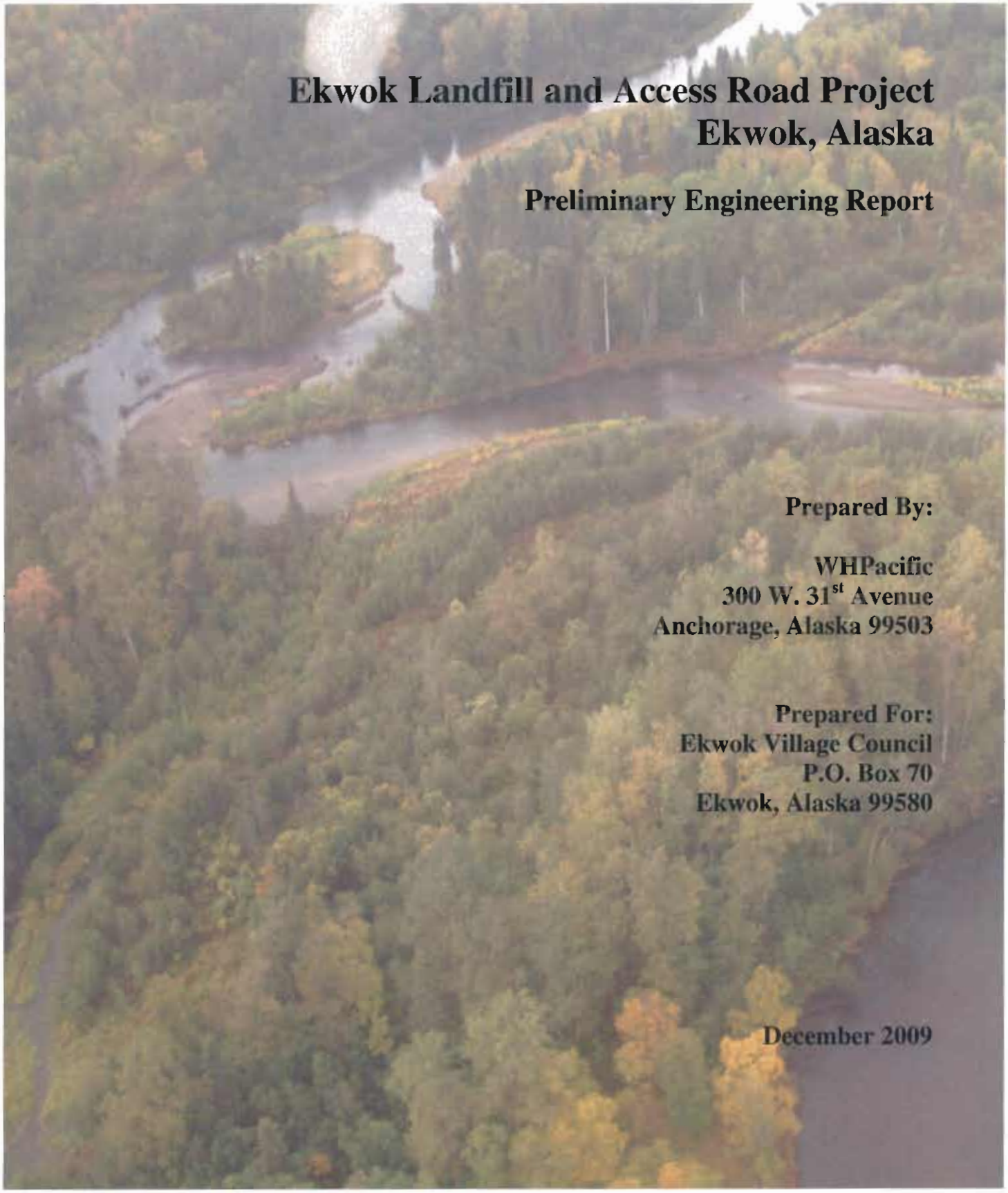


Ekwok Landfill and Access Road Project
Ekwok, Alaska

Preliminary Engineering Report

Prepared By:

WHPacific
300 W. 31st Avenue
Anchorage, Alaska 99503

Prepared For:
Ekwok Village Council
P.O. Box 70
Ekwok, Alaska 99580

December 2009

Table of Contents

DRAWINGS

APPENDICES

ACRONYMS AND ABBREVIATIONS

°	degrees
ADCCED	Alaska Department of Commerce, Community and Economic Development
ADEC	Alaska Department of Environmental Conservation
ADOT&PF	Alaska Department of Transportation and Public Facilities
AEA	Alaska Energy Authority
ATV	all-terrain vehicle
BIA	Bureau of Indian Affairs
BBNC	Bristol Bay Native Corporation
BEESC	Bristol Environmental & Engineering Services Corporation
bgs	below ground surface
BLM	Bureau of Land Management
City	City of Ekwok
cy	cubic yard(s)
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
ISWMP	Integrated Solid Waste Management Plan
kWh	kilowatt-hour
N	North
O&M	operations and maintenance
PCB	polychlorinated biphenyls
PER	preliminary engineering report
RUS	Rural Utilities Service
SHPO	State Historic Preservation Office
S.W.A.N.	Solid Waste Alaska Network
Village	Native Village of Ekwok
W	West
'	minutes
"	seconds

I. GENERAL

The Native Village of Ekwok (Village) retained Bristol Environmental & Engineering Services Corporation (BEESC) on August 29, 2004, to prepare an Integrated Solid Waste Management Plan (ISWMP) addressing solid waste management options for the community, including waste disposal, recycling, and minimization. Development of a new Class III landfill facility is included as part of the waste disposal options. This ISWMP provides an evaluation of the construction costs, O&M costs, technical requirements, system management impacts, and estimated revenues and expenses for the proposed solid waste improvements.

The Village later retained WHPacific to:

- reorganize the information contained within the ISWMP into a Preliminary Engineering Report (PER) adhering to the format provided in RUS Bulletin 1780-4
- change the preferred alternative to the new community-preferred landfill site (Site 4) and prepare estimates for this site

Landfill access was included in the ISWMP and draft versions of this PER. Rural Utility Service has determined that the landfill access road is outside the scope of their funding authorization. However road design data and cost estimates have been left in the PER for informational purposes, understanding that funding may be restricted to the landfill site development costs.

A. Overview and Selected Alternative

The community-preferred landfill site is located approximately 5,000 feet west of the existing landfill, and approximately 5,200 feet from the new Ekwok runway. This distance exceeds the Federal Aviation Administration (FAA)-required 5,000-foot separation distance from runways designed for piston aircraft use. Community resolutions accepting this site are included as Appendix A. Records of public meetings conducted during development of this PER are included in Appendix B.

II. PROJECT PLANNING AREA

A. Location

The project planning area is shown in figures 1 and 2.

Ekwok is located on the northwest shore of the Nushagak River, between New Stuyahok and Portage Creek. It lies 285 miles southwest of Anchorage, and 43 miles northeast of Dillingham. The community is located at approximately 59 degrees (°) 21 minutes (') north latitude and 154°28' west longitude (Section 35, Township 009 South, Range 049 West, Seward Meridian). Ekwok is located in the Bristol Bay Recording District (ADCCED, 2005a).

The project planning area and the area to be serviced by the proposed landfill consists of the entire village of Ekwok. This region is bounded on the south and east by the Nugashak

River, and on the west by Klutuk Creek. The village is not expected to expand beyond the project planning area or landfill service area during the lifespan of the proposed landfill.

The community is primarily accessible by air via a 3,300-foot gravel runway, or by boat. Bulk goods are typically barged up the Nushagak River to Ekwok. The comunity has no docking facilities, but a barge-loading site is available. Limited travel to the community is achieved during the winter by snowmobile.

B. Environmental Resources Present

(1) Climate

Ekwok is in a transitional climatic zone that is affected by both marine and continental influences. Winters are moderately cold, and summers are cool and humid. Fog is common during summer months. The Nushagak River is ice-free from June through mid-November. The community has an estimated annual precipitation of 26 inches, and an annual snowfall of 87 inches. Extremely strong winds are common during the winter. Prevailing winds are from the north and the east, during the winter. Prevailing winds are from the southwest in the summer. Temperatures range from approximately -30 degrees to over 80 degrees Fahrenheit. (ADOT&PF, 2004).

(2) Geology and Soil Conditions

The following information is provided by the Alaska Department of Transportation (ADOT&PF, 2004): "Ekwok lies within the Nushagak Lowlands, where the terrain is made up largely of glaciofluvial or outwash deposits. These deposits originated as debris eroded by glaciofluvial action, but they were reworked and partially sorted by the streams that issued from the ends of glaciers, and were distributed into the Nushagak Valley, largely as a great outwash plain. In areas where the deposits have been dissected by streams, they are seen to consist of rounded but poorly sorted gravel, sand, and silt."

(3) Wetlands

The National Wetland Inventory, on-line mapping, has not been completed for the Ekwok area. There has been no formal Wetlands Delineation in the field for this PER. The Final Ekwok Integrated Solid Waste Management Plan indicated that some soil mapping had been completed for Ekwok. The USDA, Natural Resources Conservation Service (NRCS) is conducting a soils survey for the Nushagak-Mulchatna Watershed. The study began in 2006 and is ongoing.

(4) Groundwater

Test holes at the gravel pit have shown groundwater at depths of 2 to 13 feet below ground surface (bgs). Seasonal frost has been reported to depths of 3.5 feet bgs near the airport (ADOT&PF, 1983).

No test pit logs are available for the existing dump. Refer to Appendix C for test pit logs for the alternate landfill Sites 1 and 2A.

Drinking water is provided from individual household wells, rather than a central community water system. The majority of wells in the community tap into a deep aquifer that has high levels of iron and manganese. Some wells currently tap into a shallow, unprotected aquifer. A Village Safe Water Project recently installed additional wells into the shallow surficial aquifer.

(5) Flood, Erosion, and Seismic Hazards

The community-preferred landfill and existing dump, are not located in known flood hazard areas (USACE, 2005); although, the community has a known history of flooding. Extensive flooding occurred in Ekwok (prior to its relocation to higher ground) during the 1930s through 1950s (intermittently). By June 1993, only one home was occupied in the floodprone area. The worst reported flood occurred in 1936. The existing dumpsite is approximately 128 feet above sea level. The community preferred landfill [Site 4] is approximately 100 to 150 feet above sea level. The Nushagak River is approximately 76 feet above sea level, near Ekwok. Ekwok does not participate in the National Flood Insurance Program. A floodplain map of the community is presented in Appendix D.

It is not believed that a future landfill site would be significantly impacted by seismic activity typical for this region of Alaska. Erosion hazards (i.e. landslides) are not a concern for either the existing dumpsite or potential landfill sites evaluated for this plan.

(6) Historic Sites

Ekwok is a Yupik Eskimo village, and is the oldest continuously occupied village on the Nushagak River. The village relocated onto higher ground (away from the river) in the 1960s because of flooding. The City was incorporated as a second-class city in 1974 (ADCCED, 2005 a).

There are no standing structures at the community-preferred landfill site. It is not believed that any standing structures have ever existed at the site, or along the proposed access road alignment between the community and the proposed site. The State Historic Preservation Office (SHPO) lists no historical or archaeological sites in the direct vicinity of either the existing dumpsite or the community-preferred landfill site.

All future road and solid waste projects will be coordinated with the State Office of History and Archaeology in order to identify any potential impacts to historical and/or archaeological sites. SHPO must give an archaeological clearance for any federally funded project, which usually occurs when a project is going into final design and permitting. If an area is found to be historically or archaeologically rich, any capital improvement projects requiring excavations will likely require the supervision of an on-site archaeologist.

(7) Wildlife

Five species of Pacific salmon (chinook, chum, coho, pink, and sockeye) are present in the Nushagak River and nearby streams, and make up a large part of the local commercial fisheries economy. Arctic char and grayling, northern pike, and Dolly Varden are other freshwater fishes generally present throughout the Nushagak region (Selkregg, 1976).

Moose are present in Ekwok year-round. Brown bears are common. Caribou are generally present in the area. The surrounding land supports a variety of fur-bearing and small game animals, including wolves, wolverine, ermine, red fox, beaver, mink, muskrat, squirrels, moles, lynx, otters, and voles (Selkregg, 1976).

The western end of Nushagak Bay is a major waterfowl migration route, and Ekwok is a medium-density waterfowl area. Birds such as ravens, seagulls, terns, geese, ducks, and numerous other birds of coastal/inland communities may occasionally inhabit the area during the spring, summer, and fall months. Numerous birds of prey, perching birds, and songbirds also inhabit the Nushagak region (Selkregg, 1976).

(8) Endangered Species and Critical Habitats

Endangered and threatened species of Alaska include: the Aleutian shield fern, the short-tailed albatross, Eskimo curlew, spectacled eider, Steller's eider, leatherback sea turtle, Steller's sea lion, bowhead whale, finback whale, and humpback whale. Additionally, the northern sea otter is a proposed threatened species, and the Kittlitz's murrelet is a candidate species in Alaska (USFWS, 2005a, c, d). No habitat for any of the listed or endangered species exists near Ekwok. However the Steller's eider may occasionally pass through the Ekwok area, while traveling along migration routes.

Anadromous streams in the Ekwok area include Nushagak River, Klutuk Creek, and Kokwok River (ADF&G, 2005). Ekwok is located at the confluence of Klutuk Creek and the Nushagak River. The Kokwok River is located approximately 4.5 miles southwest of Ekwok. The Togiak National Wildlife Refuge and the Wood-Tikchik State Parks are located approximately 35 miles west of Ekwok (ADNR, 2005; USFWS, 2005b). The Mulchatna River, located approximately 25 miles northeast of Ekwok, is designated as a Wild and Scenic River (NWSRS, 2005). Ekwok is located within the Nushagak and Mulchatna Rivers Recreation Management Area.

C. Growth Areas and Population Trends

The City's current population (2008) is estimated at 121 individuals. There are currently 42 homes occupied year-round, and 5 seasonally occupied homes within the community. All of these homes would benefit from the construction of a new solid waste facility. The number of households affected by the proposed improvements would be expected to increase as the population of the community increases. There are a few lodges and commercial businesses in the community that would also benefit from the proposed improvements.

Since the 1950s, Ekwok's population has been relatively stable (plus or minus approximately 30 residents). Annual (10-year average) growth rates from 1950 to 2000, ranged from approximately -2.9 percent to 6.8 percent (Tables II-1 and II-2).

Table II-1 Historical Population Estimates (U.S. Census Data)

Year	Population	Year	Population
1930	40	1970	103
1940	68	1980	77
1950	131	1990	77
1960	106	2000	130

Table II-2 Average Annual Growth Rates – Ekwok[1]

Year	Annual Average Growth Rate (%)
1941-1950	6.8
1951-1960	-2.1
1961-1970	-0.3
1971-1980	-2.9
1981-1990	0.0
1991-2000	5.4
Average Growth Rate 1931-2000	1.2
Maximum Annual Growth Rate (per decade) 1941-2000	6.8
Average Growth Rate 1981-2000	2.7
Assumed Annual Growth 2005-2025	2.7

Notes:
[1]Growth rates were calculated from U.S. Census Bureau data, provided on the Alaska Department of Community and Economic Development's Alaska Community online database (2005a).

Table II-3 presents a summary of future population projections from 2005 through 2025. It is assumed that future population growth will occur at an annual rate of 2.7%. Based on this rate, the population in 2025 is estimated to be 254 people.

Table II-3 Ekwok Population Projections: 2005-2025[1]

Year	2005	2010	2015	2020	2025
Population	149	170	194	222	254

Note:
[1]Assumes a 2.7 percent average annual growth rate

The historical population growth rates for similar communities in the Bristol Bay Region are shown in Table II-4.

Table II-4 Average Annual Growth Rates for Similar Alaska Communities[1]

	Portage Creek	New Stuyahok	Koliganek
2000 Population (U.S. Census)	36	471	182
Average Annual Growth Rate (%)	-1.70[2]	3.4[3]	1.4[3]
Maximum Annual Growth Rate (%) (per decade)	1.6[2]	5.1[3]	4.5[3]

Notes:
1) Growth rates were calculated from U.S. Census Bureau data, provided on the Alaska Department of Community and Economic Development's Alaska Community online database (2005).
2) 1961-2000
3) 1951-2000

III. EXISTING FACILITIES

A. LOCATION MAP

The location of the existing landfill site is shown on Figure 1.

B. HISTORY

The present Ekwok dumpsite is located approximately 1,300 feet north of the Ekwok runway, and approximately 2,400 feet from the nearest residence. There is at least one additional former dumpsite located in the community that is not currently used.

C. CONDITION OF FACILITIES/CURRENT DUMP PRACTICES

The existing dumpsite has a footprint of approximately one acre. The dumpsite is not formally operated, and does not have an ADEC landfill permit. The City has recently provided for some limited maintenance of the dumpsite. The dump is operated using trenched cells. As one trench fills, a new trench is opened adjacent to the former cell. The dump has a salvage area for drum and metal wastes. Refer to Figure 1 and photographs in Appendix E for details of the dumpsite, road access, and City-owned equipment.

There is a fence at the dumpsite, however, the fence is in poor repair and does little to limit access to the site. The existing site has a bird/vermin problem; typical scavengers at the

dumpsite include bears, foxes, and birds. The site also has considerable problems with windblown litter and debris.

Residents currently self-haul their refuse to the landfill. There are no hours or restrictions limiting access to the site, or monitoring disposal practices. Open burning occurs in the trenches. The facility has a burn barrel, constructed of an old steel tank. The barrel is designed to operate with the tank horizontal. Vents have been cut into the tank to provide air circulation and improve combustion in the chamber, but the box does not achieve a high efficiency burn rate.

The current site is a potential health and safety hazard. The site is much closer than the minimum separation distance required between wildlife attractants (e.g., landfills) and airport runways like Ekwok's. The landfill is in close proximity to residential areas that use private wells for drinking water. The current trend is to install shallow wells in the surficial aquifer, as the deeper aquifer is highly mineralized. Residents have also complained about smoke from open burning.

The Village Council has a recycling shed (Conex) near the ENL building for the storage of recyclables. Aluminum cans, cardboard, and batteries are collected at the shed. The cardboard is collected primarily for reuse. Excess cardboard is periodically taken to the landfill, and burned to minimize accumulation. The shed has a tote for collection of lead-acid batteries.

D. Financial Status of Any Existing Facilities

The City does not currently have an established solid waste utility. Finances for maintenance of the existing dumpsite derive from the City budget. The City budgeted $3,000 for the operation of the dumpsite for 2005. Funds to operate the facility were not provided prior to 2005.

IV. NEED FOR PROJECT

A. Health, Sanitation and Security

The following problems are associated with the community's current solid waste disposal site:

- Lack of a permit and noncompliance with current ADEC regulations;
- Uncontrolled dumping;
- Little separation of hazardous wastes from the waste stream entering the dumpsite (antifreeze, paint thinner, etc.), apart from batteries;
- Inappropriate site location in close proximity to the community, and within 5,000 feet of the existing runway;
- Scavenging wildlife and vermin that can be a health hazard, and potentially interfere with runway operations;
- Close proximity to residential homes served by shallow wells;

- An existing burn box that has a low burn efficiency;
- Smoke inhalation nuisances, primarily because of open burning;
- Existing fencing does not completely enclose the landfill, and is in poor condition;

The existing solid waste dumpsite is located approximately 1,300 feet north of the existing runway. FAA Advisory Circular 150/5200-33A (FAA, 2004) recommends a distance of 5,000 feet. The nearest residence is approximately 2,000 feet from the existing dumpsite. The distance from the new preferred landfill site 4 to the new Ekwok Airport is approximately 5,200 feet, and meets FAA separation distance requirements.

B. SYSTEM O&M

The current dumpsite is unpermitted and not formally operated. The City has recently provided for some limited maintenance of the dumpsite, but Prior to 2005 the City did not budget any O&M for the dumpsite. The cost to meet O&M requirements for the proposed sanitation improvements are described in Section V.G.3. O&M requirements for the new, properly operated, solid waste facility, will be significantly higher than those for the existing landfill, and are expected to average $42,800 per year, or $1019 per household per year. These O&M costs incorporate access road maintenance and landfill operations. Revenues for O&M from the new proposed facilities will be generated through service fees.

C. GROWTH

The proposed community-preferred landfill site has ample capacity for expansion of future landfill cells, based on projected population growth.

V. ALTERNATIVES CONSIDERED

A. DESCRIPTION

The following alternatives are considered:
- Continuing the use of the current unpermitted landfill (no-build alternative)
- Constructing a new permitted landfill at a site meeting FAA separation guidelines
- Collection alternatives for transporting waste to the proposed landfill

Development of a landfill within the community is a common and cost-effective practice for most rural communities. Potential costs and environmental impacts associated with landfills can be minimized with proper siting, design, operation and closure. Considering the community size, anticipated waste generation rates, and transportation constraints, Ekwok would be eligible for development of a Class III landfill, under Alaska Solid Waste regulations (18 AAC 60. 300(c)(3)).

A new landfill will incorporate the following requirements:
- An access road from the community to the new landfill site;
- A new landfill facility, including a salvage area;
- Fencing for the domestic waste cell(s)

- A community burn box;
- Design drawings and Class III ADEC landfill permit application;
- Purchase or repair of equipment to operate and maintain the landfill, and access road;
- Potential equipment storage area at the landfill site.

Six sites were identified as potential landfill sites for future solid waste disposal. The facilities for alternate sites are identical except for variation in location and the length of the access road.

- Site 1: Located northeast of the village at N 59°22'22'', W 157°25'40'', approximately 1,000 feet northwest of the Nushagak River.

- Site 2: Located approximately adjacent to an existing wetland. An access road, approximately 6,500 feet in length, would be required.

- Site 2A: Located at N 059°22'28'' W 157°26'49'', approximately 500 feet from an existing wetland.

- Site 3: Located on a bluff approximately 3,500 feet southwest of town, across Klutuk Creek. Suitable land availability may be limited as the land in this area is either wooded (spruce forest) or tundra with visible standing water. Access to this site would require a bridge across Klutuk Creek. The access road would need to climb the south bank of the creek valley, which rises approximately 50 feet above the creek elevation in a short distance.

- Site 4: Located at N 59°21'21'', W 157°29'44'', on a hill approximately 6000 feet northwest of town, across Klutuk Creek. Access to this site would require a bridge across Klutuk Creek.

- Existing community dumpsite for continued use.

The community selected Site 4 (across Klutuk Creek and northwest of the village) as the preferred landfill site. The site should not affect known subsistence activities.

Alternatives for the collection and disposal of the Ekwok's solid waste are described in Sections (1) through (4). Under all these options, hazardous wastes would be self-hauled to the community designated hazardous material recycling, and/or hazardous waste storage area. These materials will ultimately be recycled or shipped out of the community to an appropriate disposal facility.

(1) Self-haul

The majority of residents currently self-haul their waste to the existing unpermitted dumpsite. Trash collection is provided to some older residents. If self-hauling of waste continues for the new landfill site, most residents will be required to haul their waste farther than they currently do. The distance between the dumpsite and existing residential

homes is between 2,000 and 5,600 feet (0.5 to 1 mile), depending on the resident's location. There may be one home 7,700 feet away. The distance between the community-preferred landfill site, and existing residential homes is between 3,500 and 11,000 feet (2 miles). The majority of the existing homes are between 6,000 and 11,000 feet (1 to 2 miles) from the community-preferred landfill site. Regular snow plowing of the access road would likely be required, or snowmobiles with sleds for self-haul in the winter. Under this scenario, the landfill would be open to the public at designated times; however, supervision of waste disposal would be limited. One disadvantage of this option is the potential for improper disposal of waste streams. The landfill operator would have to survey the burn box and the waste disposal area for prohibited wastes, before burning and cover operations. The waste disposal point would have to be flagged or appropriately marked for disposal of non-burnable wastes. This option presents a slightly higher health risk over other collection options because residents could come into contact with other wastes during disposal.

Depending on the weather conditions, access to the landfill could be difficult during the winter. There is a higher possibility for individual residents to get lost or hurt, while transporting waste during questionable weather events, than for a single operator, who would likely choose to wait until the weather permits safe access.

(2) Curbside Collection (Public or Private)

In this scenario, residents would pay Ekwok Village Council or a private collection entity to haul waste to the landfill by four-wheeler, truck or other means. Waste would have to be separated into separate "nonburnable" and "burnable" containers for appropriate disposal. Waste would be collected at the point of generation, and hauled to the landfill. Residents would also have the option of self-hauling their waste to the landfill site at designated times. Oversized items would be self-hauled to the landfill. Recyclable materials would be self-hauled to the recycling area. Snowmobiles could haul waste by trailer during the winter, eliminating the need for regular snow removal from the access road. Financial considerations, and the need for a reliable haul operator, could preclude this haul scenario for the entire community. The need to separate containers into separate "nonburnable" and "burnable" materials would make this option slightly more difficult from a practical standpoint, because residents would have to purchase and label separate containers for these two waste streams.

(3) Centralized Community Collection (Dumpsters)

In this scenario, solid waste would be collected in large 10- to 20-cubic yard (cy) dumpsters located throughout the community. Households would deliver their wastes to the dumpster locations. Dumpsters could be designated for "nonburnable" materials that should not be placed in the burn box, and "burnable" materials that would be allowed in the burn box. The use of dumpsters would require the purchase and maintenance of a designated vehicle to handle dumpsters, and transport waste to the landfill. The access road would require regular plowing in the winter for the truck to regularly visit the landfill. Oversized items would be self-hauled to the landfill. Recyclable materials would be self-hauled to the recycling area. This scenario is not recommended because of the

cost of purchasing and maintaining a truck and the dumpsters. Under this scenario, the landfill would be available for public access only at designated times or by appointment.

(4) Dump Truck Collection (Self-haul to Truck)

In this scenario, the dump truck would hold approximately 4 cy of material. Residents would self-haul their refuse to the truck. Larger, inert waste (i.e., refrigerators, four-wheelers, etc.) would probably be self-hauled. The solid waste operator would haul the waste to the landfill whenever the truck was full. The truck would generally be kept covered to prevent snow and rain accumulation. Hazardous waste and batteries would be self-hauled to a hazardous waste shed/storage area in town. Accumulated hazardous wastes would be consolidated, and hauled off site by a certified handler/carrier. This could be coordinated with the Bristol Bay Health Corporation. Solid waste collection services would be billed to every household in the community. The community currently has two dump trucks, both of which need major repairs to be operational. Oversized items would be self-hauled to the landfill. Recyclable materials would be self-hauled to the recycling area. This scenario would require the operator to manually sort out the waste into separate "nonburnable" and "burnable" streams at the landfill site; and have separate trips and disposal times for "nonburnable" and "burnable" materials. This alternative would not be recommended, unless substantial repairs were made to at least one of the existing dump trucks to ensure reliable operation, or at least one new truck was purchased.

B. Design Criteria

The selected alternative site must provide energy efficient and environmentally sound service to the project planning area. The selected alternative must have sufficient capacity to allow for reasonable growth and provide the most economical service practicable.

Separation distance from the runway in accordance with the FAA Advisory Circular is a primary criteria in the alternative analysis.

C. Map

The layout of the community preferred project site and the alternatives can be found on Figures 1 and 2.

D. Environmental Impacts

(1) Land Uses

The no-build alternative will not impact local land uses, farmland or Formally Classified Lands.

None of the alternative sites will impact local land uses, farmland or Formally Classified Lands.

(2) Floodplains

The no-build alternative will not impact floodplains.

None of the alternative landfill sites will impact floodplains. See appendix D for floodplain map.

(3) Wetlands

Preliminary soils investigations indicate that wetlands may not be impacted by this project. However, more detailed information is necessary to determine if that is a fact. There may be some minor fill in wetlands associated with the road or the bridge crossing. EO 11990 requires that a Protection of Wetlands Determination be developed for projects in wetlands. Soils mapping is provide in Figure 5.

The no-build alternative will not impact wetlands.

All proposed alternative sites may impact wetlands. The proposed access roads could involve placing material in wetlands. The proposed access road may qualify for a Nationwide Permit from the USACE. If not, an individual USACE Section 404 permit will be required.

A bridge to cross Klutuk Creek is required for alternative sites 3 and 4. Bridge abutments will be sited to avoid being below the ordinary high water line. This may eliminate the need to acquire a USACE permit for the abutments, a Title 16 Fish Habitat permit and an Essential Fish Habitat consultation.

(4) Cultural Resources

The no-build alternative will have no impacts to cultural resources. However, the current situation would continue to exist, with poor Visual Aesthetics due to the existing landfill close to the middle of the village.

None of the proposed alternative sites will have impacts on cultural resources and all alternatives will improve Visual Aesthetics in the village.

(5) Biological Resources

The no-build alternative will not impact wildlife.

The proposed alternatives may involve fill in wetlands, an access road and construction of a landfill cell. The impact to wildlife in general from this new infrastructure is minimal. Migration patterns will not be altered, habitats will not be segmented and for sites 3 and 4 bridge abutments will stay above the ordinary high water line.

(6) Water Quality

The No-build alternative will not impact water resources in the community.

The proposed alternative sites may have beneficial impacts on water quality by removing a waste stream from within the community and putting it on the fringes. Another benefit is moving the landfill from upstream of a subdivision with individual wells, to a new site away from the subdivision.

E. Land Requirements

Landfill site 1 is on land currently owned by Bureau of Land Management (BLM). Access to the site will cross property owned by Ekwok Natives, Limited, and the BLM. Road access that circumvents existing Native allotments will require 12,500 feet of roadway, with a minimum of two creek crossings. A more direct route through existing Native allotments could reduce this distance by approximately 3,000 feet, but rights-of-way would need to be acquired from individual stakeholders;

Landfill sites 2 and 2a are located on land owned by Ekwok Natives, Limited with subsurface rights held by Bristol Bay Native Corporation. A road bypassing these allotments crosses land owned by Ekwok Natives, Limited. Alternatively, access to the site via a road following existing trails would cross through two native allotments, shown on Figure 1.

Proposed landfill sites 3 and 4 are located on land owned by Ekwok Natives, Limited with subsurface rights held by Bristol Bay Native Corporation. No Native allotments would be crossed by the proposed access roads to these sites.

An agreement between BBNC and the City will have to be reached regarding access to the selected site's subsurface rights. Surface rights to the site may require the ultimate transfer of land from Ekwok Natives, Limited or the BLM to the City. The access road to the chosen site would require an easement from Ekwok Native, Limited.

F. Construction Problems

Sites 3 and 4 have not been visited. Access to sites 3 and 4 will require construction of a bridge across Klutuk Creek. No test pits have been dug at sites 3 or 4, the soil classification and water table at those sites are unknown. There are wetlands in the vicinity of the all alternative locations and DA authorization is required for construction in this area according to the Corps of Engineers Jurisdictional Determination POA-2008-1250.

G. COST ESTIMATES

Cost estimates presented in this PER are approximate estimates made without detailed engineering information. Order-of-magnitude estimates were incorporated into these estimates, where appropriate. All construction and O&M costs are on a present-worth (2008) basis. An average labor rate of $25 per hour is used for present-worth O&M estimates. A 20-year planning period was used for analyzing project alternatives and costs.

(1) Construction

The cost estimates for sites 1, 2a, and 3 were prepared by BEESC as part of the ISWMP in 2005. These cost estimates have been adjusted to 2008 dollars using the Anchorage Consumer Price Index from 2005 to 2008. Detailed information on the methodology behind the original estimates is unavailable and there may be significant variance between the costs estimation method used for site 1, 2a, and 3 and the method used for site 4.

The cost estimates for sites 1, 2a, and 3 are for a 14 foot wide single lane road with road construction costs of $800,000 per mile. The cost estimate for site 4 is a 14 foot wide road with costs of $1,000,000 per mile. The estimate for site 4 includes design, mobilization and demobilization and all incidental expenses. The BEESC prepared cost estimates may not include these items.

The environmental report submitted with this PER includes cross-section information detailing a 22 foot wide landfill access road. However a 14 foot wide road will allow adequate access to the landfill with lower costs and lower potential environmental impact.

Cost estimates for the construction of the preferred sanitation improvements (Site 4) are presented in table V-2. This includes a 5400 foot access road and a 100-foot-long bridge across Klutuk Creek. The cost estimate for site 4 is detailed in section VII.B.

Site 1 requires a 12,500 foot access road. The road length would be significantly longer than the other sites, partly because of the requirements to bypass private land and potential wetlands.

Site 2a requires 7200 foot access road. Site 2 is similar to site 2a, but has a 3000 foot longer access road and requires more extensive wetlands crossings. It is therefore not included in table V-2.

Site 3 requires a 4,000 foot access road and a 100-foot-long bridge across Klutuk Creek. Access to the site may be difficult during the winter if the road conditions are icy, because of the potentially steep grade required to climb the bluff on the southern side of Klutuk Creek. Improvements to the existing access road to Klutuk Creek, that crosses private property in some areas, would be required. A test pit was not dug at Site 3 during the field investigation. Areas surrounding the shown site may be wetlands.

An estimate of the construction costs for Sites 1, 2A, 3, and 4 are provided in Table V-2. It is assumed that, at a minimum, access to each of the alternative site locations would require the construction of 14-foot-wide gravel roads of varying lengths with turnouts. Site 2 is excluded from the cost estimate.

Table V-2 Capital Cost Estimates

Item	Site 1	Site 2A	Site 3	Site 4
	Amount ($)			
New Landfill, Design, Construction, Equipment	700,000			
Existing Dump Site Consolidation and Cap	82,500			
TOTAL NEW LANDFILL FACILITY, EXCLUDING ACCESS ROAD	**782,500**			
New Burn Box, to be funded by Denali Commission	30,000			
Access Road Improvements	1,870,000	1,142,000	1,774,000	2,957,000

(2) Non-Construction

The present-worth (2008) cost for closing the existing dumpsite is estimated at approximately $82,500, which includes the costs for consolidation, cap and cover material, and seeding. Annual post-closure costs are expected to be approximately $800 (12 hours per year, at $20.00 per hour plus equipment costs), which includes annual inspections and a 5-year postclosure report. This cost has been included in the construction cost estimates provided in Section V.G.(1).

(3) Annual Operations and Maintenance

The O&M costs provided in Table V-3 assumes that garbage collection is conducted by self-hauling. O&M costs for all three sites are assumed to be generally similar, based upon snow removal, road maintenance, and transportation requirements.

Table V-3 Landfill and Access Road O&M Cost Estimate, Sites 2, 2A, 3, and 4

Items	Amount
Year-round Costs	
Operator @ $25/hour x 6 hours/week	$7800
Operator (monthly cover/cleanup) x $25/hour x 40 hours/month x 8 months/year	$8000
Operator (spring cleanup) x 40 hours x $25/hour	$1000
Equipment: F.O.G. and Maintenance	$2200
Hazardous Waste Disposal	$1500
Scrap Metal Disposal	$1000
Grade Access Road	$600
Insurance	$6000
Reclamation Bonding	$2000
Short Lived Asset Replacement	$6000
Additional Costs (7 Months per Year)	
Snowplowing (15 hours/month)	$5000
Equipment (Grader): F.O.G.[1] and Maintenance	$1200
Administration	$500
TOTAL	**$42,800**
Cost per Household	
Number of Households	42
Monthly Cost per Household[3]	$85

Notes:
[1]F.O.G. = fuel, oil, and grease cy = cubic yards

It is estimated that Site 1 would have an additional $4,000 in snowplowing costs per year.

H. ADVANTAGES/DISADVANTAGES

Construction and O&M costs for the sites are compared in Table V-4. Sites 1, 2a, 3, and 4 have similar advantages and disadvantages. All of the landfill sites evaluated for this project exceed the 5,000-foot minimum separation distance from the airport, required by FAA Circular 150/5200-33A. All evaluated sites have sufficient capacity to provide for growth in the community.

Table V-4 Cost Estimate Comparison

Recommended Improvement	Landfill Capital Costs ($)	Additional Annual O&M Costs ($)
Site 4 [Community Preferred Site], Site 2A [Alternative], Site 3 [Alternative]	782,500	42,800
Site 1 [Alternative]	782,500	46,800

VI. SELECTION OF AN ALTERNATIVE

A. PRESENT WORTH COST ANALYSIS

The present worth cost analysis assumes a project life cycle of 30 years and the real federal discount rate of 2.8% for 30-year treasury notes. Salvage values are equal to 10% of construction costs, excluding existing dump site decommissioning. All present worth values are in 2008 dollars.

Recommended Improvement	Landfill Capital Costs Present Worth ($)	O&M Present Worth ($)	Salvage Present Worth ($)	Net Present Worth ($)
Site 4 [Community Preferred Site], Site 2A [Alternative], Site 3 [Alternative]	782,500	877,000	22,500	1,637,000
Site 1 [Alternative]	782,500	958,000	22,500	1,718,000

VII. PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

A. PROJECT DESIGN

(1) Collection

The recommended waste collection alternative is self-haul.

(2) Storage

Limited land availability restricts options for landfill placement. The Nushagak River, Klutuk Creek, other creeks, and wetlands restrict accessibility to land over 5,000 feet from the existing and proposed airport runways. Airport restrictions also limit land within 5,000 feet of the community. The selected landfill site is approximately 6,000 feet northwest of the Ekwok townsite, and between 3,500 and 11,000 feet of existing homes. Refer to Section V for a more detailed description of the community-preferred landfill site.

A salvage area would be located near the new landfill site, and used for the disposal and salvaging of inert wastes, such as white goods, machine parts, etc. Based on other similar communities, it is estimated that as much as 25 percent of the Ekwok waste volume can be considered as metals/white goods. The metals/white goods disposal can also serve as a salvage and parts area, if the site is maintained in a reasonably clean and safe manner. Future crushing and burial operations for inert wastes will occur within the new landfill.

(3) Disposal

The primary waste disposal mechanism is use of a burn box at the landfill to reduce the volume of solid waste to be stored. This burn box would likely be a new burn box that would have higher burn efficiency, and would have a more efficient design for movement of solid waste to, and ash from, the unit. Additionally, the community has an in-community cardboard recycling program, so that residents can reuse cardboard boxes for shipping and other uses. These wastes are currently stored in the recycling shed. The Ekwok Village Council places paper wastes in the burn box when volumes exceed the storage capacity of the recycling shed.

Burn box operations will vary, depending on the actual unit purchased, and can be provided by the manufacturer. A minimal amount of fuel oil may be required to start the burn. To prevent the creation of toxic smoke, it is important that residents or the solid waste operator separate out highly flammable or explosive wastes, hazardous wastes, plastics, and rubber from the burn box. The operator should wear protective gear and work boots. Burns should be regularly scheduled, because inefficient burns can result from overloading of the burn box. Regular (daily) burns provide for more efficient burn operations, and minimize precipitation accumulation in the waste.

Burning should only occur on days when the wind is blowing away from the community. If smoke is smelled in the community on certain windy days, burning operations should cease until more favorable wind conditions occur. Ash should be lightly wetted once it is deposited in the landfill, to prevent scattering. In order to prevent runoff, the ash should not be flushed (S.W.A.N., 2005).

Animal carcasses and fish wastes should be not be burned, but buried in the landfill at the end of each day.

BEESC used a 1993 Solid Waste Characterization Study completed for the City of Dillingham 1993 (HDR, 1993) to provide an estimate of Ekwok's solid waste volumes and characteristics. Solid waste compositions deposited in the City of Togiak's landfill in 2000, generally followed the 1993 Dillingham waste volumes. A very limited solid waste survey was completed by the Ekwok Village Council in July of 2004; 20 homes provided an estimate of their garbage and recycling generation rates for a one-week time span.

The Dillingham study developed an average waste generation of 6.3 pounds/person/day for the full time residents in 1993/1994. The 2000 Togiak study provided an annual average waste volume of 6.0 pounds/person/day. Based upon this information, estimated solid waste production for Ekwok is provided in Table VII-1.

Table VII-1 Ekwok Solid Waste Production Assumptions

Assumptions	
Annual growth rate	2.7%
Per capita garbage production	6.3 pounds/capita/day
Density of compacted garbage	650 pounds/cubic yard
Burn box reduction	50%
Cover material	10%

(3.1) Waste Stream Components

Waste compositions are generally expected to follow production rates described in Table VII-2. These waste compositions are based upon a recent solid waste study conducted for the City of Bethel (CH2M Hill, 2002), which is approximately 170 miles from Ekwok.

Table VII-2 Estimated Community Waste Stream Components (2006)

Waste Type	Percent by Weight	Solid Waste Production (pounds/day)
Cardboard/paper	37%	359
Glass	3%	25
Metals	8%	75
Plastics	9%	84
Rubber and leather	4%	42
Textiles	4%	42
Wood	6%	58
Food waste	10%	92
Yard trimmings	3%	25
Other	3%	33
Inert	10%	96
Biosolids	3%	29
Total Solid Waste	**100%**	**960**

(3.2) Waste Volumes and Characteristics for Ekwok

Estimated waste volumes for 2006 through 2026 are presented in Table VII-3.

Table VII-3 Projected Ekwok Solid Waste Volumes

Year	Population	Tons/ day	Tons/ Year	Cumulative Tonnage	Cumulative Yardage (CY)	-50% Burn Reduction (CY)	+10% Cover (CY)
2006	153	0.48	177	177	544	272	299
2007	157	0.50	182	358	1102	551	606
2008	161	0.51	186	545	1676	838	922
2009	166	0.52	191	736	2265	1133	1246
2010	170	0.54	197	933	2870	1435	1579
2011	175	0.55	202	1135	3491	1746	1920
2012	180	0.57	207	1342	4130	2065	2271
2013	184	0.58	213	1555	4785	2392	2632
2014	189	0.60	219	1774	5458	2729	3002
2015	194	0.62	225	1998	6149	3075	3382
2016	200	0.63	231	2229	6859	3429	3772
2017	205	0.65	237	2466	7588	3794	4173
2018	211	0.67	243	2709	8337	1068	4585
2019	216	0.68	250	2959	9106	4553	5008
2020	222	0.70	257	3216	9895	4948	5442
2021	228	0.72	264	3480	10706	5353	5889
2022	234	0.74	271	3750	11539	5770	6347
2023	241	0.76	278	4028	12395	6197	6817
2024	247	0.78	286	4314	13273	6637	7300
2025	254	0.80	293	4607	14175	7088	7796
2026	261	0.83	301	4908	15102	7551	8306

Notes:
CY = cubic yard

(3.3) Size of First Cell at New Landfill

To be conservative, it is assumed that there will be a 40 percent reduction in volume from burning, and a 10 percent reduction in volume from waste sent to the metals/white goods area. This allows for a 50 percent reduction in volume in waste

actually going to the new sanitary landfill. Significantly greater burn efficiency, approaching 80 to 90 percent, is possible with a well-designed burn box.

The first cell will be designed for a minimum of eight years of operation. This should allow for a reasonably sized cell that will not accumulate too much storm runoff. The following is the design procedure:

- 5,458 cy (cumulative yardage in 8 years)
- Allow for 50 percent reduction: 0.5 x 5,458 cy = 2,729 cy
- Use a 10 percent allowance for cover material: 1.10 by 2,729 cy = 3,002 cy
- Use a design volume of 3,000 cy

Once this first cell is filled and capped, a similar cell could be constructed adjacent to the first cell.

(4) Landfill Closure

As part of the closure process, any vehicles and white goods that are not already covered will be crushed and buried. All motorized vehicles will have batteries and fluids removed, and white goods will have Freon removed. Loose, burnable wastes will be collected and burned in the burn box to reduce volume.

Any toxic or hazardous waste identified during landfill closure activities will be disposed of in accordance with applicable state and federal guidelines. If any oil is found during the cleanup, it should be drained and/or removed, and burned in the community waste oil burner. Any used lead-acid batteries encountered will be collected in fish totes, or similar containers, and shipped to Anchorage or a west coast recycler. Batteries cannot be transported on passenger flights. Any used oil encountered will be burned in a waste oil burner, or a waste oil heater.

Remaining waste will be consolidated into an existing depression, covered, and capped. The cover material will be hauled to the site from established borrow sites. After consolidation and compaction, a cover of sand/silt will be placed over the waste. The final cap and cover will consist of 20 inches (minimum) of low-permeable, sand/silt material, rolled and compacted; and approximately 4 inches of topsoil (24 inches total). The cap will be sloped at a minimum 2 percent and maximum 5 percent grade. Cover will be graded to promote drainage without causing erosion. The final cover will be revegetated with a low maintenance, and shallow rooting grass. Within 90 days of closure, the City will provide written notification to ADEC that the landfill closure is complete. At closure, the site will be inspected for settlement, and other potential problems, and will be regraded and reseeded if necessary. In accordance with 18 AAC 60.396, the City will make annual, visual inspections of the closed landfill, and will submit a Post-closure Report to ADEC. Permanent markers or survey monuments will be established to determine the exact location of the facility upon closure. In addition, a note will be added to the property deed, indicating the previous use of the parcel, and filed with the Alaska Department of Natural Resources. The City will provide ADEC with

written notification that the notation required has been recorded, and that a copy has been placed in the operating record of the facility.

B. Total Project Cost Estimate

Table VII-4 lists the itemized estimated costs of constructing the landfill at Site 4, including road improvements and a bridge over Klutuk Creek in 2008 dollars. Road cost estimation was performed using the technique provided in United States Bureau of Indian Affairs Juneau Area Transportation Plan Technical Memorandum No. 2: Cost Estimation Methodology. Bridge cost estimation is based on a bridge of similar span constructed in Grayling, Alaska. This cost estimate includes the requirement that iron, steel, and manufactured goods used in the project are produced in the United States as well as the requirement that wages be paid at rates not less than those prevailing on projects of a character similar in the locality.

Landfill cost estimate assumes availability of equipment upon completion of access road. Without sufficient equipment in place for construction Mobilization / Demobilization Costs could significantly increase.

Table VII-4 Itemized Cost Estimate

Item	Cost (2008 dollars)
Landfill Facility	
Survey and Platting	50,000
Geotechnical Investigation	20,000
Design and Permitting	80,000
Clearing	4,000
Borrow	50,000
Separation Geotextile	5,000
Construction Surveying	10,000
Mobilization / Demobilization	150,000
Fencing and Gate	65,000
Loader	85,000
Mini/Compact Excavator	82,000
Land Acquisition / ROW	7,000
15% Contingency	92,000
Landfill Facility Total	**$700,000**

Item	Cost (2008 dollars)
Access Road	
Road and Bridge Design	217,500
Right-of-Way	5,500
Road Construction Survey	43,500
Mobilization/Demobilization	304,500
Embankment Construction	515,500
Incidental Construction	111,000
Bridge Construction	1,440,000
Road Surfacing	103,500
Construction Inspection	217,500
Access Road Total	**$2,957,000**

C. ANNUAL OPERATING BUDGET

(1) Income

Revenues for maintaining the landfill site will be derived from fees paid for by residents, businesses, and the school, and will be included in the Solid Waste Utility Budget.

(2) Operations and Management (O&M) Costs

O&M costs for the community solid waste facility are limited to maintenance of cap and cover material, road maintenance, equipment maintenance, and the maintenance of landfill fencing. These costs will be paid for through garbage collection fees, which will be included in the Solid Waste Utility Budget. Annual costs for landfill O&M (excluding haul costs) are initially estimated at approximately $42,800 per year.

VIII. CONCLUSIONS AND RECOMMENDATIONS

The community needs a new landfill to replace the current landfill that is not permitted, is too close to the new runway, is too close to housing, and is in proximity to the community's water sources (a shallow aquifer). A new landfill would be a cut and cover landfill, with an effective burn box, adequate fencing, provision for excluding bulky "white goods" and segregated hazardous materials. The new landfill would serve the community for the foreseeable future, and would be designed for at least a 20-30 year period.

The community has considered several landfill location alternatives. Site 4 is their preferred alternative because it achieves multiple objectives of the community. This site selection is confirmed by City resolution Landfill-2008 contained in Appendix A. Below are several beneficial qualities of the preferred landfill alternative:

- Achieves the required runway separation
- Locates the landfill away from the community's shallow aquifer drinking water sources
- Has the least wetlands impacts
- Does not impact allotments or BLM lands
- Opens up land for subsistence activity in close proximity to the Village

Challenges to this site include the need for a new access road with a bridge crossing of Klutuk Creek. The recommended site has not been visited and soil and water table information are unavailable. For all alternatives the cost of the access road is a significant portion of the overall costs of the landfill improvements.

While this 2009 PER presents the Site 4 Alternate as having the highest overall cost, the cost difference is due to additional access road costs, which will not be funded by RUS. The landfill construction and maintenance costs for all alternatives are generally equal, with additional operations and maintenance costs for Site 1.

REFERENCES

Alaska Department of Commerce, Community, and Economic Development (ADCCED), 2005a. Alaska Community Database, Detailed Query.
Website: http://www.dced.state.ak.us/cbd/commdb/CF_BLOCK.htm.

ADCCED, 2005b. Alaska Community Plan: Ekwok.

Alaska Department of Transportation and Public Facilities (ADOT&PF), 2004 (July). Geology Report: Ekwok Airport Rehabilitation, Project No. 55377.

ADOT&PF, 1983 (May). Engineering Geology and Soils Report, Ekwok Airport Materials Investigation, Project No. D11512.

Alaska Department of Fish and Game (ADF&G), 2005. ADF&G Fish Distribution Viewer.
Website: http://gis.sf.adfg.state.ak.us/AWC_IMS/viewer.htm.

Alaska Department of Natural Resources (ADNR), 2005. Wood-Tikchik State Park.
Website: http://www.dnr.state.ak.us/parks/units/woodtik.htm.

CH2M Hill, 2002 (September). City of Bethel Solid Waste and Sewage Lagoon Facilities Design Study/Master Plan Update.

Federal Aviation Administration (FAA), 2004 (July 27). Advisory Circular 150/5200-33A, Hazardous Wildlife Attractants on or Near Airports.

Hartman, Charles W., and Phillip R. Johnson, 1978 (April). Environmental Atlas of Alaska, 2nd Edition. University of Alaska Fairbanks.

HDR Engineering, Inc. (HDR), 1993 (October). Dillingham Solid Waste Characterization Study.

Municipality of Anchorage (MOA), 2003a.
Website: http://www.muni.org/sws/disposalrestrict.cfm#computers.

MOA Solid Waste Services, 2003b.
Website: http://www.muni.org/sws/disposalrestrict.cfm#antifreeze.

National Wild and Scenic Rivers System (NWSRS), 2005. Wild and Scenic Rivers by State.
Website: http://www.nps.gov/rivers/wildriverslist.html.

National Oceanic and Atmospheric Administration (NOAA), 2005. Steller Sea Lion Critical Habitat and No-Entry Zones.
Website: http://www.fakr.noaa.gov/protectedresources/stellers/habitat.htm.

Selkregg, Lidia L., 1976. Alaska Regional Profiles, Volume V, Northwest Region. Arctic Environmental and Information Data Center, Anchorage, Alaska.

Sewell, Rich, 2005 (March 3). Personal Conversation Between Kyle Petersen of BEESC and

ADOT&PF Employee.

S.W.A.N., 2005. Website: http://www.ccthita-swan.org/main/index.cfm.

U.S. Army Corps of Engineers (USACE), 2005. Floodplain Hazard Data for Alaska Communities.
Website: http://www.poa.usace.army.mil/en/cw/fld_haz/floodplain_index.htm.

U. S. Census Bureau, 2005. Website: http://factfinder.census.gov/servlet/SAFFFacts?_event=Search&geo_id=&_geoContext=&_street=&_county=ekwok&_cityTown=ekwok&_state=04000US02&_zip=&_lang=en&_sse=on&pctxt=fph&pgsl=010.

U. S. Census Bureau, 2005.
Website: http://factfinder.census.gov/home/saff/main.html?_lang=en.

U.S. Department of Agriculture (USDA), 1979. Exploratory Soil Survey of Alaska.

U.S. Fish and Wildlife Service (USFWS), 2005a. Species Information: Threatened and Endangered Animals and Plants. Website: http://endangered.fws.gov/wildlife.html#maps.

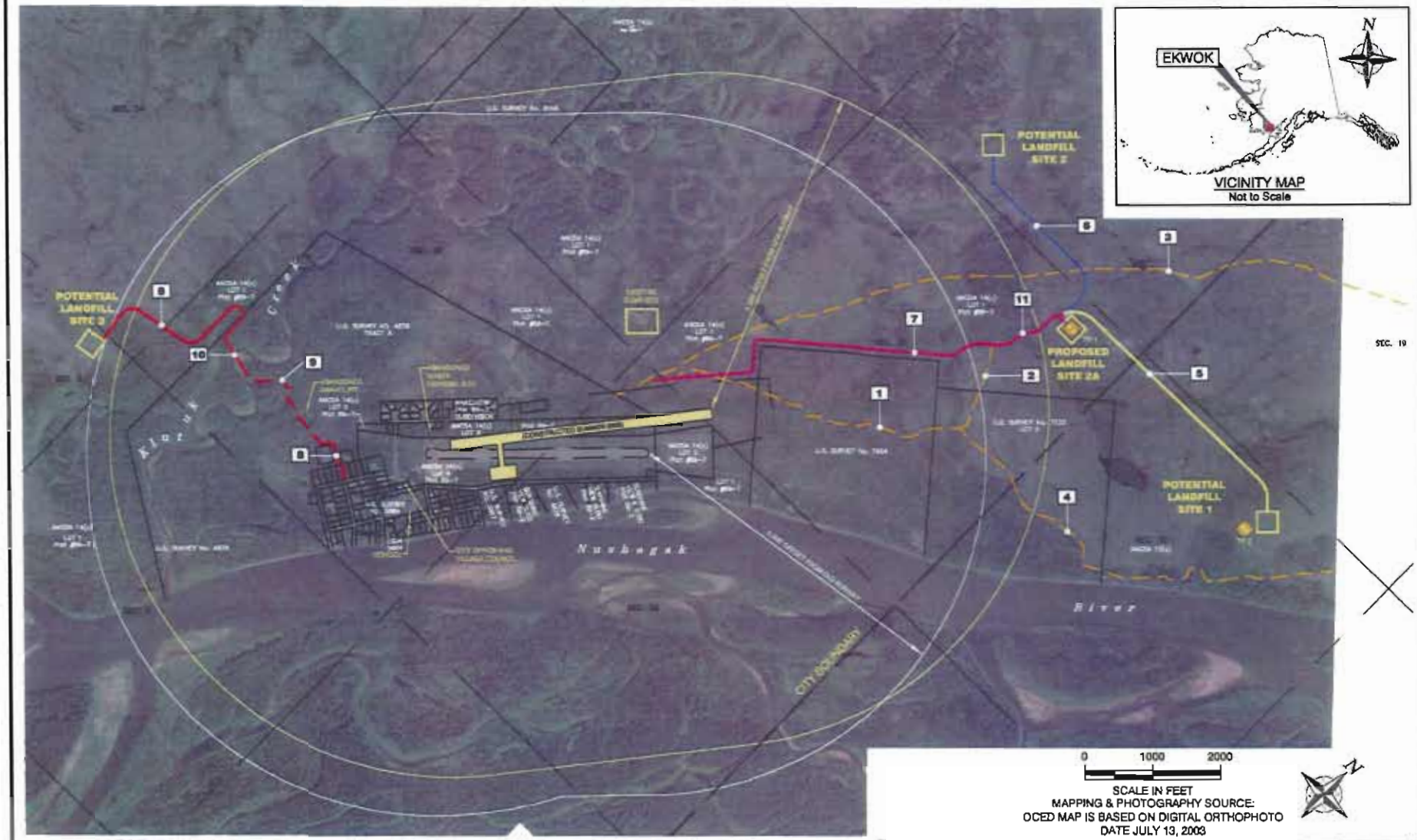
USFWS, 2005b. Togiak National Wildlife Refuge.
Website: http://togiak.fws.gov/content.htm.

USFWS, 2005c. Listed Species with FWS Critical Habitat
Website: http://alaska.fws.gov/media/stelleider.htm
Website: http://alaska.fws.gov/media/speceider.htm.

USFWS, 2005d. Threatened and Endangered Species System (TESS)
Website: http://ecos.fws.gov/tess_public/ TESSWebpageCrithab.

DRAWINGS

Drawing: I:\25054 EKWOK ISWMP\ACAD-DESIGN\EKWOK_LANDFILL\DWG\25054_C1_85X11.DWG - Layout: LAYOUT1
User: SWHEAT Jan 09, 2006 - 12:47pm Xrefs: 25054_BASE.DWG GIS_EXPORT.DWG BR_85X11L.DWG - Images: EKWOK_6FT_ASP6_NAD83.JPG



LEGEND

- EXISTING TRAIL [LOCATIONS ARE APPROXIMATE]
- TEST PIT LOCATION
- LANDFILL ACCESS ROAD [PROPOSED ALTERNATIVES]
- 1 EXISTING TRAIL ACCESS TO SITE 1, & 2A [WITHIN NATIVE ALLOTMENTS]
- 2 EXISTING TRAIL ACCESS TO SITE 2A [WITHIN NATIVE ALLOTMENTS]
- 3 EXISTING WINTER TRAIL TO NEW STUYAHOK
- 4 EXISTING BLUFF TRAIL [WITHIN NATIVE ALLOTMENTS]
- 5 PROPOSED ROAD TO SITE 1
- 6 PROPOSED ROAD TO SITE 2
- 7 PROPOSED ROAD TO SITE 2A
- 8 PROPOSED ROAD TO SITE 3 (ROW REQ'D)
- 9 EXISTING ROAD TO SITE 3 [REQUIRING IMPROVEMENTS]
- 10 BRIDGE INSTALLATION REQUIRED
- 11 CULVERT INSTALLATION REQUIRED

EKWOK, ALASKA
PROPOSED LANDFILL SITES

Bristol
ENVIRONMENTAL & ENGINEERING SERVICES CORPORATION
Phone (907) 563-0013 Fax (907) 563-6713
Project No. 25054

DATUM:	NAD 83
PROJECTION:	ASP ZONE 6 US FEET
DATE	01/09/06
DWN.	SJW
SCALE	SHOWN
APPRVD.	KLP
SHEET	1 of 1

Rural Development

WHPacific

ENGINEERS · ARCHITECTS · SURVEYORS · PLANNERS

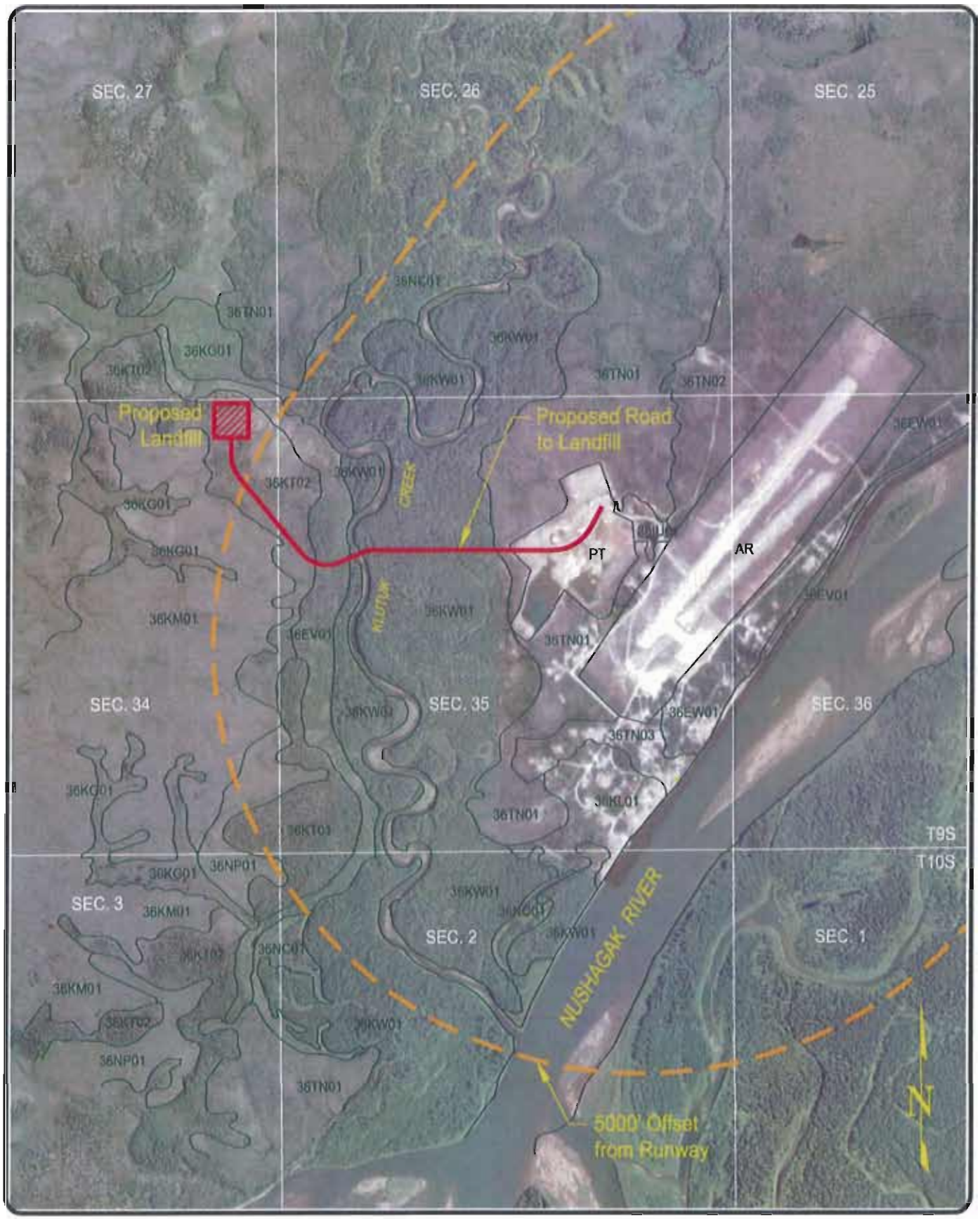
800 W. 31ST AVENUE · ANCHORAGE, AK 99503
PHONE (907) 338-0500 · FAX (907) 338-5329

PROJECT MAP, SITE 4
PRELIMINARY ENGINEERING REPORT

Ekwok, AK
Ekwok Village Council

Job No.:	5225
Date:	9/26/08
Drawn By:	SEC
Checked By:	DKR

Figure No.
2



Rural Development

WHPacific

ENGINEERS · ARCHITECTS · SURVEYORS · PLANNERS

300 W. 31ST AVENUE · ANCHORAGE, AK 99503
PHONE (907) 338-6600 · FAX (907) 338-5329

SOILS MAP
PRELIMINARY ENGINEERING REPORT

Ekwok, AK
Ekwok Village Council

Job No.:	5225
Date:	9/26/08
Drawn By:	SEC
Checked By:	DKR

Figure No.
3

APPENDIX A

Community Resolutions Selecting The Landfill Site

City of Ekwok

RESOLUTION # Landfill -2008

A Resolution Supporting an Alignment for a Landfill Access Road

WHEREAS: The City of Ekwok, hereinafter called the City, Is the governing body of Ekwok, Alaska, and

WHEREAS: The City desires to improve transportation Infrastructure and support a new landfill, and

WHEREAS: The Village Council is moving forward with plans for a new landfill and access road,

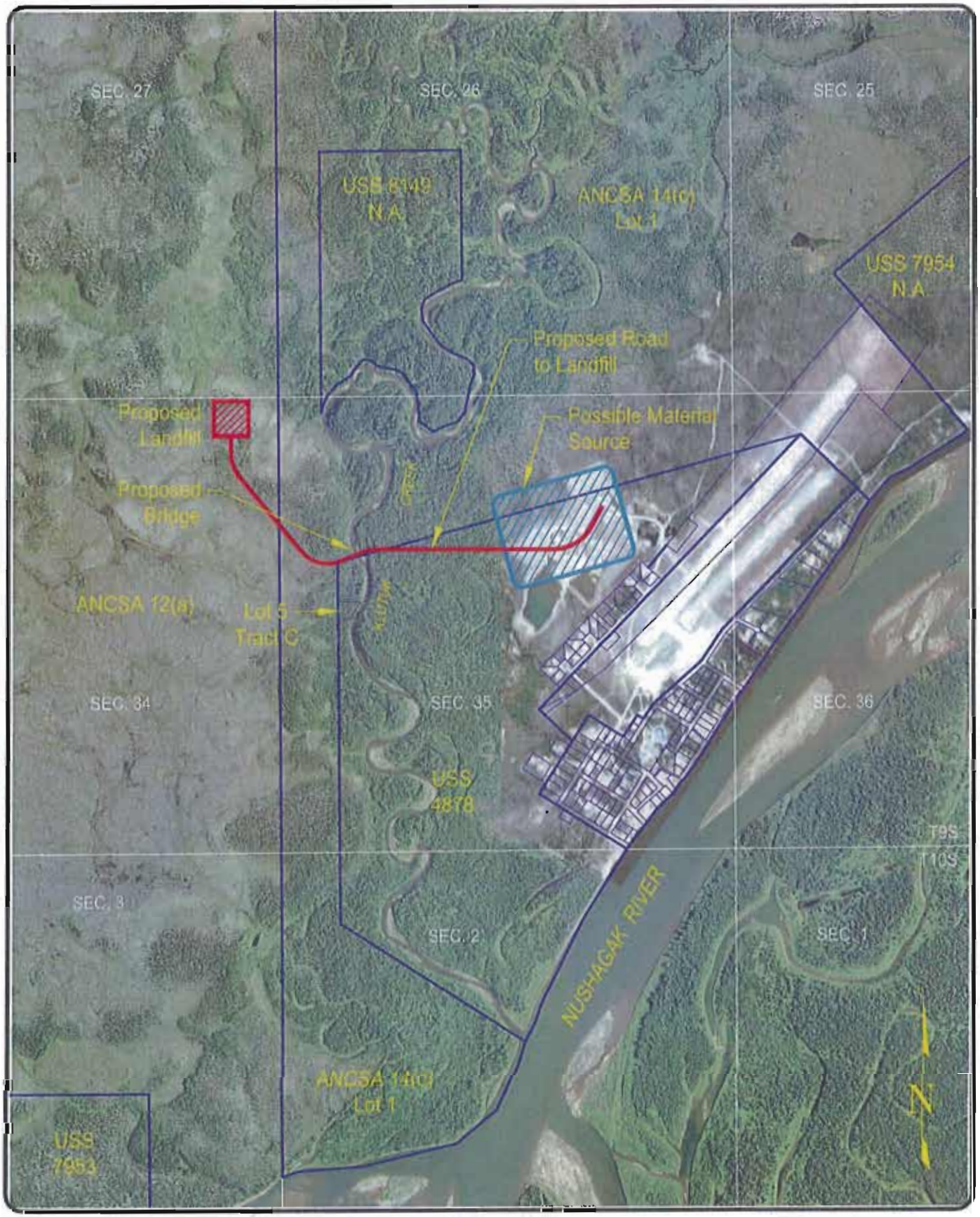
WHEREAS: A landfill access road through the City's material site will reduce costs and allow expansion of the material site,

NOW THEREFORE BE IT RESOLVED; that the City supports the road alignment as shown on the attached exhibit,

I, the undersigned, hereby certify that the City Council is composed of 7 members of who 6, constituting a QUORUM, were present and that the foregoing resolution was **PASSED AND APPROVED** by the City Council of Ekwok, Alaska, this 10th day of Nov, 2008.

Vote: 6 **Yeas** 0 **Nays** Signed _____
Richard Stermer, Sr., Mayor

Alice L Kanuski
ATTEST: City Clerk



Rural Development

WHPacific

ENGINEERS · ARCHITECTS · SURVEYORS · PLANNERS

300 W. 31ST AVENUE · ANCHORAGE, AK 99503
PHONE (907) 339-6500 · FAX (907) 339-3329

POSSIBLE MATERIAL SOURCE ENVIRONMENTAL REVIEW

Ekwok, AK

Ekwok Village Council

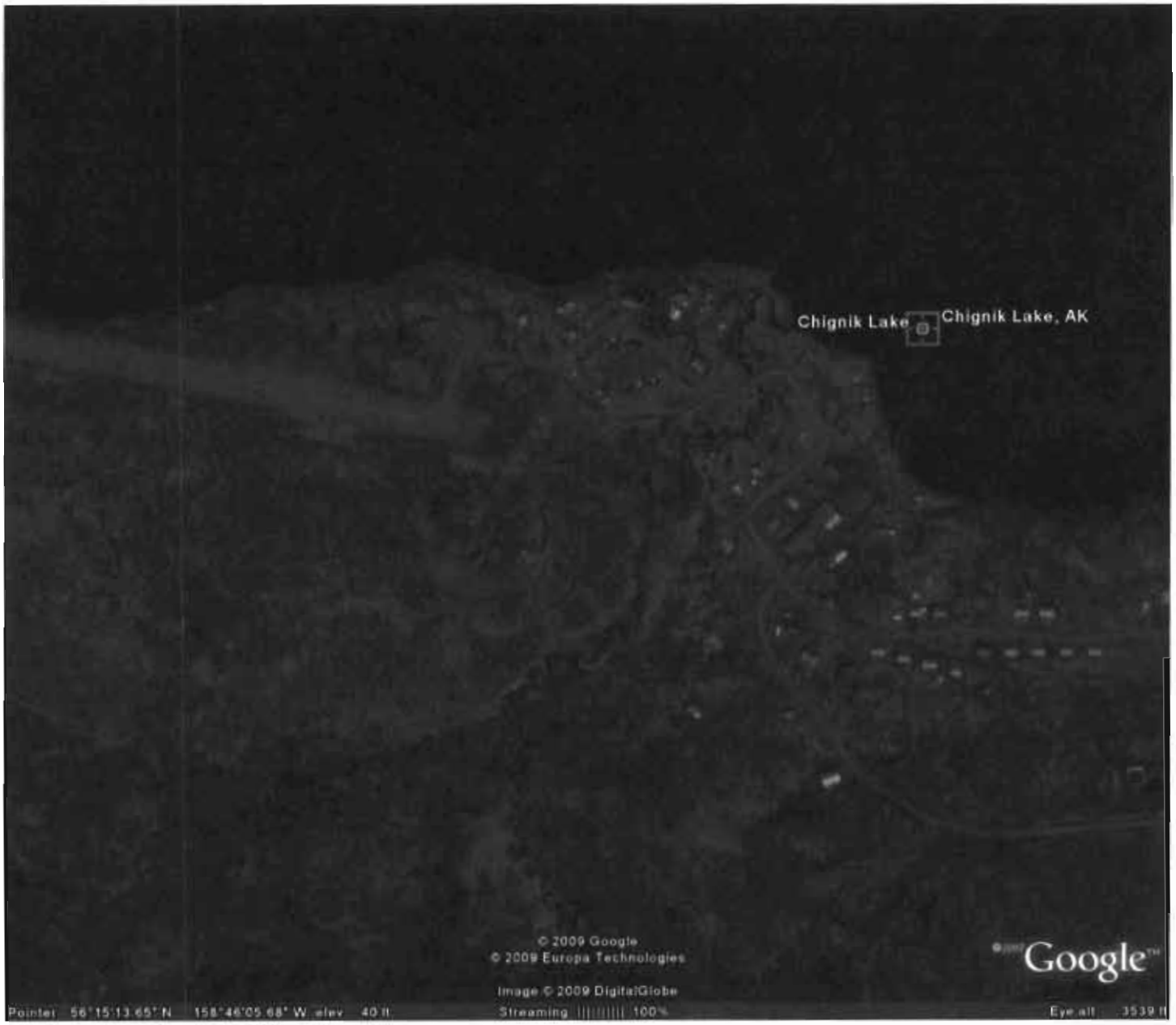
Job No.:	5225
Date:	9/26/08
Drawn By:	SEC
Checked By:	DKR

Figure No.

4

APPENDIX B

Meeting Summaries, Public Comments, and Trip Reports


Chignik Lake
Chignik Lake, AK
© 2009 Google
© 2009 Europa Technologies
Image © 2009 DigitalGlobe
Google
Pointer 56°15'13.65" N 158°46'05.68" W elev 40 ft
Streaming 100%
Eye alt 3539 ft

Bristol
ENVIRONMENTAL & ENGINEERING
SERVICES CORPORATION

2000 W. International Airport Road, #C-1
Anchorage, AK 99502-1117
907-563-0013 Phone
907-563-6713 Fax

MEMO

DATE: July 12, 2005

TO: File

FROM: Kyle Petersen, P.E.

RE: Trip Report
Ekwok Integrated Solid Waste Management Plan

The following is a summary of Bristol Enviromental & Engineering Services Corporation (BEESC) site visit to Ekwok on July 6 - 8, 2005, by Mark Madden and Kyle Petersen.

July 6, 2005

7:00 AM – 12:00 PM: We traveled to Ekwok. We were met at the Ekwok Airport by Luki Akelkok, who checked us into our room, and took us to the Tribal Office.

12:30 – 1:30 PM: We met with Lorraine King, and other members of the village council. Discussed planned schedule for the trip. Richard Stermer was hired to help with the geotechnical investigation. Arrangements were made to rent two all-terrain vehicles (ATVs).

1:30 – 4:30 PM: Site 2A was chosen as an alternative to Site 2, because access would be easier. The winter trail to New Stuyahok travels in close proximity to the site. The site is northeast of town, across wetlands, near Blueberry Hill. Blueberry Hill is heavily used for berry-picking. The wetlands are fairly limited in a narrow section near this site, and could probably be crossed with a culvert and matting. It is generally believed that activity at the proposed landfill site would not impact groundwater or surface water at Blueberry Hill. A test pit (TP-1) was dug by hand at the site to a total depth of 7 feet 10' inches below ground surface (bgs). The test pit was silt, except for the top organic layer (0 feet to 0.5 feet bgs). Seasonal frost was encountered from 3 feet to 3 feet 8 inches bgs. After 15 minutes of exposure in the bottom of the pit, a slight amount of water seepage was observed. Visual observation placed the landfill site approximately 10 to 15 feet vertically above the elevation of the wetlands near the site.

We were able to cross the marsh between Blueberry Hill and Site 2A without traveling on flowing water, except for one, 2-foot-wide crossing of flowing water.

4:30 – 5:30 PM: We went to Site 1 to look at access requirements. The site is easily accessible along an existing trail (except for the final 800 feet), but the existing trail crosses Native allotments. Avoiding the Native allotments will require crossing wetlands, and possible creeks. We decided to dig the test pit for Site 1 the following day.

July 7, 2005

7:30 – 11:00 AM: We met Richard at the Luki's Bed and Breakfast. We took four-wheelers and drove out to Site 1. A test pit (TP-2) was dug at the site by hand. The test pit was organics from 0 feet to1.5 feet bgs, and silt with some sand from 1.5 feet to 7.5 feet bgs. Total depth was 7.5 feet. After 15 minutes of exposure in the bottom of the pit, a slight amount of water seepage was observed.

11:00AM – 12:00 PM: Mark and Richard repaired the chain on one of the four-wheelers used during the morning. Kyle prepared forms for the meeting.

12:00 – 1:00 PM: Richard, Mark, and Kyle traveled to the Klutuk Creek to look at access requirements for a road to Site 3, on the top of the bluff. Site 3 is north of town and close to the river. Access across Klutuk Creek is believed to require an approximately 100-foot-long bridge; switchbacks will be required for any access road up the bluff on the far bank. The top of the bluff appeared to contain some wetlands where not heavily forested, based upon visual observation from the plane. Site access is difficult because of the steep bluff and the creek crossing.

1:00 – 2:00 PM: Lunch

2:00 – 4:00 PM: We prepared for the community meeting at the council office. Discussed project with Lorraine King.

6:30 – 7:00 PM: Set up for the community meeting.

7:00 – 8:30 PM: Held a community meeting at the City Hall to discuss the project with the community. Thirty members of the community were in attendance. A sign-in sheet was provided for the meeting, and door prizes were given. We made a presentation of what sites we were considering for a new landfill.

We described how the existing site is too close to the runway, and can negatively impact airplane traffic. A description of five options was made available to the community; to continue using the existing site, or to relocate the landfill to Sites 1, 2, 2A, or 3.

We provided preliminary cost estimates for the access roads to each of the sites. The road to each site was estimated as:

Site 2A: $998,000

Site 1:	$1,806,000
Site 3:	$1,588,000

The landfill construction was estimated at approximately $400,000 to 500,000. Costs for hauling had not yet been estimated.

The community voted on Site 2A (across the marshland and north of Blueberry Hill) as the most favored site. There was concern over the effects of the landfill on berry-picking, as some members of the community believed that the site was at Blueberry Hill. The site did not seem to be a concern from a subsistence standpoint, once residents realized where the site was actually located. A total of 25 people voted. A total of 22 people voted for site 2A; two voted for Site 3; and one voted for Site 2. Site 1 and the continued use of the existing dumpsite received no votes.

Concerns and comments from the meeting included:

- Site 1 is too close to the river, and is in a location for salmonberries;
- Perhaps look at getting 3 alternative haulers for waste.
- Site 2 is on corporate land. BEESC agreed to research land ownership of the three sites, and report back to the village;
- Will Bristol Bay Native Corporation release surface and subsurface rights?;
- Possible use of supersacks for waste depositing; and
- Some members of the community believed that Site 1 could negatively impact water from the Nushagak River; some people haul water from the river.

We talked about the trash hauling options available to the community. These included self-haul, dumpsters, truck haul, community pickup, and private pickup. Currently they use mostly self haul, except for limited door-to-door pickup for some elders. No collective preference was made apparent from the community members present.

July 8, 2005
9:30 AM – 8:30PM: Returned to Anchorage via Dillingham.

Bristol
ENVIRONMENTAL & ENGINEERING
SERVICES CORPORATION

2000 W. International Airport Road, #C-1
Anchorage, AK 99502-1117
907-563-0013 Phone
907-563-6713 Fax

MEMO

DATE: October 14, 2004

TO: File

FROM: Mark Madden

RE: Trip Report
Ekwok Solid Waste Program

The following is a summary of my site visit to Ekwok on October 5 and 6, 2004.

October 5, 2004

8:00 – 11:30 AM Traveled to Ekwok. I was met at the Ekwok airport by Lorraine King who took me to the Tribal office.

11:30 – 3:30PM Met with Elaine King, Charlie Nelson and Sylvia Kazimirowicz. Discussed potential landfill sites. From the discussion, 3 possible sites became apparent. None of the sites are easily accessible.

The first site is south of town and would require crossing the lower reaches of Klutuk Creek. In this area the creek appeared to be about 7 yards across and would likely require construction of a bridge. On the far side is a significant bluff (20+ feet high) to get up out of the creek bed. The area is isolated from the village, and there is little local use because of the difficulties in crossing the creek. I indicated that the creek crossing would be costly enough that the site might be precluded.

The second site is northeast of town, across Klutuk Creek near Blueberry Hill. Blueberry Hill is heavily used for berry picking. Klutuk Creek is pretty small and marshy and could probably be crossed with a culvert. In the winter, the trail to New Stuyahok goes right by the site.

The third site is north of town and close to the river. The site access may be better since there is no creek to cross. The river has a bluff in that area so you couldn't get to the site easily from the river. There may be some individual allotment parcels in that area. There was concern raised about how close to the river is acceptable, and whether leachate or blowing trash would end up in the river.

The existing site is too close to the runway and the village. The landfill is a series of slot cells. They are currently on their 3rd slot. Charlie has been working on improving their burn box, which is an old oil tank on skids. The tank is set horizontally with a rack in the bottom and vents cut.

They are drilling a lot of new wells to the shallow aquifer in town and there is concern that continued us of the existing site could affect their wells. Charlie noted there are a couple of old dump sites west and southwest of town that aren't used any more.

The village has a recycle shed. The mostly recycle aluminum which they can sell through the Flying Cans program. Last year they recycled about 1,400 lbs of aluminum. They collect batteries which they discard through Alaska Battery Specialties in Anchorage. The save cardboard and paper in the Recycle Shed to be available for reuse by the villagers until they accumulate too much, then they are burned.

There are about 150 people in the village. They did a rough trash estimate in June and July 2004 and came up with about 3.75 lbs of trash per household per day. Charlie provided a newsletter with the study information. They estimated about 21,700 lbs of trash per year.

5:30 – 8:00 PM Village meeting. Lorraine King has a sign in sheet for the meeting and door prizes were given. Made a brief presentation of what sites we were looking at for a new landfill. In general, most favored the site near Blueberry Hill, although there was concern over the effects of the landfill on berry picking and whether siting the landfill there would negatively impact groundwater in the village.

Talked a little about recycling. They have a program which is working. Because of the location and access a lot of recycling options are somewhat limited.

Talked a bit about trash hauling and community and self haul. Currently they use mostly self haul. One local guy has a 4-wheler with trailer. He picks up trash from the elders and hauls it for them. They would be interested in community haul if the landfill is to be far away from the village.

October 6, 2004

8:30 – 11:30 AM Met Charlie at the village office. Took 4-wheelers and drove out to the existing landfill. The site was relatively clean. Fencing was in poor shape and provided little control either to access or blowing litter. A lot of blown litter was observed in the tees west of the site.

Went farther up the trail to look at the Klutuk Creek in that area. It appears to be mostly a marsh with small creek in the middle (<4 feet across and slow moving). Area across the creek was upland with a small bluff (about 10 feet) rising out of the creek bed. Took the 4-wheelers up to Blueberry Hill and photographed the area. Visited the Recycle Shed and City offices. Looked at equipment at City shop. The equipment present included:

- Dump truck – Ford F8000 (broken gearbox housing)
- Dump truck – Ford F9000 (needs new transmission)
- Loader – JD 644C (runs but needs new battery)
- Kubota KH-28L track hoe (operational, very small tracks slightly over knee-high)
- Dozer – make and model unknown but reported to be operational and working out somewhere in the village. I did not see this equipment.

12:00 – 4:30PM Returned to Anchorage

APPENDIX C

Geotechnical Information

Bristol
ENVIRONMENTAL & ENGINEERING
SERVICES CORPORATION

2000 W. International Airport Road, #C-1
Anchorage, AK 99502-1117
907-563-0013 Phone
907-563-6713 Fax

MEMORANDUM

To: File

From: Mark Madden

Date: September 28, 2005

Re: **Ekwok Solid Waste**
Geotechnical Assessment

On July 6 and 7, 2005, Bristol Environmental & Engineering Services Corporation (BEESC) conducted preliminary geotechnical assessments at two potential landfill sites near Ekwok, Alaska to identify subsurface soil conditions including soil types and groundwater observations. The investigation was performed under the direct supervision of Mark Madden, P.E., a geotechnical engineer of our staff.

General Project Area

Ekwok is located on the Nushagak River, approximately 43 miles northeast of Dillingham. The following information is provided by the Alaska Department of Transportation (ADOT&PF, 2004): "Ekwok lies within the Nushagak Lowlands, where the terrain is made up largely of glaciofluvial or outwash deposits. These deposits originated as debris eroded by glaciofluvial action, but they were reworked and partially sorted by the streams that issued from the ends of glaciers, and were distributed into the Nushagak Valley, largely as a great outwash plain. In areas where the deposits have been dissected by streams, they are seen to consist of rounded but poorly sorted gravel, sand, and silt."

The two landfill sites are located north of the village of Ekwok, beyond the 5,000-foot buffer required by regulation from the end of the village air strip. The area is characterized by gently rolling terrain. The area has poorly developed surficial drainage patterns which include small streams, isolated lakes and wet areas. Vegetation at the site was typical of a tundra, with heather, cranberry, grasses and sedges. Spruce stands are present on elevated ridges in the area.

Methods

The geotechnical investigation included excavation of a single test pit at each of the two potential landfill sites. Test pits were dug by hand to a depth of approximately 4 feet. A hand auger was then used to probe approximately 3 feet below the floor of the excavated pit. Soils were logged during excavation noting color, texture, and moisture condition of each definable soil strata. Representative samples were collected from selected soil strata for laboratory analyses. Logs of borings are presented in this Appendix.

Observations

Typical soils observed included approximately 1 foot of vegetative mat and organic materials, underlain by interbedded layers of silt to fine sand. No gravel, cobbles, or coarse sands were observed. A lens of frozen silt was encountered at 3 feet below ground surface in test pit TP1 which extended approximately 8 inches in thickness. It is likely that this layer is remnant of the annual seasonal frost penetration. Permafrost was not indicated or suspected in the project area.

No groundwater was observed in either excavation. Both excavations were allowed to stand open for a brief period upon completion. Slight seepage was observed in each test pit, indicating that groundwater would likely stabilize at or near the depth of excavation.

Soil samples were analyzed to determine grain size distribution of the materials. All soils submitted passed the #10 U.S. Screen size (2.0 mm). Percent coarser than the #200 Screen size (0.04 mm) ranged from 7 percent to 21 percent by weight; thus all soils were classified as silt, and considered highly frost susceptible. Permeability for each sample was estimated using Darcy's equation, which relates effective grain size to permeability. Effective grain size is the diameter which represents 10 percent of the soil mass. Laboratory results are summarized in the following table:

Sample Description	% Gravel	% Sand	% Silt	USCS C;assification	Effective Grain Size (D_{10})	Estimated Permeability
TP1 6'-7'	0	7	93	Silt (ML) – F4	0.01 mm	10^{-4} cm/sec
TP2 3.5'-4'	0	20	80	Sandy Silt (ML) – F4	0.004 mm	$1.6x10^{-5}$ cm/sec
TP2 5'-6'	0	21	79	Sandy Silt (ML) – F4	0.025 mm	$6.25x10^{-4}$ cm/sec

Conclusions

Soils in the area are characterized by highly frost susceptible fine grained materials. Development of a landfill at either site would require construction of an above-grade, bermed cell. The cell would need to be lined with a granular material, possibly reinforced with a geotextile fabric to ensure that the site remains functional during wet weather and spring breakup. Surficial peat and organic soils should be stockpiled for final closure and site restoration.

Groundwater is anticipated to be greater than 5 feet below the base of the cell if constructed at approximately current ground surface elevation. Permeability of the subsoils is estimated to range between 10-4 and 10-5 cm/sec. This is slightly more permeably than recommended, but should limit leachate migration from the cell. Because either site is isolated from areas of development, impacts associated with leachate migration are expected to be minimal. Use of a burn box for waste minimization will also reduce contaminant loadings in leachate generated at the site.

Assuming that the soils observed at the site are representative of soils in the area, development of an all-weather road to provide access to the landfill site will require a gravel cap and likely require geotextile reinforcement to develop a traffic section which will remain passable throughout the year. Culverts will be required to cross small streams in the area.

Bristol
ENVIRONMENTAL & ENGINEERING
SERVICES CORPORATION

LOG OF TP-1

Ekwok Integrated Solid Waste
Management Plan
Ekwok, Alaska

Date Started	: 7/6/05	Elevation	: Unknown
Date Completed	: 7/6/05	Northing Coord.	: N 059°22'28.4"
Hole Diameter	: N/A	Easting Coord.	: W 157°26'49.0"
Drilling Method	: Excavated by Shovel	Survey By	: Garmin GPS
Sampling Method	: Grab	Logged By	: M. Madden & K. Petersen

SAMPLE SIZE: ⊠ < 1 GALLON; ■ > 3 GALLONS
WATER LEVEL: ▼ ▽

DEPTH IN FEET	USCS	GRAPHIC	DESCRIPTION	FROZEN	WATER LEVEL	SAMPLE NUMBER	SAMPLE SIZE	SIEVE ANALYSIS % Silt	% Sand	% Gravel	DEGRADATION	REMARKS
0	Pt		Very Moist, Vegetative Mat.									Hand dug test pit
	ML		Orange and tan, interbedded silt, wet									
1			Tan Silt, moist to wet									
2	ML											
3			Frozen at 3' to 3'8"									
4												
5												
6							⊠	90	7	0		D10=0.01mm
7			Slight seepage in bottom of hole									
8												

09-08-2005 I:\25054 Ekwok ISWMP\70 Reports and Document Submittal\GEO_TECH\TP1_EKWOK.bor

Bristol
ENVIRONMENTAL & ENGINEERING SERVICES CORPORATION

LOG OF TP-2

Ekwok Integrated Solid Waste Management Plan
Ekwok, Alaska

Date Started	: 7/7/05	Elevation	: Unknown
Date Completed	: 7/7/05	Northing Coord.	: N 059°22'22.3"
Hole Diameter	: N/A	Easting Coord.	: W 157°25'39.6"
Drilling Method	: Excavated by Shovel	Survey By	: Garmin GPS
Sampling Method	: Grab	Logged By	: M. Madden & K. Petersen

SAMPLE SIZE: ☒ < 1 GALLON; ■ > 3 GALLONS
WATER LEVEL: ▼

DEPTH IN FEET	USCS	GRAPHIC	DESCRIPTION	FROZEN	WATER LEVEL	SAMPLE NUMBER	SAMPLE SIZE	SIEVE ANALYSIS % Silt	% Sand	% Gravel	DEGRADATION	REMARKS
0	Pt		Vegetative Mat. Roots, Moss, Peat and organic silt, intermixed, wet to damp.									Hand dug test pit
2	OL		Dark brown organic silt, damp.									
3	ML		Interbedded tan, brown and orange silt with trace sand, moist.				☒	80	20	0		D10=0.004mm
5												Hand auger 4'5"-7'5"
6	ML		Fine tan/brown sandy silt, moist.				☒	79	21	0		D10=0.025mm
7	ML		Tan Silt, wet.									
8			Slight seepage in bottom of hole									

R&M Laboratory Test Results Lab # 171

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

AMRL Lab #793

Client & Sample Information

Field #:

Client: Bristol Environmental & Engineering Serv
Client Address: 2000 W. International Airport Road #C-1
Anchorage, Alaska 99502-1117
Project: Ekwok Solid Waste
Material/Use:
Test Location:
Sampled From:
Sampled By:
Date Sampled:
Source:
Depth:
Quantity Rep:
PO Number:

Laboratory Sample Data

Received By:
Date Received: 8/22/2005
Tech Assigned:
R&M Project No: 1061.10
Lab No: 171
Date Completed:

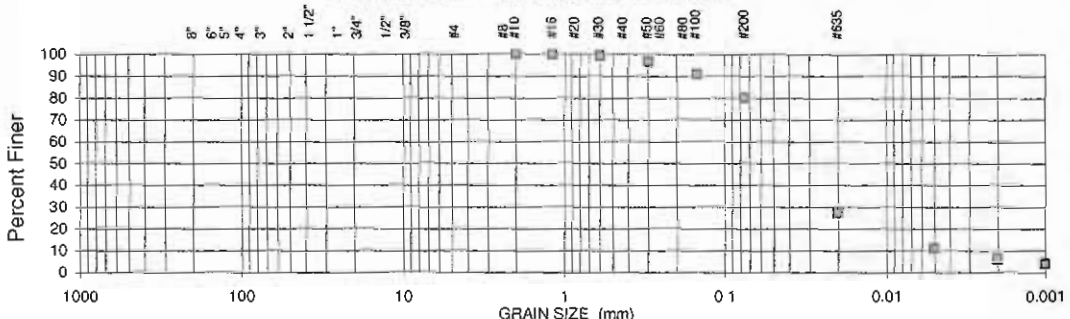
Aggregate & Soils Classification, Atterberg, SpG, etc.

Grain Size Distribution

Sieve	% Ret.	% Pass	Spec.
8"			
6"			
5"			
4"			
3"			
2 1/2"			
2"			
1 1/2"			
1 1/4"			
1"			
3/4"			
5/8"			
1/2"			
3/8"			
5/16"			
1/4"			
#4			
#5			
#6			
#8			
#10	0.0	100	
#12			
#16	0.2	100	
#20			
#30	0.7	99	
#40			
#50	2.6	97	
#60			
#70			
#80			
#100	5.9	91	
#140			
#200	10.7	80.0	
.02mm	52.6	27.4	
.005mm	16.4	10.9	
.002mm	4.8	6.1	
.001mm	2.1	4.0	
Fineness Modulus:			

R&M performs sieve analyses using one or more of the following test methods (whichever apply): **P200 Wash**: ASTM-C117 or D1140 or AASHTO-T11; **Standard Gradation Only**: ASTM-C136 or AASHTO-T27 or T88; **Gradation w/ Hydrometer**: ASTM-D422 or ATM T-1; **Sieve Analysis of Mineral filler for Asphalt**: ASTM-D546 or AASHTO-T37; **Sieve Analysis of Extracted Aggregate**: ASTM-D5444 or AASHTO-T30

GRAIN SIZE DISTRIBUTION CHART



ASTM-USCS Classification

Boulders	Cobbles	Gravel		Sand			Silt Clay		
		Coarse	Fine	Coarse	Medium	Fine	Silt Clay	Silt Size[1]	C.S.[2]

[1]ASTM D653 defines "Silt Size" as soil finer than .02mm and coarser than .002mm; [2]ASTM D653 defines "Clay Size" as soil finer than .002mm

USCS % Boulders & Cobbles	USCS % Gravel	USCS % Sand	USCS % Silt Clay	USCS Classification	AASHTO % Boulders & Cobbles	AASHTO % Gravel	AASHTO % Sand	AASHTO % Silt Clay	AASHTO Classification
		19.9	80.1	#VALUE!		0.0	19.9	80.1	

Note: The USCS (ASTM) and AASHTO classifications were determined using the following test methods, respectively: ASTM-D2487 and AASHTO-M145
For both USCS and AASHTO: % boulders & cobbles is based on the original field sample; % gravel, sand and silt clay are based on only minus 3 inch material.

Test Methods used are as follows:
D_{100}, D_{60}, D_{30}, D_{10}, C_C, C_U- ASTM D2487
Atterberg Limits- ASTM D421, D2217, D4318 or AASHTO T87, T89, T90, T146;
Specific Gravity- ASTM C127, C128, D854 or AASHTO T84, T85, or T100;
Fineness Modulus- ASTM C136 or AASHTO T27

Chart for Coefficients of Curvature and Uniformity					
D_{100}	D_{60}	D_{30}	D_{10}	C_C	C_U
			0.004		

Note: D100 = particle diameter (mm) corresponding to 100% finer on the particle-size distribution curve. Similarly, D60, D30 and D10 = particle diameter (mm) corresponding to 60, 30 or 10% finer on the particle-size distribution curve, respectively. These values may have been obtained through interpolation or extrapolation. These values are based on only the minus 3-inch material.

Atterberg Limits			
Prep:	Wet	Dry	Spec.
LL			
PL			
PI			

Specific Gravity					
Coarse			Fine		
	Actual	Spec.		Actual	Spec.
Bulk:			Bulk:		
Bulk SSD:			Bulk SSD:		
Apparent:			Apparent:		
Absorption:			Absorption:		

More Test Results on the Following Page →

R&M Consultants, Inc. 9101 Vanguard Dr., Anchorage, AK 99507, (907) 522-1707, Fax (907) 533-3403

Density, Moisture, Unit Weight, etc.

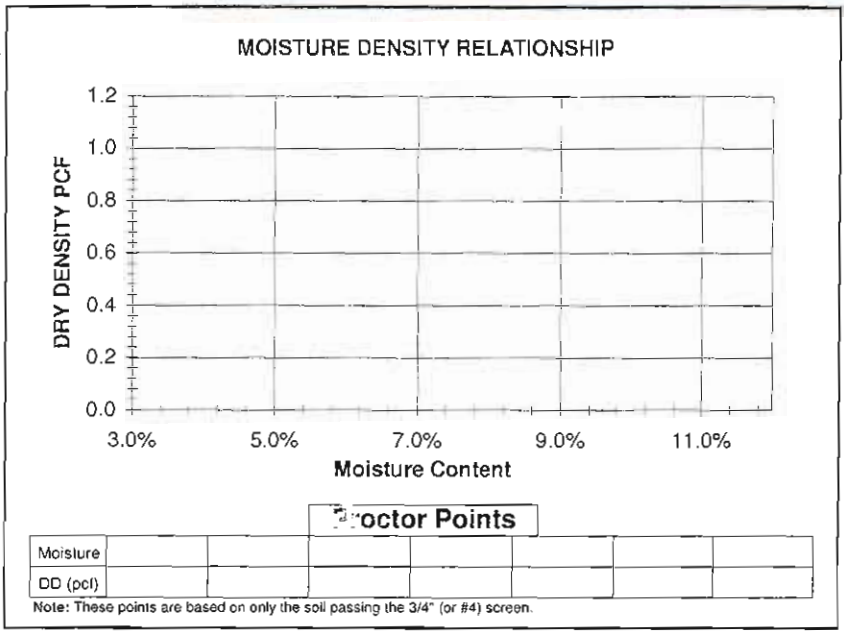
R&M uses the following methods for these tests: **Proctor**: ASTM-D698 or D1557 or D4718 or AASHTO-T99 or T180 or T224 or T272; **Moisture**: ASTM-C566 or D2216 or AASHTO-T217 or T255 or T265; **Unit Weight of Aggregate**: ASTM-C29 or AASHTO-T19; **Brass Liner Dry Density**: ASTM-D2937

Density (BLDD/Proctor)
Natural Density(BLDD)
Max Dry Density
Corr. Max Density

Moisture
Natural Moisture
Optimum Moisture
Corr. Opt. Moisture

Density - Vibratory Table (D4253)	
Maximum Index Density:	

Unit Weight			
Weight Loose:		Weight Rodded:	



Proctor Points

Moisture							
DD (pcf)							

Note: These points are based on only the soil passing the 3/4" (or #4) screen.

Aggregate Quality (Degradation, LA Abrasion, Sodium Sulfate)

R&M performs aggregate quality tests using the following methods (whichever apply): **Degradation**: ATM-T13; **LA Abrasion**: ASTM-C131 or C535 or AASHTO-T96; **Sodium Sulfate**: ASTM-C88 or AASHTO-T104

	Reading	D-Value	Spec.
ATM Deg.			

	Grading	% Loss	Spec.
LA Abrasion			

	Fine	Spec.	Coarse	Spec.
Sodium Sulfate				

Fracture, SE, Organic, pH, Friable Particles, etc.

Test Methods Used are as follows: **Sand Equivalent**: ASTM-D2419 or AASHTO T176; **Organic Content**: ASTM-D2974 or AASHTO-T267; **pH Level**: ASTM-D4972 or AASHTO T-289 or ATM-T29; **Friable Particles**: ASTM-C142 or AASHTO-T112; **Uncompacted Voids**: ASTM-C1252 or AASHTO-T304; **Permeability**: ASTM-D2434 or AASHTO-T215

	Actual	Spec.
Sand Equivalent Value:		
Organic Content:		
pH in H_2O:		
pH in $CaCl_2$:		
Friable Particles:		
Uncompacted Voids:		
Permeability:		

Fracture Count				
Size	1 Face	Spec.	2 Face	Spec.
+ 1"				
1" - 3/4"				
3/4" - 3/8"				
3/8" - #4				
#4 - #10				
Combined				

ASTM DESCRIPTION: #VALUE!

REMARKS:

Checked By:

Signed By: Thomas R Oliver - Laboratory Manager

More Test Results on the Previous Page

APPENDIX D

Floodplain Map (DCCED)

Map of Ekwok, Alaska showing the approximate area of the flood plain.

APPENDIX E

Photographs

EKWOK LANDFILL PHOTOS

Photo 1: Existing dumpsite.

Photo 2: Salvage area at existing dumpsite.

EKWOK LANDFILL PHOTOS

Photo 3: Existing burn box.

Photo 4: Aerial view of existing dumpsite.

EKWOK LANDFILL PHOTOS

Photo 5: City dump truck and bulldozer.

Photo 6: City loader.

EKWOK LANDFILL PHOTOS

Photo 7: Kubota KH-28L.

Photo 8: Landfill access road.

EKWOK LANDFILL PHOTOS

Photo 9: Community Preferred Landfill Site 2A.

Photo 10: Alternative Landfill Site 1.

EKWOK LANDFILL PHOTOS

Photo 11: Test Pit 1 [Site 2A]

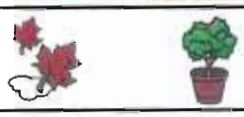
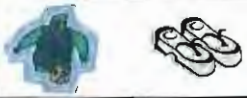
Photo 12: Test Pit 2 [Site 1]

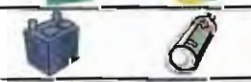
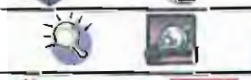
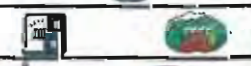
APPENDIX F

Burn Box Options

EKWOK

Burn Box Information

Wastes that Can be Burned	
Paper	
Untreated Wood	
Cardboard	
Food Waste	
Organic Wastes	
Oil-free Rags	
Clothing	
Small, Disease-Free Carcasses	

Wastes that Cannot be Burned	
Construction Debris With Plastic/Synthetic Materials	
Pressurized Cylinders	
Hazardous Wastes	
Large Quantities of Plastics & Rubber	
Fuels	
Liquid Waste	
Chemicals, Paints, & Solvents	
Batteries & Electrical Devices	
Light Bulbs	
Explosives & Ammunition	
Medical Waste	
Tires	
Treated Wood	
Foam Insulation	
Glass	
Large Animal Carcasses*	

*These may be allowed, with the City's permission. Otherwise, pits should be dug, and the carcass immediately disposed of, and limed. Ask your operator for assistance. If an animal is diseased, a state veterinarian must be contacted for disposal requirements.

Alaska Department of Environmental Conservation
Division of Air Quality, Air Permits Program

Fairbanks Office:	**Anchorage Office:**	**Juneau Office:**
610 University Avenue	555 Cordova St .	410 Willoughby Ave., Suite 303
Fairbanks, AK 99709	Anchorage, AK 99501-2617	Juneau, AK 99801
Phone: (907) 451-5173	Phone: (907) 269-7577	Phone: (907) 465-5100
Fax: (907) 451-2187	Fax: (907) 269-7508	Fax: (907) 465-5129

2) Requirements for Open Burning

Anyone who conducts an open burn must not burn prohibited wastes (see Table 1) and must provide for the most efficient combustion possible throughout the burning period. The air quality control regulations specify the following requirements for open burning:

- The material must be kept dry or covered to the greatest extent possible prior to burning.
- Before igniting wastes, non-combustible wastes must be separated out to the greatest extent practicable.
- Natural or artificially induced draft must be present.
- Combustibles must be separated from the grass or peat layer to the greatest extent practicable.
- Combustibles must not be allowed to smolder (burn and smoke without flames).
- Burning must prevent nuisance complaints.
- The burn must not create black smoke.

If waste is to be burned in a way that creates black smoke, then approval from ADEC is required. Common wastes that may create black smoke include but are not limited to asphalt, rubber products, plastics, tars, oils, oily waste, and contaminated oil cleanup materials. Anyone who conducts open burning must use reasonable procedures to minimize adverse environmental effects and limit the amount of smoke generated.

3) Requirements for Incineration

All incinerators of municipal waste are required to meet a standard for opacity (smoke density). As stated in the regulations, the opacity of gasses coming out of the stack cannot be greater than 20% averaged over any 6 minutes during the burning period. This means that sunlight cannot be blocked more than 20% by the smoke. Heavy, dense grayish or black smoke is not desirable **(see Figure 17)**, whereas very little to no visible smoke is acceptable. The burning period includes the start-up, operation, and cool-down phases of the burn. The only other requirement is that incineration should not cause any nuisance complaints.

0% -5% Opacity *20% - 30% Opacity* *90% - 100% Opacity*

Figure 17: Examples of smoke opacity ratings.

4) Wastes That Should Not Be Burned

A general requirement of the Air Quality Control regulations is that wastes should be burned in a manner that does not cause a public health, safety or welfare threat, an environmental problem, or a nuisance. As such, the regulations prohibit or restrict the burning of specific items. A list of these items is provided in **Table 1**. Please note that open burning and incineration are separate columns in the table and that different restrictions may apply depending on which burning method is used. In general, more restrictions apply to open burning. The three categories of restrictions are identified in the table using the following notation:

P (Prohibited): These wastes are prohibited from being burned.

P* (Conditionally Prohibited): These wastes may be burned in an incinerator that has sufficient air pollution controls and meets specific emission limits.

SN (Should Not Be Burned): There is no regulation that specifically prohibits the burning of these wastes. However, the wastes should not be burned if there is a more acceptable way to deal with them (i.e. storage, disposal or transshipment). Also, specific emission limits may apply if the particular waste is burned in a way that exceeds the standards.

Table 1. Wastes that cannot be open burned or incinerated, or that require special treatment

Waste Type	P = Prohibited SN = Should Not Be Burned Open Burn	Incinerate
Spill absorbents and contaminated soils regulated as RCRA hazardous wastes	P	P*
Waste regulated by the Federal Resource Conservation and Recovery Act (RCRA) or the Toxic Substances Control Act (TSCA) such as PCB's. (Call ADEC for details)	P	P*
Asbestos	P	P
Radioactive wastes (i.e. smoke detectors and tritium lights)	P	P
Organic compounds that contain chlorine, including Highly chlorinated plastics and petroleum based materials containing chlorine as an essential component (i.e. PVC pipe) with the exception of salt (any metal chloride used for thawing or ion exchange) residue in empty containers. Plastic garbage bags, milk containers and other household plastic articles are acceptable, as they generally do not contain chlorine as an essential component	P	SN
Chlorinated solvents	P	P*
Inorganic materials containing chlorine as an essential component (for example rock salt)	SN	SN
Pesticides, cyanic compounds or polyurethane products	P	SN
Items containing beryllium, chromium, cobalt, arsenic, selenium, cadmium, mercury, or lead, including liquid paints, computer equipment, and electrical lamps or components such as fluorescent bulbs and high-pressure sodium, mercury vapor, and metal halide lamps.	P	SN
Electrical batteries and electrical components	SN	SN
Explosives and other highly volatile items, such as propane cylinders (the burning of these items is a safety risk)	SN	SN
Medical waste (more than 10% of waste stream)	P	P*
Medical waste (less than 10% of waste stream)	P	
Other wastes which is injurious to human health or welfare, animal or plant life, or property, or which would unreasonably interfere with the enjoyment of life or property.	P	P
Putrescible garbage, animal carcasses, or petroleum-based materials (plastics) Treated wood containing compounds such as creosote or tar Tires	May be open burned in a way that does not cause odor, black smoke or an adverse effect on nearby persons or residences	May be incinerated in a way that does not exceed 20% opacity averaged over any 6-minute period during the burn or in a way that does not have an adverse effect on nearby persons or residences.
Non-combustible waste and inert material, such as large metal items, sheet rock, electrical components	Should be separated out in order to increase burning efficiency	

* These wastes may be burned if the incinerator has sufficient air pollution controls and meets specific emission limits.

B. Solid Waste Management Regulations (18 AAC 60)

The Solid Waste Management regulations (18 AAC 60) set standards for solid waste handling, treatment and disposal. These standards are intended to minimize water pollution, safety hazards, and other undesirable impacts typically associated with garbage. The primary goal of the Solid Waste Management regulations is to promote cost-effective, environmentally-sound solid waste management and to minimize health and safety threats, pollution, and nuisances from landfills.

1) Ash Disposal Requirements

There are three classes of municipal landfills designated in the regulations. Most landfills serving rural Alaskan communities are regulated as class III municipal landfills, which are landfills that receive an average of less than 5 tons of waste per day. The Solid Waste Program recognizes that burning garbage at small landfills may be an effective way of controlling animal attraction to the waste, reducing the volume of waste in the landfill, and minimizing the potential for creating harmful leachate. Therefore, the Solid Waste regulations include several provisions that apply specifically to the burning of waste at Class III landfills. These include the following:

- Class III landfills are required to minimize animal access to food wastes in the landfill [18 AAC 60.230(b)].

- Ash from incinerated municipal solid waste is required to be free of food scraps that might attract animals [18 AAC 60.300(c)(3)(A)].

- Open burning of municipal solid waste is allowed at Class III landfills [18 AAC 60.355].

These three items are all based on the concept that burning garbage is the most direct way of making it non-attractive to wildlife and domestic animals. However, complying with the requirement that the ash be free of food scraps probably requires the use of a burning method other than open burning. Also, because food scraps have a high moisture content, low temperature methods (open burning, burn cages, and burn boxes) require more direct management of the burning process to ensure that food scraps are sufficiently burned and do not attract animals. The higher temperature methods will more readily achieve this goal and are also better able to comply with the Air Quality requirement of maintaining efficient combustion throughout the burn cycle. Whatever method is used, the only requirement for ash disposal is that the ash must be completely cooled before it is placed in the disposal site.

2) Proposed Changes to the Regulations

The current solid waste regulations require a permit for all landfills in the state. The requirements for getting a permit include preparing a solid waste management plan, submitting a permit application, and complying with regulatory requirements for locating, operating, and closing the landfill. The design standards for Class III landfills are less strict than for larger landfills so it is important to maintain some control over what is put into the landfill.

At the time of writing, changes to the Solid Waste regulations are being proposed that will significantly affect the management of Class III landfills. Those changes are likely to include replacing the permit requirement with a "prior authorization" provision and incorporating Best Management Practices into the regulations. These changes are anticipated to take effect no earlier than 2006. Under the revised regulations, Class III landfills will be authorized and approved without a permit as long as the landfill is operated in accordance with the Best Management Practices that apply to the particular type of landfill. The Solid Waste Program is also developing a Landfill Location Criteria Calculator that will allow each community to evaluate the relative level of risk (high, medium, or low) its landfill poses to the community and the surrounding environment. Communities that have a high- or medium-risk landfill will need to incorporate additional operational practices and/or design features into the landfill to control the increased risks at their facility. The calculator will include ideas and suggestions that will assist communities in deciding what additional steps will be taken.

3) Wastes That Can and Cannot Be Disposed

Wastes should be disposed in a manner that does not cause a public health, safety or welfare threat, an environmental problem, or a nuisance. Please refer to **Tables 2 and 3** for wastes that can and cannot be buried in a rural municipal Class III landfill. In certain cases wastes should be separated out prior to disposal, stored properly and dealt with in another way (either by recycling or by shipping to a disposal facility that is permitted to accept the items).

Table 2. Wastes that may not be disposed in a Class III municipal landfill

Waste Type	Special Precautions
Liquids	Waste that is less than 10% solids by weight is considered liquid waste and is prohibited. All containers greater than 1 gallon in size must be open and empty of fluids.
Oils or petroleum wastes This includes waste oil, oil spill clean-up material (sorbents) and contaminated soil.	Soils with sufficiently low concentrations of petroleum contaminants may be disposed if the contaminants cannot be leached or washed into surface water, will not cause threat to public health or environment, long term protection controls are in place, and a practical potential does not exist for migration to an aquifer of resource value
Hazardous wastes This include certain chemical waste, pesticides, radioactive materials, solvents, acids, corrosives, lead-acid batteries, ignitable and explosive waste, polychlorinated biphenyl (PCB) fluids, and any other hazardous waste defined and regulated under 40 CFR 261.	Hazardous wastes generated from households can legally be disposed in a permitted landfill. However, it is recommended that these wastes be collected and re-used or shipped for disposal as hazardous waste.
Untreated medical waste and diseased animal carcasses	Medical waste must be decontaminated or sterilized and then packaged to prevent a health hazard, or incinerated in a medical waste incinerator prior to disposal. Animal carcasses infected with a communicable disease may not be disposed without authorization by a state veterinarian.
Friable Asbestos	Friable asbestos may be disposed only at a facility that is permitted for disposal of friable asbestos waste.

Table 3. Wastes that <u>may</u> be disposed into a rural Class III municipal landfill

Waste Type	Special Precautions
Household garbage (Includes food waste, paper, cardboard, plastic, textiles, rubber, leather, vegetative wastes, wood, glass, tin cans, metals, dirt, ashes, brick, etc.)	
Tires	
Septage and honeybucket waste (Liquid sewage)	Some rural Alaskan communities must dispose liquid septage and honeybucket waste at a solid waste disposal facility. <u>All</u> sewage waste should be handled in a way that does not allow animals or humans to come into contact with the waste. To reduce animal attraction and pathogens, lime is added to the waste to raise the pH to 12 for at least 1 hour. Other treatment methods are available. Sewage waste should be covered with at least 6 inches of soil on the day it is disposed.
Construction and demolition waste	A building survey should be performed for asbestos and hazardous waste prior to demolition. Friable asbestos, some forms of non-friable asbestos and hazardous wastes should be abated prior to demolition.
Vehicles	Vehicles should be empty of all fluids, freon, and batteries prior to burial.
White goods (includes household appliances, washers, refrigerators and freezers)	Freon should be removed from refrigeration equipment prior to burial.
Non-friable asbestos	Non-friable asbestos wastes may be disposed at any permitted landfill provided the waste is covered within 24 hours of disposal and there have been no fires at the landfill for more than one year.
Animal carcasses	Animal carcasses should be incinerated prior to disposal but may be buried on land with the landowner's permission.

Disposal facilities that accept the wastes in **Table 3** should have a valid State of Alaska solid waste permit and an approved solid waste management plan. Please contact the nearest ADEC Solid Waste Program office for information regarding the proper disposal of wastes in your community. Contact information for the Solid Waste Program offices are listed below.

Alaska Department of Environmental Conservation
Division of Environmental Health, Solid Waste Program

<u>Fairbanks Office:</u>

610 University Avenue
Fairbanks, AK 99709
Phone: (907) 451-2135
Fax: (907) 451-2187

<u>Anchorage Office:</u>

555 Cordova St.
Anchorage, AK 99501-2617
Phone: (907) 269-7590
Fax: (907) 269-765

<u>Juneau Office:</u>

410 Willoughby Ave., Suite 303
Juneau, AK 99801
Phone: (907) 465-5153
Fax: (907) 465-5164

APPENDIX G

Short-Lived Assets Schedule

SHORT LIVED ASSETS LISTING & REPLACEMENT COST

Ekwok, Alaska

FIFTEEN YEAR REPLACEMENT ASSETS

	Number	Cost
Chain Link Fence and Gate	1	$ 60,000
Burn Box	1	$ 30,000
Total fifteen year replacement budget		$ 90,000
Annual contribution (Total/15)		$ 6,000
TOTAL ANNUAL CONTRIBUTION		**$ 6,000**