CONTAMINATED SOIL REMEDIATION PLAN
OLD BIA SCHOOL PROPERTY
BLOCK 7, LOT 8
BEAVER, ALASKA

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Prepared for:

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ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ACM	asbestos containing material(s)
ADF&G	Alaska Department of Fish and Game
AEA	Alaska Energy Authority
AST	Aboveground Storage Tank
BIA	Bureau of Indian Affairs
BVC	Beaver Village Council
COC	chemicals of concern
CSM	conceptual site model
CSP	Contaminated Sites Program
cy	cubic yards
DBAC	DEC Brownfield Assessment and Cleanup
DCRA	Department of Community and Regional Affairs
DEC	Alaska Department of Environmental Conservation
DEED	Alaska Department of Education and Early Development
DNR	Alaska Department of Natural Resources
FWS	U.S. Fish and Wildlife Service
gpm	gallons-per-minute
HAZWOPER	Hazardous Waste Operations and Emergency Rescue
HBMS	hazardous building material survey
MTGW	migration to groundwater
NWR	National Wildlife Refuge
OSHA	Occupational Safety and Health Administration
PACP	Property Assessment and Cleanup Plan
PCB	polychlorinated biphenyl
PID	photoionization detector
QEP	Qualified environmental Professional
RACM	regulated asbestos containing material
ROM	rough order of magnitude
RSE	Restoration Science and Engineering
sf	square feet
SPLP	synthetic precipitation leaching procedure
USACE	U.S. Army Corps of Engineers

1.0 EXECUTIVE SUMMARY

NORTECH was contracted by the U.S. Fish and Wildlife Service (FWS) to evaluate the former Bureau of Indian Affairs (BIA) School, support buildings/structures, tank farm and associated piping owned by the FWS. The village is located on the north bank of the Yukon River, approximately 105 miles north of Fairbanks. The purpose of this assessment was to review, consolidate and verify existing assessment data in order to develop a contaminated soil corrective action plan, and provide rough order of magnitude cost estimates for proposed remedial activities.

The Old BIA School property fell into disrepair following the construction of the new Cruikshank School north of the old school. Four buildings and a former aboveground storage tank (AST) farm are currently located on the site, none of which are in use except for storage. Environmental assessments were conducted at the site between 2001 and 2019 that focused on petroleum sampling and delineation across the site. A limited hazardous building materials survey (HBMS) of some of the four buildings was completed in 2022

Surface and subsurface investigations to date identified three areas of petroleum impacts across the site that include an area to the west/northwest or the AST farm, a second area encompassing the tank farm footprint where multiple releases have been documented, and a third area to the south of the tank farm resulting from a leaking pipeline. The assessment activities completed in 2023 included limited field screening to verify pre-existing data, and a review of available information to develop a remedial approach and cost estimate. An estimated 12,070 square feet (sf) of surface area have been identified as having been impacted as a result of onsite fuel management and spills, with an estimate of 4,000 cubic yards (cy) of excavated contaminated soil requiring treatment to meet reuse objectives. Cleanup would include excavation to a maximum depth of 10 feet in select areas, targeting removal of the most contaminated material. No cleanup has occurred at the site to date. The field observations indicate the previous assessment results are valid and were the basis of calculations used in this assessment.

Site cleanup will require the demolition and disposal of four onsite structures and the AST farm before cleanup activities can commence. Disposal of buildings not reused will require out-of-state disposal due to the presence of low-level polychlorinated biphenyls (PCBs) identified in paint coatings and reported in the HBMS. The site is currently secured by fencing and much of the site has been cleared of vegetation in preparation for future site work.

Soil treatment is anticipated to be managed locally through landfarming adjacent to the existing landfill on land owned by the Beaver Village Council (BVC). The area can accommodate 4,000 cy to a depth of 18 inches. Additional soil may be added if design considerations are incorporated and appropriate treatment methods are employed. Local equipment is not anticipated to be available within the community and is expected to require mobilization prior to commencing cleanup activities. The treatment time is estimated at three years.

Based on the proximity of the area of impact to the community water supplies, DEC is anticipated to require groundwater monitoring as part of the long-term management strategy. Specifics of a site monitoring plan will be predicated on the resulting cleanup and estimated amount of residually contaminated soil that is not removed.

2.0 INTRODUCTION

The Village of Beaver is located on the north bank of the Yukon River, approximately 105 miles north of Fairbanks. An old BIA School, support buildings/structures, tank farm and associated piping (Lot 8, Block 7) which are owned by the FWS are present in the community. The Old BIA School property was leased to the Alaska Department of Education and Early Development (DEED), but the buildings became defunct and fell into disrepair following the construction of the new Cruikshank School north of the old school.

Four buildings are currently located on the site:

- School building (6,000 sf)
- Generator building (800 sf)
- Shop building (1,280 sf)
- Storage shed (300 sf)

In addition to the four structures, there are nine ASTs, eight of which were in use up to 2022. The buried and above-ground piping associated with the tank farm was removed in 2022, and the tanks were emptied of their contents. They are currently not in use but have not been decommissioned or welded closed.

Environmental assessments were conducted at the site associated with the bulk-fuel storage upgrade program in 2001 (Oasis, 2002), in 2002 following a diesel fuel release on August 8 (RSE, 2002), again in 2009 as part of a *Brownfield Property Assessment and Cleanup Plan* (SLR, 2010), and in 2019 following a diesel fuel spill response. A limited HBMS was also completed in 2022 focusing on lead and asbestos delineation in the four buildings. During the initial 2001 field work, contaminated soil was identified in two main areas to the west/northwest and east of the Old BIA School tank farm. Additional assessment completed in 2009 refined the estimated aerial extent of the impacted soil to an estimated 9,200 sf, with an estimated 1,700 cy of contaminated soil associated with Lot 8. The 2022 HBMS identified the presence of lead paint and friable asbestos requiring special handling during demolition or renovation but the report did not detail additional potential hazards (see below) associated with building demolition.

The OASIS and SLR reports also document contamination that is not part of this project. This project does not include any additional assessment or planning for the former burned generator building, the washeteria, washeteria pipeline, utility pipelines, or the pipeline to the airport.

2.1 Purpose

The purpose of the current scope work was to complete a review of available data documenting pre-existing site conditions at the former BIA school site. In addition to petroleum contamination derived from historical onsite fuel management, the FWS requested further assessment of hazardous building materials in four structures, and a review of the AST farm demolition requirements, and are reported under separate cover. The resulting information was used to develop a remedial action approach designed to render the property safe for reuse by the community.

2.2 Lines of Authority

The following provides the contact information for organizations and personnel directly involved with this project:

U.S. Fish & Wildlife Services, Property Owner
Yukon Flats National Wildlife Refuge System
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2.3 Site Location and Climate

The Village of Beaver is located on the north bank of the Yukon River, approximately 60 air miles southwest of Fort Yukon and 105 miles north of Fairbanks. It is located in Yukon Flats National Wildlife Refuge (NWR). Within the community resides an old BIA School, support buildings/structures, tank farm and associated piping, all residing on Lot 8, Block 7 (the Site).

Beaver falls within the continental climate zone, characterized by extreme temperature differences. The continental climate zone encompasses most of the central part of the state and experiences extremely cold winters and warm summers. Extreme temperatures ranging from a low of -70 to a high of 90 °F have been measured. The Yukon River is ice-free from mid-June to mid-October (DCRA).

2.4 Site Geology and Water Supply

Beaver is located on the north bank of the Yukon River known as the Yukon Flats region, an area of 13,700 square miles. The region is characterized by meandering channels, oxbow lakes, sloughs, swamps, alluvial fans, thaw lakes, sink holes and sand dunes. Permafrost is present throughout the Yukon Flats region and Beaver is near or within the thaw bulb of the Yukon River. The surficial geology consists of more than 300 feet of silt and sands deposited by Pleistocene glaciers (DCED, 1990).

Surficial soil observed on site during previous investigations was described as silt and sandy silt. The upper 4 to 6 inches of soil consisted of silt containing organic material. The remainder of test pits consisted of silt to a depth of approximately 5 feet below ground surface. Based upon a review of available literature, the dominant soils are fluvial-deposited silts and fine sands. Windblown silty loam covers the fluvial deposits in some areas of the Yukon Flats region (Selkregg, 1976).

Neither groundwater nor permafrost have been encountered in any site assessment to date, with the deepest excavations extending to 9.5 feet. Discontinuous permafrost is expected to range between four to eight foot below grade in most areas of Beaver according to DEC representatives onsite in 2002. Groundwater flow in the project area is assumed to be south to southeasterly based upon the relative position of the site to the Yukon River. Area surface drainage observed by onsite response staff and local villagers is to the south. The subject site is in the flood plain of the Yukon River and therefore groundwater flow direction and gradients will vary in accordance with seasonal surface water levels. Mean annual precipitation for Beaver is reported to be approximately 6.5 inches per year at nearby Fort Yukon (Leslie, 1989).

Community water is derived at a well installed in 1997 located about 300 feet due south of the tank farm area near the banks of the Yukon River (Longbotham, 1968). The water tank, water treatment system and washeteria were renovated in spring 2003 (BVC Community Plan).

The drilling log from the initial well installed for the community (Well 1), was subsequently abandoned, and indicated about 40 feet of "frozen clay and gravel" followed by about 14 feet of frozen sand and gravel underlain by thawed zones bearing low quantities of water. This well was originally screened from the 60 ft to 70 ft interval but failed to produce significant water. This well was then reworked and drilled to a deeper depth of 84 feet and fitted with additional screens but still failed to produce adequate water.

Well 2 was installed 54 ft closer to the Yukon River on the assumption that a thaw bulb that receives greater recharge may be encountered. This well encountered thawed soil (the boring log did not indicate frozen soil). The well log showed brown silt from the ground surface to four feet bgs. This was followed by sand and gravel to a depth of 30 feet bgs, where groundwater was encountered and rose to a static water level of 23.5 feet bgs. The well was installed to a total depth of 41.8 ft bgs and produced up to 15 gallons per minute (gpm) (Longbotham, 1968).

2.5 Legal Description

The legal description of the Old BIA School property is Lot 8, Block 7, U.S. Survey 4895, which is 2.77 acres in size. The Old BIA School property is owned by the FWS and is leased to the State of Alaska Department of Education and Early Development (DEED) through 2024 through a 50-year lease. The four buildings are currently located on the Site:

1. School building (6,000 sf)
2. Generator building (800 sf)
3. Shop building (1,280 sf)
4. Storage shed (300 sf)

2.6 Background

The site includes the old BIA School building, an AST farm with nine vertical fuel tanks with an estimated capacity of 57,000 gallons, a former school generator building (800 sf), a storage shed (300 sf), and the former School Shop building (1,280 sf), all located on the Old BIA School property. The school building is abandoned and boarded up and the remaining buildings are used for storage or maintenance activities.

The former school building and associated facilities initially housed the BIA school. The school is a large two-story frame building (approximately 6,000 square feet and was closed in 1986, after which the building largely stood empty until the BVC used it for their offices in the late 1990s. The BVC vacated the building when the new health clinic/tribal office building was completed, and the building has remained empty since.

This site was entered into the Department of Environmental Conservation (DEC) Contaminated Sites Database in April 2002, and is known as *Beaver School Tank Farm.* The site is in Active status with Hazard ID 3944, File 790.38.002, with latitude 66.359685, and longitude 147.396634 (WGS84).

There is a perceived need to demolish the buildings (an action supported by FWS) so that the land may be used for housing or a new community building, such as a multipurpose building. Demolition cannot occur without adequate characterization due to the presence of hazardous building materials, which are confirmed to include LBP and asbestos. Additionally, contaminated soil has been documented beneath the structures and the removal of the structures would aid the removal of contaminated soil.

2.7 Equipment in Village

There is limited equipment in the village and it is assumed that significant excavation and/or demolition activities may require the mobilization of equipment to the community. Heavy equipment available for rent in the village reportedly includes a John Deer JD 450C backhoe and Case 455 track loader. All equipment is owned by BVC. BVC also owns a 12-cy end dump truck. A large loader owned by the state Department of Transportation & Public Facilities (DOT&PF) is located at the airport and is used for State maintenance work. Small all-terrain vehicles and trailers may be available to rent and are best located and arranged through the BVC. It is uncertain as to the degree the equipment would function as part of a large-scale cleanup operation.

2.8 Transportation

Primary transportation to the village is by air, using a 3,954-ft gravel airstrip managed by the State of Alaska. Air service is reportedly between Monday through Saturday by Warbelows Air Service. Fuel, store goods, and supplies are shipped to Beaver via air cargo or barge during the summer months. Trucks and ATVs are used primarily by residents, with snow machines during the winter. During the summer months, Crowley Marine manages a barge service with two trips up the Yukon River from Nenana, used primarily to transport bulk goods, heavy equipment, and other freight to the community. Residents also navigate the river waterways in privately owned river boats for hunting, fishing, subsistence activities, and recreation (BVC, 2016).

2.9 Previous Assessments

Environmental assessments were conducted at the site associated with the bulk-fuel storage upgrade program in 2001 (Oasis, 2002), in 2002 following a release (RSE, 2002), and again in 2009 as part of a brownfield property assessment and cleanup plan (SLR, 2010). In 2019, a field investigation was completed by Arctic Data Services (ADS) in April following a mishap in January, when a heavy equipment operator for the Beaver Tribal Council hit a fuel line during snow removal operations at the tank farm, resulting in an estimated 4,200 gallons of diesel fuel released to the ground. A limited HBMS was also completed in 2022 focusing on lead and asbestos delineation in one of the four buildings (the Old BIA School), and LBP in two of the remaining three buildings (Storage Shed and former Generator Building).

During the initial 2001 field work, contaminated soil was identified in two main areas to the west/northwest and east of the Old BIA School tank farm with an estimated 5,600 sf of contaminated surface area, with about 1,640 cy of contaminated soil present. HBM were identified as a concern, although no testing was completed.

In August of 2002, a fuel tank was overfilled which caused an approximate 25 ft by 50 ft contaminated area on the east side of the AST farm. Hydrocarbon impacts were observed at depths up to five feet below grade, although a full assessment was not possible due to lack of available excavation equipment. It was noted at the time of assessment that there were indications that the site may have been subject to petroleum releases prior to this most recent event. The estimate of contaminated soil remaining in place was 280 cy. No groundwater was evaluated during this assessment.

Additional assessment completed in 2009 refined the estimated aerial extent of the impacted soil to an estimated 9,200 sf, with an estimated 1,700 cy of contaminated soil associated with Lot 8, limiting the excavation depth to a maximum of 5 feet.

The 2019 ADS assessment refined the aerial extent of petroleum impacts following a release in January of 2019 and improved on the estimated volume of contaminated soil at the site with a total estimate up to 7,500 cubic yards; however, this report anticipated that the excavation depth of contaminated soil extends to 15 feet.

The limited 2022 HBMS identified the presence of lead paint and friable asbestos requiring special handling during demolition or renovation, but the report was incomplete in its assessment and did not detail additional potential hazards associated with building demolition. The four primary structures on the property were further evaluated for HBM by ***NORTECH*** as part of its 2023 assessment. The results are reported under separate cover.

2.10 Scope of Work

Three specific assessments have focused on the evaluation of near surface petroleum concentrations resulting from fuel releases associated with the onsite tank farm and associated piping. ***NORTECH***'s task was to review the available information, and during site inspection, evaluate any potential surface data gaps, and develop a conceptual plan and rough order of magnitude (ROM) cost estimate for soil remediation at the site. .

Table 1 - Scope of Work

Hazard	Assessment/Samples
Document Review	Collect and review available assessment information to identify potential data gaps associated with previous investigations
Develop Work Plan	Develop an assessment work plan to target areas to confirm previous findings (as appropriate) or fill data gaps (if any) to determine cleanup requirements
Implement Work Plan	Complete a site visit and identify areas of stressed vegetation, fuel storage, or indications of a release, that are outside current identified areas. Conduct sampling and field screening as appropriate.
Evaluate Cleanup Alternatives	Summarize cleanup alternatives for review/comment by FWS and DEC and select the most appropriate approach
Develop Remedial Action Approach	Using available information, develop an approach to remediate the site following the removal and/or decommissioning of onsite structures and tank farm.
Cost Estimation	Develop a Rough Order of Magnitude (ROM) cost estimate to complete excavation and disposal of contaminated soil.

This report documents only the effort associated with the soil excavation and management to meet remedial objectives. Details specific to the onsite abatement and removal/demolition of structures and the demolition of the AST farm are addressed in separate reports completed as part of this effort. The demolition of these structures and tank farm must be completed before soil remediation can be started. Estimated costs have been separated for these project may be completed as separate phases with independent funding. Economies of scale may be realized if some of the activities are combined.

3.0 METHODOLOGY

This effort provides for the preparation of a remediation plan that estimates the volume of petroleum contaminated soil across the site based on historical assessment data. Field screening/sampling of subsurface soil targeted areas of concern to confirm data was also completed. Buried piping was reportedly removed at the site, but there was limited information regarding potential lead-paint impacts from flaking paint along the utilidor lengths. Lead sampling of the exterior paint along the utilidors was completed to evaluate potential lead contamination in soil.

Identified contaminated sites listed in the DEC Contaminated Sites Program (CSP) database require work plans developed and approved by DEC staff overseeing the project work if sampling will occur. Although no sampling for laboratory analysis was anticipated, the plan was provided to DEC for review and comment as the resulting report will be reviewed by DEC, as it will describe the proposed remedial approach. No significant comments were provided and the work plan was approved.

An estimated volume of contaminated soil was developed that incorporated information and data from 2002, 2010, and 2019 reports. This information is the basis for the corrective action plan with cost estimates for review by FWS and DEC. As part of this plan development, ***NORTECH*** reached out to the community to determine the current available equipment and a location for the potential remediation alternative to locally remediate the soil within the community. Soil treatment options are generally limited in rural Alaska and include in-place treatment alternatives and monitoring, excavation and landfarming, and offsite disposal. Based on the 2010 review of remediation alternatives, ex-situ soil remediation was identified as the most efficient approach. A corrective action approach and cost estimate has been developed detailing the technical approach, resource requirements, and estimated costs.

3.1 Regulatory Requirements

DEC soil cleanup levels specified in Title 18 of the Alaska Administrative Code (AAC), Chapter 75 Oil and Other Hazardous Substances Pollution Control, Tables B1 and B2, Method Two, for the Under 40-inch Zone (DEC, 2021) are applicable for this site. The most stringent of the direct contact, outdoor inhalation, or migration-to-ground water soil cleanup levels, whichever is less, is used. The soil cleanup levels for compounds of potential interest are listed in Section 3.4.

3.2 Field Methods

The subsurface assessment of the site has been limited but completed sufficiently to provide an estimate of the extent of impacts anticipated. The site was visited by staff, and near surface soil was field screened to determine the presence of volatile compounds as an indicator of contamination. Hand tools (shovels) were used to obtain near-surface soil samples. The assumption is that petroleum contaminated soil remains at depth, and that near surface soils that are likely to have attenuated where spills have not re-occurred. Twenty-one field screen samples were collected in order to verify the presence and absence of contamination within and outside the previously defined areas of impact.

3.3 Soil Volume Estimates

Soil volume estimates were based on historical assessment data depicting the extent of impact in each of three primary areas on report figures. These areas were field checked with sampling that was screened with a photoionization detector (PID) to determine if the areas were roughly accurate. No significant discrepancies were noted during the site visit, although the ground surface in the south area (Area 3, pipeline leak) had been graded with heavy equipment and no indication of near-surface impacts were observable.

The three identified contaminated areas were transferred as polygons overlying aerial photography using observed site markers, with the resulting polygon area calculated within the Google Earth Pro program. The depth of contamination in each of the three areas is estimated and averaged to provide an approximation of the amount of material necessary for removal to achieve project specific objectives.

3.4 Contaminants of Concern

Historical laboratory analyses indicate that petroleum-related contaminants have been detected at concentrations exceeding current cleanup levels. The following summarizes the contaminants of concern (COC) and the appropriate cleanup levels for soil and groundwater for each COC:

**Table 2: Contaminants of Concern
Previously Detected Above Cleanup Levels**

Contaminant	Cleanup Level – µg/kg (Human Health)	Cleanup Level – µg/kg (MTGW)	GW Cleanup Level – µg/L (Human Health)
RRO	10,000	11,000	1,100
DRO	10,250	230	1,500
GRO	1,400	300	2,200
Benzene	11,000	22	4.6
Ethylbenzene	49,000	130	15
Toluene	200,000	6,700	1,100
Total Xylenes	57,000	1,500	190
1-Methylnaphthalene	68,000	410	11
2-Methylnaphthalene	310,000	1,300	36
Naphthalene	29,000	38	1.7
1,2,4-Trimethylbenzene	43,000	610	56
1,3,5-Trimethylbenzene	37,000	660	60

3.5 Conceptual Site Model

A conceptual site model (CSM) was developed in 2010 to qualitatively assess the risk to potential and ecological receptors from the petroleum release at the Old School Tank Farm site (SLR, 2010). A complete discussion of these pathways is described in the referenced report, as well as a discussion regarding DEC's exposure tracking model. An additional release of more than 4,000 gallons of diesel fuel was documented in 2019, although this does not significantly alter the findings of the CSM.

The following exposure pathways were determined to be potentially complete:

- Incidental soil ingestion
- Dermal absorption of contaminants from soil
- Ingestion of groundwater
- Inhalation of outdoor air
- Ingestion of surface water

- Dermal absorption of contaminants in groundwater
- Dermal absorption of contaminants in surface water
- Inhalation of volatile compounds in tap water.

Current and future receptors were identified to include residents (future); commercial or industrial workers (future); construction workers (future); site visitors, trespassers, or recreational users (current and future); and subsistence harvesters and consumers (current and future).

3.6 Exceptions of Assessment and Limitations

Due to the significant cost of importing equipment sufficient to complete subsurface investigations, the depth of contaminated soil in areas across the site is estimated and extrapolated based on the reported information, the likely source of petroleum (tank, line or coupling), detected concentrations, and distance from the assumed source. Soil cleanup is often coupled with risk of exposure, practicality, cost, schedule, future use requirements, and objectives.

Assumptions in this document were based on previous assessment activities, with the potential for additional contamination contributions not readily identifiable with this limited assessment. Based on information obtained during review, no additional significant releases appear or are assumed to have occurred that were not captured in the 2019 assessment activities.

A five-foot depth is generally considered sufficient to reduce the risk of exposure for most surface use of the site; however, it is unlikely to address the potential impacts that any residual contamination may have with respect to groundwater. Trench excavation to the depth of groundwater at the site has not been achieved at this site to date, so the specific depth to groundwater is unknown. Groundwater is estimated to be at least 15 feet below grade. In addition, discontinuous permafrost is assumed to be present across the site and has likely impacted contaminant migration, as well as groundwater movement.

The primary concern regarding groundwater impacts is the effect they may have on the community water supply well, which is reportedly located downgradient from the site. Laboratory analytical data from the well has not indicated that petroleum has contaminated the well to date. With the understanding that the contamination has been present for decades, we believe it is impracticable to consider excavation and treatment of all contaminated material onsite to the depth of groundwater. These extent of remediation will be cost prohibitive and is not considered feasible. To that end, this proposal assumes an excavation limit of 5 feet below grade across the site as the minimum target remedial objective, with additional excavation to 10 feet targeting the areas of highest petroleum impacts in select areas within each of the three identified areas of impact.

4.0 FIELD ACTIVITIES

NORTECH completed its site assessment on June 21-22, 2023. The site visit included a review of the site conditions, an inventory of onsite structures and materials, four HBMS, an evaluation of the tank farm components, and a review of existing piping and utilidors. Soil sampling and screening were completed on June 22 to verify pre-existing conditions to the degree possible.

4.1 Site Observations

The property was entirely fenced with chain link, separating the former BIA School Site from the existing and active Cruikshank School on the northern half of the property. The eastern half of the property has had most of the vegetative cover removed. Each building was in various states of disrepair and use. Details of the HBMS are presented under a separate cover.

The AST Farm on the eastern edge of the fenced property consisted of nine ~6,000-gallon ASTs. These ASTs had been cleaned and rendered unusable under the direction of the Alaska Energy Authority (AEA) as part of the bulk fuel upgrade program. The community received upgraded fuel storage in 2022, and all previously functioning tanks at this location were taken out of service. Tanks were cleaned and rendered unusable with holes cut into the sides of each tank. Additional details on the condition of the AST Farm and associated components are detailed under separate cover.

In addition to the structures and ASTs, more than one dozen drums were stored within the fenced area. The drums appeared to be in good condition with sealed open-top lids. Unused rolls of fencing were stored adjacent to the drums along the south side of the fence line. Much of the site has been reworked with a bulldozer to remove the vegetation growth as bulldozer tracks were observed. A village elder confirmed that this was performed in 2022. The area to the south of the utilidor leading to the former school was also reworked with heavy equipment in the area of the previously identified pipeline leak.

4.2 Petroleum-Contaminated Soil Areas

The contaminated soil locations identified through previous site assessment activities were divided into the three areas described below for purposes of assessment, discussion, and soil volume calculations. Since no new spill had occurred since the 2019 cleanup and site assessment, additional laboratory analytical testing was not considered necessary.

Each contaminated area was field screened near the surface using hand tools to evaluate the presence of residual petroleum within confirmed petroleum contamination areas. Additional field screening samples were collected near the perimeter of each of the three areas to confirm the approximate extent of impacts near the surface.

<u>*Area 1 – Northwest Area*</u>
Initially identified in 2001 as part of the Oasis assessment, the aerial extent of contamination in this area expanded with each subsequent investigation. This area extends off the AST Farm pad area and likely resulted from multiple releases from tanks, pipelines, drum storage, and possible day tanks or small fuel storage over the period of operation of the fuel distribution system. Much of the contamination likely resides beneath the Former Generator Building and Shop Building, with the greatest concentrations between the two structures.

Area 2 – AST Farm Footprint
This area encompasses the AST Farm pad and combines the historical release area previously identified by Oasis in 2001, and the most recent reported release in 2019. The extent of contamination extends off the pad in all directions, with the greatest reach to the east extending approximately 50 feet to the former tree line. A small area to the east was originally identified in 2001, which did not include an assessment of the tank farm footprint in its entirety. This was likely the only area focused on during the investigation at the time since the tank farm was active and sampling beneath the tanks was not possible.

Area 3 – South Pipeline Leak
This area encompasses a leak that reportedly resulted from faulty couplings in the pipeline that fed the washeteria, first identified in 2002 during the Oasis field investigation. This area was expanded in size as part of the 2009 SLR investigation which may have been a result of an on-going release. In 2023, the surface soil in this area was reworked with heavy equipment about the time of the AST decommissioning, and the site was regraded following the removal of debris.

4.3 Field Screening Results

During the field assessment, ***NORTECH*** collected 21 field screening samples to confirm the absence or presence of near surface soil contamination. This information was used to establish the approximate extent of petroleum impacts that may require excavation and removal as part of the corrective action plan for the Old BIA School Site.

Area 1 – Northwest Area
The sample results (samples identified as 'Soil-1, -2,' and 'Soil-10 -17') from within and surrounding this area did not indicate that contamination had extended beyond that which was previously reported. The highest PID result was from location Soil-13 (600 parts per million [ppm]) at 12 inches below grade, indicating elevated petroleum impacts remain in this area near the surface between the two structures. Sample results outside the previously identified areas at 12 to 14 inches below grade did not yield significant PID results.

Area 2 – AST Farm Footprint
Samples collected from this area (samples 'Soil-3 -9') indicated elevated petroleum impacts remain in the core of the AST Farm footprint (1,000+ ppm) and at the western and southern boundaries. The concentrations diminished near the periphery of the previously defined areas of impact to the north, east, and south. The sample collected along the south edge of the footprint (Soil-5) had the second highest PID reading of 250 ppm. This location was close to a pipeline that exited the tank farm and led to the Washeteria to the south. The sample (Soil-7) collected along the center of the west edge of the footprint had elevated PID results of 245 ppm. This area is in close proximity to the 2019 release that occurred near the northwest corner of the tank farm.

Area 3 – South Pipeline Leak
Samples collected in this area (samples 'Soil-18 -21') were collected initially near the surface and then advanced an additional 14 inches and did not identify any significant impacts, although a slight odor was observed. The soil in this area had been reworked by heavy equipment (grader or loader) following the removal of the vegetative cover in this area. This surface leveling work was reported to have been completed in 2022 and likely relocated minor near-surface petroleum impacts leading to the observed odor.

5.0 DISCUSSION OF FIELD SCREENING SAMPLE RESULTS

The field screening results generally confirmed the previous analytical findings, with the exception of where the ground surface had been reworked with equipment to the south. Coupled with onsite observations, no additional areas of concern were clearly visible, and the extent of petroleum contamination is generally defined based on previous assessments. Ten years of natural attenuation and limited potential re-working of near surface soils are assumed to have reduced concentrations in the top 12 to 18 inches and possibly deeper. The low-level impacts observed at the edge of the defined areas indicate that any new releases were not substantial beyond the previously defined areas of impact summarized in the 2019 ADS report.

Significant readings were not reported in the Northwest Area from the field screening other than between the Former Generator Building and the Shop. This area was evaluated with trenching in 2001 with increased concentrations to 7.5 feet below grade. Contamination was widespread at about 7 feet below grade between the two buildings and toward the AST Farm. This may indicate that unspecified sources likely resulted in one or more releases in this area that may have migrated downward, potentially spreading out laterally at the surface at the time of release or moving laterally based on underlying lithology at depth. A release at a day tank at the former generator building was also reported which likely contributed to impacts in this area. Previous reporting indicates that contamination likely extends to 15 feet in the core areas based on the high concentrations at 7 feet below grade.

The contamination is likely to be deepest in the center of the AST Farm footprint due to the likelihood of unreported releases and the difficulty with cleaning up historical releases within the tank footprint. The highest two field screening readings during this assessment (1,000 ppm and 250 ppm) were located near the center of the tank farm and on the southern footprint edge, respectively, where the pipeline to the washeteria connected to the tank farm. Sample Soil-7 was located along the western border adjacent to where the most recent 2019 release was reported. Following decommissioning of the tanks in this area, excavation is likely to be required to the depth possible with available equipment. For the purposes of estimating costs associated with this review, the depth was limited to 10 feet.

The area to the south where a long-term pipeline leak was documented could not be fully evaluated with near surface sampling as the area had been regraded with earth-moving equipment. Staff were informed that the debris and items in this area were removed, and subsequently, the site reworked as part of site clearing and preparation activities. Considering that the releases in this area were reportedly consistent and extended over a long period of time, it is likely that the impacts will be limited laterally, but potentially extend to 15 feet or greater. For the purposes of estimating costs associated with this review, the depth was limited to 10 feet in the core area of the leak.

6.0 CONTAMINATED SOIL ESTIMATES

Based on the assessments and soil characterization to date, the contaminated soil areas were segregated into three distinct areas to align with the site layout, and the project objectives:

- Area 1 – Northwest Area
- Area 2 – AST Farm
- Area 3 – South Pipeline Leak

Each of these areas was evaluated previously using available excavation equipment and trenching or surface borings/probes to collect samples. The extent of sampling did not exceed 9.5 feet below grade. The depth of contamination is believed to extend to groundwater in some locations, which is estimated to be near 15 feet but has not been determined. ***NORTECH*** used this available information as a basis for its assessment of the cleanup requirements. Estimated areas of contamination are depicted in Figure 4 and are summarized below.

6.1 Swell Factor

The excavation of contaminated soil will result in an ex-situ expansion of the material as it is stockpiled and relocated for treatment. This is known as 'swelling' of the material, and for silt it is estimated that the swell factor may be as much as 30% to 50%. This implies that for every 100-cy removed, as much as 130-150 cy may require management. As a more realistic example for this project, an estimated 3,000 in-place cubic yards may require a long-term soil management area that can accommodate as much as 3,900 cy to 4,500 cy. A swell factor of 1.3 has been included in all contaminated soil volume calculations in this section.

6.2 Soil Areas and Volumes

Soil volumes were calculated based on the estimated areal extent as identified through multiple assessments since 2001. The depth of soil for purposes of calculations will be estimated based on historical trenching data, and/or a specified target depth designed to meet future use scenarios.

Some areas are likely to have inconsistent contaminant levels with depth, and interim stockpiling and field screening may be possible to enable a reduction in the soil requiring treatment. This practice may be time consuming and not compatible with remediation timelines for completion. In that event, stockpiling at a treatment area may enable some level of soil management prior to placement for final treatment if the soil is to be managed locally.

6.2.1 Northwest Area (Area 1)

This area encompasses releases that likely migrated from the releases at the tank farm or have resulted from incidental or day tank releases adjacent to the buildings over time. The extent of the impacts in this area expanded following the 2001 investigation and encompasses an estimated aerial extent of 7,300 sf. An arbitrary line separates this from Area 2 (AST Farm).

Assuming that the depth of excavation in this area is a minimum of 5 feet, the estimated volume of soil to be removed for treatment would be 1,757 ex-situ cy, assuming a 30% swell factor. Each additional foot of excavation across this entire area would result in an additional 351 cy.

Based on trenching results from 2001, it is estimated that the excavation may be extended to 10 feet in one target area located between the two structures. Using an estimated 600-sf area between the buildings, this would increase the resulting excavated soil volume by 29 cy per foot, or a total of 145 cy for the estimated area. For estimation purposes, assuming removal of contaminated material across the entire area to a depth of 5 feet, with an additional 600 sf of contaminated soil removal to 10 feet, the total yardage removed requiring treatment and management would be 1,902 cy.

Contamination was reported at depths to 7 feet without specific sampling to verify contaminant concentrations between the buildings and the tank farm. Additional excavation deeper than 5 feet across the northwest area may be prudent to maximize source removal, depending on the future use of the property, the placement of buildings, and the construction methods to be employed. This can be better evaluated at risk assessment and work planning stages.

6.2.2 AST Farm (Area 2)

The area of impact surrounding the AST Farm footprint is estimated at 3,600 sf, which includes the initial historical area of impact on the east side of the AST Farm. Excavation in this area is likely to be required to 10 feet below grade at a minimum, or to the range of the equipment. Petroleum releases are likely to have had the opportunity to migrate deepest at this location due to long term leaks, coupling failures, and spill incidents. This has likely allowed the petroleum to reach a natural subsurface aquitard (such as permafrost, if present) and spread out laterally, or to reach the groundwater surface.

A 10-foot excavation across this footprint would yield 1,733 cy of contaminated soil (swell factor included) requiring handling and treatment. Additional removal across the footprint of each vertical foot of soil, if determined undertaken, would increase the volume of soil to be treated by 173 cy. Site management activities would have to allow for the local placement of clean material surrounding the excavation to enable the safe removal of contaminated soil to the desired depth.

A previously defined area of impact from the 2001 and 2009 assessments was located to the east (Figure 5) and comprises approximately 19% of the area identified within the AST farm location. It is likely that this area was greater, but that assessment within the AST farm was made difficult due to the presence of the cribbing, piping, and tanks. An estimated 20% of the current cleanup in this area may be attributed to historical documentation.

6.2.3 South Pipeline Leak (Area 3)

The south pipeline leak area is currently estimated with a surface area of about 1,170 feet, which was expanded from the initial estimation in 2001 by nearly 10 times during the 2009 SLR assessment. Contaminant concentrations exceeded the most stringent cleanup levels at 4 feet below grade 30 feet to the east of the north-south transect along the removed pipeline that previously connected to the river barge location.

Removal of material to 5 feet in this area would yield approximately 282 cy (swell factor included) requiring management and treatment. Based on the elevated concentrations at 4 feet below grade, the remediation may require additional removal to 10 feet over an estimated one-half (50%) of the aerial extent (585 sf). This would produce an additional 141 cy, or an estimated 28 cy per additional foot removed over this area.

6.3 Summary

Using these estimated quantities, a total of about 3,000 cy of in-situ contaminated soil is considered a reasonable volume to significantly reduce the risk at this site. This is expected to swell to approximately 4,000 cy of soil that will require handling and treatment in the landfarm. This estimated volume is intended to remove petroleum impacts above the most stringent cleanup criteria to a depth of 10 feet. Additional material may be removed as determined necessary to meet risk reduction objectives, or as soil management and treatment capacity permits.

These estimated volumes for soil remediation are not expected to remove all petroleum impacted soil from the site. Residual petroleum contaminated soil is likely to remain at depth, but the risk from this material will be minimized by other factors. The risk-based work plan to complete this work will provide the detailed rationales and risk management factors for the safe, long-term operation of the site for future activities.

7.0 CLEANUP APPROACH

The proposed remedial action approach is based on information and data obtained from previous assessments, including the 2002 Oasis report, 2002 RSE report, 2010 SLR *Property Assessment and Cleanup Plan*, ADS *Spill Response Report*, and the BGES *Old Schoolhouse Limited Hazardous Building Materials Inventory* (2022), as well as ***NORTECH***'s recent assessment and hazard evaluation activities. The costs to address hazardous materials abatement prior to demolition were developed based on ***NORTECH***'s inspection and field work, coupled with pre-existing data.

7.1 Pre-Excavation Site Clearing

Any remedial action alternative for the management and removal of contaminated soil will need to consider the abatement, removal or demolition and disposal of the buildings, utilities, piping, tank farm, and other debris to enable ready access to the excavation and removal of contaminated soil. This recent 2023 assessment included a separate designed to refine the hazardous building materials data for each of four onsite structures, one which had not been previously assessed, and evaluate and inventory the remaining AST farm components. These items would require removal to allow for the excavation of soil that is present beneath them. A separate reporting provides regulatory context for the FWS to evaluate paths toward abatement and demolition/relocation of the onsite structures located on the Old BIA School property prior to soil cleanup.

The 2010 Property Assessment and Cleanup Plan was specifically tasked with summarizing a remedial approach for soil at this site. The selected approach was the excavation of contaminated soil within the identified areas, and treatment of the contaminated soil within the community at an offsite location adjacent to the landfill. Treatment was expected to be through active landfarming of the soil, including frequent tilling during summer months. The desired result will be cleared and remediated soil allowing for the unrestricted beneficial reuse of the property by the community, and the reuse of the treated material as daily cover at the landfill.

7.2 Primary Considerations for Excavation of Contaminated Soil

The following activities must be completed to prepare the site for soil remediation. These could be completed as maintenance projects (vegetation removal), preliminary steps for the soil remediation project (utility locates), or as separate demolition projects (building removal).

- All activities for the removal of materials off site should be conducted according to all applicable state, federal, and local regulations.
- All utility clearances must be performed to avoid encountering and damaging any onsite utilities that may be present.
- All onsite structures, utilidors, and buildings should have hazardous materials properly abated, and the buildings demolished and/or removed offsite to the local landfill (HBMS and demolition addressed under separate cover.)
- All onsite abandoned debris, drums, containers, etc., should be characterized (as appropriate) and removed from the site for proper recycling or disposal in landfill.
- Additional vegetative growth may require clearing and removal to allow for the excavation of contaminated material.
- Contamination will remain at the site and will require the implementation of institutional controls, potentially coupled with long-term monitoring.

This proposed cleanup approach will require multiple coordinated elements to achieve the project goal. The required elements necessary to complete this project include:

- Landfarm pad preparation and construction
- Excavation and soil spreading
- Backfill and grading of site
- Management and monitoring of soil treatment (3 years)
- Site closure

It is unlikely that these activities can be entirely completed with local available equipment, but consideration of available local equipment and labor should be a priority at the time of work plan development. It may be more cost effective to pay for the repair of local equipment than to mobilize equipment in for the project and incur equipment standby costs.

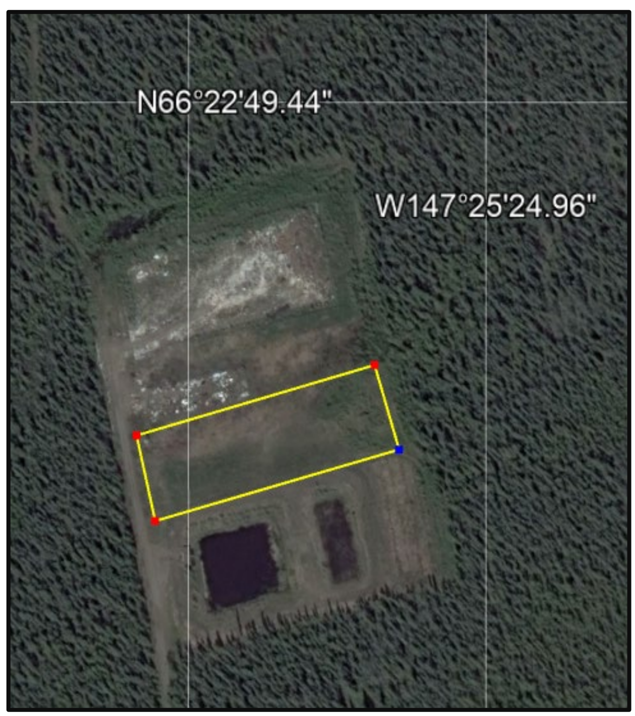
7.3 Landfarming

The 2010 Property Assessment and Cleanup Plan (PACP) developed for the DEC evaluated practical cleanup approaches and determined that excavation and landfarming of petroleum contaminated soil is the most practical approach, and the same criteria exist today. Landfarming is often the generally applied approach in rural Alaska, although it can take several years to complete cleanup, with the soil material often reused as cover material for village landfill if not suitable for incorporation into roadbeds.

Landfarming is defined as the spreading of contaminated soil with or without the use of a liner, to include routine tilling, monitoring, and sampling until soils have reached the target levels. Many landfarming operations include amending the soil with nutrients (i.e., fertilizer) to enhance biodegradation. DEC may require annual or periodic monitoring of the remedial progress throughout the period of landfarm operation.

Landfarming in Beaver requires the construction of the new landfarm cell at a location adjacent to the existing landfill in Beaver about 2.4 miles from the center of the community. This location is a suitable distance from village residents and exposure to the material during treatment can be controlled.

The area adjacent to the landfill is reportedly not associated with the DEC regulated landfill and would not require additional permitting and approval through the DEC Solid Waste Program. There appears to be sufficient area to be used for the long-term management of contaminated soil and the community has tentatively approved the use of this area for landfarming. Using an estimated 18 inches as a maximum depth for a soil treatment area, a surface area of about 72,000 sf is required to manage 4,000 cy. The area depicted in the rectangle in *Insert 1* has an available area of



Inset 1 - Beaver Landfill Area and proposed Landfarm Area

73,000 sf which would be sufficient to manage this quantity of soil if this area was made available. With community approval, additional configurations are possible that could accommodate an estimated 4,000 cy, and potentially more if the landfarm depth was increased to 2 feet, or slightly expanded to the north.

All coordination for the construction and management of a treatment landfarm would be through the DEC CSP since this area is not part of the community landfill.

If the soil is to be used as cover material at the landfill, the DEC Solid Waste Program (SWP) would be involved in determining the final target soil treatment requirements, which may differ from the Contaminated Sites Program cleanup requirements. The SWP typically requires a soil leachability assessment to determine if the contaminant concentrations in the resulting leachate exceed DEC Contaminated Sites Groundwater Cleanup levels [18 AAC 345(b)(1), Table C].

Log-term soil management must also consider the equipment necessary to manage the oversight, tilling, and movement of soil. A remediation project designed to treat an estimated 4,000 cy of soil would likely require a tractor and appropriate tilling attachment such that the material can be efficiently turned, leading to more effective and timely attenuation of the contaminants and closure. (This project assumes the purchase of a dedicated tractor with mobilization into the community, with removal of the equipment following project completion at the discretion of the FWS.)

If management of the soil locally within the community is not desired for reasons yet to be finalized, the only other reasonable option is for the excavation and disposal of material out of the village in a lined Class I Landfill or Industrial Waste Landfill that is permitted to receive non-hazardous petroleum contaminated soil. Prior approval must be provided by the Landfill operator as there may be specific restrictions imposed by the Landfill that limit their capacity to receive the material. Out-of-village disposal substantially increases the logistics required to excavate, manage, and remove soil from the village since barges have limited storage capacity and scheduling. This approach was not evaluated.

7.4 Equipment and Labor

The equipment and labor requirements to implement the preferred alternative require the use of an excavator capable of reaching at least 10 feet below grade, haul truck(s) capable of carrying 10 to 12 cy of soil, and a front-end loader to spread the soil in preparation for the landfarm soil at the landfarm location adjacent to the landfill. These activities can be carried out simultaneously to minimize the time required to complete the work. In this manner, the excavator will fill haul trucks that dump at the landfarm location while a loader consolidates the material to the 18-inch depth specification.

The number of operators required would be dependent on the equipment that is used to carry out the cleanup. A minimum of two haul trucks, one front-end loader, and an excavator are considered necessary, requiring a total of four equipment operators. In addition, two local laborers are included to support the remedial action effort. Personnel working on the field component of this project must be trained to the *Hazardous Waste Operations and Emergency Rescue* (HAZWOPER) standard per the Occupational Safety and Health Administration (OSHA) requirement in 29 CFR 1910.120. Equipment operators must have certification with a commercial driver's license and be able to verify their training and experience to operate equipment required for this project.

Qualified environmental professional (QEP) sampling personnel would be in addition to the operators/laborers. The function of the QEP would be to document and direct the excavation work using field screening tools such as a PID and collect confirmation samples. Laboratory sampling would be completed at the limits of the excavation area to determine if a clean line was reached, or if residual petroleum impacts remain at the limits of the excavation. Additional laboratory sampling would be required at the landfarm site prior to construction (background), and following soil placement.

Since it is very likely it will be necessary to mobilize equipment to the site to complete the removal of the contaminated soil, it is recommended that this action be completed at the time that structure demolition and tank farm decommissioning are completed. These activities will be required prior to soil removal, and similar equipment requirements will be necessary to address all tasks.

7.5 Site Management/Control

The site is currently secured by chain-link fencing to discourage trespassing. Additional unused fence material was observed onsite and could be employed to expand the fencing to accommodate excavation requirements that would encroach on the current fence line. The current fencing will reduce overall cleanup costs and provide security and safety during demolition and excavation activities.

The haul route to the landfarm area can circumvent most of the community by heading due north or northwest from the site toward the airport (Figure 2). The road distance is about 2.3 miles.

7.6 Landfarm Site Preparation

The landfarming is expected to take place on top of a liner. Landfarming may be conducted without a liner if the concentrations do not exceed the maximum allowable concentrations, do not have leaching results that exceed Table C cleanup levels, and is approved by DEC. Since petroleum concentrations have been reported that exceed the maximum allowable cleanup concentrations [18AAC75341(c),Tables B1 and B2], and the treatment will occur on land not owned by the responsible party, for purposes of this assessment, a liner is determined a reasonable precaution. The purchase and placement of a liner increases the cost of landfarm construction but provides better control over potential secondary contamination resulting from the landfarm treatment process.

The location of the landfarm should be identified and cleared of debris with a base layer of appropriate sand/gravel to accommodate the placement of a liner. Berms shall be constructed around the perimeter of the landfarm to contain water and runoff. Access to the site for equipment throughout the landfarm operational period shall be constructed. The landfarm may also be constructed with a slope to allow for the collection and management of leachate in a controlled manner. Additional sand/gravel material is often placed beneath the contaminated soil to allow sufficient depth for the tilling equipment to reach the base of the contaminated material without penetrating the liner. This may require 1,000 cy of clean material to be placed atop the liner prior to placement of contaminated soil. A landfarm design and work plan is required for review by DEC prior to the implementation of the remedial strategy.

7.7 Contaminated Soil Excavation

All ex-situ remedial actions begin with the removal of contaminated soil for management and ultimate disposal. The treatment, management and disposal of petroleum contaminated soil is expensive in rural Alaska communities. The limits of the excavation should be determined based on the risk of exposure posed by the residual concentrations of petroleum remaining after excavation.

The preliminary limits of excavation are depicted in Figure 5 and are based on historical assessment data that included trenching, hand borings, and surface sampling. It is unlikely that the petroleum contamination has significantly attenuated *in-situ* during the period since the first assessment, and more likely that additional unreported releases led to additional areas of impact that may be discovered during cleanup activities. The total in-place (compacted) volume of contaminated soil targeted for removal is estimated at 3,000 cy and includes 5-foot excavation across much of the northwest area (Area 1), with a select area within the northwest area and much of the remaining excavation areas across the site excavated to 10 feet. The expected excavated volume of soil (loose soil) is estimated at nearly 4,000 cy. The 5-foot depth was considered the minimum target depth across all excavation areas necessary to eliminate the potential risk of exposure for future above-grade use of the site. The excavation to 10 feet is limited to areas suspected as being above the maximum allowable petroleum concentration, and more likely to contribute to long-term releases over time.

Areas of contamination are expected to extend beyond 5 feet throughout Area 1, but analytical data quantifying contaminants were not always available. Flexibility in determining where source removal extends to depths beyond 5 feet across the excavations will be required. The determination should be based on accurate field screening direction by a QEP during activities and predicated on future use scenarios and risk-based cleanup objectives, the overall quantity of material that may be managed at the site, community input and perception, and funding limitations.

Excavation will require the mobilization of all equipment into the community, with the excavator capable of reaching the 10-foot target depth at a minimum, and deeper as determined appropriate. Management of soil from the excavations will likely be directly placed into one of two dump trucks, followed by transportation and placement at the landfarm location.

7.8 Backfill

Backfill sources should be coordinated with the Beaver Village Council. Sources may include material from upland sources or river gravels from the Yukon River, which may require a permit from the Alaska Department of Natural Resources (DNR). The Alaska Department of Fish and Game (ADF&G) Habitat Division requires a Fish Habitat Permit which is informational only and is not fee-based (i.e., there is no cost for this permit). The U.S. Army Corps of Engineers (USACE) also requires a permit to operate below the normal high-water line of the Yukon River for the purpose of resource extraction (SLR).

7.9 Cleanup Criteria

The applicable DEC soil cleanup levels for this site are specified in Title 18 of the Alaska Administrative Code (AAC), Chapter 75 Oil and Other Hazardous Substances Pollution Control, Tables B1 and B2, DEC Method Two, for the Under 40-inch Zone (DEC, 2008). The most stringent of human health or migration-to-ground water (MTGW) soil cleanup levels, whichever is less, is generally applied to a site if groundwater consumption is a potential concern. Since groundwater is a source of drinking water in Beaver, the MTGW pathway must be considered.

The MTGW cleanup levels are unlikely to be achieved across the site due to the extent of contaminated soil that has already been documented at more than 5 ft below the ground surface. DEC allows the use of site-specific risk-based cleanup levels coupled with site management practices to ensure that cleanup is sufficient to prevent risk of exposure to the public. A risk-based cleanup approach will be required and coordinated with DEC at the time of work plan development, and understanding the potential concern with respect to groundwater will be required. This effort is proposed to target the removal of contamination that meets human health cleanup levels across the site, with an expectation that concentrations that exceed MTGW cleanup levels are likely to remain.

DEC ground water cleanup levels, as specified in 18 AAC 75.345, Table C are applicable at the property if a groundwater monitoring program is implemented and monitoring is part of long-term management requirements. The field effort should include groundwater sampling at the base of select excavations to determine groundwater concentrations across the site to better evaluate whether groundwater concentrations have been exceeded, and to what extent. The collection of 5 groundwater samples through the advancement of temporary monitoring points in excavations is included in the evaluation, so that impacts to groundwater may be evaluated at the areas of identified impact, as well as downgradient between the site and the community water supply. Approval to excavate and advance temporary sampling point off the property will be required. Any resulting long-term monitoring is not included as part of this evaluation.

Landfarmed soil cleanup levels may need to consider the results of samples following the application of the synthetic precipitation leaching procedure (SPLP), with the results compared to Table C cleanup levels per DEC Solid Waste Program requirements. This is necessary if the soil will be used as landfill cover. The SPLP assessment is a method to determine the mobility/leachability of low volatility organic and inorganic analytes in liquids, soils, and wastes. Landfarmed soil that is to be used in the future as daily cover must meet Table C cleanup levels following the SPLP extraction. If the material is not to be used for daily cover, the cleanup levels may be determined through coordination with DEC Contaminated Sites and the community, depending on the location of the final deposition of treated soil. Table B1 and B2 soil cleanup levels drive placement of treated soil.

7.10 Environmental Monitoring

Environmental oversight and monitoring of progress are required components of any regulated cleanup project. The general elements of this cleanup will require the following tasks as part of the cleanup process:

- Risk-based cleanup goals and objectives coordination
- Excavation and soil management work plan development (to include coordination with regulatory agency programs)
- Oversight and documentation of landfarm construction (include background sampling; design may be included)
- Monitor site conditions for worker safety
- Oversight of field activities and soil segregation during excavation through real time monitoring
- Soil sampling at excavation limits to characterize residual impacts prior to backfill

- Pre-treatment sampling of landfarm soil
- Groundwater sampling with future well installation and monitoring (as determined necessary)
- Final reporting and documentation for all cleanup activities
- Long-term monitoring of landfarm progress with interim reporting and regulatory coordination
- Closure documentation and reporting

The sampling and analysis plan will need to include petroleum contaminants associated with diesel fuel, and as summarized in Appendix F of the DEC Field Sampling Guidance:

- Gasoline range organics (AK101)
- Diesel range organics (AK102)
- Benzene, toluene, ethylbenzene, and xylenes (EPAA 8021B)
- Semi-volatile organic compounds (EPA 8270E)
- Volatile organic compounds (EPA 8260D)

8.0 REMEDIAL ACTION APPROACH

NORTECH developed a rough order of magnitude cost evaluation for the excavation and treatment of an estimated 4,000 cy, which is presented under separate cover. The proposed costs cannot be confirmed for future action, and obtaining pricing for logistical information is difficult and subject to change based on fuel/transportation costs and a number of other factors. The following summarizes assumptions used in the development of the cost summary:

- All structures on the property have been removed and no obstacles to excavation are present
- No equipment is available in the community and all equipment necessary for the excavation and remediation activities requires mobilization to/from Beaver
- No licensed operators are available in Beaver and must be brought in, although local support labor is available in Beaver
- The identified landfarm location adjacent to the landfill is available for use over an estimated 3-year period
- A 20-mil liner will be used for the landfarm operations
- The soil excavation is limited to 4,000 cy, although the landfarm may accommodate additional material if approved, and tilling methods account for the increased depth
- A tractor and tilling equipment will be purchased for the project and remain at the site throughout the period (storage of equipment is not included)
- An aggressive tilling approach and schedule is pursued throughout the period of treatment using local labor
- The reuse objective for soil is landfill cover material, with DEC Solid Waste Program SPLP testing parameters meeting Table C Groundwater Cleanup Levels required
- The liner is removed upon completion of treatment, but majority of soil remains at treatment location

NORTECH has been involved in similar projects in other rural locations. Based on this experience, the following eight tasks have been identified and are described below. The ROM cost estimate is also divided into these tasks. These tasks are focused on the construction contractor and environmental subcontractor completing the work, although some portions of the planning for this project will likely be completed by FWS during the design of the project.

Task 1 – Work Plan and Landfarm Design

An environmental work plan and landfill design will be required to address the site-specific requirements to achieve full remediation. This task involves the development of a risk-based approach based on future use of the site, and potential exposure from residual impacts. This will require coordination with the community and DEC to ensure that all stakeholders are included in the cleanup goals and objectives and that it meets all requirements and expectations.

The work plan will address the following at a minimum:

- Cleanup goals and objectives
- Landfarm design and construction details
- Excavation and soil management practices
- Field sampling approach

- All sampling methods, including baseline, confirmation, groundwater, and stockpile sampling
- Landfarming operation and management plan
- Landfarm sampling and monitoring
- Closure requirements

A site visit by the environmental professional and the contractor to evaluate site conditions for preparation of the landfarm and the site for excavation is warranted. Onsite equipment can be evaluated to determine if potential repairs made to existing local equipment are possible to reduce mobilization costs.

Task 2 – Landfarm Construction

Landfarm construction assumes the labor requirements of one QEP and a minimum of three operators to manage a loader, dump truck and potentially an excavator to obtain material as a base course on top of the liner. Two additional local laborers are included for a construction period estimated at up to nine days. Specialty equipment will be required for field-seeming of the liner.

Barge services of equipment necessary for the entire excavation project. This cost is subject to change depending on the equipment requirements at the time of the project and may be unnecessary if equipment is presently on site to complete demolition of the onsite buildings and tank farm. This would be the most cost-efficient approach.

Background sampling will be required to document the absence of contaminants off the landfarm area. Additional testing will be required at the time of closure to confirm that migration of leachate off the landfarm footprint did not occur.

Task 3 – Excavating Contaminated Soil, Spreading

The excavation of soil across the site is anticipated to take 16 days. A minimum of three operators are required to manage the excavator, loader, and two dump trucks continuously. Two QEPs should be onsite to oversee the excavation, field screen, and evaluate soil as it is deposited in the landfarm. Local laborers will assist with the site work and field management.

Field sampling will be required at the base of each excavation and along all sidewalls. Soil sampling of all contaminated soil to be landfarmed will be required following placement. Discrete sampling estimates are developed in accordance with current DEC FSG Tables 2A and 2B. Incremental sampling methods may be employed to reduce the number of laboratory analytical samples, if determined beneficial to the project.

The advancement of groundwater monitoring points to assess impacts to groundwater and determine whether long-term groundwater monitoring may be required. Materials to install five well points are anticipated as sufficient.

Task 4 – Backfilling Excavations

Backfill operations are assumed to take approximately 11 days based on truck turn time to complete delivery of 4,000 cy of material with two trucks. Compaction of material to be completed during backfill operations with handheld compactor purchased for the project. The site will be brought to grade with clean material with the top material appropriate for future use of the site and bladed to meet grade.

Task 5 – Soil Tilling and Management

Landfarm soil tilling and management is assumed to be coordinated locally, with environmental oversight and task management through the project manager. An experienced operator is recommended to train the long-term soil tilling operator to ensure that the process is carried out sufficiently. A three-year treatment process is anticipated, although depending on the efficacy of the fertilization and tilling, it is possible that adequate concentrations can be attained sooner. An estimated eight tilling events throughout the summer season are appropriate to ensure target levels are met (approximately every two weeks). Fertilization should be completed at the time of placement, and then two more times annually.

The cost estimate includes a budget for the purchase of a new tractor and tilling equipment, not yet specified. The equipment budgeted is new; however, satisfactory used equipment is likely available for the project at a savings. The tractor may be retained in the community or removed upon project completion.

Task 6 – Environmental Monitoring During Treatment

The treatment progress will require annual monitoring and reporting to document that concentrations are decreasing and confirm the effectiveness of the treatment. Three annual trips are to be completed near the end of each summer. The number of samples required is based on DEC's Table 2A for stockpiled soil. DEC has allowed for a reduction in the number of samples and required analyses necessary for monitoring purposes, with more comprehensive sampling requirements to verify closure attainment. Alternative sampling programs that include incremental sampling are also permitted and may be evaluated at the time of assessment.

Once target cleanup levels have been attained, soil samples will be required from the stockpiled soil, beneath the liner, and potentially adjacent to the landfarm to ensure that contamination has not migrated from the site. The specifics and sample locations will be determined at the work plan development stage. Samples beneath the liner may be collected through the liner at select locations, prior to removal. Patching of the liner may be required if the liner is to be reused in place.

Task 7 – Decommission Landfarm

Upon completion of the soil treatment, the material may be left in place, relocated, or reused as landfill-cover material on the adjacent landfill. Soil to be used to cover active landfills must meet SPLP testing requirements for appropriate analytes as compared to DEC's Table C Groundwater Cleanup Levels, per DEC's Solid Waste Program requirements. If the material is to be used elsewhere or remains in place, the cleanup levels may be adjusted accordingly relative to the final area of deposition, and as coordinated with the DEC Contaminated Sites Program. For purposes of this evaluation, the target cleanup goal is the most stringent of the direct contact, outdoor inhalation, or migration-to-ground water soil cleanup levels.

At a minimum, it is likely that landfarm liner will require removal from the site at the request of the property owner. An estimated 4 days are estimated as necessary with one operator and local labor to manage the movement of soil and removal of liner. In some instances, the liner may be left in place as a protective barrier for future use by the property owner, depending on their long-term land-use objectives. This determination can be made in conjunction with the BTC at the time of construction in the event there are certain design requirements they may prefer.

Task 8 – Closure Reporting

Upon completion of all cleanup requirements, a comprehensive closure report will be required that provides appropriate data and documentation of the remedial process. This report will include summary data that describes the cleanup process, landfarm management, and interim sampling. The report will be provided to the DEC for review and comment. While most of the data will have been reported in a previous interim report or other documentation, the compilation and delivery of this comprehensive report is expected to provide the community with a single document for reference to the site. This will include an evaluation of risks, summaries of work completed, and compliance with DEC and other requirements.

Not Currently Estimated – Groundwater Monitoring

Although not budgeted as part of the soil cleanup requirements, DEC may require long-term monitoring and the installation of monitoring wells to determine the extent of potential groundwater impacts. This requirement is typical for sites with residual contamination that has impacted or could impact the groundwater table.

This effort may require the mobilization of a small track-mounted drilling unit and supplies to the site. Installation of wells would likely include upgradient and downgradient locations, with the potential for a centrally installed well to evaluate worst-case conditions. Requirements for these tasks can fluctuate greatly, and a generalized estimate for installation of three monitoring wells, with annual monitoring over the treatment period (three years) is provided separately from the soil cleanup evaluation. If it is observed during the cleanup activities that groundwater monitoring is likely, the use of excavator to advance trenches in select locations and place monitoring points may be feasible. One or more of the driven points during excavation activities may also be retained for long-term use.

9.0 CONCLUSIONS AND RECOMMENDATIONS

NORTECH was contracted by the FWS to evaluate the former BIA School, support buildings/structures, tank farm and associated piping owned by the FWS. The old BIA School property fell into disrepair following the construction of the Cruikshank School. Four buildings and a former AST farm are currently located on the site which has been rendered inoperable. Environmental assessments were conducted at the site between 2001 and 2019 that focused on petroleum sampling and delineation across the site. The purpose of this assessment was to review and verify existing assessment data in order to develop a contaminated soil corrective action plan and provide rough order of magnitude cost estimates for proposed remedial activities.

Based on the data developed during this assessment and the previous studies conducted in the area, ***NORTECH*** has developed the following conclusions and recommendations:

Site Conditions

- Petroleum contamination is widespread across the site, and generally allocated to three areas:
  - Area 1 (Northwest Area) with an aerial extent about 7,300 sf
  - Area 2 (AST Farm) with an aerial extent of 3,600 sf
  - Area 3 (Pipeline Leak) to the south of the AST farm with an estimated aerial extent of 1,170 sf
- Limited near-surface soil screening by ***NORTECH*** generally confirmed previous assessment data
  - No new areas of impact were observed or detected
  - Reworking of the surface in Area 3 limited the usefulness of near-surface field screening
- The depth of petroleum impacts is not well defined through historical assessment and likely extends to the depth of permafrost or groundwater in select areas
- The site is fenced with limited access
- An estimated 4,000 cy of contaminated soil are estimated as requiring removal and treatment, targeting the greatest impacts to a depth of 10 feet

Treatment Methodology

- A landfarm treatment area will require construction adjacent to the landfill 2.3 miles from the site
  - Approximately 70,000 sf of 20-mil liner will be required to accommodate 4,000 cy
  - Landfarm design shall consider base course material, access, leachate management, and control of runoff
  - A landfarm design will require DEC approval
- Heavy equipment consisting of an excavator, loader and two dump trucks are considered minimum requirements
  - Three to four licensed operators will be required throughout much of the field effort, whom may or may not be available within the community
  - Local labor should include a minimum of two qualified persons

- Two QEPs will be required to field screen soil, direct the excavation, collect soil samples to verify site conditions, and document all activities
- Excavation will target the areas of greatest impact with the objective of removing the maximum allowable contamination to a depth of 10 feet, or the limits of equipment
    - The volume of soil removed may be limited on available treatment area
    - Additional soil removed will result in deeper soil-treatment tilling
- Backfilling the excavations will require a source of locally obtained gravel/sand
- A 3-year treatment period is estimated
    - A tractor and disc-tilling equipment dedicated to the project are recommended and budgeted
    - Fertilizing soil to occur annually
    - Tilling to occur a minimum of eight times annually over the three-year period
- Environmental Monitoring
    - Annual monitoring will be required to document effectiveness
    - Closure documentation and reporting will be required following final monitoring

Cleanup Approach Assumptions

- Site preparation costs are assumed to be covered under the demolition of onsite structures
- Landfarm construction
    - Seven days are estimated for three operators, two local laborers, and one QEP to complete construction, complete baseline sampling, and document activities (includes travel)
    - Two dump trucks, one front-end loader and excavator are allocated to landfarm construction for all or part of the duration
    - Equipment will need to be barged in and out for this effort, but some equipment may be available locally through other projects at time
    - Coordination of this activity following building demolition may be desired to eliminate multiple barge events
- Excavation and Backfill
    - An estimate of 16 days for four operators, two local laborers, and two QEPs are anticipated to complete excavation, soil segregation, and placement of soil in landfarm
    - Two dump trucks, one loader and excavator are allocated to complete excavation activities
    - 12-mil liner may be placed at the limits of excavations to determine extent of excavation
    - Laboratory analytical sampling requirements will be based on estimated volumes and excavation pit limits and subject to vary
    - Backfilling is estimated to require four operators, one local laborer, one QEP, two dump trucks, front-end loader, and excavator throughout 12 days task duration
    - A compactor may be purchased and dedicated to the project

- Treatment
    - A dedicated tractor and tilling equipment should be considered for the project
    - An estimated 3 days per fertilization and tilling are budgeted 8 times per year for one local laborer
- Environmental Monitoring
    - Two QEPs will be required to conduct annual monitoring over a three-day period to include soil sampling and laboratory analytical testing
    - Annual summary reporting will be required
    - Groundwater monitoring may be required depending on the contamination present at the limits of the excavations
- Decommission Landfarm/Project Closure
    - Four days for one operator, two local laborers, and one QEP part-time are appropriate to remove liner
        - Liner may remain in place to be reused locally if desired
    - Four days for one front-end loader and two days for one dump truck to move select soil to undetermined location
    - Comprehensive environmental closure reporting and documentation will be required by DEC

10.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

NORTECH is a Fairbanks-based, professional consulting firm, established in 1981, offering environmental engineering, civil engineering, and industrial hygiene consulting services. The firm has offices in Fairbanks, Anchorage and Juneau and has completed hundreds of environmental cleanup and hazardous building materials assessments across Alaska.

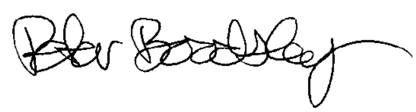
John Carnahan, Environmental Project Manager with ***NORTECH***, has managed, led, and participated in environmental assessments, investigations, and corrective actions at military, communication, mining, landfill, and retail facilities in Alaska over the past 30 years. He has extensive experience designing assessment strategies, as well as investigating, characterizing, monitoring, and implementing remedial actions at contaminated sites regulated under CERCLA and RCRA, often in remote locations. Mr. Carnahan meets the definition of an ADEC Qualified Environmental Professional and Qualified Sampler.

Peter Beardsley, PE, has over 25 years of experience in environmental engineering and is President and CEO of NORTECH. His responsibilities include principal-level review and project management of all aspects of environmental investigations. Peter’s experience includes performing contaminated site investigation and remediation, soil, and groundwater sampling, Phase I and Phase II Environmental Site Assessments (ESAs), indoor air quality investigations, and commercial energy audits. Peter is an EPA AHERA Asbestos Inspector and has designed multiple work and demolition plans for a variety of projects, including for hazardous materials investigations and assessments

Primary Author Signature

John Carnahan
Title

Principal Reviewer



Peter Beardsley, PE
President and CEO

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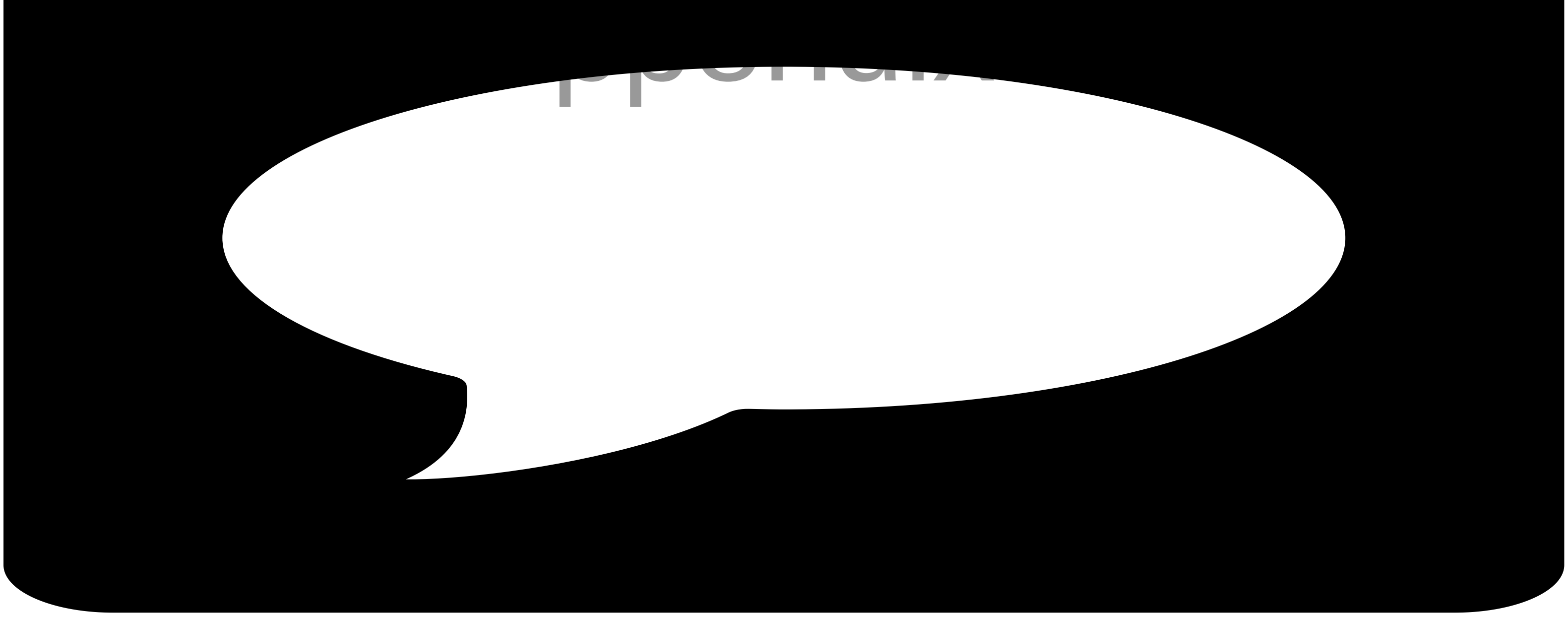

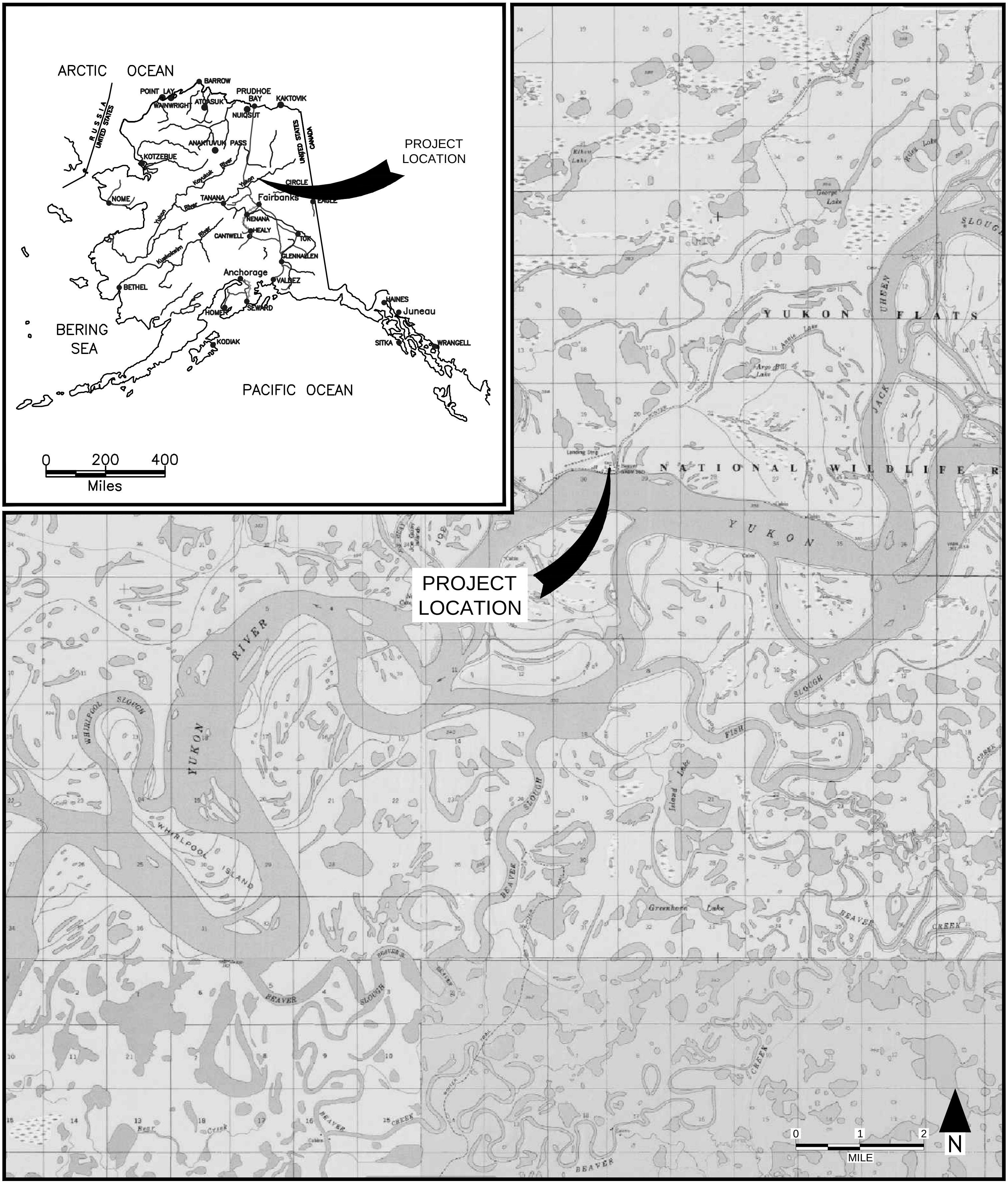

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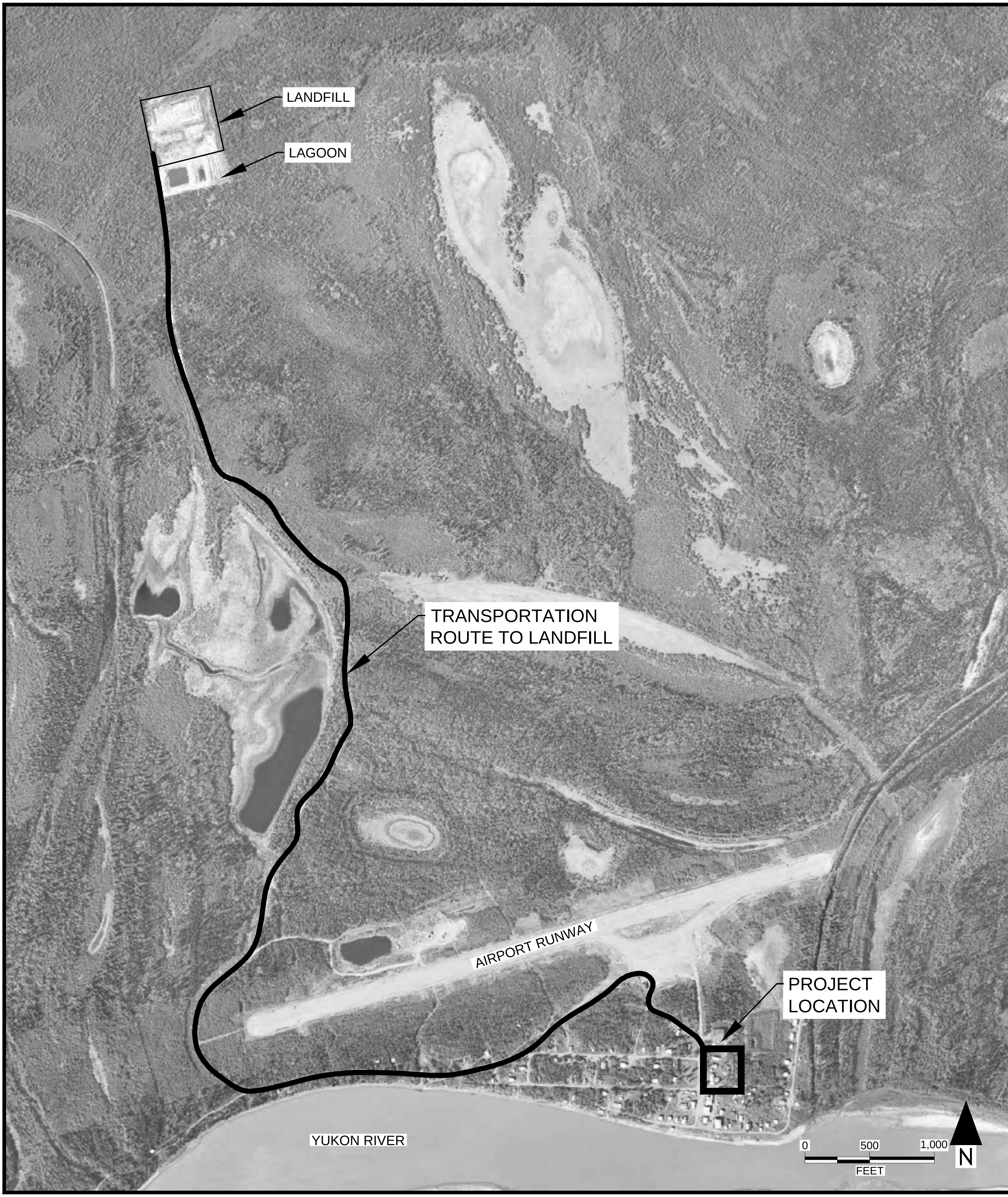

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Vicinity Map & Landfill Route

Contaminated Soil Remediation Plan, Old BIA School Site

Beaver, Alaska

SCALE: As Shown		FIGURE: 2
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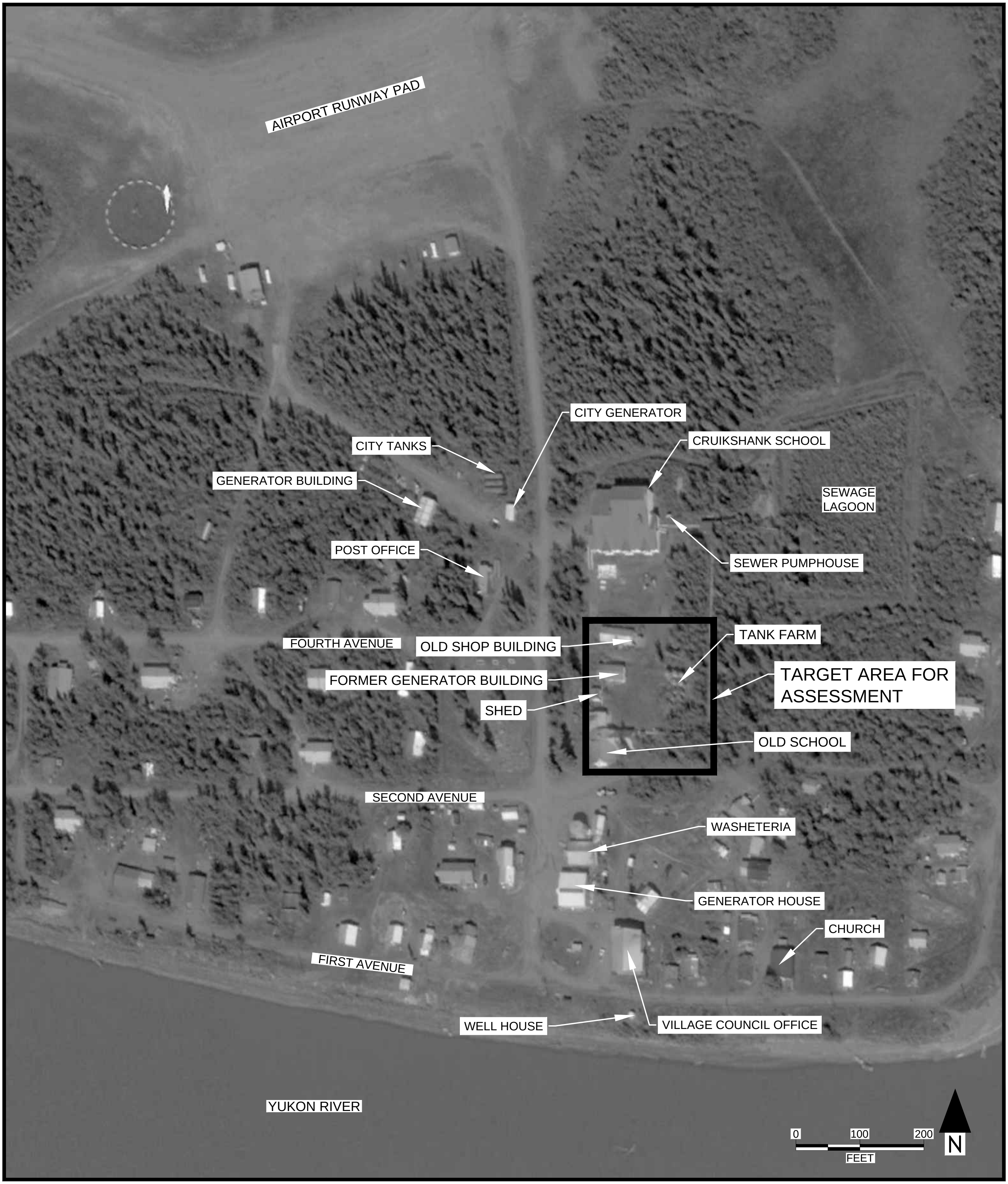
PROJECT NO:	23-1018	
DWG:	231018(soil)b	
DATE:	08/21/2023	



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Village Map

Contaminated Soil Remediation Plan, Old BIA School Site

Beaver, Alaska

SCALE: As Shown		FIGURE: 3
DESIGN: JBC		
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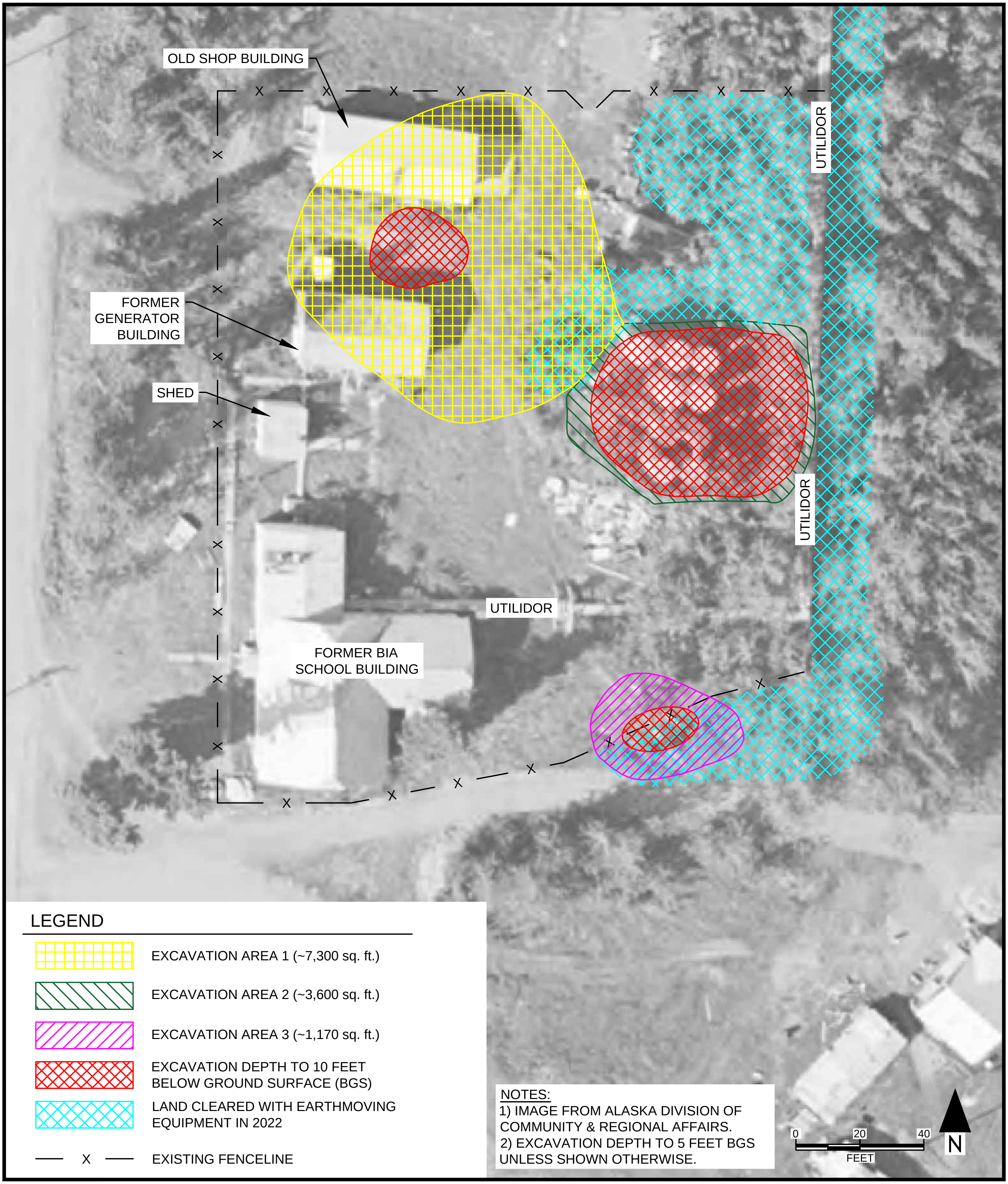
PROJECT NO: 23-1018		
DWG: 231018(soil)b		
DATE: 08/21/2023		



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Areas of Excavation

Contaminated Soil Remediation Plan, Old BIA School Site

Beaver, Alaska

SCALE:	As Shown
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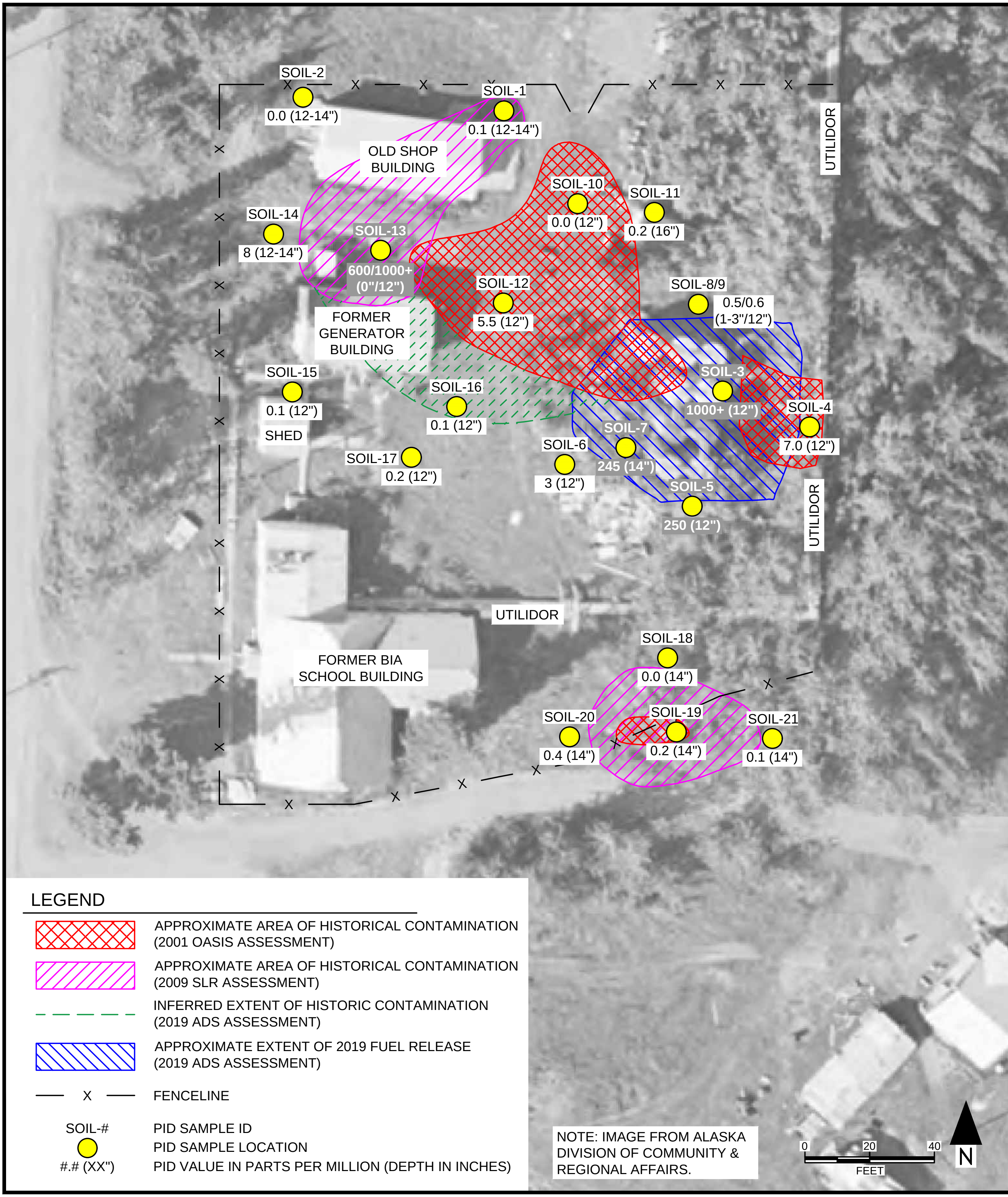
FIGURE:	4
PROJECT NO:	23-1018
DWG:	231018(soil)b
DATE:	08/21/2023



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PID Soil Sample Locations & Results

Contaminated Soil Remediation Plan, Old BIA School Site

Beaver, Alaska

SCALE:	As Shown
DESIGN:	JBC
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PROJECT NO:	23-1018
DWG:	231018(soil)b
DATE:	08/21/2023

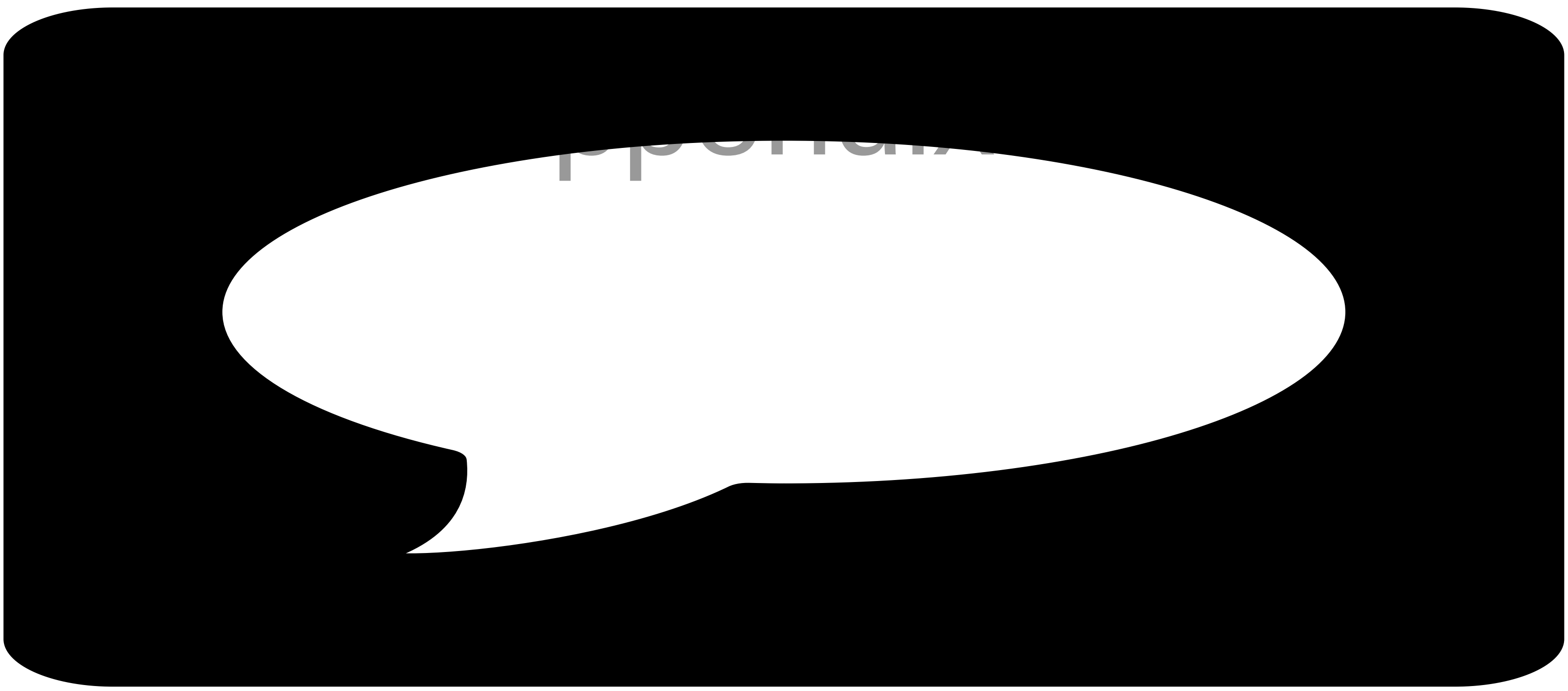

Table 1 - Contaminated Soil Volume Estimates

Estimated Yardage	Area (sf)	Exc Depth (ft)	In-situ Soil Vol. (cy)	Ex-situ Soil Vol. (cy)[1.]	Soil Vol. per foot (cy)[2.]
Area 1 - NW Excavation	7300	5	1352	1757	*351*
Area 2 AST Farm footprint	3600	10	1333	1733	*173*
Area 3 - S. Pipeline Leak	1170	5	217	282	*56*
Total Surface Ariel Extent	**12070**				
Area 1b - Core area between buildings to 10 ft.	600	5	111	144	*29*
Area 3b - Core area to 10 ft.	585	5	108	141	*28*
		Total Yardage	**3121**	**4058**	
			in-situ	*ex-situ*	

[1.] Note: Swell factor of removed soil estimated at +30%.

[2.] Each additional foot in this target area yields this additional material.

Total Aerial Extent	12070	sf
Aerial extent to 10 feet	4785	sf
Percent of Aerial extent to 10 feet	40%	sf

Table 2 - Landfarm Size

Treated Soil (cy)	Treated Soil (cf)	Depth (ft)	Area Needed (sf)	Available Length (f)	Available Width (f)	Available Area (sf) [1.]
2000	54000	1.5	36000	360	100	36000
3000	81000	1.5	54000	400	135	54000
4000	**108000**	**1.5**	**72000**	**450**	**160**	**72000**
5000	135000	2	67500	451	150	67650

1. The available area is estimated and may be modified site-specifically to accommodate more material.

Table 3 - Soil Sample Number Calculation (Excavation and Stockpile)

Location	Amount	Unit	SF	Required	Rounded	QC	Criteria
Excavation Floor	12070	sf		49.3	50	5	2, plus 1 sample per additional 250 sq.ft.,or portion thereof; or as the CSP determines necessary
Sidewall Area 1 to 5 feet	307	f	1535	9.1	10	1	Minimum 1 per each sidewall, plus 1 additional sample for each sidewall area over 250 total square feet (depth and length), or portion thereof.
Area 1 to 10 feet	100	f	500	5.0	5	1	See above
Area 2 to 10 feet	215	f	1075	7.3	8	1	See above
Area 3 to 5 feet	130	f	650	5.6	6	1	See above
Area 3 to 10 feet	50	f	250	4.0	4	1	See above
Stockpiled soil	4000	cf		22.0	22	3	3, plus 1 per each additional 200 cubic yards, or portion thereof, or as the CSP determines necessary
					105	11	
					Total samples	**116**	

Table 4 - Barge Rate Calculations

Equipment	Units	wt. lbs	Tons	Barge Cost One way	Barge Cost RT
Excavator	1	50000	25	$ 15,000	$ 30,000
Dump Truck	2	27500	13.75	$ 16,500	$ 33,000
Front-end Loader	1	29000	14.5	$ 8,700	$ 17,400
Misc. Equpment	1	5000	2.5	$ 1,500	$ 3,000
Tractor/Tiller	1	5000	2.5	$ 1,500	$ 3,000
Pick Up Truck	1	3200	1.6	$ 960	$ 1,920
				$ 44,160	**$ 88,320**
			15% Cont	$ 6,624	$ 13,248
			Total	**$ 50,784**	**$ 101,568**

Approximate Rate **$ 0.30** *per pound, one way, equipment or stackable*

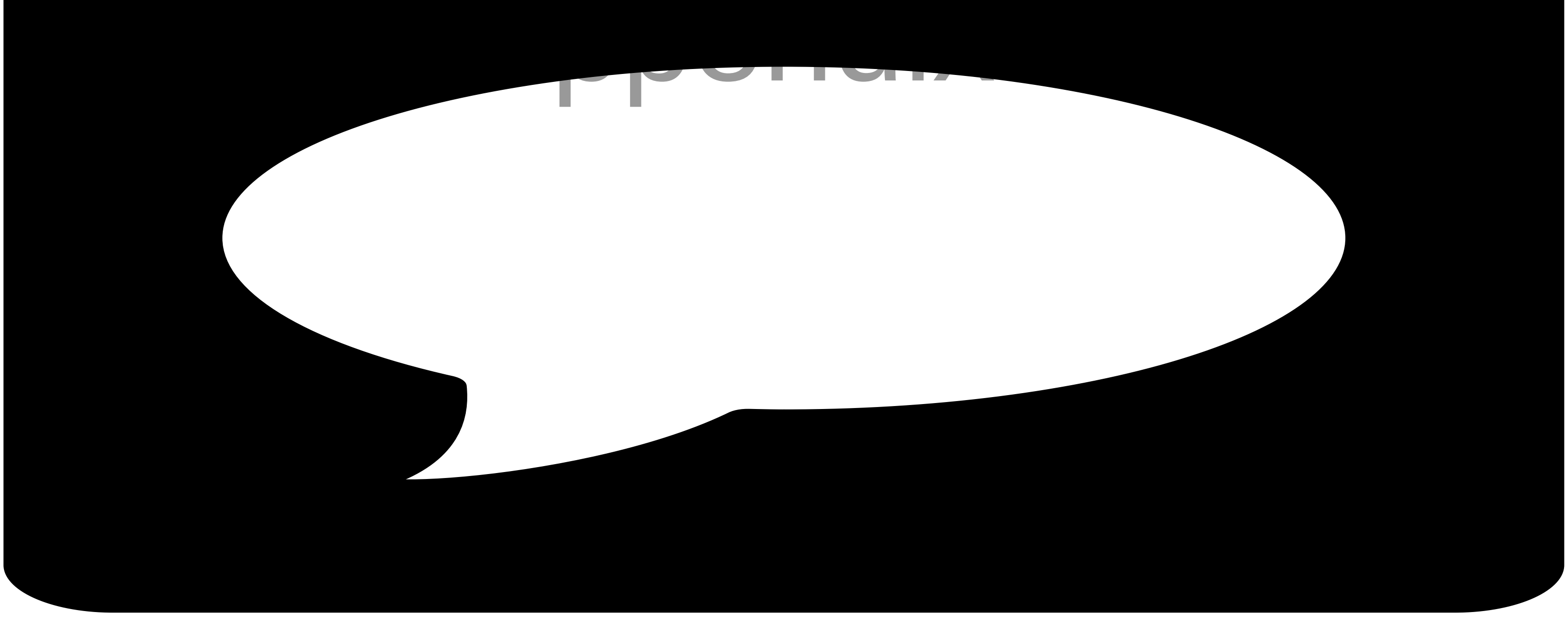

Photo 1: *Looking southwest toward former BIA school from AST farm.*

Photo 2: *Looking west toward former generator building, with shed to left, and BIA school in left edge of frame.*

Photo 3: *Looking northwest toward Shop Building, with new Cruikshank School in background.*

Photo 4: *Standing outside fenced area looking south-southeast toward north side of Shop Building, with tank farm to left (east), and water tank in background on right.*

Photo 5: *Standing outside fenced area looking northeast, collecting soil sample near location of Area 3 – Pipeline leak. Area had been regraded with surface material relocated.*

Photo 6: *Looking west toward former BIA School, with fence and 2nd Avenue to left, collecting sample Soil-18.*

Photo 7: *Looking northwest toward drums and unused fencing material along northern fence line.*

Photo 8: *Looking east while collecting soil sample Soil-2 near northwest corner of Shop Building.*

Photo 9: *Looking west on south side of AST farm preparing for collecting sample Soil-5.*

Photo 10: *Looking south from northeast section of property collecting sample Soil-11. Area to east previously had trees/brush which has been removed.*

Photo 11: *Looking west between former Generator Building to south (left) and Shop Building to north (right).*

Photo 12: *Looking southwest toward former BIA School with Shed to right collecting sample Soil-16.*

Photo 13: *Typical near surface (< 2 feet) soil sample collection method for field screening.*

Photo 14: *Looking northeast toward AST farm. Note heavy equipment tracks across foreground.*

Photo 15: *Gross staining and stressed vegetation surround the former AST farm, indicative of past releases. Significant petroleum impacts are located beneath the former footprint.*

Photo 16: *Additional staining and stressed vegetation on opposite side of AST farm.*

Appendix 4

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Soil-1 no odor - no staining 12-14" (12:30) 0.1 ppm
Soil-2 no odor - no staining 12"-14" (12:35) 0.0 ppm
Soil-3 smell and staining of product 1000+ ppm (12:43) 12"
Soil-4 slight smell - 12" (12:50) 7.00 ppm
Soil-5 smell and staining 12" (12:58) 250 ppm
Soil-6 staining but no odor 12" (13:05) 3 ppm
Soil-7 (Low area) ~~slight~~ Strong odor 14" (13:10) 245 ppm
Soil-8 odor at surface 1-3" (13:11) .5 ppm
Soil-9 same hole as soil-8 12" down (13:12) 0.6 ppm
(no odor no stain)

Soil-10 no odor looks like rocks are sticking 12" 0.0 ppm (13:18)
Soil-11 no odor or stain 16" 0.2 ppm (13:20)
Soil-12 no odor/slight odor 12" old staining? no volatiles left? 5.5 ppm (13:28)
Soil-13 stained/odor 12" 1000+ ppm @ surface 600 ppm (13:32)
Soil-14 no odor 12"-14" .8 ppm (13:45)
Soil-15 no odor/or staining 12" 0.1 ppm (13:41)
Soil-16 no odor/or staining 12" 0.1 ppm (13:47)
Soil-17 no odor/staing 12" 0.2 ppm (13:52)
Soil-18 staining/light odor 14" 0.00 ppm (14:00)
Soil-19 no odor or staining 14" (outside of fencing) 0.2 ppm (14:11)

Soil-20 no odor/staing 0.4 ppm (14:15)
Soil-21 no odor/staining 0.1 ppm (14:20)

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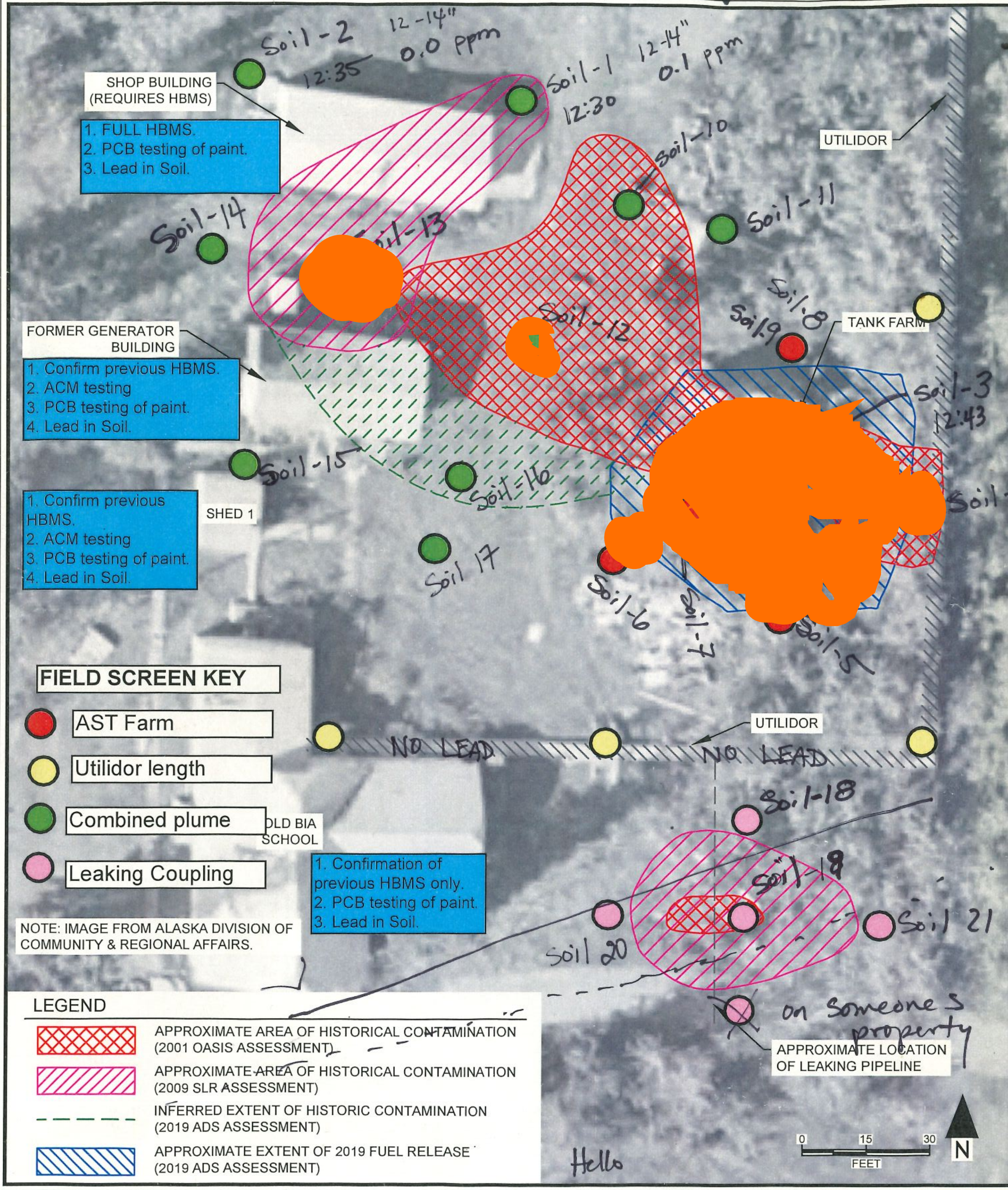

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Historic Contaminated Soil Areas

Sampling & Analysis Plan, Old BIA School Site

Beaver, Alaska

SCALE:	As Shown
DESIGN:	JBC
DRAWN:	SPH
PROJECT NO:	23-1018
DWG:	231018a
DATE:	04/26/2023

FIGURE: 3