CEPOA-EN-CW-ER (1105-2-10b)

MEMORANDUM FOR RECORD

SUBJECT: Newtok Relocation Site Survey of Nelson Island

1. Introduction. The village of Newtok, Alaska, is threatened by erosion on the Ninglick River. A likely relocation site has been identified on higher ground on Nelson Island, approximately 10 miles away (figure 1). Chris Hoffman, biologist, and Estrella Campellone, biologist, U.S. Army Corps of Engineers, Alaska District, conducted the surveys from 1 through 8 June 2005. Estrella Campellone contributed the vegetation section of this report and performed all related fieldwork. The surveys were conducted to assess potential impacts to each site as well as impacts of access routes on adjacent habitat. Observations from this trip may be useful in guiding future development and will form the basis for determining the need for future detailed studies.

2. Methodology. No development has occurred at the relocation site on Nelson Island, so a base camp was established along the coast next to a fresh water spring near the center of the proposed town site. Several hiking trips were made from the campsite to document local birds, fish, and plants as well as some potential runway alignments. Approximate routes covered during hikes are shown in figure 2.

Waterfowl occupying the coastal wetlands between the campsite and the Takikchak River to the west were surveyed from the high ground using a Leica APO Televid 20-60X spotting scope. The area was broken down into two areas based on recognizable terrain features (ponds and drainages) and surveyed from separate vantage points (figure 1). The vegetation was low, and the survey should be considered completed for waterfowl, but it is likely that some shorebirds were missed due to the large distance surveyed. A complete list of species observed is included in tables 1 and 2. For upland birds and other noteworthy species, an annotated species list is included in table 3.

Juvenile fish in the Takikchak River were sampled at three locations (MT 1, 2, 3) using minnow traps baited with salmon roe placed in 35 mm film canisters with holes punctured in them. Traps were soaked for approximately 22 hours. Soak times were long because of the distance from the campsite to the river.

A survey team from U.S. Fish and Wildlife Service (USFWS) arrived on site by floatplane during our survey to search for spectacled eider nests in the coastal wetlands near the village site. USFWS will provide their own report with details on the area and the species present.

Selected photos with descriptions are included in attachments 1 and 2 of this document. Additional annotated photographs are available in Q: Projects by location/Newtok/Relocation of Village / Photos-Maps-Drawings/June 05/Hoffman field visit photos and Q: Projects by location/Newtok/Relocation of Village/Photos-Maps-Drawings/June 05/Campellone field visit photos.

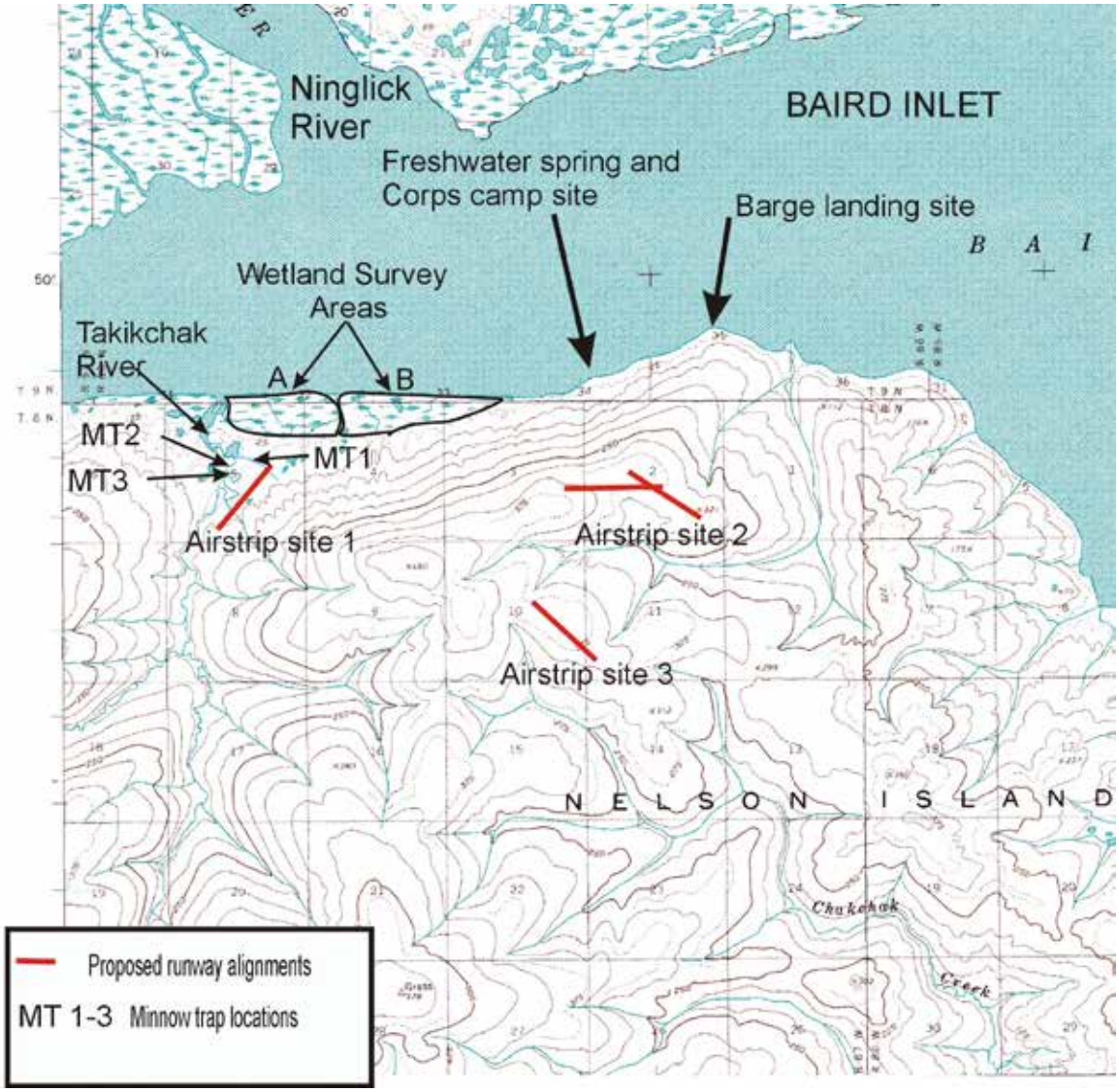

Figure 1. Nelson Island survey locations.

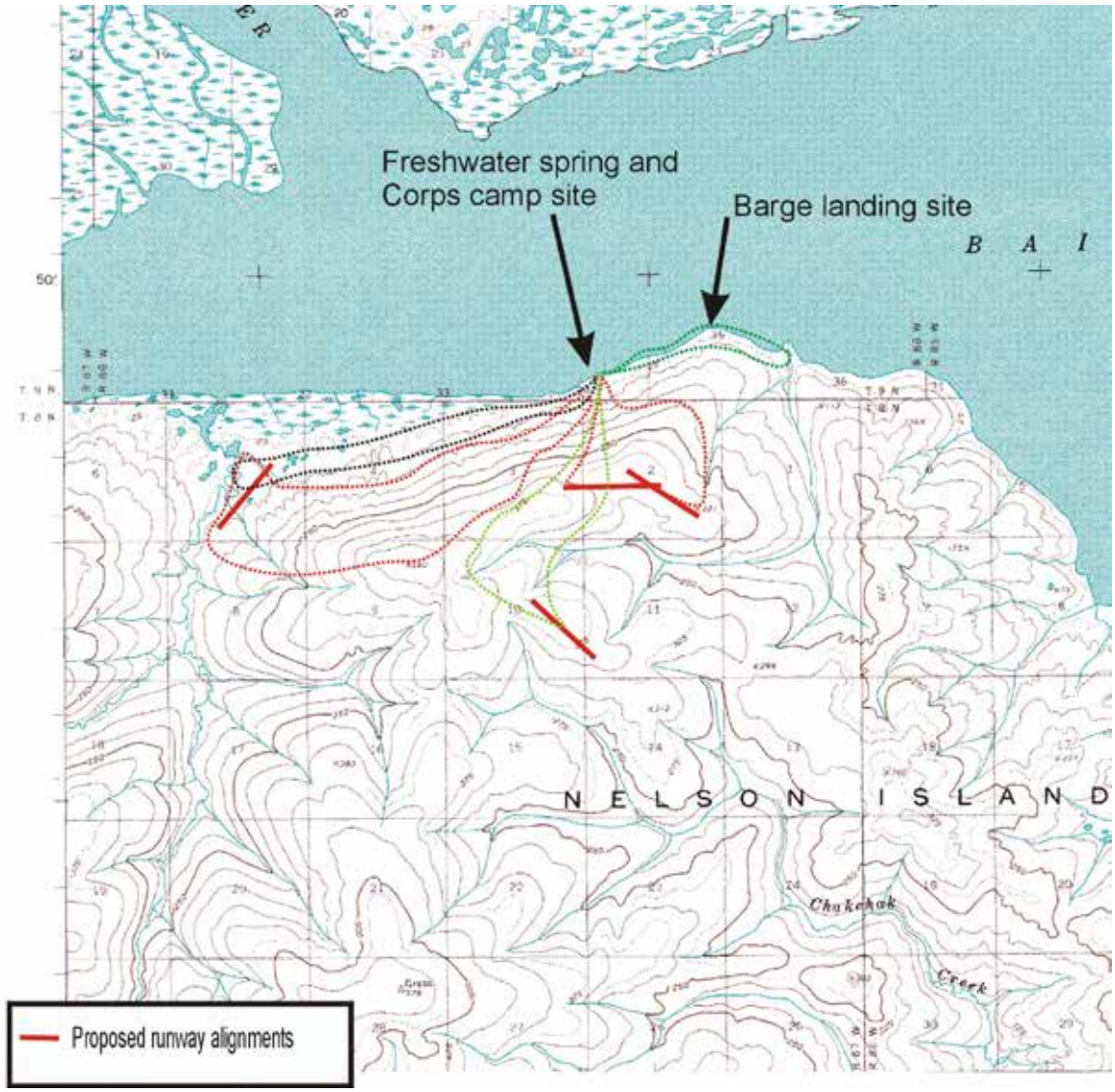

Figure 2. Routes covered during hikes near potential relocation site.

3. Biological Observations. Data gathered on birds and fish during this trip are representative of a single sampling effort; repeated efforts during other times of the year would be necessary to properly characterize habitat use by birds and fish. However, data from this trip are useful to broadly characterize species present, relative abundance, and habitat associations during the early portion of the egg-laying period for birds. A discussion of the various issues related to birds, fish, runway alignments, and development issues follows:

Wetland Bird Observations.

Birds observed in wetland survey areas A and B (figure 1) are presented in tables 1 and 2 along with relevant survey data. A photograph of the area is in figure 3.

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Survey area A. 2 June 05 Begin 1623 End 1703 Temp 47°F, Wind 10 G15 mph NE, scattered clouds	
Species	**Number Observed**
Northern pintail	11
Green-winged teal	8
Brant	3
Greater scaup	8
Canada goose	12
Cackling Canada goose	9
Emperor goose	19
Mallard	1
Tundra swan	2
Northern shoveler	8
Sandhill crane	1
White-fronted goose	2
Western Sandpiper	12
Dunlin	38
Red necked phalarope	7
Arctic tern	3
Black turnstone	3
Lapland longspur	2
Yellow wagtail	1
Mew gull	7

Table 1. Waterfowl in wetland area A.

Survey area B. 2 June 05 Begin 1330 End 1420 Temp 47°F, Wind 10 G15 mph NE, scattered clouds	
Species	**Number Observed**
Northern pintail	8
Green-winged teal	10
Greater scaup	5
Canada goose	3
Emperor goose	27
Mallard	2
American Widgeon	2
Northern shoveler	11
Long-tailed duck	3
White-fronted goose	9
Western Sandpiper	26
Dunlin	4
Red necked phalarope	26

Bar-tailed godwit	1
Black turnstone	2
Lapland longspur	3
Savannah sparrow	2
Yellow wagtail	4
Mew gull	21

Table 2. Waterfowl in wetland area B.

Figure 3. Wetlands in area A and B.

In wetland areas A and B most of the birds appeared to be foraging or resting. These wetlands are very wet and probably subject to periodic inundation at the highest tides. Therefore, they are probably of low value as nesting habitat. However, birds probably use this area during pre- and post-nesting periods; non-breeders likely use the area during the breeding season. Additional surveys would be necessary to determine use of these wetlands by molting waterfowl. A fox was seen in the wetlands during the survey where it was likely foraging for eggs.

General Bird Observations.

General observations of birds observed during the trip to the relocation site on Nelson Island are included in table 3. Only noteworthy species are included in the table below; it is not complete list of all species observed.

Species	Comment
Black Turnstone	Observed along the shore near our campsite on several occasions.
Bar-tailed godwit	A male was observed several times a day foraging on the shore near the camp. A female was seen less frequently. A female on a nest with four eggs was found on the south side of the ridge, approximately 1.5 miles from camp.
Western sandpiper	The most common shorebird observed near the relocation site.
Red necked phalarope	Common. Often seen foraging on ponds and in pools on streams.
Short-eared owl	Uncommon. One observed on higher ground about a mile south of camp. Remained in area, but no nest observed.
Parasitic Jaeger	Common. Several observed daily near camp and during hikes. Most abundant jaeger species.
Long-tailed Jaeger	Common. Several observed daily near camp and during hikes. A close second in abundance to parasitic jaegers.
Yellow Wagtail	Common. several seen daily, often perched on willows.
Lapland longspur	Abundant. Most common passerine, some nesting near camp. Often found concentrated on the few remaining snowdrifts on the hillside or along the steep banks near the coast where they forage fore seeds and insects.
Redpoll	Uncommon. A few seen during the 8 days on site.
Willow Ptarmigan	Abundant. Males observed constantly, a few females were flushed from nests in dense willows. Males very vocal.
Northern pintail	Common. Observed on the tundra and on ponds. Also seen in small numbers on the pool created by the fresh water spring next to camp.
Green-winged teal	Common. Observed on ponds. Also seen in limited numbers on the pool created by the fresh water spring next to camp.
Emperor goose	Common. Observed on the coastal wetlands and also along the shore at low tides. At low tides they were commonly observed drinking freshwater runoff from melting snow of from the fresh water spring near camp. Local birds may have been non-breeders.
Long-tailed duck	Uncommon. A few seen or heard offshore or on ponds in coastal wetlands.
Black Scoter	Uncommon. A few seen offshore and one pair seen on a pond perched on the hillside near the unnamed river.
Harlequin duck	Uncommon. One male observed on a gravel bar in the unnamed river. Harlequins are considered uncommon in the Y-K Delta since the habitat is unsuitable, but areas of Nelson Island appear to provide some useable habitat due to the mountain streams. Detecting

Table 3. General bird descriptions.

Fish Sampling.

Only one set was made with minnow traps due to the distance of the river from the campsite and other objectives of the trip. Information on the minnow traps is included in table 4.

Minnow Trap 1 (MT1) Set 1800 02 June, Pulled 1440 3 June. Location: 60° 48’ 52” N 164° 35’ 05” W Catch: 1 Dolly Varden, 55mm fork length
Minnow Trap 2 (MT2) Set 1850 02 June, Pulled 1510 3 June. Location: 60° 48’ 49” N 164° 35’ 14” W Catch: 7 Dolly Varden, 55-65 mm fork length size range
Minnow Trap 3 (MT3) Set 1920 02 June, Pulled 1600 3 June. Location: 60° 48’ 47” N 164° 35’ 20” W Catch: Ø

Table 4. Minnow trap data.

Given the near 24-hour soak times for the minnow traps, the catch per unit effort (CPUE) is very low. MT1 was set above a beaver dam, which could explain its low CPUE. Access to this area is probably limited to time when the beaver dam is removed or during floods. MT2 was set along a cut bank in water approximately 5 feet deep. MT3 was set in a relic channel near the main stem. This channel was only connected to the river at the downstream end, and although it had no flow, it was connected and therefore had anadramous access. Additional survey effort would be required to determine the limits of anadramous access and to determine fish use during other periods of the year.

Vegetation Descriptions.

Observations on vegetation types and wildlife uses of the vegetation were made in the proposed relocation site and at two of the proposed airport sites (site one by the Takikchak River and site two at the top of the ridge). Similar observations were also made at a potential quarry site located on top of the hill and in the vicinity of the barge site. Figure 4 shows the general vicinity where each of the vegetation types described below are located. The size and location of each vegetation unit shown in this map is only tentative and should be used as a general reference, as careful delineations were not conducted.

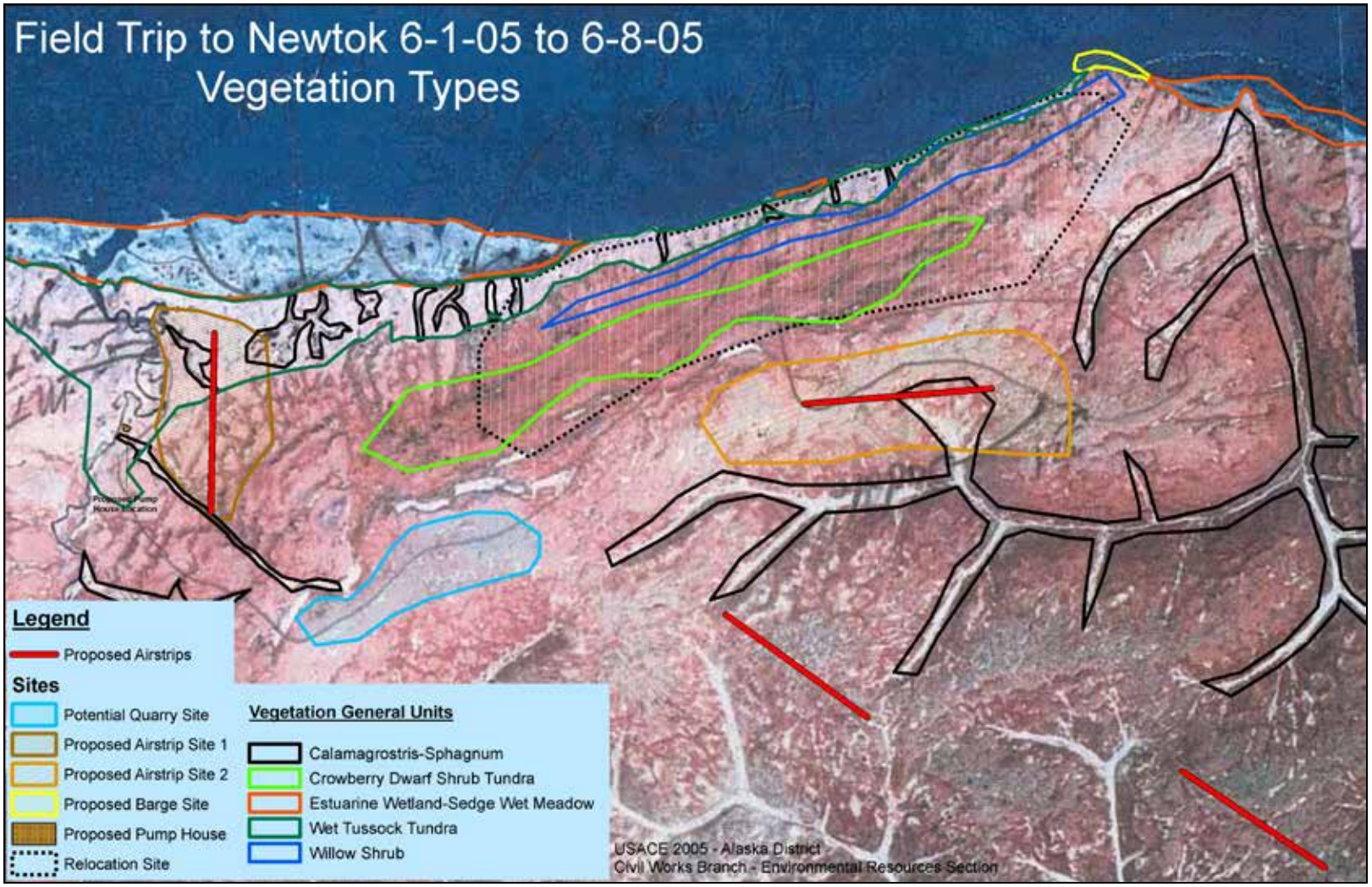

Figure 4. Potential development areas and vegetation descriptions.

Wet Tussock Tundra (Attachment (Attch) 2-photos 1, 2 & 3): In the lower areas between approximately 25 and 42 feet in elevation, the vegetation is typically a wet tussock tundra. Cottongrass (*Eriophorum vaginatum*) forms hummocks and represents approximately 30% of the absolute vegetation cover. In the depressed areas around the hummocks, narrow-leaf Labrador tea (*Ledum decumbens*) (15% cover), dwarf birch (*Betula nana*) (15%), alpine bearberry (*Arctostaphylos alpine*) 5%, crowberry (*Empetrum nigrum*) 10%, mountain cranberry (*Vaccinium vitis-ideae*) (10%) are the dominant species. A sedge was also found in the area, but it could not be identified because it was too early in the season. Mosses and lichens found in the area include a brown sphagnum, *Cladonia arbuscula, Cladonia rangiferina, Cladonia spp., Cetraria sp., Cladonia amaurocraea* and others. These cryptogams represent 100% of the ground cover. Other plant species present in this vegetation type included bog rosemary (*Andromeda polifolia*), cloudberry (*Rubus chamaemorus*), and arctic sweet coltsfoot (*Petasites frigidus*). Lapland longspurs were observed nesting and feeding on this vegetation type. Also, nests of black-bellied plovers were found lying in the open and vole trails were abundant in this vegetation community. Soil pits could not be made deeper than 6 inches (15 cm) in this vegetation type because the soil was frozen. Soil pits made to a depth of 6 inches (15 cm) show that the cushion vegetation gradually shifts to a dark organic horizon with little decomposition or partially decomposed sphagnum (peat layer).

Grassy Tussock Tundra: Similar tussock tundra vegetation is found at the top of the hill, in the vicinity of airstrip site two. In this area, however, grasses and sedges seem to be a larger cover component when compared with dwarf shrubs. Cottongrass (*Eriophorum russeolum*?) represent approximately 50% of the ground cover, thin-leaf sedge (unknown species) about 10%, and wide-leaf sedge (unknown species) about 3%, whereas crowberry represents about 25% of the vegetation cover. Mosses and lichens are similar to the ones found at the bottom of the hill, but in some areas the terrain looks drier. During the time this field trip took place, frozen soils were found at about 7.5 inches. The 7.5-inch-thawed layer was mainly a mat of partly decomposed organic matter layer below a cushion of sphagnum that sustains the vegetation root system. In this somewhat higher micro relief, soils were saturated (water released when squeezed) but without standing water (Attch - 2 photo 13 & 14). Isolated depressions are also found in this vegetation type (Attch-2 photo 14). Although in depressions the vegetation composition is similar to that of adjacent relatively higher tussock tundra, the thawed layer reaches 10 inches deep with standing water near the surface and a thicker sphagnum organic matter (Attch-2 photo 15). Also, gleys of about 50% (2/5Y 5/1) were found just above the frozen layer (10 inches deep).

Calamagrostris-Sedge-Sphagnum wetlands along bottomhills drainages (Attch-2-photos 3, 4, 4a, 4b, 4c): Drainages have cut the tussock tundra at the bottom of the hill (vegetation type described above), creating a lower topography.

Because their lower relief, these drainages hold snow later into the spring season. These drainages function as snow impoundment areas and flood outlets that channel most of the snow meltdown from slopes above into Baird Inlet. Small ponds can also be found within these drainages. Dominant species are blue joint (*Calamagrostris Canadensis)* (60% cover) and sedges (probably *Carex aquatilis*). Sedges could not be identified because it was too early in the spring (just beginning to sprout). Sphagnum (S. squarrosum) covers about 75% of the ground cover and bog blueberry (*Vaccinium oxycoccos*) commonly grows on top of the sphagnum cover. Soils are saturated at and near the surface; standing water is sometimes present. Toward the low slope banks and where soils seem drier, small patches of Alaska spiraea (*Spiraea Beauverdiana*) provide cover to small birds. Wintergreen (Pyrola sp.), Alaska violet (*Viola langsdorffii),* marsh cinquefoil (*Potentilla palustris*), nagoonberry (*Rubus arcticus*), and *Anemone Richardsonii* are also found in depressions without standing water.

Calamagrostris-Sedge-Sphagnum communities are also found along the drainages in the upper reaches of the relocation site vicinity (Attch 2 –photos 5 & 6). The drainage system east of the proposed barge site extends south and turns to the west along the south aspect of the hilltop. This drainage is characterized by the absence of a defined stream, at least in the upper and mid watershed reaches. Calamagrostris and sedges represent more than 75% of the vegetation cover and sphagnum between 60-80% of the ground cover. This community type is also found in isolated pockets at the top of the hill where three of the proposed airstrips are located (Attch 2-photo 7). This vegetation likely functions to trap sediment and regulate flood flows.

Willow Communities: Willows are found in patches in depressions where snow persists until later in the spring and next to calamagrostis-sedge-sphagnum communities. Soils in these willow patches are seasonally flooded by snowmelt runoff. In the upper reaches, they are found along drainages and in depressions or ditches where snow cover protects them from winter winds and moisture provides a suitable habitat in the summer. From 50 to 100 feet in elevation, willows are mainly established in moist belts across the landscape, reaching a height of 4 to 6 feet (tall willow shrub community-Viereck et al. 1992)[1] (Attach 2-Photo 4, 8, 9). As elevation and slope increases, willow patches become smaller in size and height, forming stunted belts along drainages (low willow shrub community-Viereck et al. 1992)[1] and isolated wet depressions on top of the hills. Photo 9a shows stunted willow patches established in depressions and drainages crisscrossing crowberry dwarf shrub tundra vegetation. The most conspicuous willow species was diamond-leaf willow (*Salix pulchra*) representing approximately 95% of the tall and low willow shrub canopy. Other species, probably felt-leaf willow (*Salix alaxensis*), comprise small percentages of the canopy cover (but identification was not completed). Undercanopy vegetation

[1] L. A. Viereck, C. T. Dyrness, A. R. Batten, and K. J. Wenzlick. 1992. The Alaska Vegetation Classification. Gen. Tech. Rep. PNW-GRR-286. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 278 p.

shows a high variety of grasses and forbs; unfortunately, it was early in the season and many of them could not be identified to species level. Grasses were the most abundant undercanopy plants with bluejoint and Poa sp. as dominants. Forbs observed in these communities include wild iris (*Iris setosa*), wild cucumber (*Streptopus amplexifolius*), burnet (*Sangisorba officinalis*?), blue Jacob's ladder (*Polemonium boreale*?), twin flower (*Linnaea borealis*), nagoonberry (*Rubus arcticus*), Pyrola sp., and fiddlehead ferns among many others. Stiff club (*Lycopodium annotinum*) and several mosses were also abundant, forming a continuous mat cover.

Willow communities are part of the wetland vegetation in depressions at the bottom of the hills. This plant community with its close canopy and extensive root system prevents erosion of tussock tundra slopes and regulates slope groundwater flow and its discharge into Baird Inlet. They also provide excellent cover, perching, feeding and nesting habitat to ptarmigan and several species of songbirds. During the field trip, yellow wagtails, redpolls, and several other songbirds were observed perching and likely foraging in these areas. Similarly, ptarmigan males perched and guarded females nesting in willow patches.

Crowberry Dwarf Shrub Tundra: This vegetation type occupies the largest area in the proposed relocation site. Dominant species are crowberry (70% vegetation cover), Narrow-leaf Labrador tea 10%, mountain cranberry 10%, and dwarf birch about 5% (Attch - 2 photo 10). Other species found in this vegetation type include lousewort (*Pedicularis Langsdorffii*), sedges, arctic willow (*Salix arctica*), stiff clubmoss, stair-step moss (*Hylocomium splendens*), and sphagnum in small patches. Berries are abundant in this community, providing feeding habitat to several bird species. Lapland longspurs and ptarmigan were observed foraging and nesting in this vegetation type; vole trails were also common. In some areas and as the elevation increases, this vegetation changes to a drier community dominated by lichens such as *Cladonia rangerifera, Cladonia sp., Thamnolia vermicularis,* and *Cetraria cucullata.* Co-dominant species are bearberry, dwarf birch, Narrow-leaf Labrador tea, mountain cranberry, and sedges. As elevation decreases toward the bottom of the hill, crowberry decreases and narrow-leaf Labrador tea and cottongrass cover increase (Attch 2-photos 11 & 12). These subtle transitions in species dominance follow a continuum pattern difficult to identify as separate vegetation types.

Bearberry dwarf shrub tundra: This vegetation type is dominant at the windswept, north-facing slopes where the potential quarry site would be located (Map 1) (Attch-2 photos 16, 16a, 16b). Lichens such as *Cetraria cucullata, Cladonia rangifera, Cladonia sp., Thamnolia vermicularis,* and fruticose lichens dominate most of the ground cover. Dominant dwarf shrubs include bearberry (10%), narrow-leaf Labrador tea (10%), Salix arctica, 3%, *Diapensia lapponica, Loiseleuria procumbens*, mountain cranberry, anemone (*Anemone Drummonddii*) and lousewort. The landscape is easy to identify because of the abundance of boulders of various sizes and the presence of alpine flora and fruticose lichens on

the rocks. Frost boils were also observed within this vegetation type as were Western sandpipers.

Estuarine wetlands and mudflats: Monotypic stands of coarse sedges (*Carex Lyngbyaei*?) and grasses are found in stable mudflats at the entrance of the stream proposed as source of freshwater (Attch-2 photos 17 & 18). Wildrye (*Elymus arenarius*) and other sedges and grasses are also part of this brackish emergent wetland that provides excellent nesting and feeding habitat to waterfowl and shorebirds. Another emergent wetland with similar species composition is found at the entrance of the eastside drainage system, which is adjacent to the proposed barge site (Attch-2 photos 19, 20 & 21). This wetland is smaller and in an earlier succession stage, but it provides foraging and resting habitat to waterfowl and shorebirds.

Dominant Plant Communities Observed at Each of the Visited Sites:

Potential Relocation Site. Crowberry dwarf shrub tundra, willow shrub communities (following drainages, decreasing in height with elevation and across the landscape at the bottom of the hill), wet tussock tundra (at the bottom of the hill), calamagrostis-sedge-sphagnum along drainages and at the bottom of the hill.

Potential Airstrip Sites. On top of the hill grassy tussock tundra and low willow shrub patches are the dominant community types. Dominant vegetation types at the proposed airstrip site located by the proposed pump house (map 1), are willow shrub along the riverbank, wet tussock tundra, Calamagrostis-Sedge-Sphagnum, and grassy tussock tundra toward the hills (Attch 2 photos 2a, 2b, 2c, 2d, 2e, 2f and 2g).

Potential Barge Site and its vicinity. Rocky barrens are found at the barge site and an estuarine wetland is to the eastside of the barge site. In the upland, the dominant vegetation types are willow patches and wet tussock tundra.

Potential Quarry Site. Vegetation in this area consists of bearberry, dwarf tundra, and grassy tussock tundra.

Runway Alignments.

Three runway alignments were visited (figures 1 and 4). Airstrip site one near the Takikchak River may be suitable from a construction perspective, but the north end is a near a wetland. Beyond likely disturbance impacts to waterfowl, there would probably be safety concerns for aircraft due to the potential for bird strikes. Site one would be close to town and avoid the need to travel to the top of a ridge to reach the airstrip.

Airstrip site two has two potential alignments, east-west and northwest-southeast. The later alignment might necessitate filling in a small saddle on top of the ridge, but this is probably a minor issue given that a lot of filling and grading would be

necessary. Both of these alignment are relatively level, but there are some areas of moist vegetation scattered along the ridge. Despite the elevation, there some small scattered ponds in the area surrounding airstrip sites two and three. Access to airstrip sites two and three might be difficult during winter depending on the location and characteristics of the road. Site three has similar issues as site two regarding terrain and access. Airstrip construction on the high ground at site two or three would likely have fewer negative effects to ducks and geese than construction at site one. However, there are birds that nest on the high ground such as jaegers and short-eared owls. A bar-tailed godwit with four eggs was located approximately halfway between airstrip sites two and three.

4. **Conclusions.** The high ground at this potential relocation site is a logical alternative to the rapidly eroding land near Newtok. Nelson Island is one of the few areas of upland habitat in the coastal area of the Yukon-Kuskokwim (Y-K) Delta and certainly provides some of the only upland habitat in the southwest portion of the Yukon Delta National Wildlife Refuge. This upland area provides habitat for some species not typically found in the more low-lying areas of the Y-K Delta, such as willow ptarmigan, yellow wagtails, and Lapland longspurs.

The fresh water spring in this area should be safeguarded if development in the area occurs. Aside from the habitat it provides, it is an important source of fresh water for people passing by from distant villages on their way to locations where they hunt, fish, and gather berries. Unlike the Takikchak River, the freshwater spring is accessible by skiff at all tide levels.

Future fieldwork would be helpful to characterize fish use and habitat in the Takikchak River. These issues are important with respect to development of a water source for the village as well as future development in the watershed. Additional bird surveys, particularly in the area of likely airstrips would be beneficial to characterize bird usage during different seasons to reduce impacts to birds and ensure the airstrip is situated in an area that minimizes strike hazards for aircraft.

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Biologist