when planning new airport development projects to accommodate aircraft movement. The distance between an airport's aircraft movement areas, loading ramps, or aircraft parking areas and the wildlife attractant should be as follows:

a. **Airports serving piston-powered aircraft.** A distance of 5,000 feet is recommended.

b. **Airports serving turbine-powered aircraft.** A distance of 10,000 feet is recommended.

c. **Approach or Departure airspace.** A distance of 5 statute miles is recommended, if the wildlife attractant may cause hazardous wildlife movement into or across the approach or departure airspace.

SECTION 2. LAND USES THAT ARE INCOMPATIBLE WITH SAFE AIRPORT OPERATIONS.

2-1. GENERAL. The wildlife species and the size of the populations attracted to the airport environment are highly variable and may depend on several factors, including land-use practices on or near the airport. It is important to identify those land use practices in the airport area that attract hazardous wildlife. This section discusses land use practices known to threaten aviation safety.

2-2. PUTRESCIBLE-WASTE DISPOSAL OPERATIONS. Putrescible-waste disposal operations are known to attract large numbers of wildlife that are hazardous to aircraft. Because of this, these operations, when located within the separations identified in the siting criteria in 1-3 are considered incompatible with safe airport operations.

FAA recommends against locating putrescible-waste disposal operations inside the separations identified in the siting criteria mentioned above. FAA also recommends against new airport development projects that would increase the number of aircraft operations or that would accommodate larger or faster aircraft, near putrescible-waste disposal operations located within the separations identified in the siting criteria in 1-3.

2-3. WASTEWATER TREATMENT FACILITIES. Wastewater treatment facilities and associated settling ponds often attract large numbers of wildlife that can pose a threat to aircraft safety when they are located on or near an airport.

a. New wastewater treatment facilities. FAA recommends against the construction of new wastewater treatment facilities or associated settling ponds within the separations identified in the siting criteria in 1-3. During the siting analysis for wastewater treatment facilities, the potential to attract hazardous wildlife should be considered if an airport is in the vicinity of a proposed site. Airport operators should voice their opposition to such sitings. In addition, they should consider the existence of wastewater treatment facilities when evaluating proposed sites for new airport development projects and avoid such sites when practicable.

b. Existing wastewater treatment facilities. FAA recommends correcting any wildlife hazards arising from existing wastewater treatment facilities located on or near airports without delay, using appropriate wildlife hazard mitigation techniques. Accordingly, measures to minimize hazardous wildlife attraction should be developed in consultation with a wildlife damage management biologist. FAA recommends that wastewater treatment facility operators incorporate appropriate wildlife hazard mitigation techniques into their operating practices. Airport operators also should encourage those operators to incorporate these mitigation techniques in their operating practices.

c. Artificial marshes. Waste-water treatment facilities may create artificial marshes and use submergent and emergent aquatic vegetation as natural filters. These artificial marshes may be used by some species of flocking birds, such as blackbirds and waterfowl, for breeding or roosting activities. FAA recommends against establishing artificial marshes within the separations identified in the siting criteria stated in 1-3.

d. Wastewater discharge and sludge disposal. FAA recommends against the discharge of wastewater or sludge on airport property. Regular spraying of wastewater or sludge disposal on unpaved areas may improve soil moisture and quality. The resultant turf growth requires more frequent mowing, which in turn may mutilate or flush insects or small animals and produce straw. The maimed or flushed organisms and the straw can attract hazardous wildlife and jeopardize aviation safety. In addition, the improved turf may attract grazing wildlife such as deer and geese.

Problems may also occur when discharges saturate unpaved airport areas. The resultant soft, muddy conditions can severely restrict or prevent emergency vehicles from reaching accident sites in a timely manner.

e. Underwater waste discharges. The underwater discharge of any food waste, e.g., fish processing offal, that could attract scavenging wildlife is not recommended within the separations identified in the siting criteria in 1-3.

2-4. WETLANDS.

a. Wetlands on or near Airports.

(1) Existing Airports. Normally, wetlands are attractive to many wildlife species. Airport operators with wetlands located on or nearby airport property should be alert to any wildlife use or habitat changes in these areas that could affect safe aircraft operations.

(2) Airport Development. When practicable, the FAA recommends siting new airports using the separations identified in the siting criteria in 1-3. Where alternative sites are not practicable or when expanding existing airports in or near wetlands, the wildlife hazards should be evaluated and minimized through a wildlife management plan prepared by a wildlife damage management biologist, in consultation with the U.S. Fish and Wildlife Service (USFWS) and the U.S. Army Corps of Engineers (COE).

NOTE: If questions exist as to whether or not an area would qualify as a wetland, contact the U.S. Army COE, the Natural Resource Conservation Service, or a wetland consultant certified to delineate wetlands.

b. Wetland mitigation. Mitigation may be necessary when unavoidable wetland disturbances result from new airport development projects. Wetland mitigation should be designed so it does not create a wildlife hazard.

(1) FAA recommends that wetland mitigation projects that may attract hazardous wildlife be sited outside of the separations

identified in the siting criteria in 1-3. Wetland mitigation banks meeting these siting criteria offer an ecologically sound approach to mitigation in these situations.

(2) Exceptions to locating mitigation activities outside the separations identified in the siting criteria in 1-3 may be considered if the affected wetlands provide unique ecological functions, such as critical habitat for threatened or endangered species or ground water recharge. Such mitigation must be compatible with safe airport operations. Enhancing such mitigation areas to attract hazardous wildlife should be avoided. On-site mitigation plans may be reviewed by the FAA to determine compatibility with safe airport operations.

(3) Wetland mitigation projects that are needed to protect unique wetland functions (see 2-4.b.(2)), and that must be located in the siting criteria in 1-3 should be identified and evaluated by a wildlife damage management biologist before implementing the mitigation. A wildlife damage management plan should be developed to reduce the wildlife hazards.

NOTE: AC 150/5000-3, Address List for Regional Airports Division and Airports District/Field Offices, provides information on the location of these offices.

2-5. DREDGE SPOIL CONTAINMENT AREAS. FAA recommends against locating dredge spoil containment areas within the separations identified in the siting criteria in 1-3, if the spoil contains material that would attract hazardous wildlife.

Cultural Resources / Historic Preservation Requirements

The State Historic Preservation Officer will require consultation prior to constructing a new landfill in Nightmute. If the project is federally funded, the responsible federal agency must determine if the project has the potential to impact cultural resources.

Typically, Village Safe Water assumes the role of the responsible federal agency for its projects. Research can be conducted at the State Historic Preservation Officer (SHPO) to determine where cultural resources are located in reference to the project site.

Afterwards, the responsible federal agency will submit a letter to SHPO stating which cultural resources could be impacted, if any, and will suggest mitigation. SHPO will return either a letter stamped "No Affect to Cultural Resources," or a mitigation plan.

The following letter was issued by SHPO for a previous Water and Sewer Project in Nightmute. While it can be used as a reference, SHPO will need to be consulted again prior to constructing a new landfill.

STATE OF ALASKA

M.A. to S.W. - 1 FYC

TONY KNOWLES, GOVERNOR

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION
OFFICE OF HISTORY AND ARCHAEOLOGY

3601 C STREET, SUITE 1278
ANCHORAGE, ALASKA 99503-5921
PHONE: (907) 762-2622
FAX: (907) 762-2628

October 19, 1995

RECEIVED
OCT 24 1995

FC&O/ANCHORAGE

File No.: 3130-2R DEC Village Safe Water

Subject: Nightmute Water and Sewer Improvement Project

Sheila Westfall
Division of Facility Construction & Operation
Village Safe Water Program
Department of Environmental Conservation
555 Cordova St.
Anchorage, AK 99501-2617

Dear Ms. Westfall:

Thank you for your letter on the referenced project. No historic or archaeological sites are known in the Nightmute project area. A 1974 archaeological survey for the airport and access road had negative results.

Our examination of air photos indicate that the area of potential effect is generally low and wet with the location of river courses rather dynamic. Therefore, it is our opinion that the potential to discover presently unknown archaeological or historic sites is low; an archaeological survey is not warranted. We have no objections to the project proceeding as planned.

Please contact Tim Smith at 269-8722 if there are any questions or if we can be of further assistance.

Sincerely,



Judith E. Bittner
State Historic Preservation Officer

JEB:tas

cc: Vicki Bukovik, DGC (AK 9510-06AP)

Appendix I

Cost Estimates

- **Capital Cost Estimates**

Table I-1: Capital Cost Estimate for Landfill Alternative #1

Table I-2: Capital Cost Estimate for Landfill Alternative #2A

Table I-3: Capital Cost Estimate for Landfill Alternative #2B

Table I-4: Capital Cost Estimate for Landfill Alternative #3

Table I-5: Capital Cost Estimate for Option 2, Phase 1 of Alternative #2A: Burn Box

Table I-6: Capital Cost Estimate for Option 2, Phase 2 of Alternative #2A: Landfill

Table I-7: Capital Cost Estimate for Cleanup of Dumpsites on Land

Table I-8: Capital Cost Estimate for Winter Dump Closure

- **O&M Cost Estimates**

Table I-9: Annual O&M Cost Estimate for a Self-Haul Solid Waste Utility

Table I-10: Annual O&M Cost Estimate for a Community-Haul Solid Waste Utility

Table I-1: Capital Cost Estimate for Landfill Alternative #1

Category	COLUMN A	COLUMN B
	Estimated Cost	Cost Savings Heavy Equipment On-Site
General Conditions -- Heavy Equipment Component	\$250,000	-\$225,000
Superintendent Payroll	\$80,000	
Equipment Parts and Labor	\$75,000	
Liability Insurance	\$15,000	
Small Tools and Equipment Rental	\$25,000	
Fuel, Oil, and Gas	\$25,000	
Mobilization (Barge / Air) -- Heavy Equipment Component	\$275,000	-\$150,000
Construct Landfill Access Road	\$100,000	
Construct Landfill Pad	\$80,000	
Construct Landfill Cell	\$40,000	
Construct Storage Building (20' x 30')	\$125,000	
Custom Burn Box	\$82,500	
Dispose of Waste from Old Sites	\$60,000	
Subtotal	\$1,232,500	-\$375,000
Design, Permitting & Engineering @10%	\$123,250	
Construction Management @ 10%	\$123,250	
TOTAL*	\$1,479,000	-\$375,000
Adjusted Total -- Heavy Equipment On-Site** (Column A less Column B)	\$1,104,000	
<p><i>Assumptions:</i></p> <ul style="list-style-type: none"> ▪ 2006 Construction or sooner ▪ Managed Force Account construction ▪ Locally available borrow material ▪ Stand alone construction ▪ All rights of way, easements, land transfers to be obtained at no cost to the project ▪ Gravel pad may require a liner for ground water separation <p>*Assumes this project procures and ships all construction equipment</p> <p>**Assumes construction equipment available from another project, such as water and wastewater improvements and/or road and airport improvements</p>		

Table I-2: Capital Cost Estimate for Landfill Alternative #2A

CATEGORY	COLUMN A	COLUMN B
	Estimated Cost	Cost Savings Heavy Equipment On-Site
General Conditions -- Heavy Equipment Component	\$334,000	-\$240,000
Superintendent Payroll	\$95,000	
Equipment Parts and Labor	\$95,000	
Liability Insurance	\$26,000	
Small Tools and Equipment Rental	\$30,000	
Fuel, Oil, and Gas	\$40,000	
Mobilization (Barge / Air) -- Heavy Equipment Component)	\$300,000	-\$150,000
Construct Landfill Access Road (unless Toksook Bay road built)	\$500,000	
Construct Landfill Pad	\$80,000	
Construct Landfill Cell	\$40,000	
Construct Storage Building (20' x 30')	\$175,000	
Custom Burn Box	\$82,500	
Dispose of Waste from Old Sites	\$60,000	
Subtotal	\$1,857,500	-\$390,000
Design, Permitting & Engineering @ 11%	\$204,325	
Construction Management @ 10%	\$185,750	
TOTAL*	\$2,247,575	-\$390,000
Adjusted Total -- Heavy Equipment Available On-Site** (Column A less Column B)	\$1,857,575	
<p><i>Assumptions:</i></p> <ul style="list-style-type: none"> ▪ 2006 Construction or sooner ▪ Managed Force Account construction ▪ Locally available borrow material ▪ Stand alone construction ▪ All rights of way, easements, land transfers to be obtained at no cost to the project ▪ Permafrost stabilization and protection measures will be required ▪ Two-year construction schedule due to soil stabilization constraints ▪ Landfill pad may require thermopiles <p>*Assumes this project procures and ships all construction equipment</p> <p>**Assumes construction equipment available from another project, such as water and wastewater improvements and/or road and airport improvements</p>		

Table I-3: Capital Cost Estimate for Landfill Alternative #2B

Category	COLUMN A	COLUMN B
	Estimated Cost	Cost Savings Heavy Equipment On-Site
General Conditions -- Heavy Equipment Component	\$334,000	-\$240,000
Superintendent Payroll	\$95,000	
Equipment Parts and Labor	\$95,000	
Liability Insurance	\$26,000	
Small Tools and Equipment Rental	\$30,000	
Fuel, Oil, and Gas	\$40,000	
Mobilization (Barge / Air) -- (Heavy Equipment Component)	\$300,000	-\$150,000
Construct Landfill Access Road (unless Toksook Bay road built)	\$300,000	
Construct Landfill Pad	\$80,000	
Construct Landfill Cell	\$40,000	
Construct Storage Building (20' x 30')	\$175,000	
Custom Burn Box	\$82,500	
Dispose of Waste from Old Sites	\$60,000	
Subtotal	\$1,657,500	-\$390,000
Design, Permitting & Engineering @ 11%	\$182,325	
Construction Management @ 10%	\$165,750	
TOTAL*	\$2,005,575	-\$390,000
Adjusted Total -- Heavy Equipment On-Site** (Column A less Column B)	\$1,615,575	
<p><i>Assumptions:</i></p> <ul style="list-style-type: none"> ▪ 2006 Construction or sooner ▪ Managed Force Account construction ▪ Locally available borrow material ▪ Stand alone construction ▪ All rights of way, easements, land transfers to be obtained at no cost to the project ▪ Permafrost stabilization and protection measures will be required ▪ Two-year construction schedule due to soil stabilization constraints ▪ Landfill pad may require thermopiles <p>*Assumes this project procures and ships all construction equipment</p> <p>**Assumes construction equipment available from another project, such as water and wastewater improvements and/or road and airport improvements</p>		

Table I-4: Capital Cost Estimate for Landfill Alternative #3

CATEGORY	COLUMN A	COLUMN B
	Cost	Cost Savings Heavy Equipment On-Site
General Conditions -- Heavy Equipment Component	\$250,000	-\$225,000
Superintendent Payroll	\$80,000	
Equipment Parts and Labor	\$75,000	
Liability Insurance	\$15,000	
Small Tools and Equipment Rental	\$25,000	
Fuel, Oil, and Gas	\$25,000	
Mobilization (Barge / Air) -- Heavy Equipment Component	\$275,000	-\$150,000
Construct Improvements to Access Road	\$50,000	
Construct Landfill Pad*	\$80,000	
Construct Landfill Cell	\$40,000	
Construct Storage Building (20' x 30')	\$125,000	
Custom Burn Box	\$82,500	
Dispose of Waste from Old Sites	\$60,000	
Subtotal	\$1,182,500	-\$375,000
Design, Permitting & Engineering @10%	\$118,250	
Construction Management @ 11%	\$130,075	
TOTAL*	\$1,430,825	-\$375,000
Adjusted Total -- Heavy Equipment On-Site** (Column A less Column B)	\$1,055,825	
<p><i>Assumptions:</i></p> <ul style="list-style-type: none"> ▪ 2006 Construction or sooner ▪ Managed Force Account construction ▪ Locally available borrow material ▪ Stand alone construction ▪ All rights of way, easements, land transfers to be obtained at no cost to the project <p>*Assumes this project procures and ships all construction equipment</p> <p>**Assumes construction equipment available from another project, such as water and wastewater improvements and/or road and airport improvements</p>		

Table I-5: Capital Cost Estimate for Option 2, Phase 1 of Alternative #2A: Burn Box

CATEGORY	Estimated Cost	
General Conditions -- Heavy Equipment Component		\$50,000
Construct Pad		\$40,000
Superintendent Payroll	\$3,500	
Equipment Parts and Labor	\$26,700	
Liability Insurance	\$2,000	
Small Tools and Equipment Rental	\$5,000	
Fuel, Oil, and Gas	\$2,800	
Mobilization (Barge / Air) -- Heavy Equipment Component		\$30,000
Custom Burn Box		\$82,500
Hopper and Super Sacks for Ash Disposal		\$15,000
Subtotal		\$217,500
Design, Permitting & Engineering @ 2%		\$4,350
Construction Management @ 10%		\$24,750
TOTAL*		\$246,600
<p><i>Assumptions:</i></p> <ul style="list-style-type: none"> ▪ 2006 Construction or sooner ▪ Managed Force Account construction ▪ Locally available borrow material ▪ Stand alone construction ▪ All rights of way, easements, land transfers to be obtained at no cost to the project ▪ Permafrost stabilization and protection measures will be required ▪ Heavy equipment component includes Caterpillar 416B for burn box operation <p>*Assumes this project procures and ships all construction equipment</p>		

Table I-6: Capital Cost Estimate for Option 2, Phase 2 of Alternative #2A: Landfill

CATEGORY	COLUMN A	COLUMN B
	Estimated Cost	Cost Savings Heavy Equipment On-Site
General Conditions -- Heavy Equipment Component	\$334,000	
Less cost from Phase 1 (Table I-5)	-\$50,000	-\$240,000
Superintendent Payroll	\$95,000	
Equipment Parts and Labor	\$95,000	
Liability Insurance	\$26,000	
Small Tools and Equipment Rental	\$30,000	
Fuel, Oil, and Gas	\$40,000	
Mobilization (Barge / Air) -- Heavy Equipment Component	\$300,000	
Less cost for Phase 1 (Table I-5)	-\$30,000	-\$150,000
Construct Landfill Access Road (unless Toksook Bay road built)	\$500,000	
Construct Landfill Pad	\$80,000	
Construct Landfill Cell	\$40,000	
Construct Storage Building (20' x 30')	\$175,000	
Custom Burn Box	\$82,500	
Less cost from Phase 1 (Table I-5)	-\$82,500	
Dispose of Waste from Old Sites	\$60,000	
Subtotal	\$1,695,000	-\$390,000
Design, Permitting & Engineering @ 11%	\$186,450	
Construction Management @ 10%	\$169,500	
TOTAL*	\$2,050,950	-\$390,000
Total -- Heavy Equipment Available On-Site** (Column A less Column B)	\$1,660,950	
<p><i>Assumptions:</i></p> <ul style="list-style-type: none"> ▪ 2006 Construction or sooner ▪ Managed Force Account construction ▪ Locally available borrow material ▪ Stand alone construction ▪ All rights of way, easements, land transfers to be obtained at no cost to the project ▪ Permafrost stabilization and protection measures will be required ▪ Two-year construction schedule due to soil stabilization constraints ▪ Landfill pad may require thermopiles <p>*Assumes this project procures and ships all construction equipment</p> <p>**Assumes construction equipment available from another project, such as water and wastewater improvements and/or road and airport improvements</p>		

Table I-7: Capital Cost Estimate for Cleanup of Dumpsites on Land

CATEGORY	COST
Consolidation of waste	\$50,000
Volume of waste (estimated)	400 cubic yards
Transport waste to new landfill	\$25 per cubic yard*
Cost to transport waste	\$10,000
Total	\$60,000

*Transportation costs may vary depending on the location of the new landfill.

Table I-8: Capital Cost Estimate for Winter Dump Closure

PARAMETER	QUANTITY	COST
Landfill Area	2.18 acres (based on <i>AutoCad</i> outline) 94,960 square feet	
Winter Soil Cap	Winter Soil Cap – 3-foot lift	
Volume of Soil Required	94,960 sq ft X 3 ft = 284,880 cubic feet 10,551 cubic yards	\$50 per cubic yard
Excavate, Transport & Place Soil Cap		\$527,550

Table I-9: Annual O&M Cost Estimate for a Self-Haul Solid Waste Utility

BUDGET CATEGORY	RATE	AMOUNT	COST
Labor	Landfill Work: 16 hours per month Equipment Maintenance: 2 hours per month Operator Salary: \$15 per hour	192 hours per year 24 hours per year 216 hours per year	\$3,240
Administration	0.5 hours per month Salary: \$12 per hour	6 hours per year 6 hours per year	\$72
Payroll Expense	Estimated @ 50% of wages; includes worker's comp, social security, other payroll expenses	50% of \$3,240 for Labor = \$1,620 50% of \$72 for Administration = \$36	\$1,656
Fuel	6 gallons per hour @ 16 hours 96 gallons per month @ \$3 per gallon	1,152 gallons per year	\$3,456
Equipment R&R Expense	from <i>Utility Business Plan</i> (see Appendix J)		\$1,800
TOTAL*			\$10,220
*An additional cost of \$300 per year may be required to maintain the access road.			

Table I-10: Annual O&M Cost Estimate for a Community-Haul Solid Waste Utility

BUDGET CATEGORY	RATE	AMOUNT	COST
Labor	Landfill Work: 4 hours per week	208 hours per year	\$14,130
	Trash Pick-up: 12 hours per week (16 trips)	624 hours per year	
	Equipment maintenance: 2 hours per week	110 hours per year	
	Operator Salary: \$15 per hour	942 hours per year	
Administration	Billings: 2 hours per week	110 hours per year	\$1,320
	Salary Cost: \$12 per hour		
Payroll Expense	Estimated @ 50% of wages; includes worker's comp, social security, other payroll expenses	50% of \$14,130 for Labor = \$7,065 50% of \$1,320 for Administration = \$660	\$7,725
Fuel for Landfill Operation	6 gallons per hour @ 16 hours per month 96 gallons per month @ \$3 per gallon	1,152 gallons per year	\$3,456
Hauling Transportation Expense	62 services (54 house + 8 non-residential) 4 buildings served per trip to landfill	845 landfill trips per year (weekly garbage service)	\$744
	Round-trip distance to landfill: 1.75 miles Mileage cost: \$0.50 per mile	\$0.88 per trip to landfill	
Landfill Equipment R&R Expense	from <i>Utility Business Plan</i> (see Appendix J)		\$1,800
Hauling Equipment R&R Expense	Summer Haul Vehicle (ATV)	\$6,000	\$3,500
	Winter Haul Vehicle (snowmachine)	\$6,000	
	New Haul Trailer	\$2,000	
	Annual ATV, snowmachine and trailer replacement based on 4-year life		
TOTAL*			\$32,675
<p><i>Assumptions:</i></p> <ul style="list-style-type: none"> ▪ ATV and snowmachine replaced every 4 years ▪ Equipment O&M costs are not shared with other utilities ▪ One landfill utility operator <p>*An additional cost of \$300 per year may be required to maintain the access road.</p>			

Appendix J

Solid Waste Utility Business Plan

SOLID WASTE UTILITY BUSINESS PLAN CITY OF NIGHTMUTE, ALASKA

INTRODUCTION

The City of Nightmute was incorporated in 1974 as a second-class city within an unorganized borough. The City is responsible for administration of the water and sewer utilities.

The City, in conjunction with the State of Alaska, Village Safe Water Program, has implemented a number of sanitation improvements over the past several years, including community-wide water and sewer system installations and upgrades.

The City is very interested in improving solid waste management and has determined that the most effective mechanism to provide for the health and welfare of the residents of Nightmute and to manage solid waste effectively is to utilize their current (existing) administration to operate, maintain, and construct the Nightmute solid waste system. This plan is the next step toward ensuring the adequate management of a solid waste utility by the City.

PROJECT OVERVIEW

Nightmute, a Yupik Eskimo village of approximately 225 residents, is situated on the Toksook River on Nelson Island in Western Alaska, 18 miles up river from Toksook Bay and 105 miles west of Bethel. The village is accessible by aircraft year round. Boats, snow machines and all-terrain vehicles (ATVs) are also used for travel between Nightmute and neighboring villages. The community participates actively in subsistence including seasonal travel to fish camp at Umkumiut, approximately 20 miles away. The largest sources of cash income are employment by the City, Traditional Council, local school, and seasonal commercial fishing and construction, while trapping and local handicrafts provide smaller sources of income.

Recent community sanitation improvements include:

- (1) new flush-tank-and-haul (FTH) units installed in 50 homes;
- (2) 400 feet of new boardwalk and upgrade of the existing boardwalk for ATV and FTH trailer access;
- (3) a new community well;
- (4) a new water treatment plant;
- (5) a new warm storage building for City heavy equipment, tools and related; and
- (6) a new sewage lagoon and access road.

Also, in the summer of 2003, the Environmental Protection Agency funded a community-based cleanup of the Summer Dump. Trash was moved away from the riverbank and consolidated in the New Summer Dump.

Presently feasibility studies are under way for construction of:

- (1) a new solid waste facility;
- (2) a new washeteria; and
- (3) sewage lagoon improvements.

CURRENT UTILITY MANAGEMENT

Currently, residents haul their trash to the dumpsite on the opposite side of the river from town. The City of Nightmute is responsible for the management of local water and sewer haul services for approximately 54 village homes and eight public facilities. Additionally, the City owns and manages the lagoon. Of the eight public buildings, the City Office, Community Building, and Post Office receive full water-and-sewage-haul service. The Bunkhouse and Clinic receive sewage-haul service and are connected by pipe to the water supply. The General Store (Chinuruk Inc.) and the Tribal Office also have sewage-haul service but choose to self-haul water. One remaining public building, the Catholic Church, and approximately five homes that do not have flush-tank-and-haul systems (FTHS) utilize honeybuckets.

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

- | | |
|--|--------------------|
| <input type="checkbox"/> water delivery (100 gallons per delivery – paid in advance) | \$ 15 per delivery |
| <input type="checkbox"/> FTH services (customer billed) | \$ 25 per haul |
| <input type="checkbox"/> home FTHS repairs (labor) | \$ 15 per hour |
| <input type="checkbox"/> home FTHS repairs (parts) | cost |

The current public administration consists of the City Council, the City Administration and laborers.

FISCAL CONTROLS AND ACCOUNTING PRACTICES

All checks for expense payments of any kind must be approved by the Council before release. Two signatures are required for each check, and four of the Council Members have check-signing authority.

The City Administrator mails billings to customers for water delivery and sewage haul services based on each work order turned in by the driver following completion of service. Payments received are deposited into the City FTHS bank account by the Bookkeeper.

The City recently transitioned from hard copy bookkeeping format to the use of *Microsoft Excel* for all revenue/expense tracking and budget management activities.

OPERATION OF A NEW SOLID WASTE UTILITY

In order to better provide for the health and welfare of the residents of Nightmute and effectively provide for solid waste services, the City Council plans to give the City Administrator responsibility and authority for operating, maintaining, constructing and replacing the community solid waste system. The current powers and duties of the Administrator include:

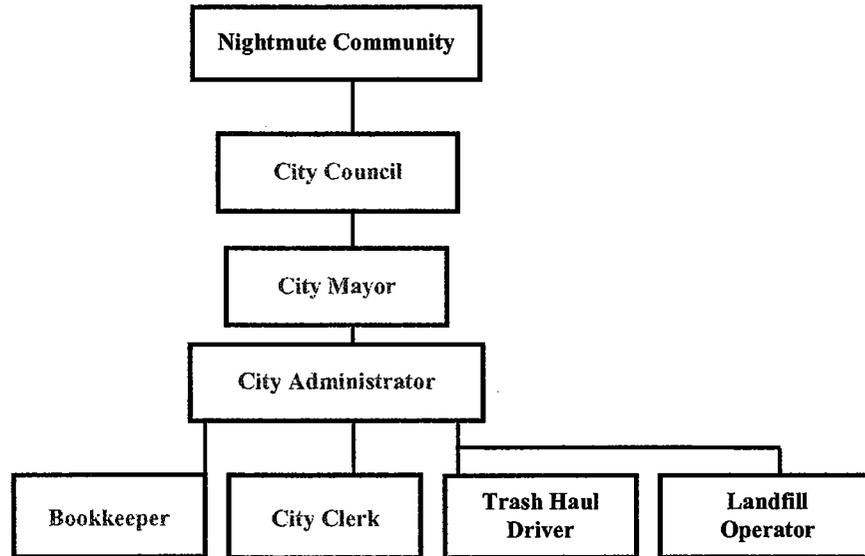
- Serve as chief administrative officer;
- Appoint City employees and administrative officers, except as provided otherwise by City Code or *Alaska Statute 14.14.065*;
- May authorize an appointive administrative officer to appoint, suspend, or remove subordinates in the City Administrator's department;

- Suspend or remove by written order City employees or administrative officers, except as provided otherwise by City Code or *Alaska Statute 14.14.065*;
- Supervise enforcement of City law as applicable;
- Prepare the annual budget and capital improvement program for the Council (this may be reassigned to the Mayor);
- Execute the budget and capital program as adopted;
- Make monthly financial reports to the Council on City finances and operations;
- Report to the Council at the end of each fiscal year on the finances and administrative activities of the City;
- Prepare and make available for public inspection an annual report on City affairs;
- Serve as City Personnel Officer unless the Council authorizes the appointment of a personnel officer;
- Direct the care and custody of all City property;
- Direct and supervise the construction, maintenance and operation of City public works;
- Make such recommendations to the Council as deemed expedient or necessary;
- Establish working hours for the City offices;
- May assign additional functions or duties to offices, departments or agencies established by ordinance and may likewise transfer functions or duties from one such office, department or agency to another. The work departments may be distributed amongst divisions thereof as may be established by the City Administrator;
- Execute other powers and duties specified in *Title 29* of the *Alaska Statutes*, or lawfully prescribed by the City Council;
- Shall attend Council meetings and shall have the right to take part in the discussion of all matters coming before the Council.

STAFFING AND TRAINING

Daily management of the new solid waste utility will be structured much as it is under the current water and sewer system with the City Administrator carrying out most functions related to the system's financial operations. Assistance will come from the Clerk and Bookkeeper, and the Trash Haul Driver will continue to provide customer service. The Mayor will oversee the activities of the Administrator. At a later time, day-to-day management may necessitate the hiring of a trained Utility Manager or promoting and training other existing staff pertinent to utility management. Advice regarding appropriate training will be sought through the Department of Community and Economic Development, Rural Utility Business Advisor (RUBA) Program. The following organizational chart illustrates the staff relationships of the proposed Solid Waste Utility:

CITY OF NIGHTMUTE ~ SOLID WASTE UTILITY



The positions shown on the chart are not dedicated entirely to the operations of the Solid Waste Utility. Each of the positions performs other functions for the City. Brief descriptions of the duties relating only to the solid waste utility follow.

City Mayor – At the direction of the City Council, the Mayor oversees the day-to-day operations of the City and its employees.

City Administrator - The City Administrator oversees expenditures and revenues (customer payments, public grants) and issues customer billings for solid waste services. The Administrator receives direction from the Mayor and assists in overseeing the City employees.

City Clerk – The City Clerk provides assistance to the City Administrator and maintains the official record for local government actions.

Utility Bookkeeper - The Utility Bookkeeper tracks all utility income and expenses.

Trash Haul Driver (community-haul service only) – The Haul Driver collects trash at each home and business once per week and transports the trash to the landfill. The Haul Driver is also responsible for the maintenance of the haul vehicles (ATV and snow machine) and the haul trailer.

Landfill Operator – The Landfill Operator burns the trash and removes the ash (if a burn box is used) and places, compacts, and covers the trash.

FINANCIAL ESTIMATES

The following financial estimates are based on similar solid waste systems in western Alaska. All estimates and assumptions contained in this plan are preliminary and are anticipated to change as the project progresses. Actual revenues and expenses will vary throughout the life of the utility. In general, the City expects all public service and administration costs related to the solid waste utility to be adequately funded by the continued collection of service fees.

Estimated Annual Revenues

Table J-1 below contains estimates of the annual revenues for the proposed solid waste utility.

Table J-1: Annual Revenue Estimate for Self-Haul Community Solid Waste Utility

REVENUE SOURCE	ANNUAL ESTIMATE
Household haul fee (54 services at \$15/month)	\$9,720
Government Offices (3 at \$15 per month)	\$540
Commercial users (2 stores, post office, clinic, school @ \$50 per month)	\$3,000
TOTAL REVENUES	\$13,260

Estimated Annual Expenses

Table J-2 contains estimates of the anticipated operation and maintenance (O&M) costs for the community solid waste system. These estimates are based on actual 2004 figures.

Table J-2: Annual O&M Cost Estimate for Self-Haul Community Solid Waste Collection

EXPENSE CATEGORY	ANNUAL ESTIMATE
Labor	\$3,240
Administration	\$72
Payroll Expense	\$1,652
Fuel / Transportation	\$3,456
TOTAL EXPENSES	\$8,420

Repairs & Replacement

The City will incur expenses relating to the repairs and replacements (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. a small to medium-sized loader to push cover material. The estimate is based on the replacement cost, the expected equipment life, and the capital recovery factor assuming 3 percent interest. The replacement cost is the estimated total cost purchase equipment in 2004 dollars. The capital recovery factor is a number used to convert a future cost to an annual amount. The value shown in *Table J-3* has been rounded up to the nearest hundredth for an R&R cost of \$1,800.

Table J-3: Annual R&R Cost Estimate for Self-Haul Community Solid Waste Collection

EQUIPMENT	COST	LIFE (years)	CAPITAL RECOVERY FACTOR	ANNUAL R&R COST
Small to medium loader	\$30,000	25	0.05743	\$1,723
TOTAL R&R				\$1,723

Annual Profit

An annual profit, based upon a rate of return of 30 percent of O&M costs (including annual R&R costs), has been included. 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. *This is a high amount of revenue over expenses because the City has a small operating budget and would be unable to subsidize the utility in the event of any unforeseen problems.*

CASH FLOW AND PROFIT/LOSS STATEMENTS

An estimated annual cash flow and profit/loss statement for the community's solid waste utility is included below.

Annual Estimated Operating Cash Flow

Table J-4: Annual Estimated Operating Cash Flow depicts the annual flow of money incoming and outgoing over the course of an operating year, regardless of whether or not the expenditures are fully tax deductible, such as capital expenditures (Annual R&R) or loan principal payments.

Table J-4: Annual Estimated Operating Cash Flow

Cash Sources	
Residential User Fees (54 customers @ \$15/month)	\$9,720
Government Offices (3 @ \$15/haul/month)	\$540
Commercial User Fees - School, Post Office, Stores, Clinic (5 @ \$50/month)	<u>\$3,000</u>
TOTAL	\$13,260
Cash Uses	
Annual Operations and Maintenance (O&M) Costs	\$8,420
Annual Repair and Replacement (R&R) Costs	<u>\$1,800</u>
	\$10,220
Excess (Shortage) of Cash Over Expenditures	\$3,040

Based upon the preliminary estimates for the new solid waste utility, the annual excess of cash over expenditures will be approximately \$3,040. It is imperative that these funds be accumulated by the Utility in a reserve account, which will be available for unexpected expenses or system improvements.

Annual Estimated Operating Income Statement

Table J-5: Annual Estimated Operating Income Statement depicts the taxable net income, based upon generally accepted utility accounting principles. Expenses on the income statement will not, for example, include long-term capital expenditures such as the R&R costs, but rather will include the associated depreciation expense over a multi-year period. It is assumed that the original system costs are not expensed by the utility given that these costs are contributed capital or grant-funded.

Table J-5: Annual Estimated Operating Income Statement

Revenue	
Residential User Fees (54 customers @ \$15/month)	\$9,720
Government Offices (3 @ \$15/haul/month)	\$540
Commercial: School, Post Office, Stores, Clinic (5 @ \$35/month)	\$3,000
TOTAL	\$13,260
Expenses	
Annual operations and maintenance costs	\$8,420
Depreciation (Repair and Replacement)	\$1,800
TOTAL	\$10,220
Net Operating Income	\$3,040
Plus: Local Capital Contribution	0
Annual Estimated Cash Flow	\$3,040

Based on the preliminary estimates for the Nightmute Solid Waste Utility, the annual net operating income will be approximately \$3,040. The net operating income does not include extraordinary expenses such as the future cost of total system replacement. The following discusses future capital replacement.

FUTURE CAPITAL REPLACEMENT COSTS

Ultimately, the utility will require major capital replacement. Given a system design life of eight years, it will be necessary to accumulate sufficient funding to replace the system at the end of this period. The annual portion of such an annuity, or the equivalent annual cycle cost (EACC), is calculated below. For this calculation the design life of the system is set at eight years and the design life factor (DLF), using an interest rate of four percent, is 0.14853. Therefore, based on an estimated capital cost (CC) for the system of \$2,247,575 the equivalent annual capital cost would be:

$$\begin{aligned}
 \text{EACC} &= \text{CC} \times \text{DLF} \\
 &= (\$2,247,575 \times 0.14853) \\
 &= \$333,833 \text{ (per year)}
 \end{aligned}$$

EQUIVALENT ANNUAL LIFE CYCLE COST

The equivalent annual capital cost can be combined with the annual operations and maintenance costs to determine the equivalent annual life cycle cost, or EALCC.

$$\begin{aligned}
 \text{EALCC} &= \text{Annual O\&M / R\&R Costs} + \text{EACC} \\
 &= \$8,420 + \$1,800 + \$333,833 \\
 &= \mathbf{\$344,053} \text{ (per year)}
 \end{aligned}$$

SUMMARY OF TOTAL REVENUE AND EXPENSES / RATE OF RETURN

Table J-6 reviews all information inclusive from the previous Revenues/Expenditures tables, the Cash Flow/Income statements, and the capital replacement costs.

Table J-6: Summary of Total Revenue and Expenses / Rate of Return

Revenue	
Residential User Fees (54 customers @ \$10/month)	\$9,720
Government Offices (3 @ \$10 per month)	\$540
Commercial: (5 @ \$35 per month)	\$3,000
Annualized Non-Local Capital Replacement Subsidy	<u>\$333,833</u>
	\$347,093
Expenses / Rate of Return	
Annualized Operations and Maintenance Costs	\$8,420
Repair and Replacement Fund	\$1,800
Equivalent Annual Replacement Costs	\$333,833
Rate of Return	<u>\$3,040</u>
	\$347,093