

AMBLER ACCESS PROJECT

2022 FIELDWORK ACTIVITIES

PROJECT DESCRIPTION

The Alaska Industrial Development and Export Authority (AIDEA) has prepared this Land Use Permit Application Package for the Alaska Department of Natural Resources (ADNR) for consideration of proposed 2022 field activities. The activities described in this permit application package consist of low-impact studies which will support refinement of the engineering design of the Ambler Access Project (Project).

AIDEA is planning to conduct cultural resource inventory and evaluation surveys, site preparation for helicopter landing zones, facilities reconnaissance, hydrologic and hydraulic investigations, land surveys, fish habitat studies, wetlands investigation, geophysical surveys and probing, and geotechnical drilling on approximately 124 miles of State of Alaska lands within the proposed Project corridor, which occurs intermittently between milepost (MP) 0 to MP 211 and is shown on attached figures. The proposed field activities do not include any construction activities and are all being conducted solely for the purposes of collecting information and to guide environmental, engineering, and design of the Project. The proposed fieldwork timeline for 2022 activities is May 1, 2022 through April 30, 2023. Any fieldwork not completed during this timeframe will be planned for the following season (May 1, 2023 through April 30, 2024). Activities on privately owned land will be conducted with approval from the landowners.

Proposed fieldwork on State of Alaska lands (see maps in Appendix A) includes:

- Cultural Resource Inventory and Evaluation Surveys at 38 locations (8 at potential bridge locations and 30 at potential material sites),
- Site Preparations and Landing Zones intermittently along the proposed alignment and at all potential component types (e.g., potential bridge locations and material sites),
- Facilities Reconnaissance at 7 locations,
- Wind and weather station installation at 4 locations,
- Hydrologic and Hydraulic Investigations at 15 potential bridge locations,
- Land Surveys intermittently along the proposed alignment,
- Fish Habitat Studies at 84 locations,
- Wetlands Investigations at the easternmost 50 miles of the proposed alignment,
- Geophysical Surveys and Probing intermittently along the proposed alignment, and
- Geotechnical Drilling at 62 locations (29 at potential bridge locations and 33 potential material sites).

AIDEA plans to continue stakeholder outreach activities to inform local communities and interested parties about the field activities planned for 2022-2023 as well as provide general updates on the status of the Project. AIDEA recognizes that communities in the vicinity of the corridor have strong subsistence cultures and residents may be in the field throughout the area harvesting subsistence resources at any time of the year. Public notices of the proposed fieldwork will be distributed to stakeholders and will allow for them to provide feedback to AIDEA as part of stakeholder outreach ongoing communications.

Project Location

The proposed activities will take place in the portion of the proposed alignment that occurs on State of Alaska lands (see maps in Appendix A). The easternmost activities are proposed to take place within Township 26 North, Range 13 West, Section 14, and the westernmost activities are proposed within Township 20 North, Range 8 East, Section 2.

Proposed field activities include those at specific locations along the proposed alignment (at potential bridge crossings, material sites, and streams) as well as at locations spread across the proposed alignment as determined in the field (land survey, geophysical survey and probing, site preparation and landing zone establishment). The descriptions of the water bodies, proposed project features, coordinates, USGS Quadrangle classifications, and estimated activity acreages are included in the tables (as applicable) in each section below.

Site Access

Summer fieldwork access will be via helicopter and equipment will be slung as needed. Helicopter sizes vary depending on crew size. The largest helicopter will likely be a Bell 212 (Photograph 1) or 214 (Photograph 2). Winter access will be by tracked over-snow vehicles, with snowmachine and helicopter support as needed and as described below. Crew sizes vary depending on the type of fieldwork and season. Fieldwork will be started at the east and west ends of the Project, with camps in Coldfoot and Dahl Creek. During transitions between survey locations, crews will scan for wildlife within and adjacent to survey targets. If wildlife is identified survey crews will avoid that location and move to an alternate survey location.



Photograph 1. Example of Bell 212 helicopter.



Photograph 2. Example of Bell 214 helicopter.

Cultural Resource Inventory and Evaluation Surveys

Cultural resource surveys are designed and executed for the purpose of identifying and characterizing archaeological and/or historic objects or sites which may be located within the Project’s future construction footprint.

For the 2022 field season, these surveys are being targeted at potential bridge crossing locations (n=8) and potential material sites (n=30) on State of Alaska lands, as shown on maps in Appendix A. For the 2022 season, AIDEA anticipates basing the eastern project cultural resources field crews in Coldfoot and the western crews in Dahl Creek, and fieldwork will proceed in a roughly east-to-west trajectory.

The cultural resources field survey will include between three and four crews that will consist of:

- a crew lead
- an assistant crew lead
- two archaeological technicians
- an archaeological intern
- a Tribal Liaison
- a bear guard

Crews will be supported by three helicopters, one based in Coldfoot and two based in Dahl Creek, and will move daily between Coldfoot or Dahl Creek and study areas. AIDEA anticipates that cultural resources field surveys will commence on approximately June 1, 2022, and will continue until the end of the season, approximately August 15, 2022.

In the 2022 field season, AIDEA is proposing to conduct cultural resource inventory and evaluation surveys on 38 project components located on State of Alaska lands (8 potential bridge locations, 11 potential primary material sites, and 19 potential secondary material sites), as listed in Table 1 and Table 2, and shown on maps in Appendix A.

Table 1. Ambler Access Project 2022 cultural resources fieldwork – bridge locations

Component	Map ID	PLSS*	USGS Quadrangle	Study Area Acreage
Large Bridge	LB1	SEC 24, T19N, R18E, KM	Survey Pass A-4	19.20
	LB2	SEC 28, T19N, R17E, KM	Survey Pass A-5	12.10
Medium Bridge	MB15	SEC 31, T19N, R16E, KM	Survey Pass A-5	9.74
Small Bridge	SB19	SEC 27, T19N, R15E, KM	Survey Pass A-6	3.54
	SB22	SEC 19, T19N, R15E, KM	Survey Pass A-6	3.04
	SB3	SEC 26, T19N, R17E, KM	Survey Pass A-5	3.93
	SB4	SEC 21, T19N, R18E, KM	Survey Pass A-4	3.25
	SB5	SEC 20, T19N, R18E, KM	Survey Pass A-4	3.22
SEC 21, T19N, R18E, KM				

*PLSS = Public Land Survey System. Sec = Section; T = Township; R = Range; KM = Kateel River Meridian

Table 2. Ambler Access Project 2022 cultural resources fieldwork – material sites

Component	Map ID	PLSS*	USGS Quadrangle	Study Area Acreage
Primary Material Site	PMS1	SEC 31, T20N, R27E, KM	Survey Pass A-1	31.03
	PMS10	SEC 31, T19N, R16E, KM	Hughes D-5	35.32

Component	Map ID	PLSS*	USGS Quadrangle	Study Area Acreage
			Survey Pass A-5	
		SEC 36, T19N, R15E, KM	Hughes D-5	
	PMS11	SEC 13, T19N, R18E, KM	Survey Pass A-4	39.34
		SEC 24, T19N, R18E, KM	Survey Pass A-4	
	PMS12	SEC 17, T20N, R9E, KM	Ambler River A-2	142.02
		SEC 18, T20N, R9E, KM	Ambler River A-2	
	PMS2	SEC 17, T19N, R23E, KM	Survey Pass A-2	43.28
		SEC 8, T19N, R23E, KM	Survey Pass A-2	
	PMS3	SEC 14, T26N, R13W, FM	Wiseman A-1	216.31
		SEC 15, T26N, R13W, FM	Wiseman A-1	
	PMS4	SEC 26, T26N, R14W, FM	Wiseman A-2	64.19
		SEC 35, T26N, R14W, FM	Wiseman A-2	
	PMS5	SEC 1, T25N, R16W, FM	Wiseman A-2	63.09
PMS6	SEC 21, T26N, R22W, FM	Wiseman A-5	77.47	
PMS7	SEC 12, T19N, R24E, KM	Survey Pass A-2	73.30	
PMS9	SEC 28, T19N, R13E, KM	Ambler River A-1	56.63	
Secondary Material Site	SMS1	SEC 27, T26N, R21W, FM	Wiseman A-5	41.32
		SEC 34, T26N, R21W, FM	Wiseman A-5	
	SMS10	SEC 27, T19N, R14E, KM	Survey Pass A-6	36.21
		SEC 28, T19N, R14E, KM	Survey Pass A-6	
	SMS11	SEC 8, T19N, R12E, KM	Ambler River A-1	27.56
		SEC 9, T19N, R12E, KM	Ambler River A-1	
	SMS12	SEC 9, T19N, R12E, KM	Ambler River A-1	30.07
	SMS13	SEC 7, T19N, R12E, KM	Ambler River A-1	60.19
		SEC 8, T19N, R12E, KM	Ambler River A-1	
	SMS15	SEC 2, T20N, R8E, KM	Ambler River A-3	56.16
	SMS16	SEC 28, T19N, R17E, KM	Survey Pass A-5	40.92
	SMS17	SEC 26, T19N, R16E, KM	Survey Pass A-5	28.92
	SMS18	SEC 26, T19N, R16E, KM	Survey Pass A-5	18.46
		SEC 34, T19N, R16E, KM	Survey Pass A-5	
		SEC 35, T19N, R16E, KM	Survey Pass A-5	
	SMS19	SEC 16, T26N, R24W, FM	Wiseman A-6	115.71
		SEC 17, T26N, R24W, FM	Wiseman A-6	
		SEC 20, T26N, R24W, FM	Wiseman A-6	
		SEC 21, T26N, R24W, FM	Wiseman A-6	
	SMS2	SEC 3, T19N, R26E, KM	Survey Pass A-1	74.63
	SMS20	SEC 12, T19N, R14E, KM	Survey Pass A-6	86.44
		SEC 13, T19N, R14E, KM	Survey Pass A-6	
SEC 18, T19N, R15E, KM		Survey Pass A-6		
SEC 7, T19N, R15E, KM		Survey Pass A-6		
SMS21	SEC 26, T19N, R13E, KM	Survey Pass A-6	81.92	
	SEC 27, T19N, R13E, KM	Survey Pass A-6		
SMS22	SEC 27, T26N, R14W, FM	Wiseman A-2	3.95	
	SEC 28, T26N, R14W, FM	Wiseman A-2		
SMS4	SEC 2, T19N, R25E, KM	Survey Pass A-1	50.91	
SMS6	SEC 20, T19N, R17E, KM	Survey Pass A-5	45.48	

Component	Map ID	PLSS*	USGS Quadrangle	Study Area Acreage
	SMS7	SEC 29, T19N, R17E, KM	Survey Pass A-5	43.61
		SEC 20, T19N, R15E, KM	Survey Pass A-6	
		SEC 29, T19N, R15E, KM	Survey Pass A-6	
	SMS8	SEC 20, T19N, R15E, KM	Survey Pass A-6	23.08
		SEC 21, T19N, R15E, KM	Survey Pass A-6	
		SEC 28, T19N, R15E, KM	Survey Pass A-6	
		SEC 29, T19N, R15E, KM	Survey Pass A-6	
	SMS9	SEC 26, T19N, R14E, KM	Survey Pass A-6	38.75
		SEC 27, T19N, R14E, KM	Survey Pass A-6	

*PLSS = Public Land Survey System. Sec = Section; T = Township; R = Range; KM = Kateel River Meridian; FM = Fairbanks Meridian

Typical cultural resources fieldwork will consist of teams hiking and walking the extent of the potential bridge crossing or material site in a patterned manner to identify surface features or artifacts, historic structures, trails, or other indications that historic or archaeological resources may be present in the area. In areas of known or suspected historic use, this will include the use of a metal detector in an attempt to locate concentrations of historic material. The crews will also inspect the terrain and conditions to determine if there are likely to be buried archaeological deposits within the area. If the area has the potential to have archaeological material, crews will excavate shovel tests, which consist of 50cm x 50cm (20in x 20in) pits dug with hand tools (e.g., small shovels and trowels). The dirt excavated is screened through a 0.25-inch hardware mesh onto a tarp to ensure that no artifacts are missed. The shovel tests are excavated until the archaeologist reaches bedrock, gravels, glacial till, or the limits of the hand tools (usually about 1 meter [3 feet]). Upon completion of the test, the crews document the soil stratigraphy and make notes and collect photos of the test and backfill all dirt from the tarp into the test hole and return the surface to its original grade.

If the crews identify a historic or archaeological site, they will document the site using field notes, forms, photographs, and GPS receivers. The type and size of an encountered site will determine the time and level of effort required to document it (e.g., a single surface artifact will take less time than a large historic mining camp). For subsurface archaeological sites, additional subsurface tests will be excavated in a systematic pattern to attempt to define preliminary boundaries of the site.

Collection and curation of artifacts and samples documented during the 2022 field survey will be conducted in accordance with the permits and agreement documents for the Project. The cultural resource team will obtain all necessary permits from landowners and regulators required for field investigations, which include the required agreements for long-term artifact curation at federal agency facilities and museums (e.g., National Park Service and University of Alaska Museum of the North).

The State of Alaska Office of History and Archaeology (OHA) and State Historic Preservation Officer (SHPO) are part of AIDEA's coordination effort. The Project's Programmatic Agreement (PA) has established the requirements for the management of historic and archaeological findings. As a PA signatory, the OHA and SHPO approved the collection and curation protocols in the PA, which the Project is required to follow.

Specifically, the cultural resource survey crews will follow the protocol outlined below:

- Subsurface Artifacts: Collect all cultural materials recovered from a shovel test, as well as charcoal associated with cultural contexts. Collect all hearth matrix (the entirety of ash/charcoal lenses or other subsurface features).
- Surface Artifacts at Prehistoric Sites: Only collect utilized or diagnostic tools, items of significant research value, artifacts that are necessary to assist with evaluating the NRHP eligibility of the site, or that are vulnerable to disturbance, loss or unauthorized collection. Collect obsidian artifacts for geochemical sourcing.
- Surface Artifacts at Historic Sites (1880 to 50 years before present): Collect items of significant research value, such as items associated with individuals' jewelry, carvings, etc.) or are vulnerable to disturbance, loss, or unauthorized collection.

Equipment used by the cultural resources inventory and evaluation survey teams include:

- Hand tools (e.g., shovels, entrenchment tools, trowels, root nippers, brushes)
- Screens for sifting excavated sediment
- Tarps
- Electronic equipment (GPS units, cameras, metal detectors, radios, satellite phones)
- Bear spray and firearm (managed by the bear guard)

Site Preparation and Landing Zones

Helicopter landing zones (LZs) are necessary to ensure safe access for Project personnel working in the field. Additionally, site preparations will need to be conducted at some locations where geotechnical drilling is proposed to allow room for the drill equipment (spread). Where targeted work sites are in areas of dense vegetation (tall shrubs, forests, etc.), vegetation clearing may be required to develop LZs and prepare drilling sites. Any vegetation clearing conducted in support of proposed activities (beyond incidental trimming of branches or small shrubs) will be conducted in the manner described below. Bird nest surveys will be conducted prior to any vegetation clearing.

LZs will be developed along the proposed road alignment to facilitate helicopter access in support of proposed fieldwork activities. LZ site selection will be based on terrain, vegetation, and necessary proximity to work areas. LZs will be spaced a reasonable walking distance apart, approximately every 0.8 to 1.2 miles along the proposed alignment. LZs will be located within the direct Area of Potential Effect (APE). LZs will be selected at sites classified as low potential for containing archaeological, historic, and/or ethnographic resources, to the extent practicable. The specific number and location of LZs will be determined in the field as necessary for the safety of Project crews and with respect to known culturally sensitive areas.

Additional site preparation will be required at most potential bridge sites, at potential material sites, and along the proposed alignment where geotechnical drilling is proposed in 2022-2023. Site preparation crews will be transported to the area via helicopter, which will land in an area as close as possible to targeted LZs and geotechnical drilling sites. Crews will access the work sites on foot.

Development of LZs and site preparation will begin in May to minimize potential impacts to the bird nesting season. Eagle, migratory bird, and raptor nest surveys will be conducted prior to vegetation clearing. Additional vegetation clearing may be conducted to prepare winter geotechnical drilling sites. No bird nest surveys will be required prior to vegetation clearing outside of all bird nesting seasons (after August 31 in the Project area).

Crews will consist of the following equipment and personnel:

- Two- to three-person crew of qualified personnel for vegetation clearing
- One qualified biologist will conduct nest surveys
- Site preparation will be conducted using hand tools and chainsaws

Where possible, LZs will be selected to minimize or eliminate the need for vegetation clearing. Where vegetation clearing is necessary for required safe rotor clearance, LZs will be developed to National Wildfire Coordinating Group (NWCG) specifications for safety circle dimensions required for the type of helicopter use expected¹. A safety circle is a zone that is free of obstructions on all sides of the helicopter touchdown area and is generally a minimum of 1.5 times the rotor diameter. The majority of LZs will be developed to Type 3 helicopter specifications, which require a minimum 75-ft diameter safety circle. Select LZs may be developed to Type 2 helicopter specifications which require a 90-ft safety circle for use by larger helicopters that may be utilized for geotechnical drilling. Preparation of the safety circle includes removal of vegetation to below 18 inches in height and the select removal of tall trees and brush on approach and departure paths leading to and from the LZ.

All chainsaws will be equipped with spark arrestors, and no disturbance of the ground or vegetative mat will be required. Cut brush and trees will be manually moved to the outside of the specified safety circle. If larger trees need to be felled within the safety circle, they will be limbed, and the trunks will be left on the ground (with no limbs extending above the 18-inch mark). For trees that need to be felled along the approach and departure paths, trees will be left on the ground as-is. Examples of developed LZs from a similar project are included as Photograph 3, Photograph 4, and Photograph 5.

¹ NWCG Standards for Helicopter Operations: <https://www.nwcg.gov/sites/default/files/publications/pms510.pdf>



Photograph 3. Example of helicopter landing zone.



Photograph 4. Example of ground conditions at helicopter landing zone.



Photograph 5. Example of helicopter landing zone.

Where possible, LZs will be co-located with geotechnical drilling sites to minimize vegetation clearing. The drill spread and personnel will require an area of approximately 25-ft by 50-ft (1,250 feet²) to be cleared of vegetation for work at each drill site. Efforts will be made to minimize the amount of clearing required at all locations. Cut trees and brush will be stacked at the edge of the clearing. Depending on locations, limited clearing may be required to set up the mobile camps.

Facilities Reconnaissance

Field investigations are planned to support, verify, and refine the roadway alignment for the Project. The objective of these activities is to collect sufficient data to establish project design criteria and advance preliminary engineering review. Facilities Reconnaissance is planned at 7 locations on State of Alaska lands, as shown in Table 3.

Table 3. Ambler Access Project 2022 facilities reconnaissance locations

Component	Map ID	PLSS*	USGS Quadrangle	Max. Work Area Acreage
Material Site	PMS11	SEC 24, T19N, R18E, KM	Survey Pass A-4	0.21
	PMS2	SEC 8, T19N, R23E, KM	Survey Pass A-2	0.21
	PMS3	SEC 15, T26N, R13W, FM	Wiseman A-1	0.21
	SMS16	SEC 28, T19N, R17E, KM	Survey Pass A-5	0.21
	SMS19	SEC 17, T26N, R24W, FM	Wiseman A-6	0.21
	SMS5	SEC 7, T19N, R24E, KM	Survey Pass A-2	0.21
	SMS6	SEC 29, T19N, R17E, KM	Survey Pass A-5	0.21

*PLSS = Public Land Survey System. Sec = Section; T = Township; R = Range; KM = Kateel River Meridian; FM = Fairbanks Meridian

Roadway Design

The Design team will conduct an initial roadway and bridge reconnaissance trip, focusing on visiting areas with identified geohazards, maximum grade areas, critical water crossings, and other terrain challenges. The typical reconnaissance team will consist of two to four engineers, who will perform reconnaissance overview flights and “boots on the ground” reconnaissance of areas of interest along the alignment. The first trip will be performed early in the season once snow clears, with additional trips possible throughout the field season as logistical support allows. These trips will typically be initiated from Coldfoot and are expected to take three to four days each.

Facility and Communication

The Facility and Communications team will perform a preliminary reconnaissance trip to investigate potential material sites for the location of proposed maintenance facilities and communication infrastructure and to refine geotechnical investigation field needs. The timeline of the field investigation aligns with the roadway design reconnaissance early in the season and is anticipated to be conducted by two geologists/engineers over a three-day period.

Aviation

The Aviation team plans to install one wind and weather data collection device at four potential airfield locations on State of Alaska lands (Table 4). Installation will be conducted by the Geotechnical team. The team plans to install 10-meter-tall, lattice structure towers, which will be secured with concrete footers or by driving rebar (similar to a survey control monument), utilizing duckbill stakes and/or threaded grounded anchors to steady as many as four guy wires per tower (Photograph 6). Concrete will be mixed in the field. Each tower is a three-legged pyramid, where each leg can rest on the stable ground. Wind and weather data collection devices will be placed to minimize ground disturbance. Equipment will remain in the field for one year. Collection of these data will inform the placement and orientation of potential airfields at proposed maintenance facility locations.

Table 4. Ambler Access Project 2022 wind and weather data collection locations

Component	Map ID	PLSS*	USGS Quadrangle
Wind and Weather Data Collection	WW_076_24	SEC 3, T26N, R24W, FM	Wiseman A-6
	WW_099_55	SEC 15, T19N, R24E, KM	Survey Pass A-2
	WW_147_04	SEC 29, T19N, R17E, KM	Survey Pass A-5
	WW_207_53	SEC 18, T20N, R9E, KM	Ambler River A-2

*PLSS = Public Land Survey System. Sec = Section; T = Township; R = Range; KM = Kateel River Meridian; FM = Fairbanks Meridian



Photograph 6. Example of wind and weather data collection tower.

Hydrologic and Hydraulic Investigations

Field investigation will assess hydrological and hydraulic (H&H) conditions to inform appropriate project design. A variety of hydrologic data will be collected, which are critical for the development of accurate hydraulic models and the basis for determining bridge design parameters, satisfying permitting requirements, and ensuring that project features do not alter natural drainage patterns. AIDEA plans to conduct H&H investigations at 15 locations on State of Alaska lands, as shown in Table 5, and on maps in Appendix A. This will include collecting spring breakup and monitoring data, establishing temporary gages, conducting detailed hydrology and hydraulics monitoring and assessments, fall wrap-up activities (e.g., removing temporary stream gages), and field observations at potential major and moderate culvert locations.

Table 5. Ambler Access Project 2022 H&H fieldwork – bridge locations

Component	Map ID	PLSS*	USGS Quadrangle	Study Area Acreage
Large Bridge	LB1	SEC 24, T19N, R18E, KM	Survey Pass A-4	14
	LB11	SEC 31, T26N, R19W, FM	Wiseman A-4	30
	LB2	SEC 28, T19N, R17E, KM	Survey Pass A-5	12
	LB4	SEC 2, T19N, R25E, KM	Survey Pass A-1	19
	LB6	SEC 32, T19N, R13E, KM	Ambler River A-1	21
	LB8	SEC 9, T19N, R26E, KM	Survey Pass A-1	17
Medium Bridge	MB1	SEC 3, T19N, R26E, KM	Survey Pass A-1	4
	MB10	SEC 13, T19N, R12E, KM	Ambler River A-1	4
	MB11	SEC 12, T26N, R24W, FM	Wiseman A-6	4

Component	Map ID	PLSS*	USGS Quadrangle	Study Area Acreage
	MB12	SEC 7, T19N, R24E, KM	Survey Pass A-2	15
	MB15	SEC 31, T19N, R16E, KM	Survey Pass A-5	10
	MB2	SEC 12, T20N, R8E, KM	Ambler River A-3	6
	MB4	SEC 33, T26N, R22W, FM	Wiseman A-5	4
	MB6	SEC 29, T19N, R14E, KM	Survey Pass A-6	5
	MB9	SEC 32, T19N, R13E, KM	Ambler River A-1	13

*PLSS = Public Land Survey System. Sec = Section; T = Township; R = Range; KM = Kateel River Meridian; FM = Fairbanks Meridian

The anticipated schedule for the H&H tasks is as follows:

- Pre-spring breakup activities are planned for two weeks beginning early May 2022; spring breakup monitoring is planned for two weeks beginning mid-May.
- Establishment of temporary stream gages at potential bridge crossings for the 2022 summer and fall field season are planned for two weeks beginning early June.
- Detailed H&H monitoring and assessments are planned for approximately seven weeks beginning mid-July.
- Fall wrap-up activities are planned for approximately two weeks beginning mid-September.
- Observations at proposed major and moderate culvert locations will take place throughout the field season as logistics for other activities allow.
- Pre-spring breakup activities for 2023 are planned for approximately two weeks beginning early May 2023; spring breakup monitoring is planned for approximately two weeks beginning mid-April 2023.

2022 Spring Breakup Setup and Monitoring

Spring breakup activities are planned to begin in May to support mid-May monitoring. Spring breakup monitoring will focus on characterizing breakup and ice jamming, particularly on the east side of the alignment. Observations will include, but are not limited to, daily alignment flights, observing pre-breakup snowpack and the presence and magnitude of overflow (aufeis), breakup progression, flood extents, presence and extents of ice floes and jams, active erosion, and general flood conveyance pathways, as well as ice thickness measured through a 2-inch-diameter hole drilled through the ice (Photograph 7).



Photograph 7. Drilling through ice using a 2-inch auger.

To monitor river water levels and the progress of breakup, the team will deploy two temporary in-river pressure transducers (pressure sensors) prior to breakup at potential bridge locations. Temporary pressure transducers will be anchored using weights (Photograph 8) or attached to the base of brush and/or trees using hose clamps (Photograph 9); equipment will be marked with high-visibility flagging. All equipment and flagging will be removed at the end of the field season.



Photograph 8. Pressure sensor anchored using weight.



Photograph 9. Pressure sensor anchored to tree.

Additional equipment will be deployed as needed to measure discharge at large bridge crossings as dictated by flood conditions and where safety allows. Discharge will typically be measured using boat mounted or tethered acoustic doppler current profilers (ADCPs; Photograph 10 and Photograph 11).

Discharge measurements are used to validate indirect discharge estimates and for stage-discharge curve development.



Photograph 10. Boat-mounted Acoustic Doppler current profilers.



Photograph 11. Tethered Acoustic Doppler current profilers.

2022 Establishing Temporary Summer/Fall Stream Gages

To measure summer/fall flow water levels after spring breakup, temporary hydrologic gaging stations will be established in early June and will remain in place for the duration of the 2022 field season, anticipated to be three months or less, at which point gage equipment will be removed prior to freeze-up in September. Equipment will include temporary staff gages and temporary in-river pressure transducers and may include field (game) cameras. Two temporary pressure transducers and field cameras may be installed at sites to obtain water gradient data for indirectly computing discharge.

Temporary staff gages will be mounted to T-posts or trees using hose clamps (Photograph 12) and will be marked with high-visibility flagging; all equipment and flagging will be removed at the end of the field season.



Photograph 12. Staff gage mounted on T-post driven into ground.

Survey equipment (tripods, levels, and stadia rods) will be used to tie gaged water surface elevations to temporary benchmarks or permanent control if available (Photograph 13). Temporary benchmarks will

consist of nails driven into the trunk or roots of mature trees (e.g., black spruce or cottonwood) (Photograph 14). Two temporary benchmarks will be placed at each hydrologic gage station.



Photograph 13. Survey level, tripod, and rod.



Photograph 14. Temporary benchmark nail in tree.

H&H investigations will consist of the following equipment and personnel:

Personnel:

- One crew will typically include one hydrologist and one bridge/hydraulic engineer
- One H&H crew will conduct spring breakup, gage installation, and fall wrap-up activities
- Two H&H crews will perform detailed field assessments at potential bridge locations

Equipment:

- Tools (e.g., sledgehammers, post drivers, handheld drills, 2-inch auger, shovel)
- Pressure transducers (sensors)
- Acoustic Doppler current profilers (ADCPs; e.g., boat-mounted, tethered, handheld) and associated accessories and/or other current meters and wading rods
- Inflatable boat with outboard and accessories (e.g., oars/paddles, fuel tank, inflatable pump, tool and patch kit)
- Gage setup components (e.g., T-posts, rebar, hose clamps, staff gage plates, anchor weights, field (game) cameras)
- Survey equipment (e.g., level, rod, tripod, tape measure, nails, flagging)
- Field laptop computers and/or tablets, notebooks, pens and pencils
- GPS units, cameras
- Cellular and satellite phones, handheld radios
- PPE and safety equipment appropriate for H&H activities (e.g., PFDs, eye wear, ear protection (for helicopter-related activities), gloves, first aid kits, appropriate footwear and clothing, emergency safety/survival bag, throw bags)

2022 Detailed Monitoring and Assessments

Hydrological monitoring will be conducted at these potential bridge crossing locations with temporary gage stations. Activities will typically include photo documentation of site conditions and measuring stream flow either by boat mounted or tethered ADCPs, or by wading (depending on the size of the crossing) and reading staff gages.

Detailed H&H monitoring and assessments for gages will involve measuring stream discharge (flow) in conjunction with surveying water levels, characterizing stream channels, and determining streambed characteristics needed for accurate hydraulic modeling. Characterizing stream channels largely involves visual inspection, measuring features with a rod or tape measure, note keeping, and photography.

2022 Fall Wrap-Up

Starting in mid-September 2022, field crews will conduct the final topographic surveys for 2022 at each gaging location, perform fall discharge and stage measurements, and retrieve pressure transducers.

Land Surveys (Hydraulic, Right-of-Way, and Landownership Surveys)

The 2022 survey plan includes survey of potential bridge crossings, potential material sites, land ownership boundaries, runways and approach paths at the four potential airfields, and water bodies along the Project alignment, including those areas where the Project alignment crosses State of Alaska lands. Activities will also establish survey control throughout the corridor to support future field crews and contractors to accurately locate proposed design features.

Survey activities across the entire Project alignment are planned to begin in mid-May and last for approximately 4 months, with three crews of up to four people. The boundary survey teams will progress from east to west along the alignment. Survey crews will be flown to work locations via helicopter. For sites where an inflatable boat is needed, gear will need to be slung via helicopter. It is anticipated that crews will stage out of Coldfoot from mid-May through early July, and out of Dahl Creek or Bornite for the remainder of the 2022 survey work along the alignment.

Land survey work will include the following equipment:

- Real-time kinematic GPS equipment
- Global navigation satellite system equipment
- Tripods and range poles
- Post-hole diggers, shovels, machetes, drills, hammers, post monuments, posts, grout, lath, and flagging
- Hydrographic survey equipment
- Inflatable boat with outboard and accessories (e.g., oars/paddles, fuel tank, inflatable pump, tool and patch kit)
- Field laptop computers and/or tablets, cameras, notebooks, pens and pencils
- Cellular and satellite phones, handheld radios
- Personal protective equipment (PPE) and safety equipment appropriate for survey activities (e.g., eye wear, ear protection [for helicopter-related activities], gloves, first aid kits, appropriate footwear and clothing, emergency safety/survival bag, personal flotation devices [PFDs], throw bags)

All survey equipment will be transported to the field at the start of the day and will be removed at the end of the day. Aside from primary and secondary control monuments, which will be set with caps flush or close to flush with the ground, no equipment will be left in the field. Primary control monuments will be a brass tablet grouted into bedrock or a 2.5-inch post monument with cap (Photograph 15 and Photograph 16). Secondary control monuments will be spikes or 5/8-inch by 30-inch rebar with aluminum caps (Photograph 17 and Photograph 18). An example of land surveyors in the field is shown in Photograph 19.

Land survey activities at potential bridge locations will include bathymetric (in-water) surveys across the river channels to collect riverbed elevation data and may include collection of topographic (e.g., elevations, features such as vegetation boundaries and stream banks) data at key sites. Surveyors will also survey the ordinary high-water mark (the average annual high-water elevation for a stream/river).



Photograph 15. Example of primary control monument (brass tablet grouted into bedrock).



Photograph 16. Example of primary control monument (post monument with cap).



Photograph 17. Example of secondary control monument (spike).



Photograph 18. Example of secondary control monument (rebar with aluminum cap).



Photograph 19. Examples of land surveyors in the field.

Fish Habitat Studies

AIDEA has retained the services of the Alaska Department of Fish and Game (ADF&G) to conduct fish habitat studies for the Project in 2022. ADF&G biologists will collect data regarding fish habitat and water quality, fish species present, or critical spawning areas. These data will inform AIDEA's approach for culvert and bridge design and will clarify potential permitting requirements.

Fish habitat studies are proposed to occur at 84 locations on State of Alaska lands along the Project between approximately milepost (MP) 53 and MP 211, as shown in Table 6. Sampling locations are shown on maps in Appendix A.

Table 6. Ambler Access Project 2022 fish habitat fieldwork

Component	Survey Site No.	PLSS*	USGS Quadrangle
Stream Crossing	Site 24	SEC 31, T26N, R21W, FM	Wiseman A-5
	Site 25	SEC 31, T26N, R21W, FM	Wiseman A-5
	Site 26	SEC 34, T26N, R22W, FM	Wiseman A-5
	Site 27	SEC 33, T26N, R22W, FM	Wiseman A-5
	Site 28	SEC 28, T26N, R22W, FM	Wiseman A-5
	Site 29	SEC 13, T26N, R23W, FM	Wiseman A-6
	Site 30	SEC 13, T26N, R23W, FM	Wiseman A-6
	Site 31	SEC 14, T26N, R23W, FM	Wiseman A-6
	Site 32	SEC 11, T26N, R23W, FM	Wiseman A-6
	Site 33	SEC 15, T26N, R23W, FM	Wiseman A-6
	Site 34	SEC 15, T26N, R23W, FM	Wiseman A-6
	Site 35	SEC 10, T26N, R23W, FM	Wiseman A-6
	Site 36	SEC 9, T26N, R23W, FM	Wiseman A-6
	Site 37	SEC 9, T26N, R23W, FM	Wiseman A-6
	Site 38	SEC 8, T26N, R23W, FM	Wiseman A-6
	Site 39	SEC 7, T26N, R23W, FM	Wiseman A-6
	Site 40	SEC 12, T26N, R21W, FM	Wiseman A-5
	Site 41	SEC 11, T26N, R24W, FM	Wiseman A-6
	Site 42	SEC 31, T20N, R27E, KM	Survey Pass A-1
	Site 43	SEC 1, T19N, R26E, KM	Survey Pass A-1
	Site 44	SEC 3, T19N, R26E, KM	Survey Pass A-1
	Site 45	SEC 10, T19N, R26E, KM	Survey Pass A-1
	Site 46	SEC 9, T19N, R26E, KM	Survey Pass A-1
	Site 47	SEC 9, T19N, R26E, KM	Survey Pass A-1
	Site 48	SEC 4, T19N, R26E, KM	Survey Pass A-1
	Site 49	SEC 2, T19N, R25E, KM	Survey Pass A-1
	Site 50	SEC 9, T19N, R25E, KM	Survey Pass A-1
	Site 51	SEC 8, T19N, R25E, KM	Survey Pass A-1
	Site 52	SEC 7, T19N, R25E, KM	Survey Pass A-1
	Site 53	SEC 11, T19N, R24E, KM	Survey Pass A-2
	Site 54	SEC 15, T19N, R24E, KM	Survey Pass A-2
	Site 55	SEC 9, T19N, R24E, KM	Survey Pass A-2
	Site 56	SEC 9, T19N, R24E, KM	Survey Pass A-2
	Site 57	SEC 8, T19N, R24E, KM	Survey Pass A-2

Component	Survey Site No.	PLSS*	USGS Quadrangle
	Site 58	SEC 7, T19N, R24E, KM	Survey Pass A-2
	Site 59	SEC 12, T19N, R23E, KM	Survey Pass A-2
	Site 60	SEC 12, T19N, R23E, KM	Survey Pass A-2
	Site 61	SEC 12, T19N, R23E, KM	Survey Pass A-2
	Site 62	SEC 12, T19N, R23E, KM	Survey Pass A-2
	Site 63	SEC 11, T19N, R23E, KM	Survey Pass A-2
	Site 64	SEC 11, T19N, R23E, KM	Survey Pass A-2
	Site 65	SEC 11, T19N, R23E, KM	Survey Pass A-2
	Site 66	SEC 10, T19N, R23E, KM	Survey Pass A-2
	Site 67	SEC 9, T19N, R23E, KM	Survey Pass A-2
	Site 68	SEC 18, T19N, R23E, KM	Survey Pass A-2
	Site 69	SEC 18, T19N, R23E, KM	Survey Pass A-2
	Site 81	SEC 24, T19N, R18E, KM	Survey Pass A-4
	Site 82	SEC 14, T19N, R18E, KM	Survey Pass A-4
	Site 83	SEC 21, T19N, R18E, KM	Survey Pass A-4
	Site 84	SEC 21, T19N, R18E, KM	Survey Pass A-4
	Site 85	SEC 25, T19N, R17E, KM	Survey Pass A-5
	Site 86	SEC 26, T19N, R17E, KM	Survey Pass A-5
	Site 87	SEC 26, T19N, R17E, KM	Survey Pass A-5
	Site 88	SEC 22, T19N, R17E, KM	Survey Pass A-5
	Site 89	SEC 22, T19N, R17E, KM	Survey Pass A-5
	Site 90	SEC 21, T19N, R17E, KM	Survey Pass A-5
	Site 91	SEC 28, T19N, R17E, KM	Survey Pass A-5
	Site 92	SEC 30, T19N, R17E, KM	Survey Pass A-5
	Site 93	SEC 30, T19N, R17E, KM	Survey Pass A-5
	Site 94	SEC 25, T19N, R16E, KM	Survey Pass A-5
	Site 95	SEC 25, T19N, R16E, KM	Survey Pass A-5
	Site 96	SEC 25, T19N, R16E, KM	Survey Pass A-5
	Site 97	SEC 26, T19N, R16E, KM	Survey Pass A-5
	Site 98	SEC 26, T19N, R16E, KM	Survey Pass A-5
	Site 99	SEC 27, T19N, R16E, KM	Survey Pass A-5
	Site 100	SEC 27, T19N, R16E, KM	Survey Pass A-5
	Site 101	SEC 31, T19N, R16E, KM	Survey Pass A-5
	Site 102	SEC 36, T19N, R15E, KM	Survey Pass A-6
	Site 103	SEC 27, T19N, R15E, KM	Survey Pass A-6
	Site 104	SEC 20, T19N, R15E, KM	Survey Pass A-6
	Site 105	SEC 19, T19N, R15E, KM	Survey Pass A-6
	Site 106	SEC 28, T19N, R14E, KM	Survey Pass A-6
	Site 107	SEC 29, T19N, R14E, KM	Survey Pass A-6
	Site 108	SEC 30, T19N, R14E, KM	Survey Pass A-6

Component	Survey Site No.	PLSS*	USGS Quadrangle
	Site 109	SEC 32, T19N, R13E, KM	Ambler River A-1
	Site 111	SEC 18, T19N, R13E, KM	Ambler River A-1
	Site 112	SEC 13, T19N, R12E, KM	Ambler River A-1
	Site 113	SEC 14, T19N, R12E, KM	Ambler River A-1
	Site 114	SEC 11, T19N, R12E, KM	Ambler River A-1
	Site 137	SEC 13, T20N, R8E, KM	Ambler River A-3
	Site 138	SEC 12, T20N, R8E, KM	Ambler River A-3
	Site 139	SEC 12, T20N, R8E, KM	Ambler River A-3
	Site 140	SEC 11, T20N, R8E, KM	Ambler River A-3
	Site 141	SEC 2, T20N, R8E, KM	Ambler River A-3

*PLSS = Public Land Survey System. Sec = Section; T = Township; R = Range; KM = Kateel River Meridian; FM = Fairbanks Meridian

Field teams will travel by helicopter to field sampling locations and travel between locations by foot when terrain, time, and field conditions allow. Teams would be retrieved by helicopter and returned to camp, which would be either Coldfoot (for sites between approximately MP 58 and MP 130) or Dahl Creek Camp (for sites between approximately MP 137 and MP 211).

A helicopter-supported program is planned for field investigations to take place during July and August 2022. The targeted field sampling sites are planned to require two teams for 10 days. ADF&G will manage and execute the fish habitat studies. A single ADF&G crew will consist of two ADF&G biologists. Equipment to be used for the fish habitat studies include fish traps and electrofishing backpacks.

Methods for conducting these studies will depend on several factors including type of habitat, volume of flow, and seasonality of target species. Typical fieldwork involves pedestrian movements along and/or in waterways and the installation of temporary equipment (e.g., fish traps). Trapping, if employed, may involve staking traps to the waterbody substrate or bank if the stream is very narrow.

Since some streams are too small to be visible on satellite imagery, aerial surveys will be used to determine if additional crossing locations need to be assessed for fish presence. Additionally, some of these sites may be ephemeral streams with no connection to downstream water bodies; however, they will be visited. Other ephemeral streams in this area are known to support populations of Arctic grayling that spawn in spring when the water is high; the young rear in the wetlands complexes and likely leave in fall during high rainfall events.

At each of the sampling sites, photographs and visual observations will be recorded and juvenile fish sampling will be conducted with baited minnow traps and/or backpack electrofishing. Minnow traps will be fished for up to 24 hours. All captured fish will be identified, measured, and released. Large drainages will also be examined for the presence of mature fish by angling and/or visual survey by helicopter.

Wetlands Investigations

Wetlands investigations for summer 2022 includes evaluation of the easternmost 50 miles of the Project corridor for either the presence or the extent of wetlands and waters (streams, rivers, ponds, lakes). This study area includes State of Alaska lands crossed by the Project alignment. The results of the

fieldwork will support the engineering teams' ability to avoid and minimize impacts on wetlands and waters during Project design development.

The goals of the wetlands investigation are as follows:

- Determine wetland status of the vegetation communities within the proposed corridor;
- Record streams, rivers, ponds, and lakes encountered within the proposed corridor;
- Record invasive species, if found;
- Record sensitive plant species, if found; and
- Record incidental wildlife information, including raptor nests.

Daily work locations will be determined in the field based on field conditions and weather. The wetlands study area is shown on the maps in Appendix A.

Field crews are expected to travel by helicopter from Coldfoot to the study area. A field crew will typically cover 1–1.5 miles of road corridor per day, depending on terrain and objectives. Field crews will be flown to a location near the start of their daily assigned stretch of the route and will then walk along the proposed corridor to a predetermined LZ for pickup at the end of the day.

It is anticipated that four two-person field crews will be based out of Coldfoot for one 9-day field event between July and late September, within the growing season for the Project area. Each field crew will consist of a team lead (Professional Wetland Scientist or Wetland Professional in Training) and an environmental scientist.

At each wetland determination location, the team will use a 16-inch-blade sharpshooter (Photograph 20) shovel to dig a soil pit approximately 24 inches deep and approximately 12 to 24 inches wide (Photograph 21 and Photograph 22). The organic mat will be cut and placed to the side, with care taken to maintain the cohesiveness of the material as a plug. The soil will be removed and placed on a tarp or equivalent. After soils have been categorized, the excavated material will be placed back in the pit and tamped down, and the organic plug will be replaced (Photograph 23 and Photograph 24). Plant species, vegetation cover, and hydrology indications will be observed to support data collection and wetland delineation process. Photographic and visual data will be recorded throughout the area. Approximately four full wetland determinations will be made per mile. In the proposed 50-mile corridor, approximately 250 wetland determination plots may be advanced. No material of any kind will be left in the field during the fieldwork; soil pits will be excavated, categorized, photographed, and refilled before the team moves to their next target site.

In addition to soil data, plant species within a 0.1-acre plot centered on the soil pit will be listed, and associated percentage cover of the vegetation within the plot will be recorded. Vegetation communities will be listed for each site based on the Alaska Vegetation Classification. If a species is unknown to the team, a sample will be collected and identified at the field camp using taxonomic references. If a sensitive species is identified in the field, a sample will be collected, pressed, and sent to botanical experts at the University of Alaska for confirmation.

Hydrology indicators, such as surface water, water-stained leaves, and evidence of flooding, will also be noted; this effort is limited to documenting visual observations. Data will be collected at streams, ponds, lakes, and rivers as encountered during the field investigation. Rivers and streams provide the information necessary to determine connectivity of the wetlands and waters within the corridor.

Because the wetland teams will conduct fieldwork on foot, they will also document waters flowing through the corridor that may or may not be seen on aerial imagery, topographic maps, or National Hydrography Mapping. Stream data will be shared with the design team to assist in culvert/bridge design.



Photograph 20. A 16-in. blade sharpshooter field shovel.



Photograph 21. Upland soil pit.



Photograph 22. Wetland soil pit.



Photograph 23. Ground surface before digging soil pit.



Photograph 24. Ground surface after soil pit.

Geophysical Surveys and Probing

Geophysical surveys and probing are planned to be conducted along the entire proposed Project alignment. Surface geophysical surveys will be advanced to characterize subsurface conditions and attempt to differentiate ice-rich and ice-poor soils, while probing will generate cross sections of the alignment corridor which will then be used to expand upon the geotechnical borehole and thermistor data. Data collected from these activities will further inform Project design.

Summer geophysical surveys are expected to be based along the eastern end of the alignment. Specific geophysical survey locations will depend on camp space (offsite), helicopter availability, and ground cover/vegetation. Summer geophysical surveys are planned for 10 days in early- through mid-August, with a 10-day winter program in early- through mid-February if summer survey results warrant additional survey needs. Potential winter geophysical surveys would start at either end of the alignment and work towards the middle.

Probing is planned for intermittent locations along the length of the proposed alignment. Probing is planned to begin in early August and last for approximately 14 days. Specific dates of geophysical surveys and probing activities will be determined closer to summer Project mobilization. Geophysical surveys will be performed by a two-person crew, and probing will be conducted by two or three two-person crews. The number of crews deployed will depend on available personnel.

Geophysical surveys are nondestructive and noninvasive, and do not require ground-disturbing activity. Geophysical surveys will be conducted using hand-carried geophysical data collection instruments (Photograph 25). Hand auguring and probing will be conducted along the sections during the summer survey to obtain ground-truth for calibrating the data. Where possible, alignment boreholes will be advanced within the geophysical profile and used for ground-truth in place of hand auguring. Expected ground disturbance area for probing is approximately 3 inches, and cuttings will be used to backfill the holes.

Probing will be performed using hand probes and the depth to refusal, surface soil conditions, and GPS coordinates of each probe will be recorded. Probing sections will be taken approximately every 100 ft. or when changes in surface conditions, vegetation, or ponding are observed. No soil samples will be taken, and no brush clearing will be performed.



Photograph 25. Geophysical data collection instrument being hand-carried by single user (photo credit: Fugro).

Geotechnical Drilling

Geotechnical drilling for the 2022 season (summer 2022 through April 2023) will support collection of physical data to inform appropriate Project design. Information gathered during the geotechnical drilling program will facilitate the characterization of subsurface conditions of the riverine environment, as well as the general soil characteristics along the proposed road alignment; that information will also support the evaluation of bridge locations, provide type and site information for facility and airstrip development, and facilitate assessment of the viability of potential material sites. The geotechnical drilling program will include installation of thermistor wells in select boreholes, which will be left in place. The objectives for the general geotechnical characterization also include the identification of subsurface thermal regime and permafrost, possible bedrock, and soil type. The planned field activities do not include any construction or placement of gravel fill. No permanent footprint is associated with this activity.

Investigations in 2022 are proposed at 33 potential material sites and 29 potential bridge locations (see Table 7 and Table 8, respectively), and as shown on maps in Appendix A.

Table 7. Ambler Access Project 2022 geotechnical drilling – material sites

Component	Map ID	PLSS*	USGS Quadrangle	Max. Work Area Acreage
Primary Material Site	PMS1	SEC 31, T20N, R27E, KM	Survey Pass A-1	0.21
	PMS10	SEC 31, T19N, R16E, KM	Hughes D-5	0.21
		SEC 36, T19N, R15E, KM	Hughes D-5	
	PMS11	SEC 13, T19N, R18E, KM	Survey Pass A-4	0.21
		SEC 24, T19N, R18E, KM	Survey Pass A-4	
	PMS12	SEC 17, T20N, R9E, KM	Ambler River A-2	0.21
		SEC 18, T20N, R9E, KM	Ambler River A-2	
	PMS2	SEC 17, T19N, R23E, KM	Survey Pass A-2	0.21

Component	Map ID	PLSS*	USGS Quadrangle	Max. Work Area Acreage
	PMS3	SEC 8, T19N, R23E, KM	Survey Pass A-2	0.21
		SEC 14, T26N, R13W, FM	Wiseman A-1	
		SEC 15, T26N, R13W, FM	Wiseman A-1	
	PMS4	SEC 26, T26N, R14W, FM	Wiseman A-2	0.21
		SEC 35, T26N, R14W, FM	Wiseman A-2	
	PMS5	SEC 1, T25N, R16W, FM	Wiseman A-2	0.21
	PMS6	SEC 21, T26N, R22W, FM	Wiseman A-5	0.21
	PMS7	SEC 12, T19N, R24E, KM	Survey Pass A-2	0.21
	PMS9	SEC 28, T19N, R13E, KM	Ambler River A-1	0.21
Secondary Material Site	SMS1	SEC 27, T26N, R21W, FM	Wiseman A-5	0.21
		SEC 34, T26N, R21W, FM	Wiseman A-5	
	SMS10	SEC 27, T19N, R14E, KM	Survey Pass A-6	0.21
		SEC 28, T19N, R14E, KM	Survey Pass A-6	
	SMS11	SEC 8, T19N, R12E, KM	Ambler River A-1	0.21
		SEC 9, T19N, R12E, KM	Ambler River A-1	
	SMS12	SEC 9, T19N, R12E, KM	Ambler River A-1	0.21
	SMS13	SEC 7, T19N, R12E, KM	Ambler River A-1	0.21
		SEC 8, T19N, R12E, KM	Ambler River A-1	
	SMS15	SEC 2, T20N, R8E, KM	Ambler River A-3	0.21
	SMS16	SEC 28, T19N, R17E, KM	Survey Pass A-5	0.21
	SMS17	SEC 26, T19N, R16E, KM	Survey Pass A-5	0.21
	SMS18	SEC 26, T19N, R16E, KM	Survey Pass A-5	0.21
		SEC 34, T19N, R16E, KM	Survey Pass A-5	
		SEC 35, T19N, R16E, KM	Survey Pass A-5	
	SMS19	SEC 16, T26N, R24W, FM	Wiseman A-6	0.21
		SEC 17, T26N, R24W, FM	Wiseman A-6	
		SEC 20, T26N, R24W, FM	Wiseman A-6	
		SEC 21, T26N, R24W, FM	Wiseman A-6	
	SMS2	SEC 3, T19N, R26E, KM	Survey Pass A-1	0.21
	SMS20	SEC 12, T19N, R14E, KM	Survey Pass A-6	0.21
		SEC 13, T19N, R14E, KM	Survey Pass A-6	
		SEC 18, T19N, R15E, KM	Survey Pass A-6	
		SEC 7, T19N, R15E, KM	Survey Pass A-6	
	SMS21	SEC 26, T19N, R13E, KM	Survey Pass A-6	0.21
		SEC 27, T19N, R13E, KM	Survey Pass A-6	
	SMS22	SEC 27, T26N, R14W, FM	Wiseman A-2	0.21
		SEC 28, T26N, R14W, FM	Wiseman A-2	
	SMS3	SEC 3, T19N, R26E, KM	Survey Pass A-1	0.21
	SMS30	SEC 24, T26N, R17W, FM	Wiseman A-3	0.21
SEC 25, T26N, R17W, FM		Wiseman A-3		

Component	Map ID	PLSS*	USGS Quadrangle	Max. Work Area Acreage
	SMS4	SEC 2, T19N, R25E, KM	Survey Pass A-1	0.21
	SMS5	SEC 7, T19N, R24E, KM	Survey Pass A-2	0.21
	SMS6	SEC 20, T19N, R17E, KM	Survey Pass A-5	0.21
		SEC 29, T19N, R17E, KM	Survey Pass A-5	
	SMS7	SEC 20, T19N, R15E, KM	Survey Pass A-6	0.21
		SEC 29, T19N, R15E, KM	Survey Pass A-6	
	SMS8	SEC 20, T19N, R15E, KM	Survey Pass A-6	0.21
		SEC 21, T19N, R15E, KM	Survey Pass A-6	
		SEC 28, T19N, R15E, KM	Survey Pass A-6	
		SEC 29, T19N, R15E, KM	Survey Pass A-6	
	SMS9	SEC 26, T19N, R14E, KM	Survey Pass A-6	0.211
		SEC 27, T19N, R14E, KM	Survey Pass A-6	

*PLSS = Public Land Survey System. Sec = Section; T = Township; R = Range; KM = Kateel River Meridian; FM = Fairbanks Meridian

Table 8. Ambler Access Project 2022 geotechnical drilling – bridge locations

Component	Map ID	PLSS*	USGS Quadrangle	Max. Work Area Acreage
Large Bridge	LB1	SEC 24, T19N, R18E, KM	Survey Pass A-4	0.11
	LB11	SEC 31, T26N, R19W, FM	Wiseman A-4	0.11
	LB2	SEC 28, T19N, R17E, KM	Survey Pass A-5	0.11
	LB4	SEC 2, T19N, R25E, KM	Survey Pass A-1	0.11
	LB5	SEC 5, T25N, R16W, FM	Wiseman A-3	0.11
	LB6	SEC 32, T19N, R13E, KM	Ambler River A-1	0.11
	LB8	SEC 9, T19N, R26E, KM	Survey Pass A-1	0.11
Medium Bridge	MB1	SEC 3, T19N, R26E, KM	Survey Pass A-1	0.11
	MB10	SEC 13, T19N, R12E, KM	Ambler River A-1	0.11
	MB11	SEC 12, T26N, R24W, FM	Wiseman A-6	0.11
	MB12	SEC 7, T19N, R24E, KM	Survey Pass A-2	0.11
	MB15	SEC 31, T19N, R16E, KM	Survey Pass A-5	0.11
		SEC 11, T20N, R8E, KM	Ambler River A-3	
	MB2	SEC 12, T20N, R8E, KM	Ambler River A-3	0.11
		SEC 33, T26N, R22W, FM	Wiseman A-5	
	MB4	SEC 33, T26N, R22W, FM	Wiseman A-5	0.11
	MB6	SEC 29, T19N, R14E, KM	Survey Pass A-6	0.11
MB9	SEC 32, T19N, R13E, KM	Ambler River A-1	0.11	
Small Bridge	SB1	SEC 12, T20N, R8E, KM	Ambler River A-3	0.07
	SB12	SEC 15, T26N, R13W, FM	Wiseman A-1	0.07
		SEC 22, T26N, R13W, FM	Wiseman A-1	
	SB15	SEC 14, T26N, R13W, FM	Wiseman A-1	0.07
	SB16	SEC 10, T19N, R23E, KM	Survey Pass A-2	0.07

Component	Map ID	PLSS*	USGS Quadrangle	Max. Work Area Acreage
	SB17	SEC 29, T26N, R17W, FM	Wiseman A-3	0.07
	SB19	SEC 27, T19N, R15E, KM	Survey Pass A-6	0.07
	SB2	SEC 11, T26N, R24W, FM	Wiseman A-6	0.07
	SB21	SEC 24, T26N, R17W, FM	Wiseman A-3	0.07
	SB22	SEC 19, T19N, R15E, KM	Survey Pass A-6	0.07
	SB3	SEC 26, T19N, R17E, KM	Survey Pass A-5	0.07
	SB4	SEC 21, T19N, R18E, KM	Survey Pass A-4	0.07
	SB5	SEC 20, T19N, R18E, KM	Survey Pass A-4	0.07
		SEC 21, T19N, R18E, KM	Survey Pass A-4	
	SB9	SEC 2, T25N, R21W, FM	Wiseman A-5	0.07
SEC 3, T25N, R21W, FM		Wiseman A-5		

*PLSS = Public Land Survey System. Sec = Section; T = Township; R = Range; KM = Kateel River Meridian; FM = Fairbanks Meridian

Summer activities are planned to occur between June and September 2022 and winter drilling in February and March 2023. Depending on the drill site, one or two drill shifts per day are proposed.

Anticipated personnel associated with each drill spread per shift include:

- One driller
- One driller helper
- One engineer/logger
- A mechanic/driller helper will move between drill spreads as needed
- One observer
- One bear guard
- TBD: Cultural resources monitor and tribal liaison, based on cultural resources survey finding

Drilling equipment used for borings may include:

- Sonic, air rotary, or auger drill
- Core penetrating test (CPT) drill

Up to four drill spreads will be utilized at any given time. The type of drill used at each location will depend on the conditions encountered; sonic drills are used for coring rock and both frozen and unfrozen soil; air rotary drills are used if the sonic drill is unable to penetrate a soil layer. All drills produce a hole less than 8 inches in diameter (Photograph 26), and there is no functional difference in drilling methods between the sonic, auger, air rotary, and CPT drills in terms of environmental impacts.

Drilling crews and drills will be transported by helicopter to the work locations, and helicopters will be used to move drills between sites and from one side of a waterbody to the other at bridge sites during open water conditions. Drills, winter camps, and fuel will be transported to the Project area via tracked vehicles during winter. Helicopter support with slung equipment will be used as needed during winter. A list of equipment for geotechnical investigation is listed in Table 9. Drilling equipment weight is provided in Table 10.

Table 9. Summary of equipment for geotechnical investigations

Equipment	Quantity
Drill	1
Air Compressor	1
Tent camp or sleigh – number of units to be decided. Sleep, mess, and hygiene units	TBD
Snow Machine	2
Helicopter support for drill picks, fuel support, and crew transport	

Table 10. Weight of drilling equipment

Equipment		Estimated weight per pick (lbs)
Drill	Tracked frame & 120-foot drill steel	4,863
	Main body	4,960
	Mast	5,200

Specific borehole locations for geotechnical drilling will be determined in the field based on site conditions. In-channel boreholes will only be drilled in the winter in frozen conditions. Boreholes located onshore or upland may be drilled either during the winter or summer.

Borings at the potential small bridge and potential material sites will be advanced to a depth of 50 and 150 feet below ground surface, respectively. In frozen ground, 10-ft cores will be collected; in unfrozen ground sonic cores will be advanced at 5-ft intervals with standard penetrometer test blow counts. Frozen cores may be transported and frozen off-site for logging or classification, while unfrozen samples will be field classified, with only representative samples collected and taken off-site. Drill cuttings will be replaced back into the borehole, with any remaining cuttings spread at the surface surrounding the hole (Photograph 27).

Water will only be withdrawn if soil and drilling conditions require. Water will be transported to a storage tank at the drill site by pump and hose to aid in advancement of drill through rock or heaving soils to approximately 100 feet below ground.



Photograph 26. Example of completed boring.



Photograph 27. Example of post-boring area.

Thermistor wells may be installed at potential bridge and proposed roadway alignment boring locations within State of Alaska lands to collect thermal data at depth over time. Wells will be constructed of 1-inch-diameter Schedule 80 polyvinyl chloride (PVC) pipe. The space between PVC pipe and borehole wall will be backfilled with imported, clean dry sand. Some thermistor wells will be equipped with a full-length digital thermal cable (DTC) installed with sensors at 2-foot intervals. In stream thermistors will be flagged to help prevent any hazards. DTCs will be connected to on-site data loggers, with data transmitted by telemetry to Anchorage or collected and stored locally using a “torpedo” data logger for manual download. Dataloggers will be mounted to Unistrut posts and denoted with reflective delineators. GPS coordinates will be recorded at each thermistor well (Photograph 28 and Photograph 29).



Photograph 28. Example of installed thermistor well, DTC, and datalogger.



Photograph 29. Example of installed thermistor well, DTC, and datalogger.

Thermistor wells will remain in place for a minimum of 1 year but may stay in place through the design phase of the Project. When removed, the PVC pipe will be cut at or below the ground surface as deep as practicable; dataloggers, support structures, and DTCs will be removed. Expected permafrost conditions at drill sites may freeze below-ground PVC in place, prohibiting complete removal of the thermistor wells. The remaining PVC will be covered with surrounding soils and tamped into place.

Geotechnical Drilling Site Access and Logistics

Summer Transport

During summer, the investigation crew and drills will be transported by helicopter to the work locations. Helicopters will be used to move drills between sites, and from one side of a waterbody to the other at bridge sites during open water conditions. The sonic drills to be used are track-mounted and will typically move between boreholes at each site without requiring helicopter transport.

Winter Transport and Overland Travel

Winter access will be by tracked over-snow vehicles, snowmachine, and helicopter support with slung equipment as needed.

The anticipated approach for the winter geotechnical drilling program will be to dedicate one drill spread for the potential large and medium bridge crossings and one drill spread for the potential small bridge crossings and proposed alignment sites, with the possibility for each drill location to be supported by a remote camp. Drilling will begin on the west end of the alignment and move east.

During winter, the investigation crew, drills, and camp will be transported overland along rivers and tundra where vegetation, terrain, and snow cover allow. To prevent damage to vegetation and underlying substrate, winter overland travel will only occur after a minimum of 6 inches of snow exists on the ground and the ground is frozen. Winter overland travel will be utilized as much as possible for safety and cost reasons associated with reducing the reliance on helicopters. Winter overland travel will include routes along the western and eastern ends of the proposed alignment for site access. Existing

Bureau of Land Management (BLM) trails and any existing infrastructure (such as ice roads) in the area (see maps in Appendix A) will be utilized to the extent practicable for site access. The actual overland routes will be within the indirect APE and run adjacent to or along the proposed road alignment to the extent practicable, or along rivers running parallel to the alignment to reduce tundra travel. Actual overland routes will depend on snowpack, ice thickness, terrain, and vegetation type. No vegetation clearing is anticipated to facilitate winter overland travel.

Mobilization of the winter program will occur from Coldfoot and Bornite. Personnel and some equipment will be flown to the Dahl Creek airstrip and Coldfoot. Drills, winter camps, and fuel will be transported to the Project area via tracked vehicles. Drilling units will be assembled on ski sleds or tracked trailers. Winter camps will be assembled on tracked trailers. Approximately four tracked vehicles are anticipated to be used to transport drill rigs. The vehicle models have yet to be determined but may include Case Steiger, PistenBully, Hagglund, or Prinoth tracked vehicles and a Hagglund articulated tracked vehicle. Tracked vehicles and trailers exert less than four pounds per square inch of ground pressure and have been extensively used in tundra environments during winter travel to minimize disturbance or damage to the vegetation under the snowpack.

An example of a mobile drill caravan is shown on Photograph 30, though the example is of a drill sled being pulled on a flexible sleigh by a Case Steiger tractor. Due to expected deeper snow conditions and terrain requirements in the Project area, a PistenBully or Prinoth tracked vehicle will likely be used, and track-mounted trailers will be pulled instead of the sleighs shown. The PistenBully and Prinoth tracked vehicles are shown in Photograph 31 and Photograph 32, respectively.



Photograph 30. Example of winter mobile drill caravan.



Photograph 31. Example of PistenBully tracked vehicle.



Photograph 32. Example of Prinoth tracked vehicle.

A stationary fuel tank at the Dahl Creek airstrip will be refilled by aircraft delivery and used as the filling station for the mobile resupply tank for drill sites and remote camps. One approximately 1,200-gallon mobile resupply double-walled tank will be loaded on a skid and pulled by tracked vehicle along the established drill caravan trail to supply the camp and drilling operations (Photograph 30).

During drilling activities snowmachines will be used to transport personnel between boreholes and to and from the adjacent remote camp. River ice at crossing locations will be evaluated for thickness using GPR, drills, and ice augers to verify that it can safely support the weight of the drill and sleds for travel to the opposite side of the river.

Geotechnical Drilling Temporary Remote Camps

Temporary remote field camps typically consist of less than 24 personnel and in place for fewer than 14 days. Temporary camps would be constructed of light soft-wall tents and designed to minimize local area impacts. These camps would be used when helicopter commute times become excessive, and work

would be concentrated in a small area for several days. Field camps used for geotechnical drilling are typically expected to consist of fewer than 12 personnel for fewer than seven days per location.

Remote camps will be mobilized from Bettles or Coldfoot in advance of the drilling equipment and personnel. Camps will be supported by additional crew members transported by ground (snowmobiles based in Bettles) and air (helicopters based in Coldfoot). The two camps will be rotated between the drill sites as the investigation advances along the alignment.

Summer camps will consist of camping style dome tents or similar and be supported via helicopter. Camps will typically be sited on upland terrain adjacent to work areas and would be installed for the minimum duration of time needed. Photograph 33 shows a typical summer camp layout.



Photograph 33. Typical summer camp layout.

Camp infrastructure will be sufficient to complete the work in the immediate area before demobilizing or moving to the next location. Power will be provided by small gasoline generator. Heat, if required, will be provided by small propane heaters installed in the tents. Camp staff will include a wilderness guide and cook. No bulk storage of fuel or supplies will be directly associated with the proposed camp. Water and food will be flown in via helicopter, and all trash will be removed from site and disposed of in designated landfills or other permitted waste disposal sites. Human waste will be disposed of in pit privies and buried prior to camp demobilization.

The winter field camps will be 16-person temporary remote camps staged on a fabricated trailer with snow skis or tracks. Four skids or trailers would be equipped with sleeper tents; the caravan would also include a modern spike kitchen tent, washroom, and generator trailer with toilets, sinks, and shower stalls, 1,000-gallon potable water tank, a skid for supplies, and a waste disposal unit. An example of the winter tent camp transported by trailer for use as winter remote camps is shown in Photograph 34. Footprints of the camp trailers will be approximately 10 ft. by 25 ft.; overall camp footprints would be approximately 100 ft. by 150 ft.



Photograph 34. Example of winter tent camp to be transported by trailer and used for personnel at remote winter camps.

All tents will have an auxiliary heat source, either propane or oil stoves. Potable water for drinking will be delivered during regular helicopter-based resupply. Latrine facilities will be portable outhouses/shelters with human waste collected for off-site disposal. Electricity will be provided via portable gasoline generators and a temporary distribution network to the tents. Non-burnable garbage and any hazardous waste will be transported off-site for proper disposal. Camp staff will include a camp manager, medic, and cook. Winter camps will be supported by a combination of snowmobiles and helicopters, as appropriate.

After completion of camp use, all tents and related infrastructure will be immediately removed.

Fuel Management

Due to the frequent use of helicopters and fuel-powered drilling equipment to support activities planned for the 2022 field season, storage, transport, and refueling activities are planned. Fuel will be transported by helicopter to proposed geotechnical locations in portable 119-gallon double-walled “fly tanks” for storage of diesel and/or Jet A fuel. Up to five 119-gallon fuel tanks would be stored in double-walled containers with at least 110 percent containment at each proposed geotechnical drill site (see Table 7 and Table 8).

Winter geotechnical drilling will require remote camps, which may be established on State of Alaska lands, up to five 119-gallon fuel tanks would be stored in double-walled containers with at least 110 percent containment, to provide five days’ worth of fuel for the camp facilities.

Portable fuel cans (5- or 15-gallon capacity) will be used for generators, camp snowmachines, and will accompany the H&H crews and land survey crews, as needed. Camp heating fuel will be provided by portable propane tanks.

Fuel storage and transfers will be conducted in accordance with all applicable regulatory requirements. Fueling procedures include spill management practices such as drip-plan placement under parked vehicles and placement of vinyl liners with foam dikes under all valves or connections to fuel tanks. Spills of any size are cleaned and evaluated to improve spill prevention procedures. If a spill occurs, the crew will immediately stop work and evaluate the situation. The release will be reported, and the contaminated snow will be removed for disposal. No fuel transfer will occur on river ice. All fuel will be stored upland.

A fuel cache site is planned again at the previously disturbed Sun Camp Airstrip (MTRS: K19N17E028, USGS Survey Pass A-5; map on page 21 in Appendix A). Sun Camp Airstrip is located on State of Alaska land. Fuel storage for the 2022 field season will include storage for not more than five 119-gallon tanks. All tanks will be removed at the end of the field season. Alaska Department of Natural Resources (ADNR) permit approval was received on August 15, 2021. The associated ADNR Land Use Permit # LAS 33785 is valid through August 14, 2026.

Minimization Efforts to Protect Archaeological or Historic Resources During the Proposed Fieldwork

The proposed 2022/2023 fieldwork activities described herein (with the exception of geotechnical drilling) pose a low likelihood of adversely affecting archaeological or historic resources and potential historic properties. These types of proposed activities have a very low likelihood of resulting in direct adverse effects due to the limited fieldwork footprint associated with these activities; that they do not significantly alter the natural conditions of the area or introduce intrusive visual, atmospheric, or auditory elements; and that they are temporary in nature and duration.

AIDEA proposes to minimize the potential for direct adverse effects resulting from these low likelihood activities by implementing a Cultural Resources specific Contractor Training Program prior to deployment of all field personnel. AIDEA's Contractor Training outlines the responsibilities of Project field personnel and their obligations and reporting requirements in the event of an inadvertent discovery to ensure the protection of archaeological or historic resources and potential historic properties during the course of their work.

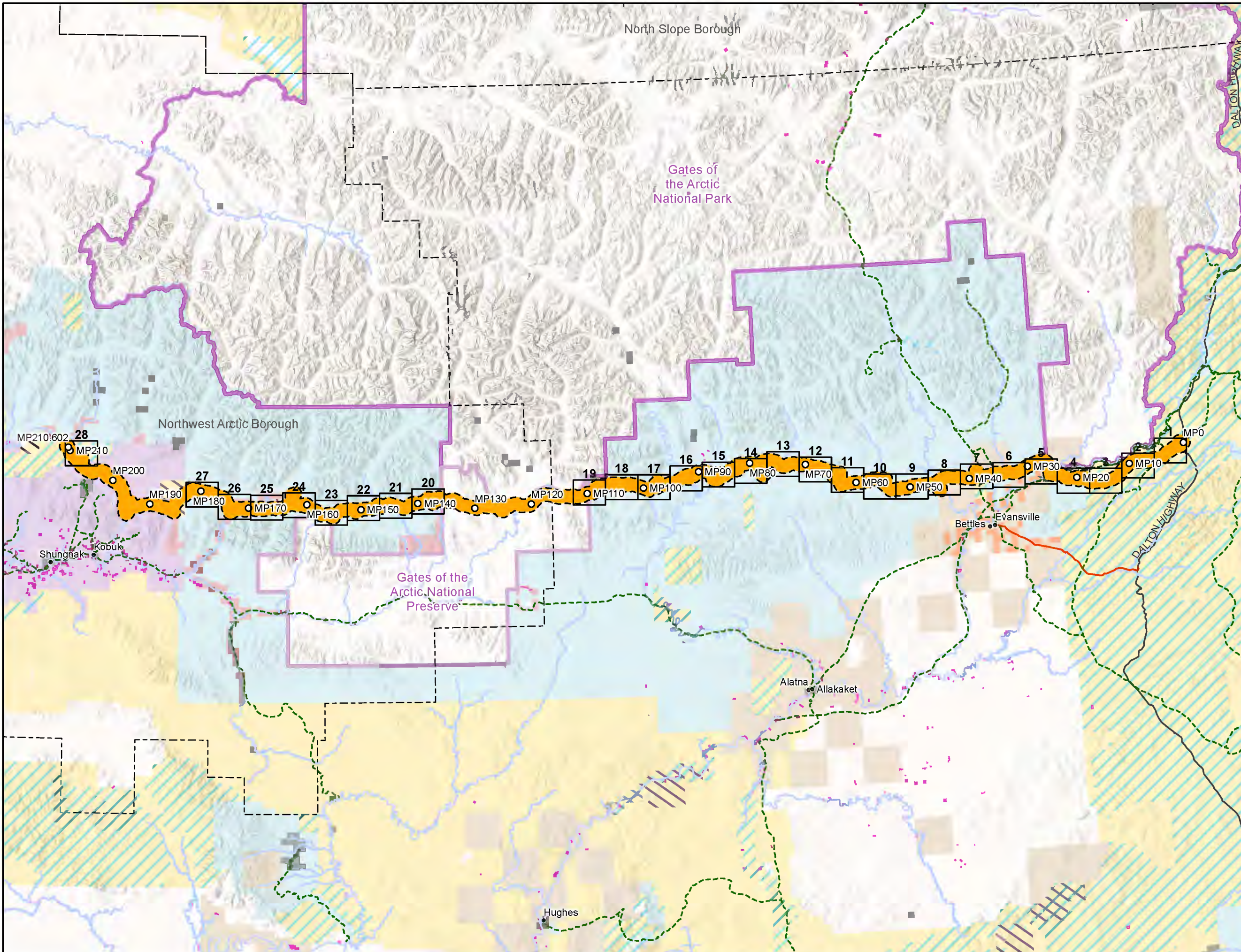
Regarding the proposed 2022/2023 geotechnical drilling, AIDEA will minimize the potential for direct adverse effects to archaeological or historic resources by implementing the Cultural Resources specific Contractor Training. In addition, AIDEA's cultural resource consultants will be conducting field inventories in advance of geotechnical drilling as part of the 2022 field season to identify the locations of archaeological or historic resources and potential historic properties. In areas where cultural resource field inventories are negative, no mitigation measures will be necessary. In areas where field inventories are positive (e.g., archaeological or historic resources identified) or where inventory not yet been conducted, AIDEA will employ a combination of cultural resources monitoring and identified resource avoidance (as necessary) during geotechnical drilling to minimize the potential for direct adverse effects to identified archaeological or historic resources and potential historic properties. AIDEA will coordinate with the Office of History and Archaeology (OHA) to confirm adequate avoidance buffers and appropriate cultural resource monitoring protocols and procedures, and AIDEA will submit to OHA a summary report describing the results of all inventory and monitoring/avoidance mitigation measures after 2022 inventory fieldwork is concluded.

Current or Pending Approvals

Depending on the activities, the following permits or approvals will be requested prior to initiation of any 2022 field activities based on jurisdiction:

- ADNR Land Use Permit
- ADNR State Cultural Resource Investigation Permit (SCRIP)
- ADNR Temporary Water Use Authorization for water withdrawal
- ADF&G Fish Habitat Permit for water withdrawal

Appendix A: Maps – Proposed Fieldwork Activities



LEGEND

- Page Index
- RS2477 Trails
- Bettles Ice Road

Project Features

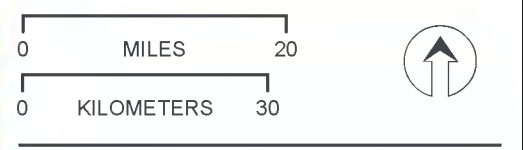
- Mile Posts
- Indirect APE

Land Manager/Owner

- Native Allotment
- Northwest Arctic Borough
- Private
- NANA Selected Land
- State Selected
- Village of Evansville
- Doyon
- NANA
- State
- Bureau of Land Management
- Gates of the Arctic National Park
- Gates of the Arctic National Preserve
- Borough Boundary

*H&H field observations, land survey, probing, and geophysical work will happen intermittently along the proposed alignment throughout the field season

	Spring (May – June 2022)	Summer (June – August 2022)	Fall (September – November 2022)
LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			

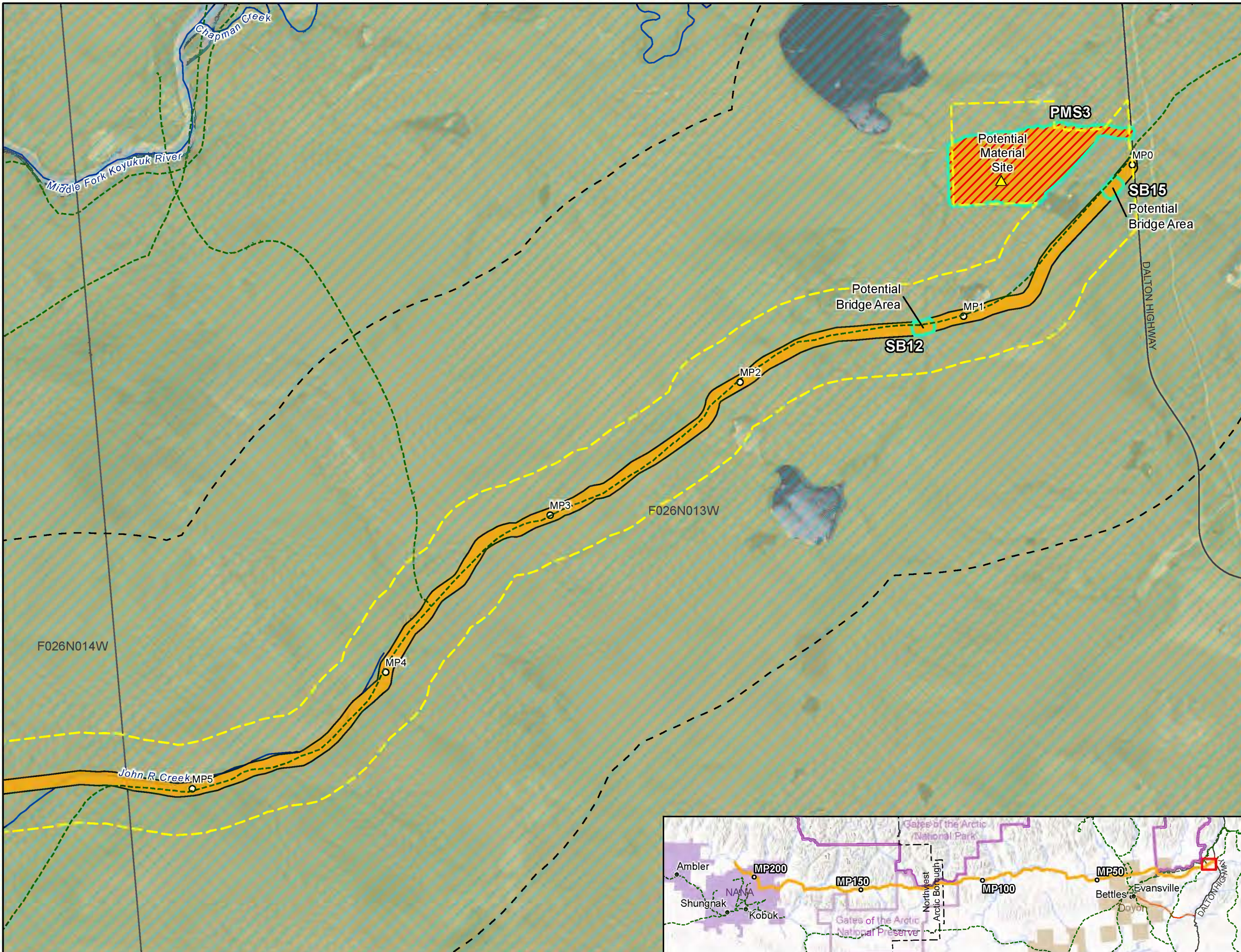


2022 ADNR LAND USE PERMIT APPLICATION

PROPOSED ACTIVITIES OVERVIEW

AMBLER ACCESS PROJECT

FIGURE 1
Date: 4/7/2022



LEGEND

Project Features

- Mile Posts
- Direct APE
- Indirect APE
- Streams (USGS NHD)
- RS2477 Trails

Land Manager/Owner

- State Selected
- Bureau of Land Management

Proposed Activities

- Wetlands Study Area
- Facilities Reconnaissance
- Geotechnical Investigations
- 2022 Cultural Resources Activity

*H&H field observations, land survey, probing, and geophysical work will happen intermittently along the proposed alignment throughout the field season

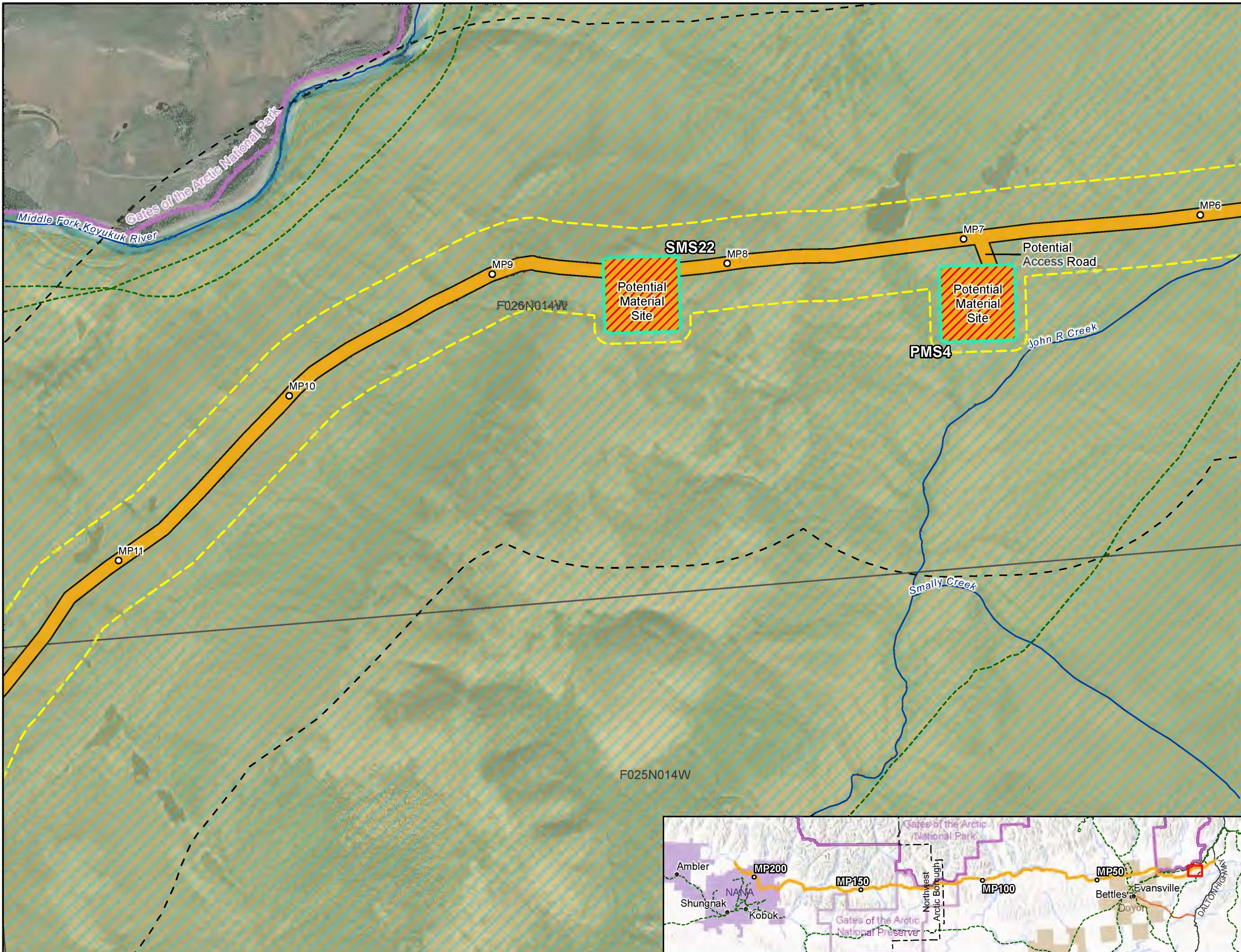
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LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES



AMBLER ACCESS PROJECT



LEGEND

Project Features

- Mile Posts
- ▭ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)
- - - RS2477 Trails

Land Manager/Owner

- ▭ State Selected
- ▭ Bureau of Land Management
- ▭ Gates of the Arctic National Park

Proposed Activities

- ▭ Wetlands Study Area
- ▭ Geotechnical Investigations
- ▭ 2022 Cultural Resources Activity

*H&H field observations, land survey, probing, and geophysical work will happen intermittently along the proposed alignment throughout the field season

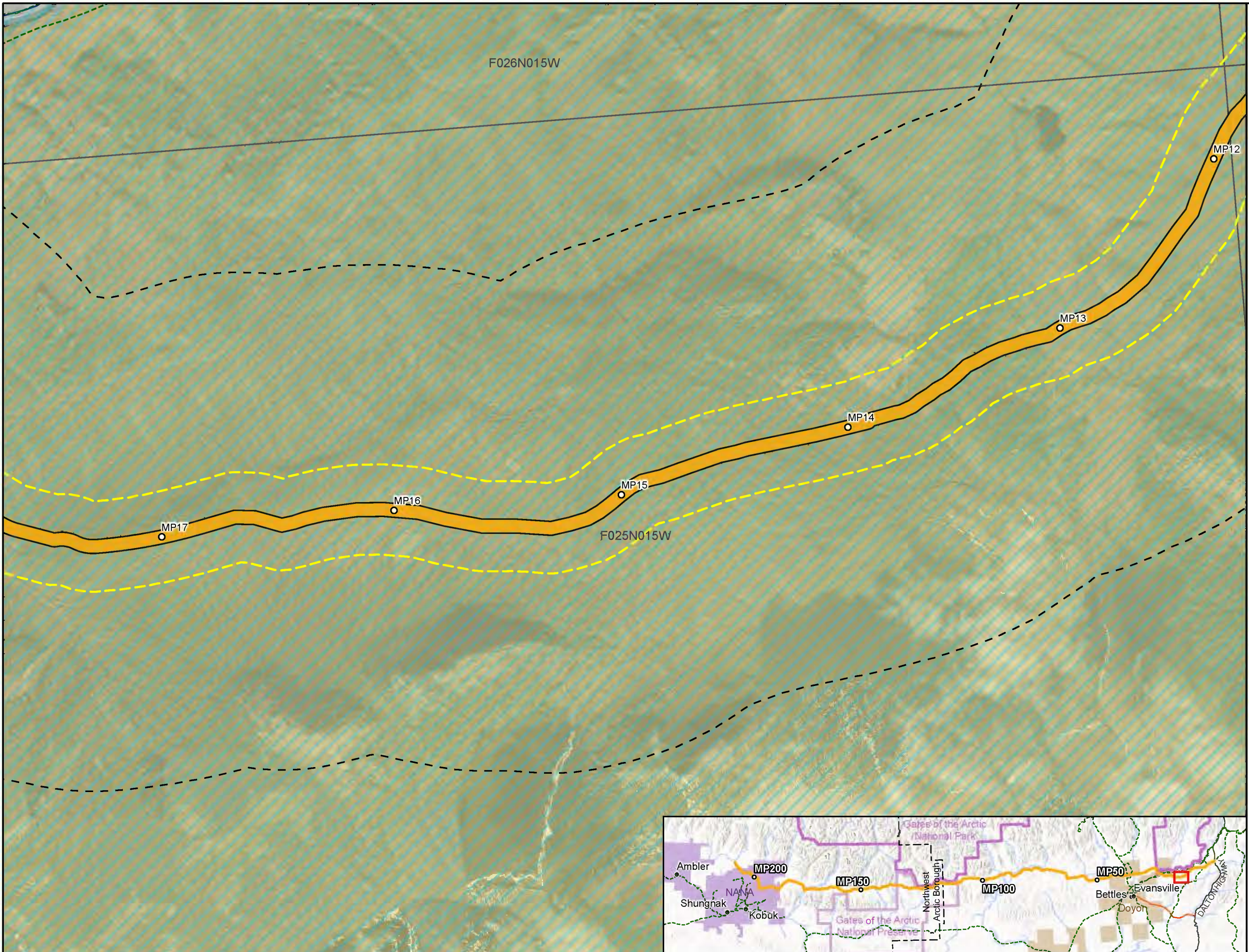
	Spring (May – June 2022)	Summer (June – August 2022)	Fall (September – November 2022)
LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES



AMBLER ACCESS PROJECT



LEGEND

Project Features

- Mile Posts
- ▬ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)
- - - RS2477 Trails

Land Manager/Owner

- ▨ State Selected
- ▨ Bureau of Land Management

Proposed Activities

- ▨ Wetlands Study Area

*H&H field observations, land survey, probing, and geophysical work will happen intermittently along the proposed alignment throughout the field season

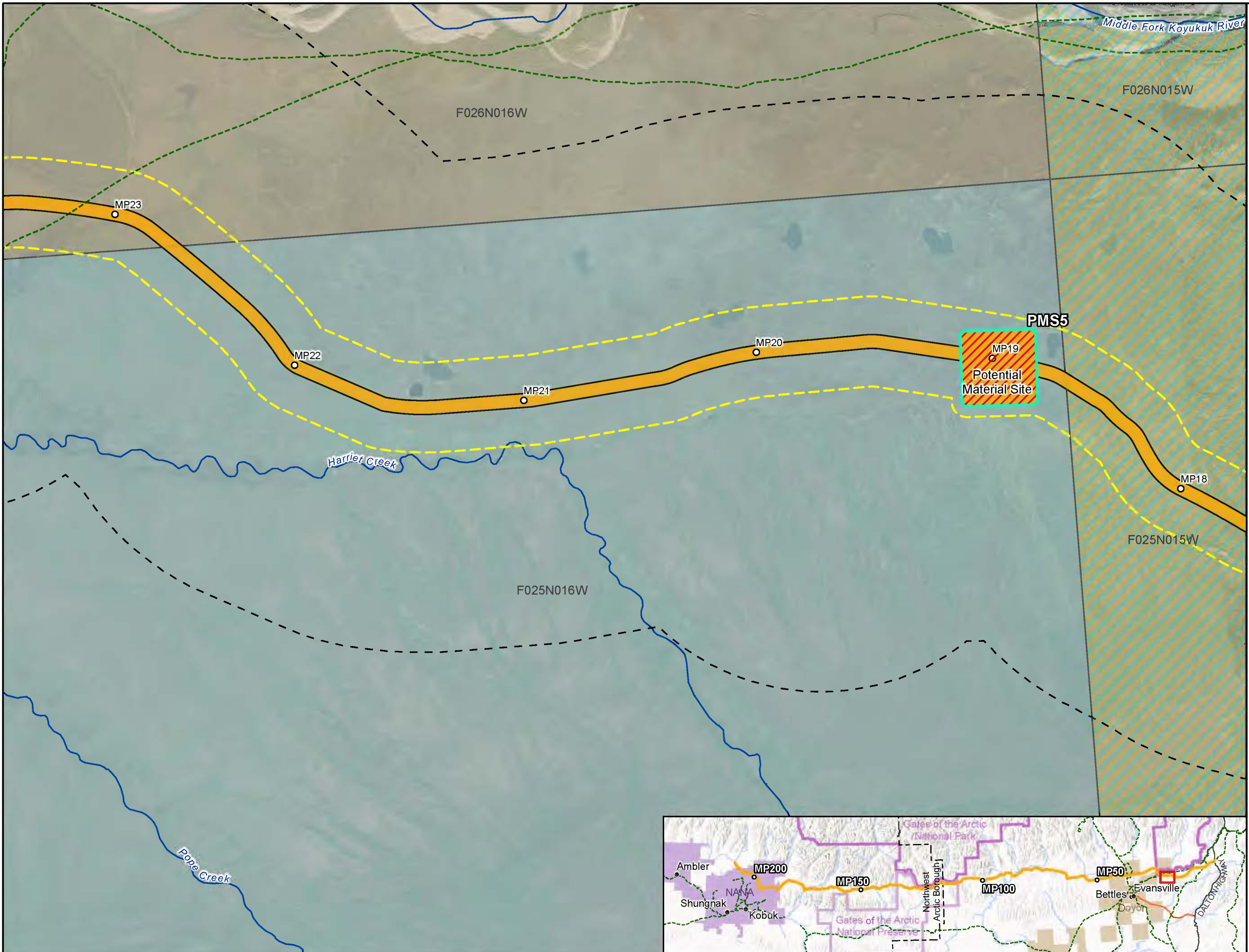
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LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNRL LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- Direct APE
- Indirect APE
- Streams (USGS NHD)
- RS2477 Trails

Land Manager/Owner

- State Selected
- Doyon
- State
- Bureau of Land Management

Proposed Activities

- Wetlands Study Area
- Geotechnical Investigations
- 2022 Cultural Resources Activity

*H&H field observations, land survey, probing, and geophysical work will happen intermittently along the proposed alignment throughout the field season

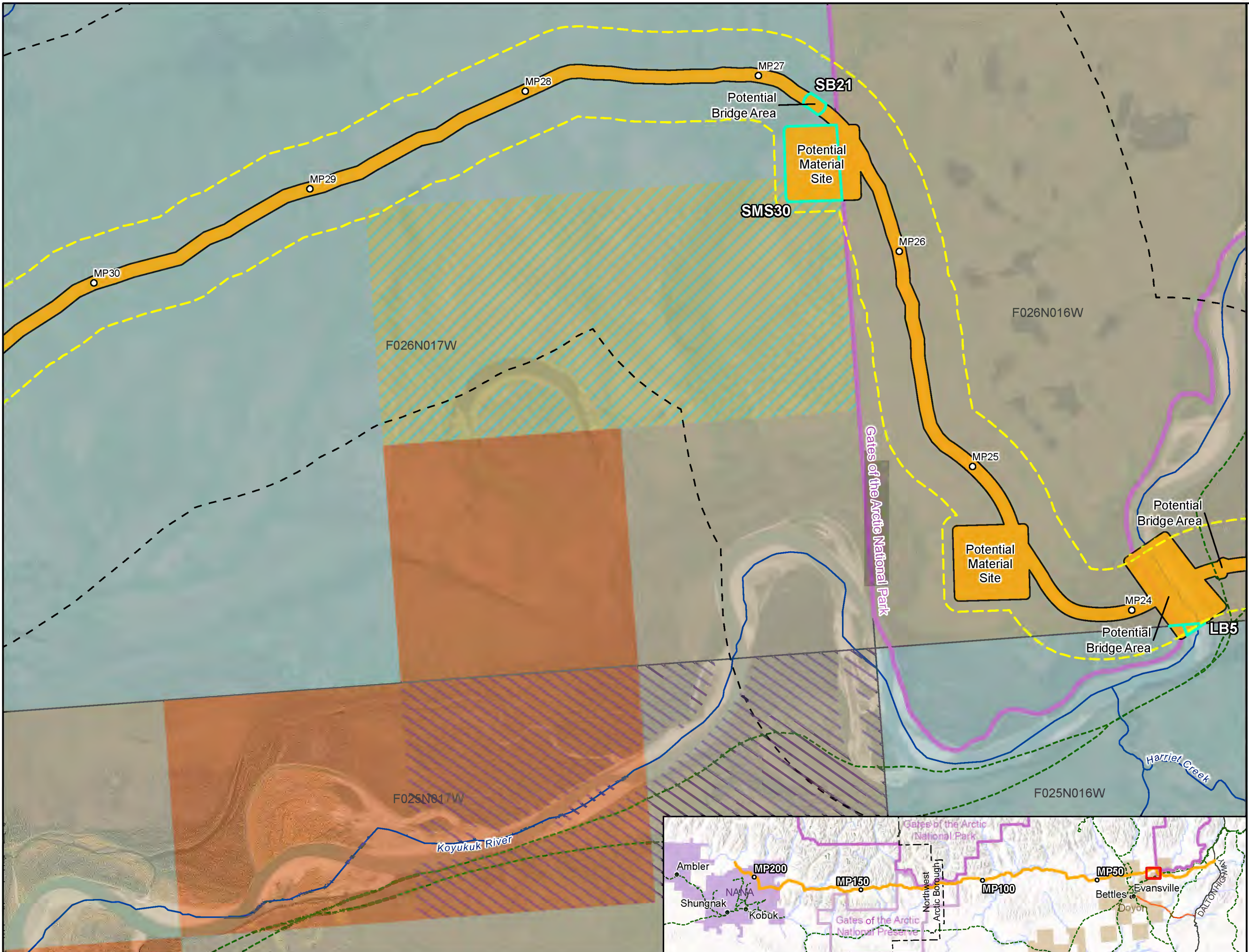
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Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▭ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)
- - - RS2477 Trails

Land Manager/Owner

- ▨ NANA Selected Land
- ▨ State Selected
- ▨ Village of Evansville
- ▨ Doyon
- ▨ State
- ▨ Bureau of Land Management
- ▨ Gates of the Arctic National Park

Proposed Activities

- ▭ Wetlands Study Area
- ▭ Geotechnical Investigations

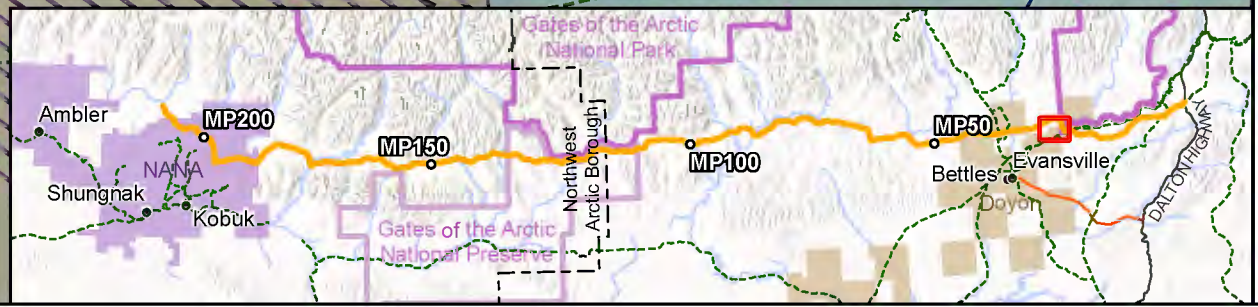
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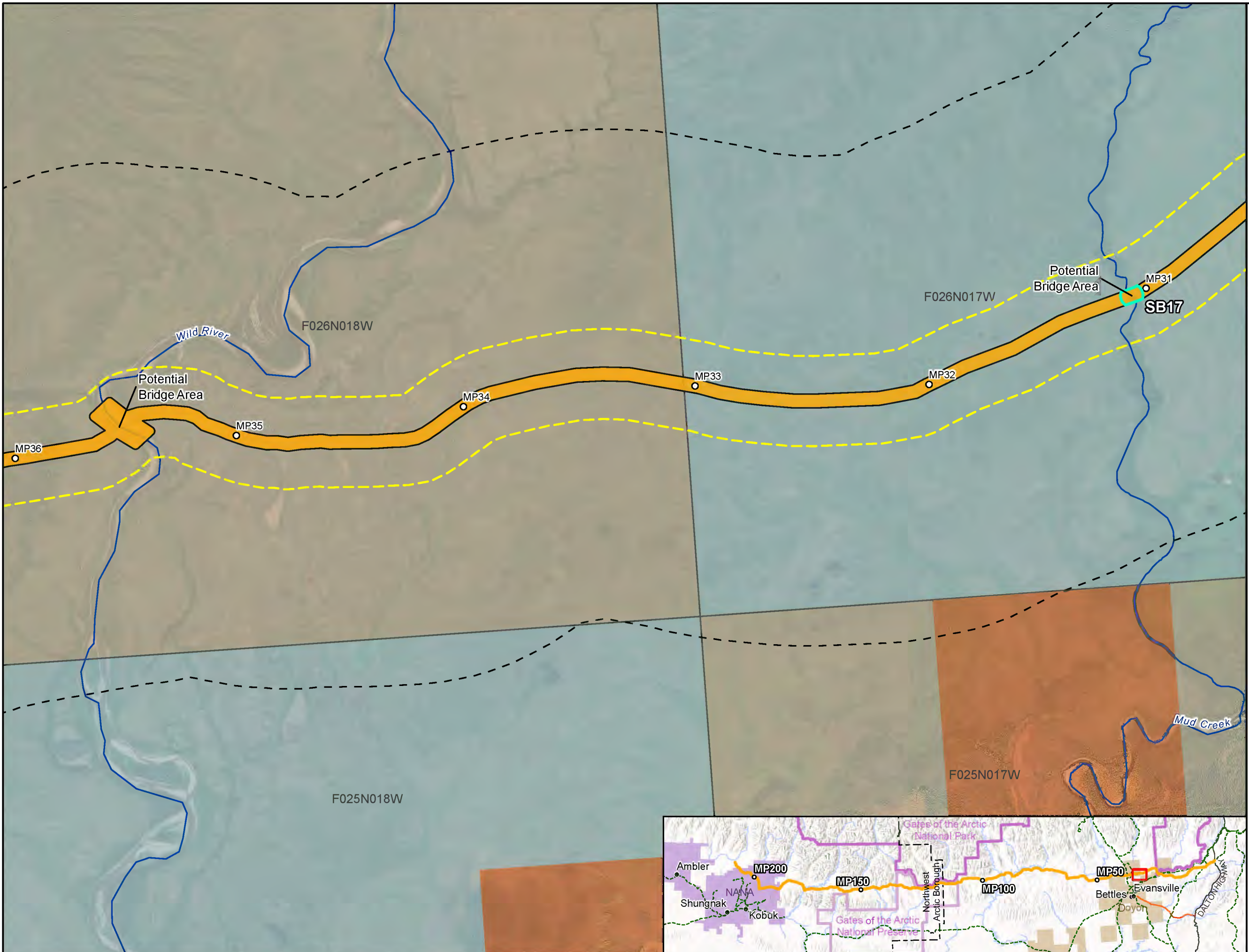
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LZ/Site Preparation			
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Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADN R LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▬ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- Orange: Village of Evansville
- Light Orange: Doyon
- Light Blue: State

Proposed Activities

- Yellow dashed line: Wetlands Study Area
- Green dashed line: Geotechnical Investigations

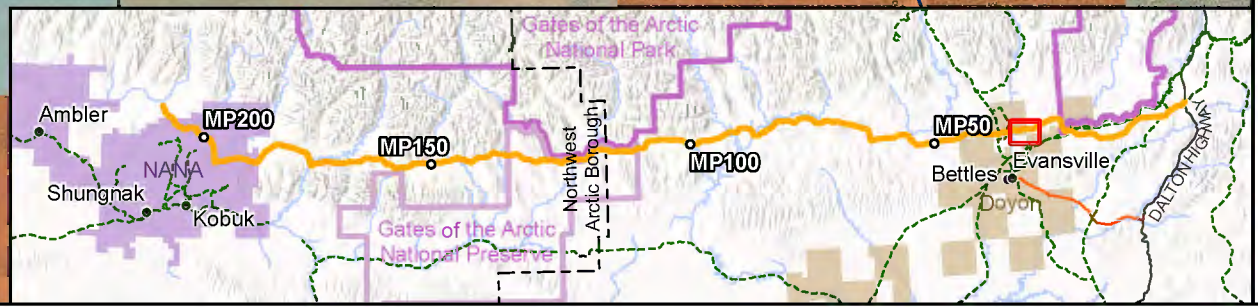
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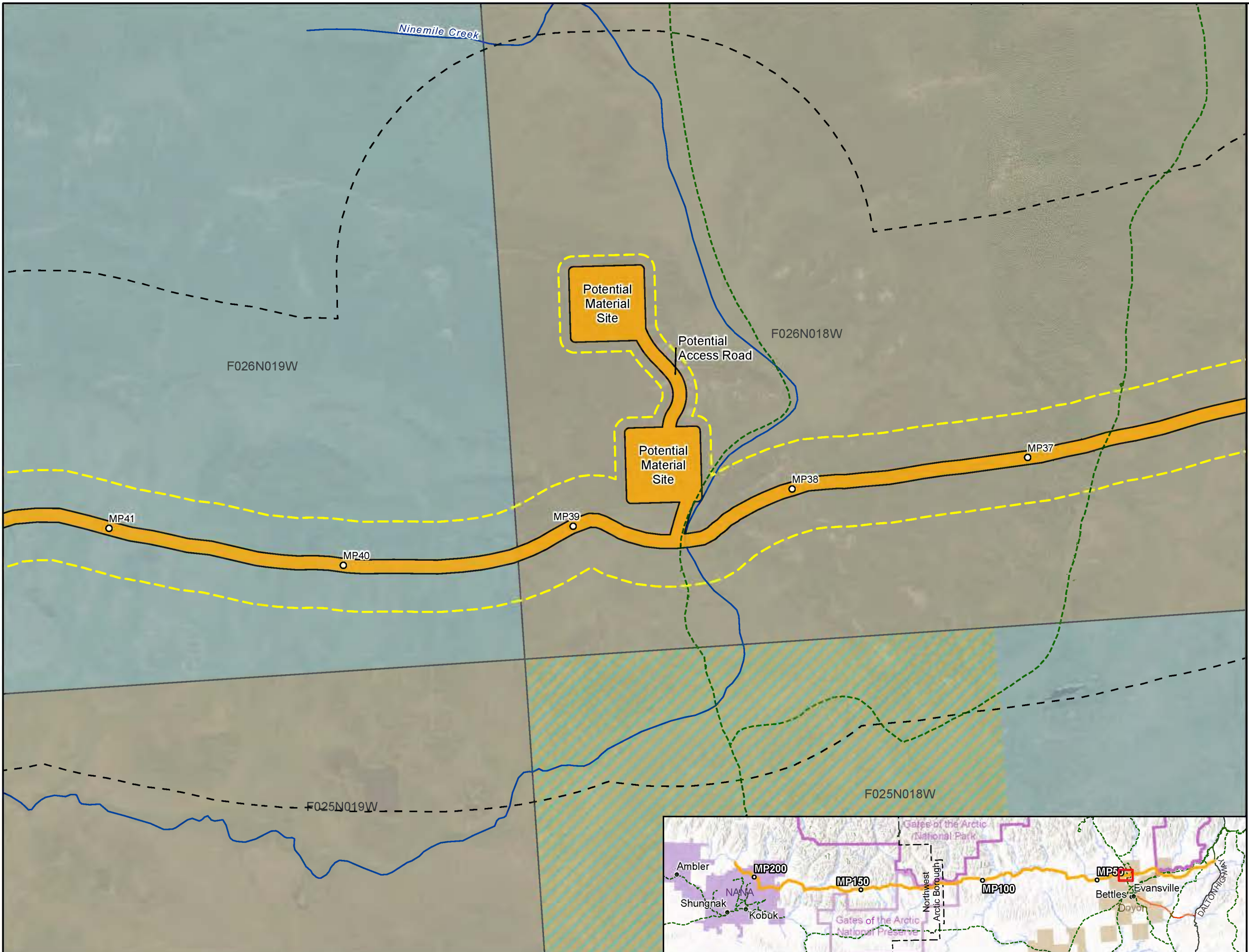
	Spring (May – June 2022)	Summer (June – August 2022)	Fall (September – November 2022)
LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▭ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)
- - - RS2477 Trails

Land Manager/Owner

- ▨ State Selected
- ▨ Doyon
- ▨ State
- ▨ Bureau of Land Management

Proposed Activities

- ▨ Wetlands Study Area

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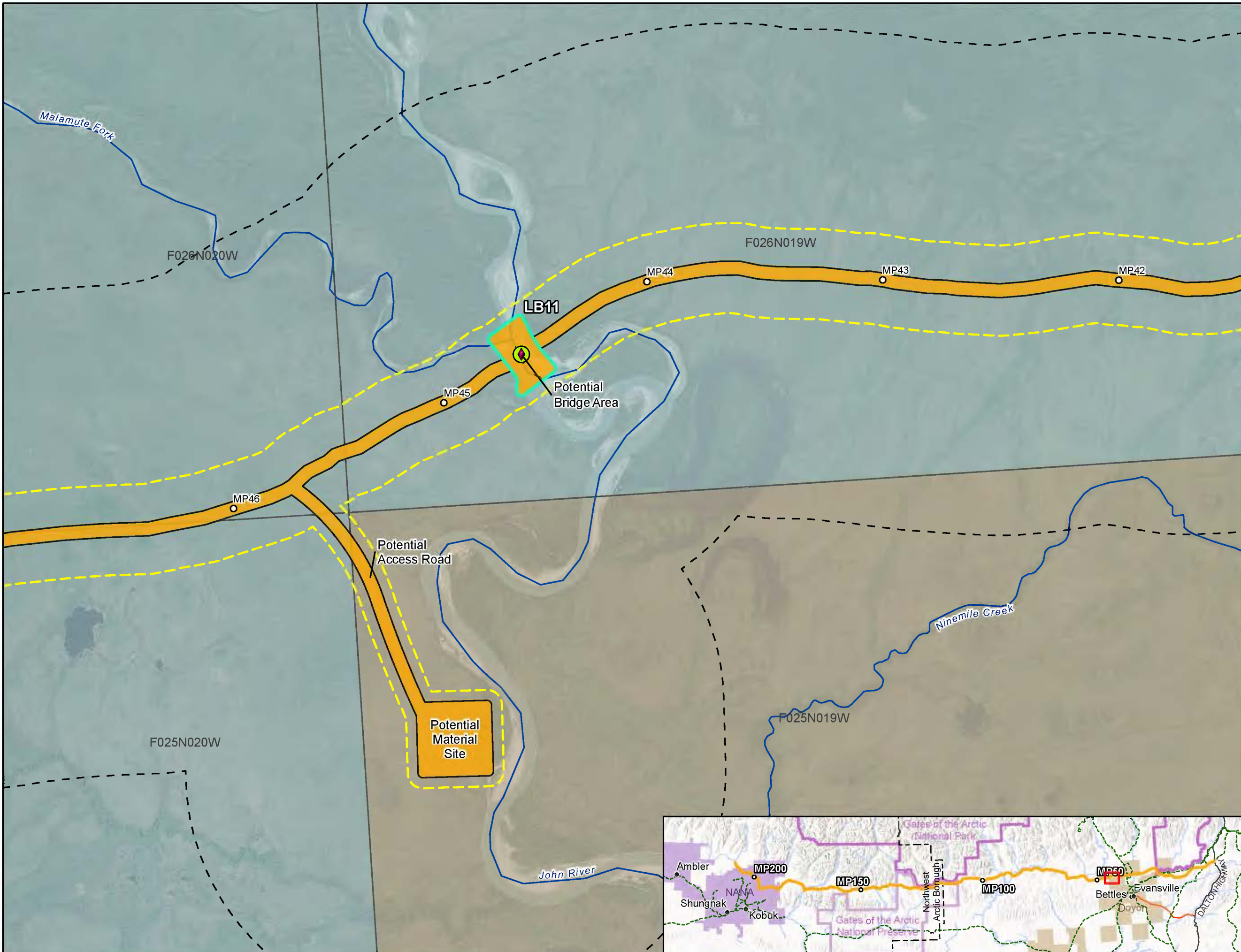
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LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNRLAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▭ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- Doyon
- State

Proposed Activities

- ▭ Wetlands Study Area
- H&H Investigations
- ▭ Geotechnical Investigations

*H&H field observations, land survey, probing, and geophysical work will happen intermittently along the proposed alignment throughout the field season

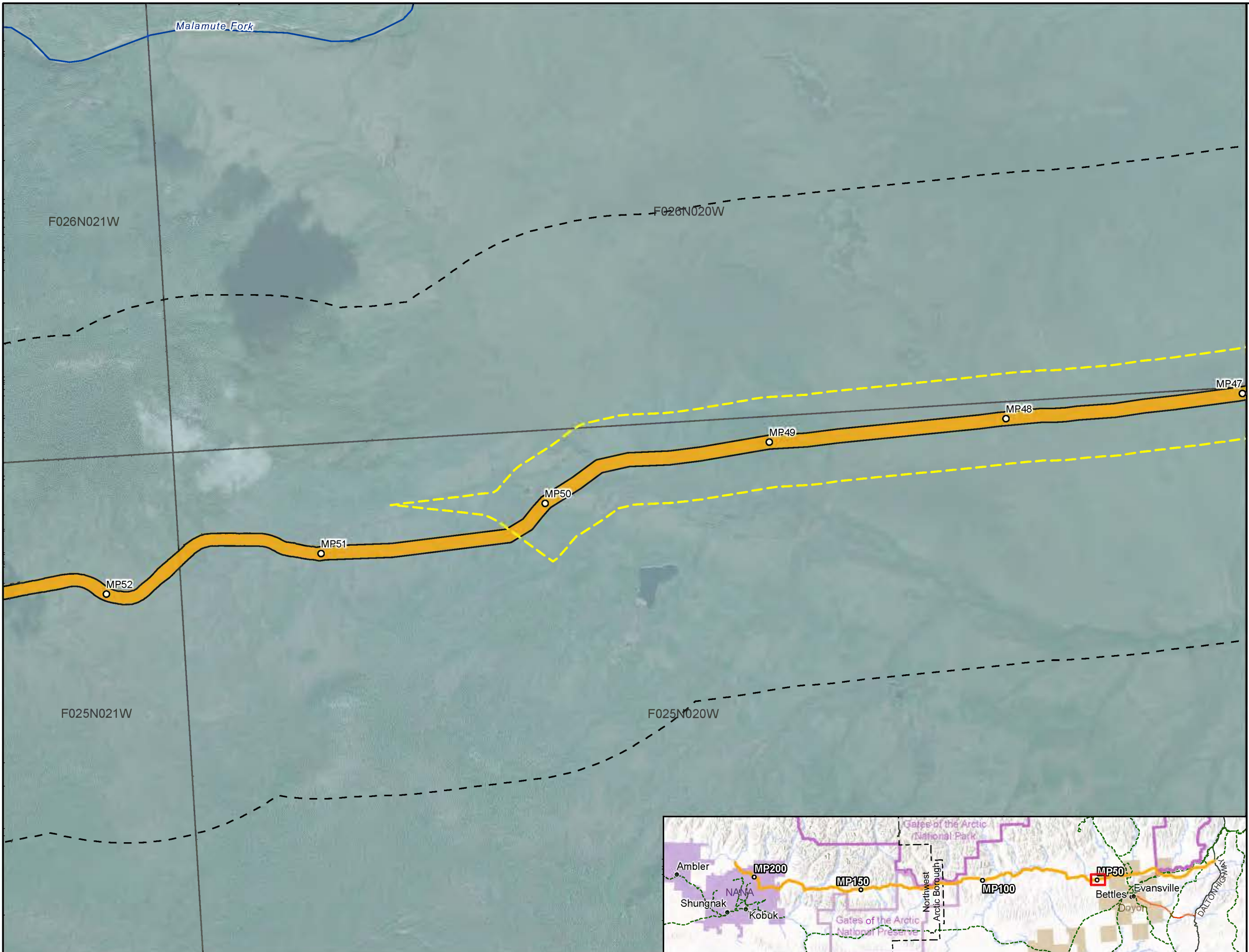
	Spring (May – June 2022)	Summer (June – August 2022)	Fall (September – November 2022)
LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▬ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- State

Proposed Activities

- ▬ Wetlands Study Area

*H&H field observations, land survey, probing, and geophysical work will happen intermittently along the proposed alignment throughout the field season

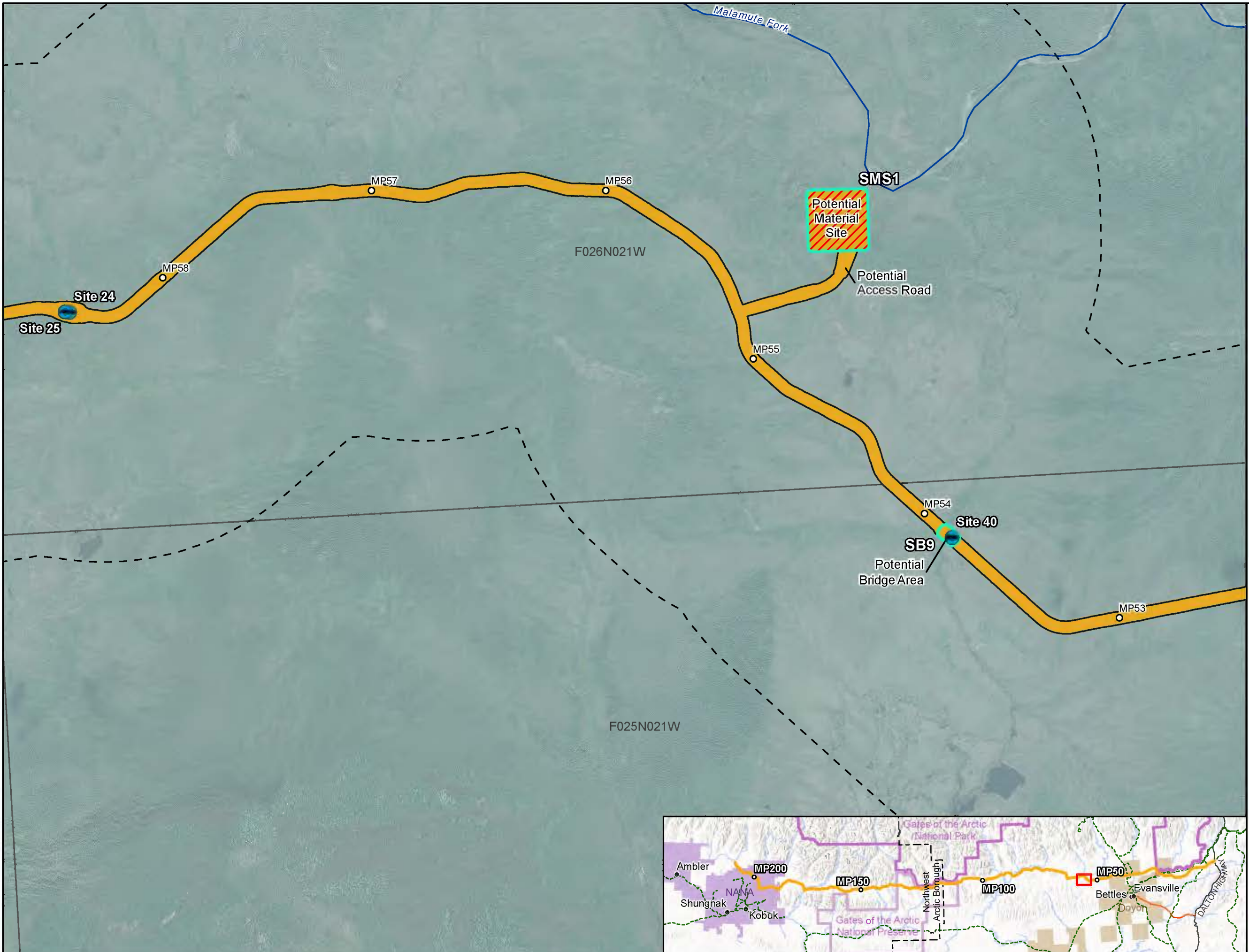
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H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- Direct APE
- Indirect APE
- Streams (USGS NHD)

Land Manager/Owner

- State

Proposed Activities

- Fish Habitat Studies
- Geotechnical Investigations
- 2022 Cultural Resources Activity

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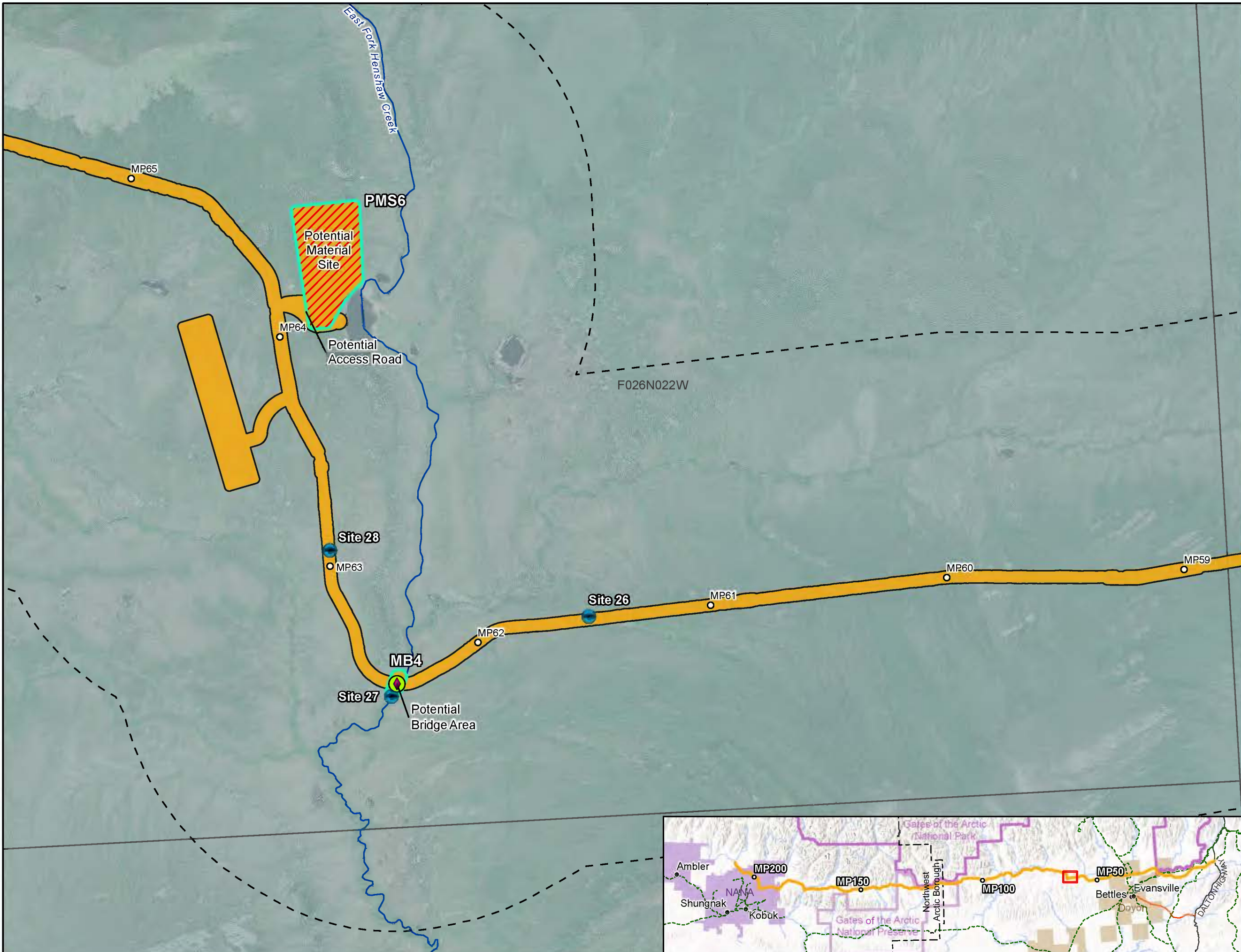
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H&H Investigations			
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Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





- LEGEND**
- Project Features**
- Mile Posts
 - ▭ Direct APE
 - - - Indirect APE
 - ~ Streams (USGS NHD)
- Land Manager/Owner**
- State
- Proposed Activities**
- H&H Investigations
 - Fish Habitat Studies
 - ▭ Geotechnical Investigations
 - ▭ 2022 Cultural Resources Activity

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	Spring (May – June 2022)	Summer (June – August 2022)	Fall (September – November 2022)
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Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▬ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- State

Proposed Activities

- Fish Habitat Studies

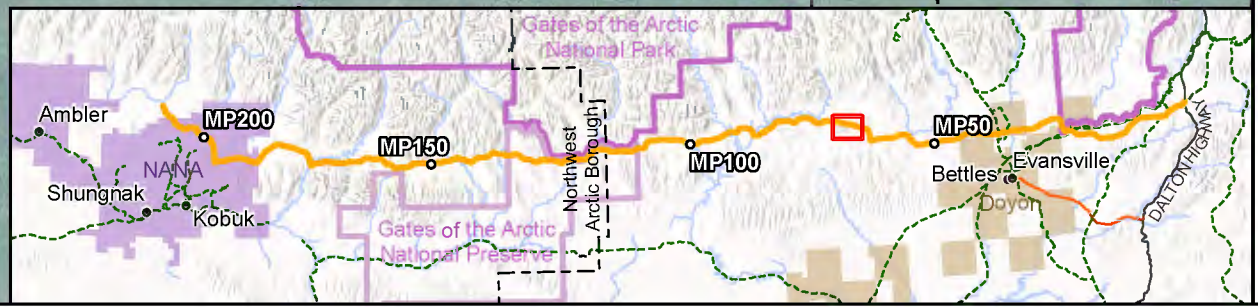
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	Spring (May – June 2022)	Summer (June – August 2022)	Fall (September – November 2022)
LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNRL LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ✚ Wind/Weather Data Station
- ▬ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- State

Proposed Activities

- ◆ H&H Investigations
- Fish Habitat Studies
- Geotechnical Investigations

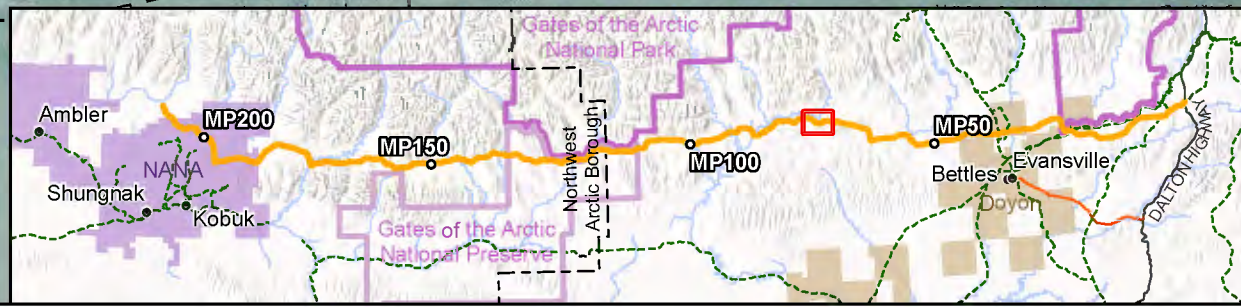
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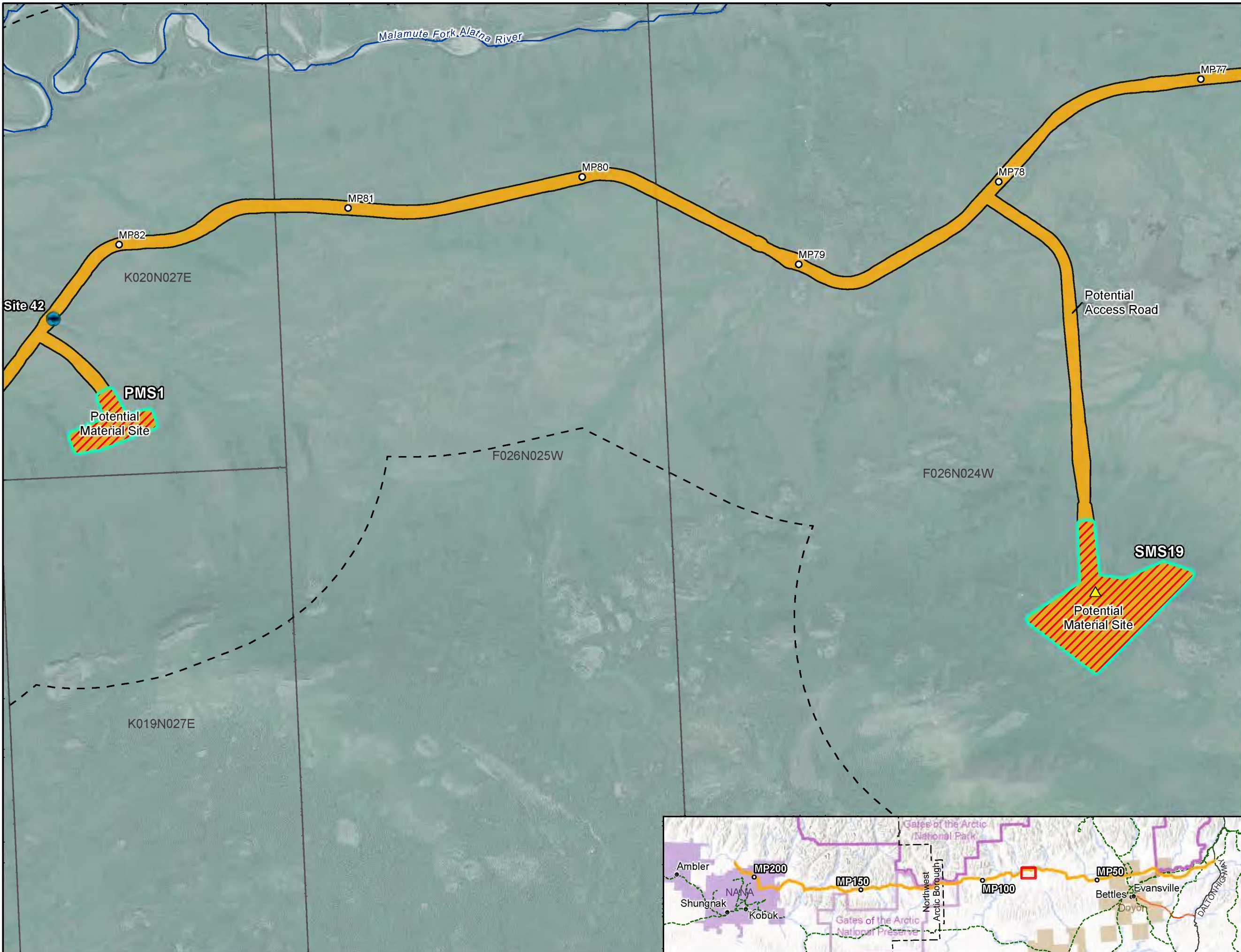
	Spring (May – June 2022)	Summer (June – August 2022)	Fall (September – November 2022)
LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▬ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- State

Proposed Activities

- Fish Habitat Studies
- ▲ Facilities Reconnaissance
- Geotechnical Investigations
- ▨ 2022 Cultural Resources Activity

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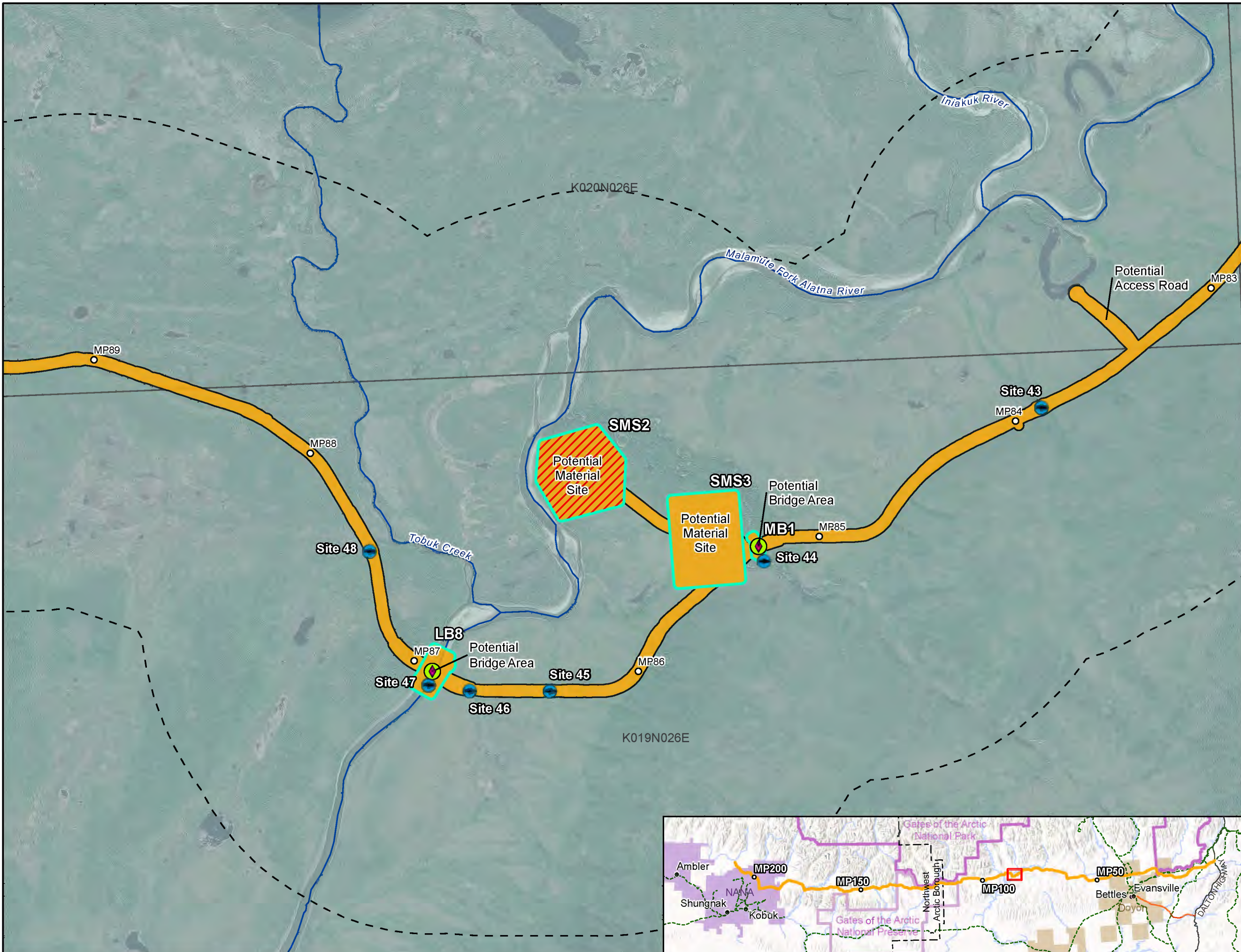
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LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- Direct APE
- Indirect APE
- Streams (USGS NHD)

Land Manager/Owner

- State

Proposed Activities

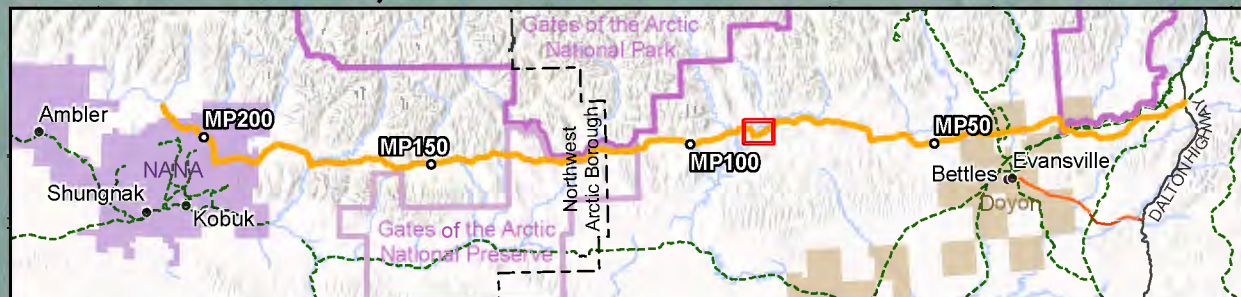
- H&H Investigations
- Fish Habitat Studies
- Geotechnical Investigations
- 2022 Cultural Resources Activity

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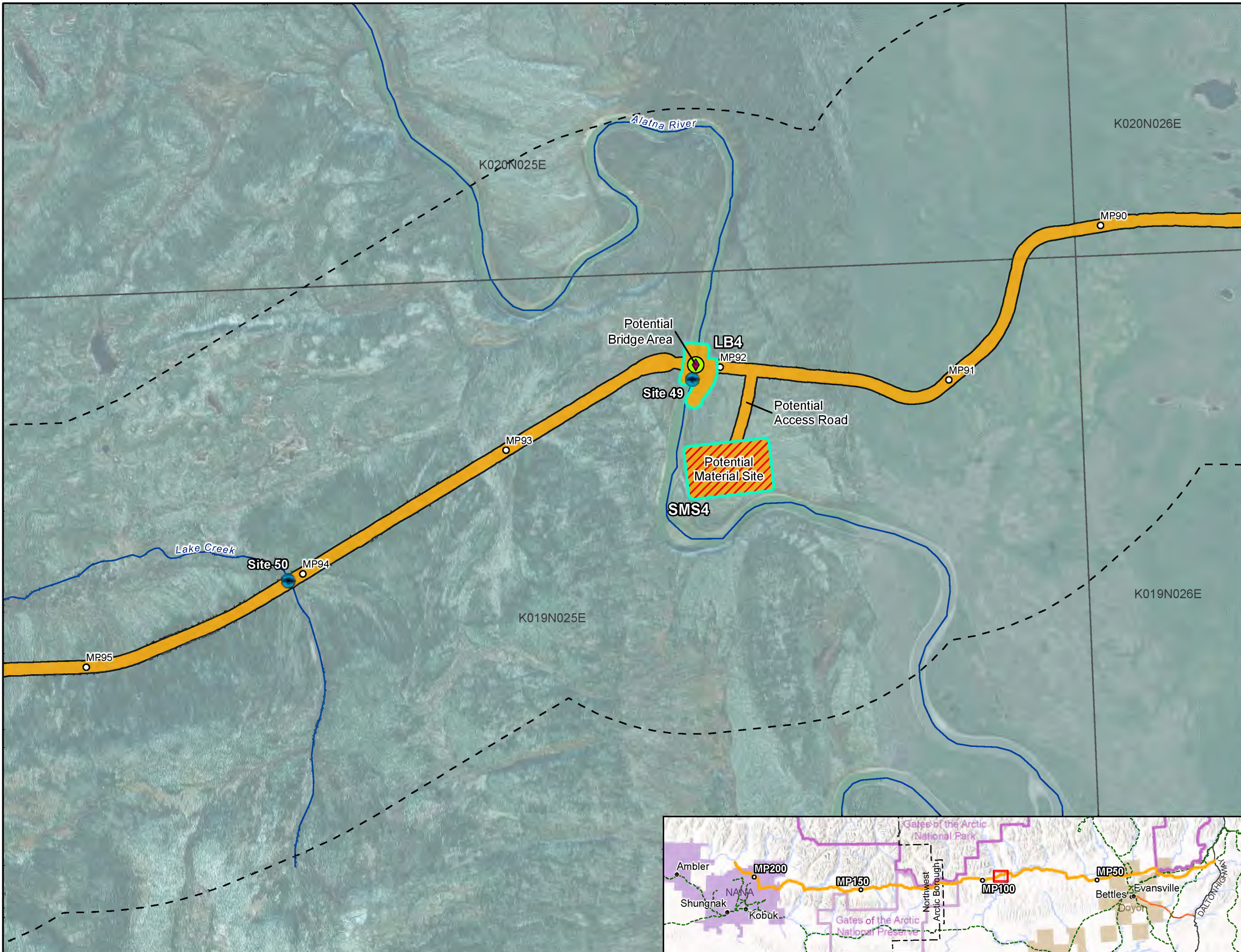
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LZ/Site Preparation			
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Land Survey*			
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2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES



AMBLER ACCESS PROJECT



LEGEND

Project Features

- Mile Posts
- ▭ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- State

Proposed Activities

- ◇ H&H Investigations
- Fish Habitat Studies
- ▭ Geotechnical Investigations
- ▨ 2022 Cultural Resources Activity

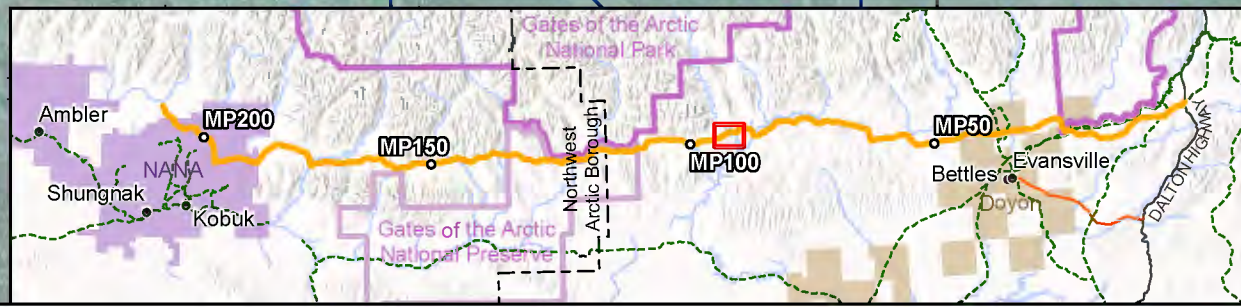
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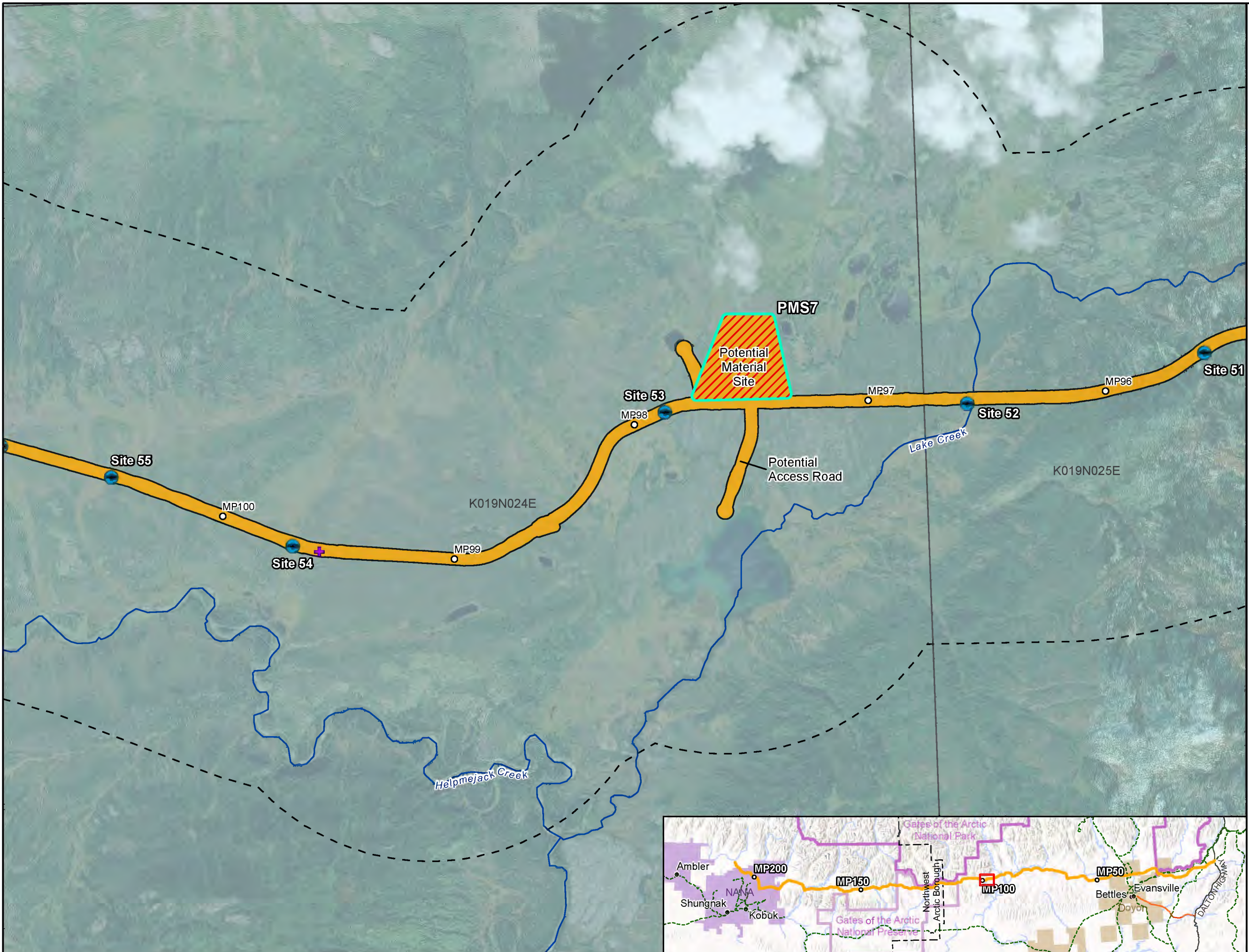
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LZ/Site Preparation			
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Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ✚ Wind/Weather Data Station
- ▭ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- State

Proposed Activities

- Fish Habitat Studies
- ▭ Geotechnical Investigations
- ▨ 2022 Cultural Resources Activity

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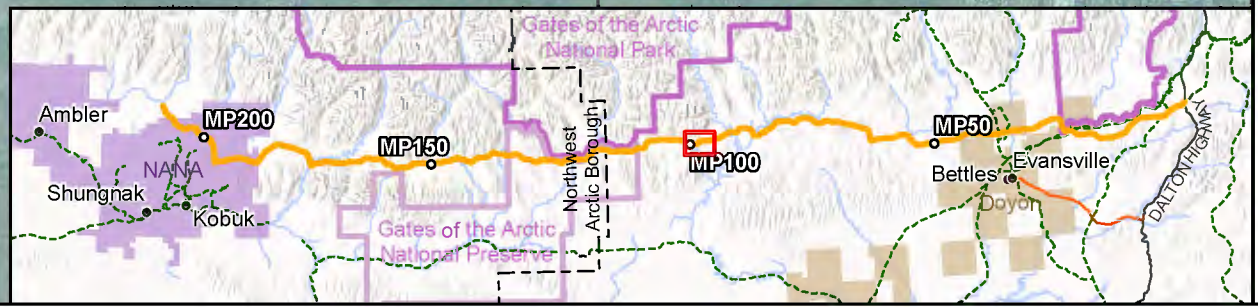
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LZ/Site Preparation			
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Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			

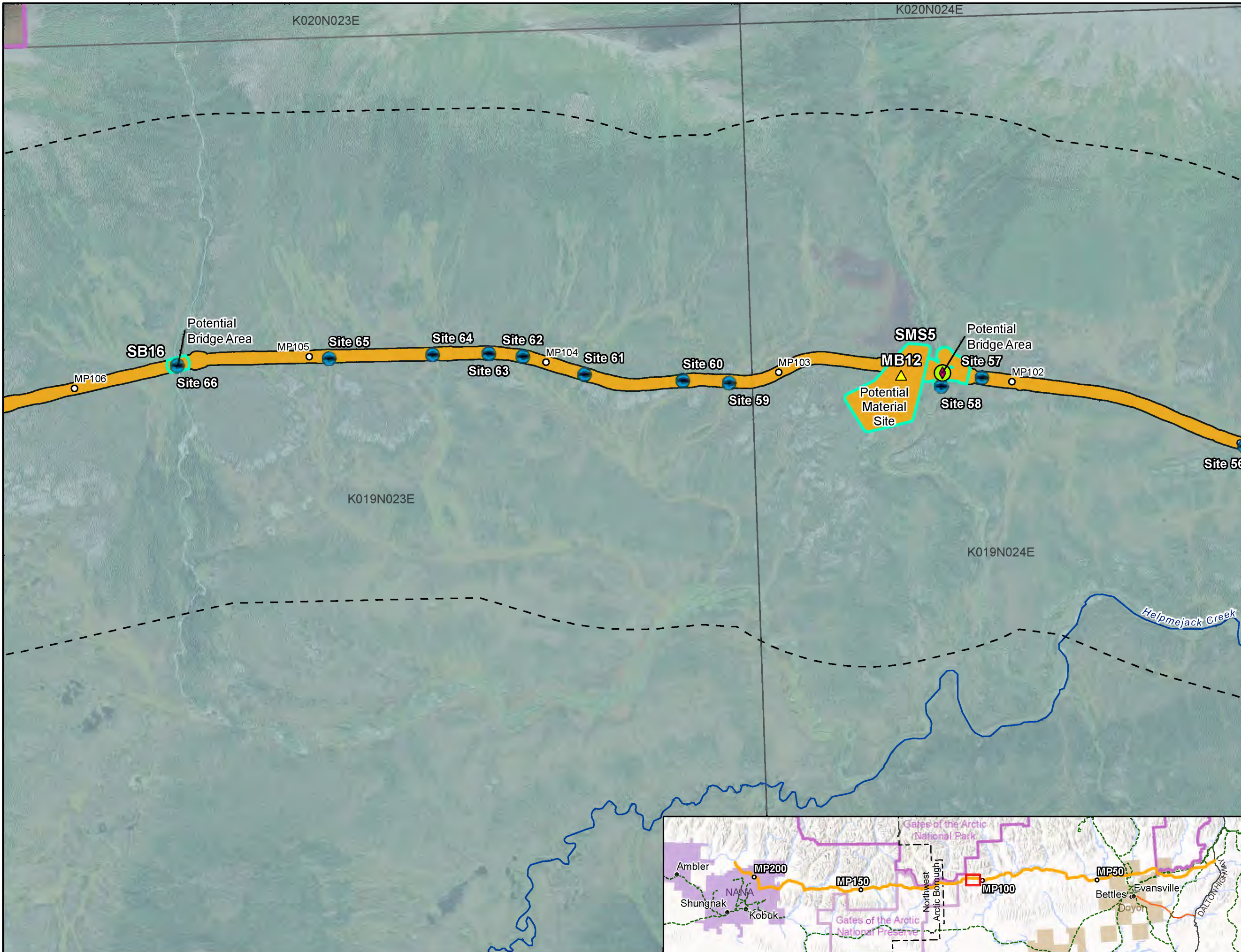


2022 ADNR LAND USE PERMIT APPLICATION

PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- Direct APE
- Indirect APE
- Streams (USGS NHD)

Land Manager/Owner

- State
- Gates of the Arctic National Park

Proposed Activities

- H&H Investigations
- Fish Habitat Studies
- Facilities Reconnaissance
- Geotechnical Investigations

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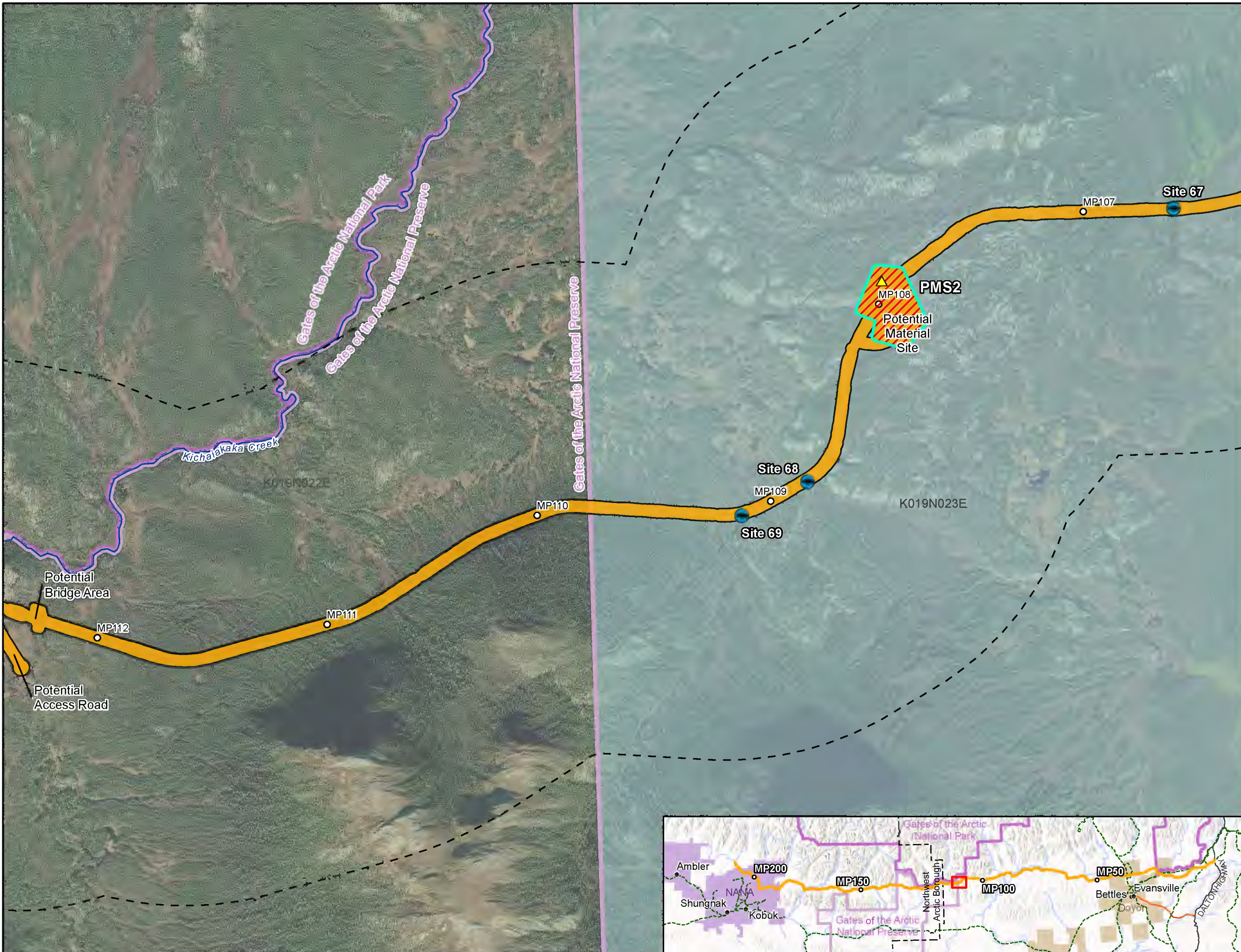
	Spring (May – June 2022)	Summer (June – August 2022)	Fall (September – November 2022)
LZ/Site Preparation			
H&H Investigations			
Fish Habitat Studies			
Wetlands Investigation			
Land Survey*			
Probing and Geophysical Activities*			



2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES



AMBLER ACCESS PROJECT



LEGEND

Project Features

- Mile Posts
- ▭ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

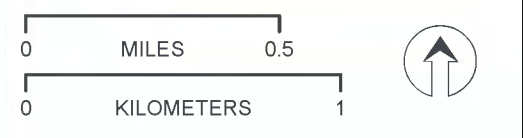
- State
- Gates of the Arctic National Park
- Gates of the Arctic National Preserve

Proposed Activities

- Fish Habitat Studies
- ▲ Facilities Reconnaissance
- ▭ Geotechnical Investigations
- ▭ 2022 Cultural Resources Activity

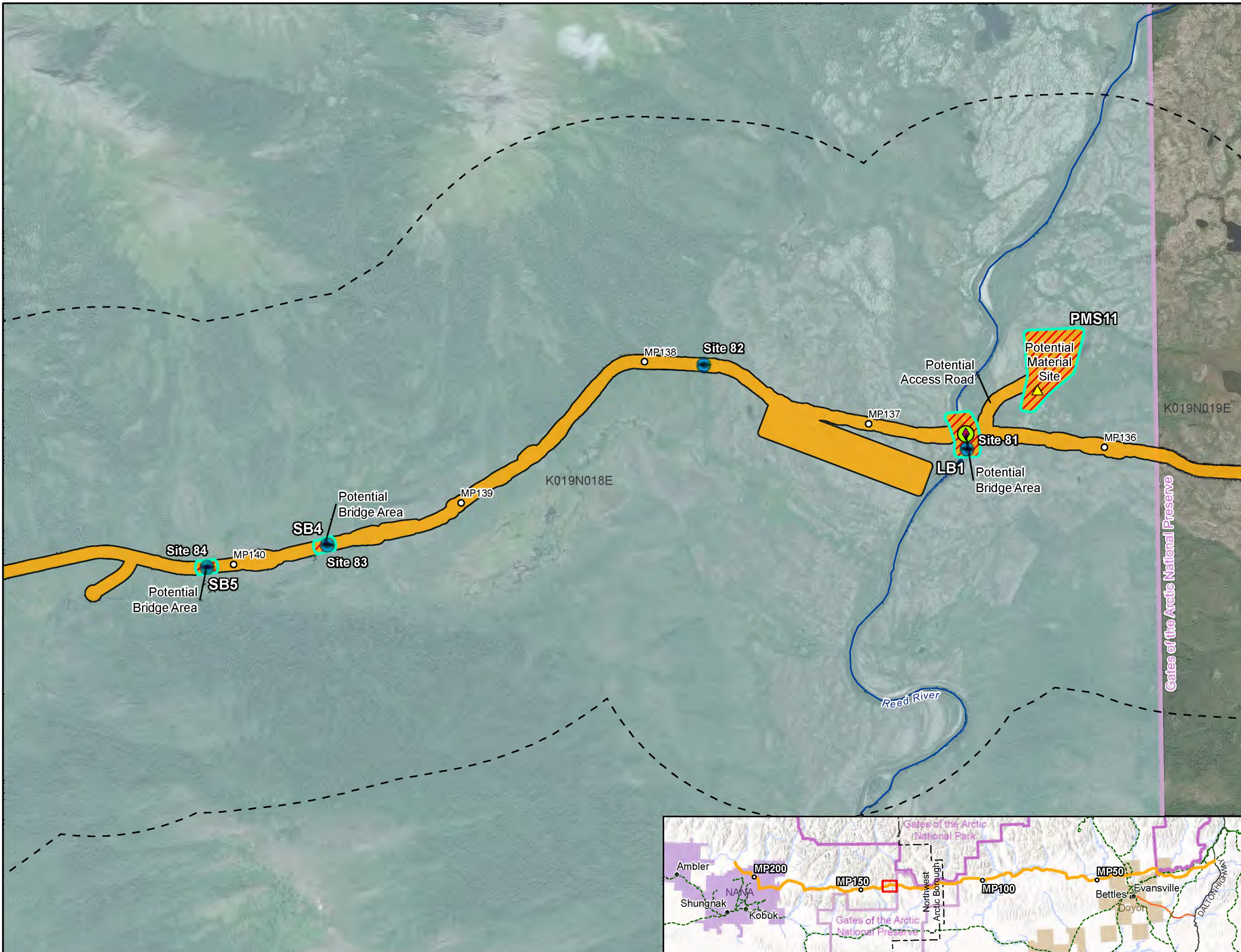
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2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT



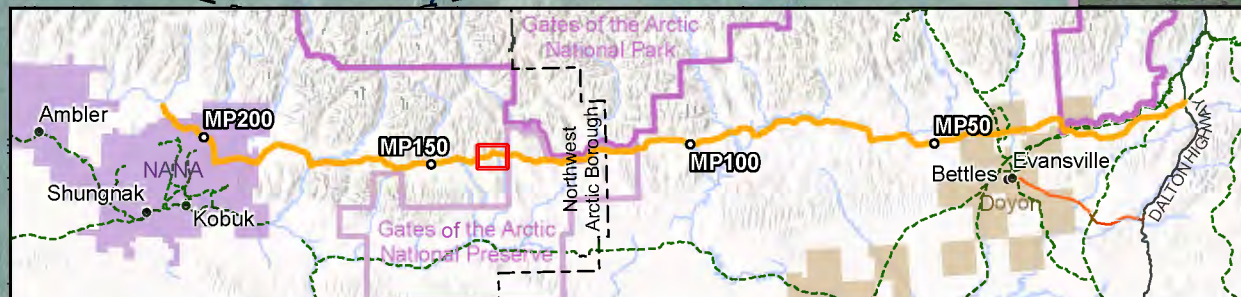
- LEGEND**
- Project Features**
- Mile Posts
 - ▭ Direct APE
 - - - Indirect APE
 - ~ Streams (USGS NHD)
- Land Manager/Owner**
- State
 - ▭ Gates of the Arctic National Preserve
- Proposed Activities**
- H&H Investigations
 - Fish Habitat Studies
 - ▲ Facilities Reconnaissance
 - Geotechnical Investigations
 - ▨ 2022 Cultural Resources Activity

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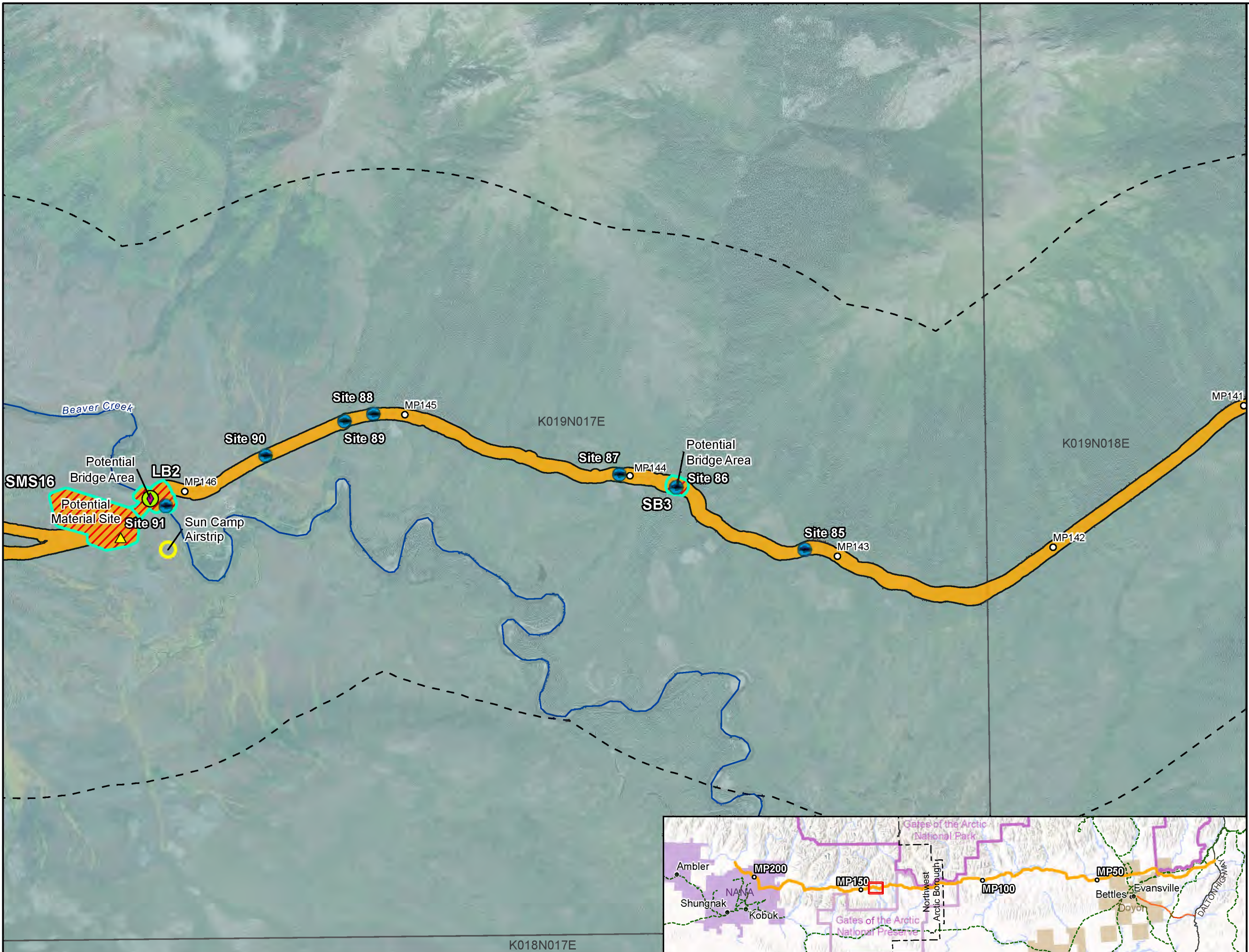
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Wetlands Investigation			
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2022 ADNRLAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES



AMBLER ACCESS PROJECT



- LEGEND**
- Project Features**
- Mile Posts
 - Direct APE
 - Indirect APE
 - Streams (USGS NHD)
- Land Manager/Owner**
- State
- Proposed Activities**
- H&H Investigations
 - Fish Habitat Studies
 - Facilities Reconnaissance
 - Geotechnical Investigations
 - 2022 Cultural Resources Activity

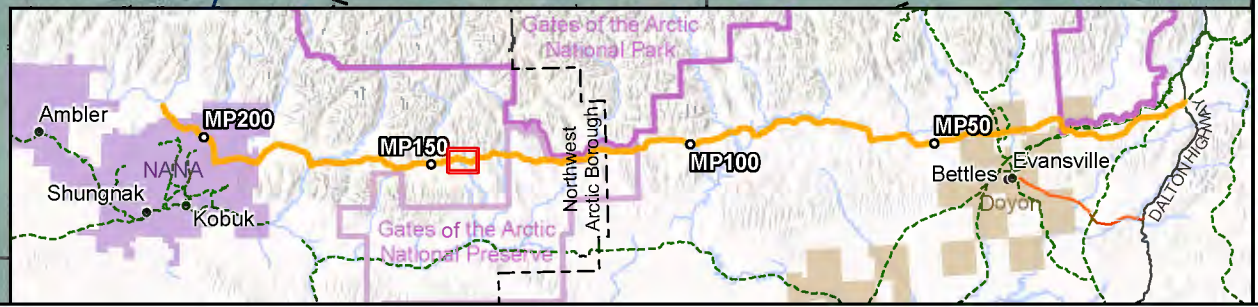
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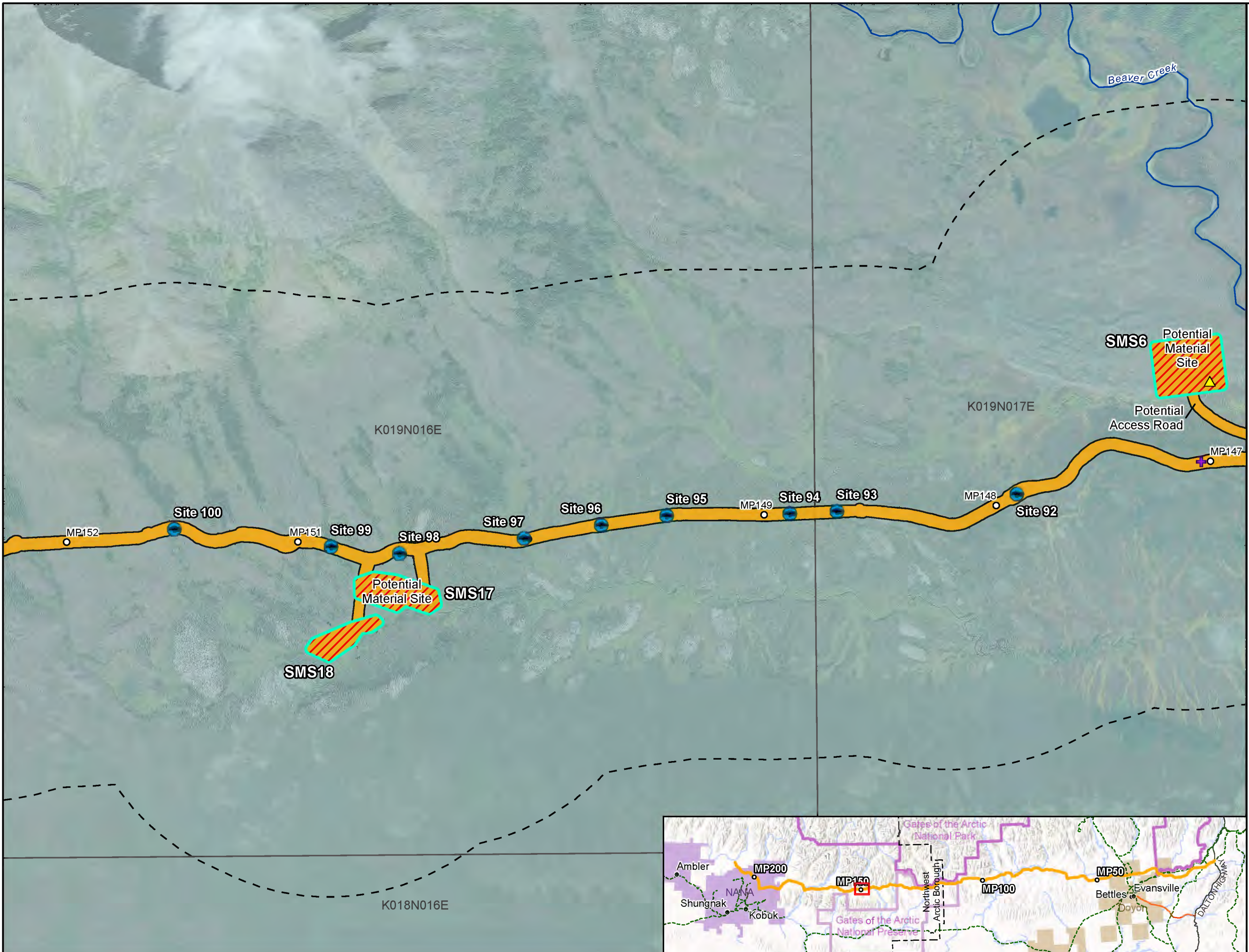


2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT



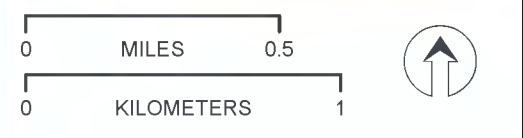
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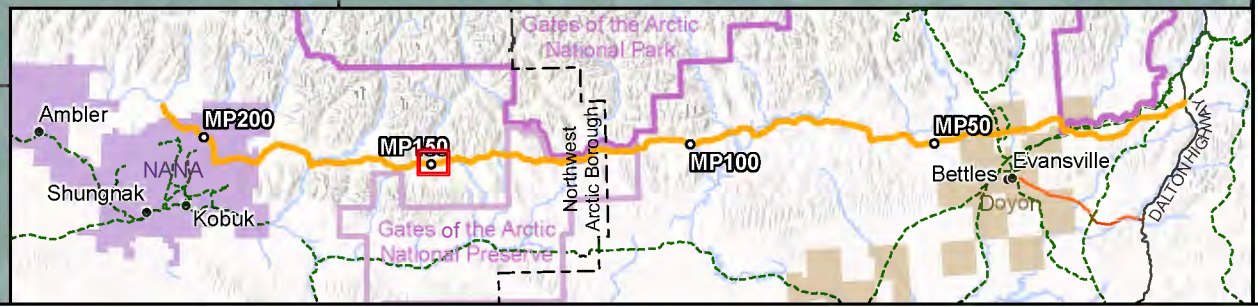
- LEGEND**
- Project Features**
- Mile Posts
 - ✚ Wind/Weather Data Station
 - ▭ Direct APE
 - - - Indirect APE
 - ~ Streams (USGS NHD)
- Land Manager/Owner**
- State
- Proposed Activities**
- Fish Habitat Studies
 - ▲ Facilities Reconnaissance
 - ▭ Geotechnical Investigations
 - ▨ 2022 Cultural Resources Activity

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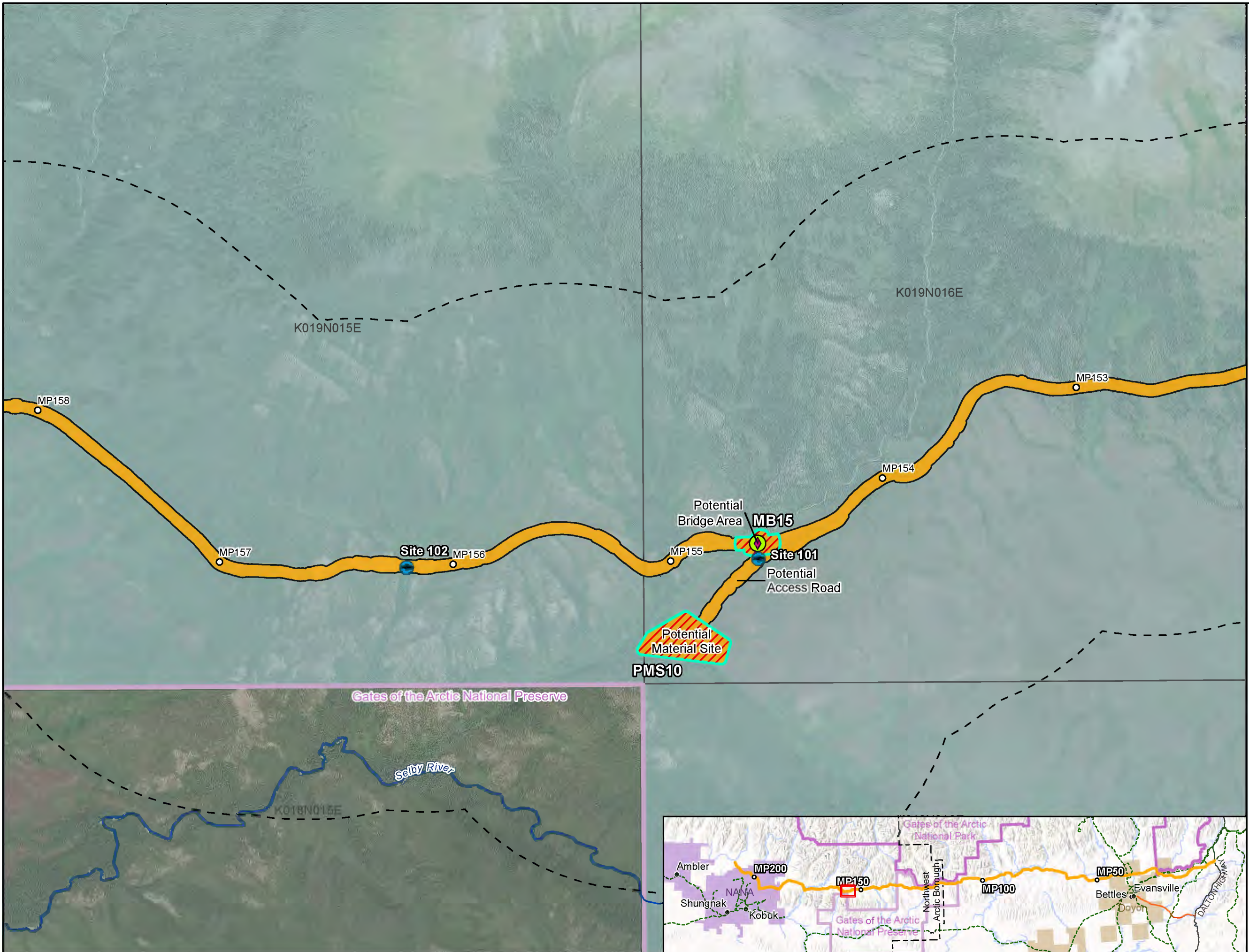
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2022 ADNR LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES



AMBLER ACCESS PROJECT



LEGEND

Project Features

- Mile Posts
- ▬ Direct APE
- - - Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- State
- Gates of the Arctic National Preserve

Proposed Activities

- H&H Investigations
- Fish Habitat Studies
- Geotechnical Investigations
- 2022 Cultural Resources Activity

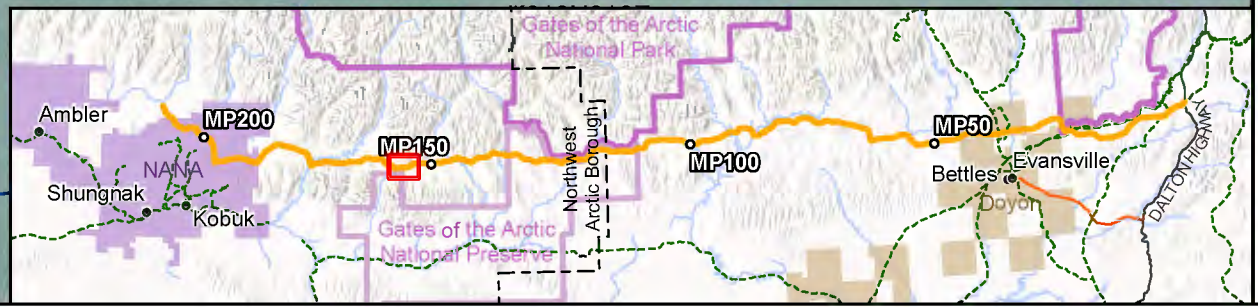
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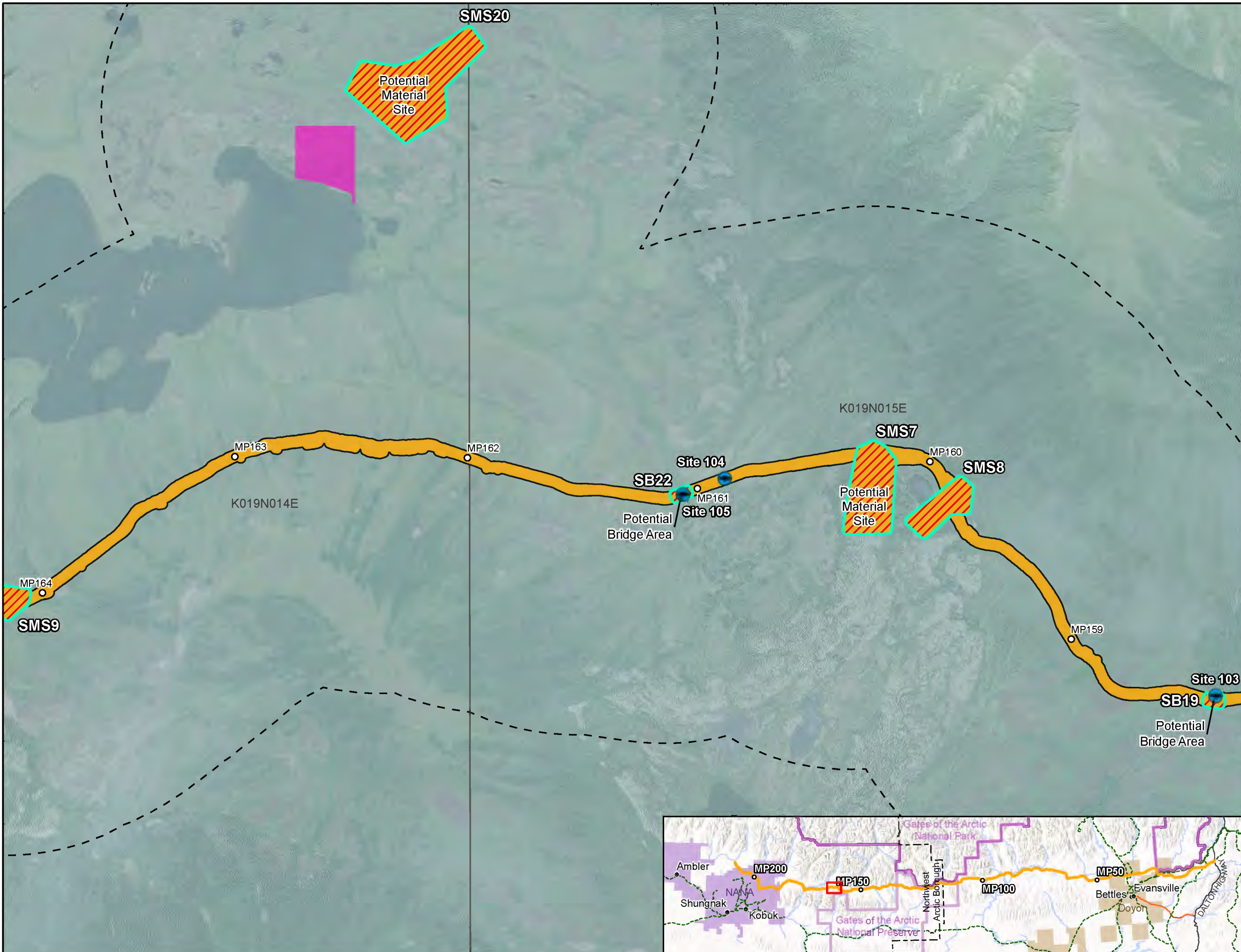
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2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▬ Direct APE
- - - Indirect APE

Land Manager/Owner

- Native Allotment
- State

Proposed Activities

- Fish Habitat Studies
- ▭ Geotechnical Investigations
- ▨ 2022 Cultural Resources Activity

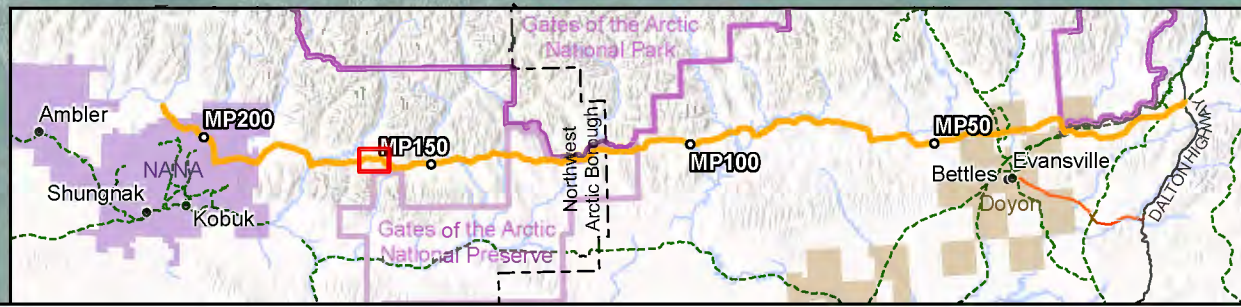
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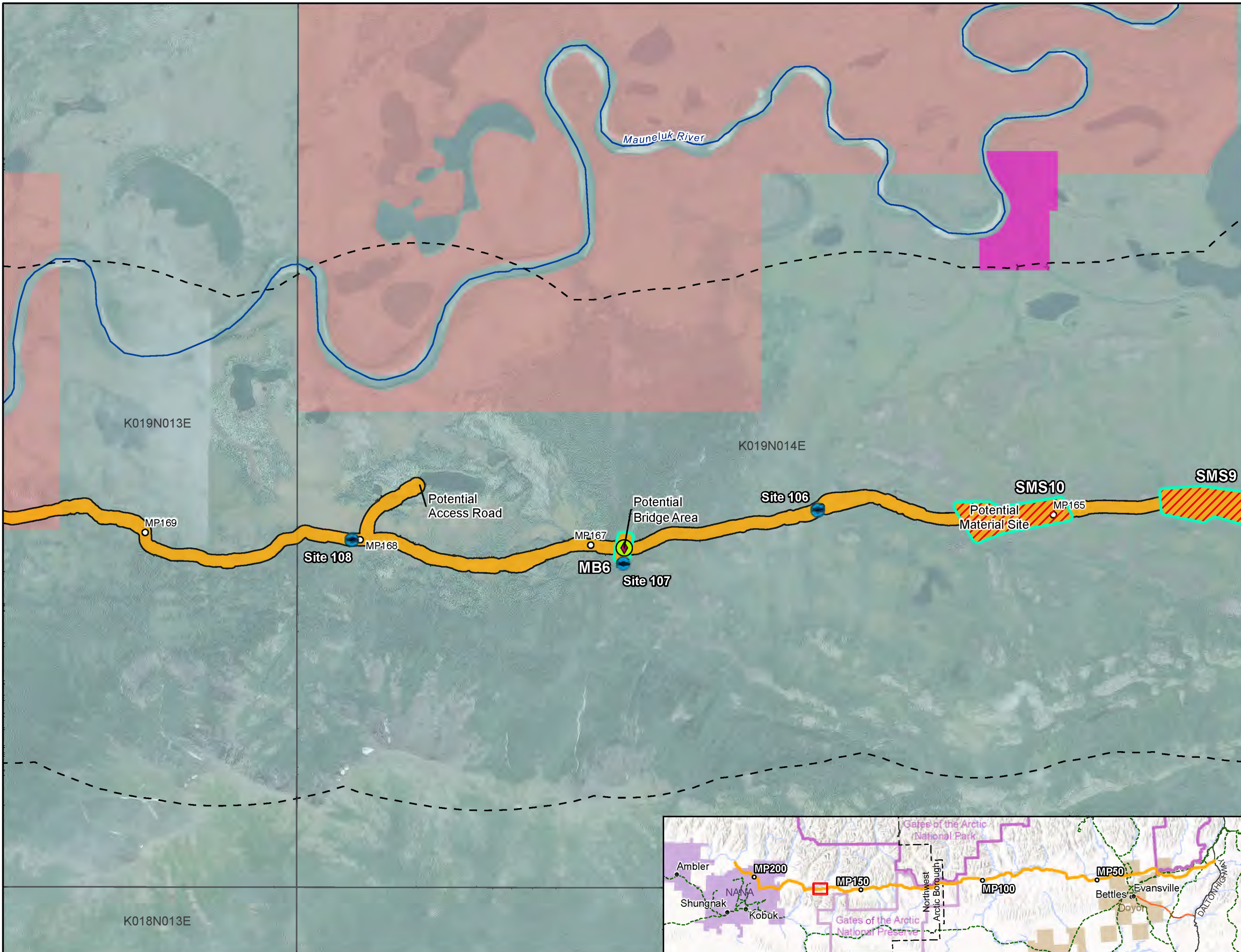
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2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- Direct APE
- Indirect APE
- Streams (USGS NHD)

Land Manager/Owner

- Native Allotment
- Northwest Arctic Borough
- State

Proposed Activities

- H&H Investigations
- Fish Habitat Studies
- Geotechnical Investigations
- 2022 Cultural Resources Activity

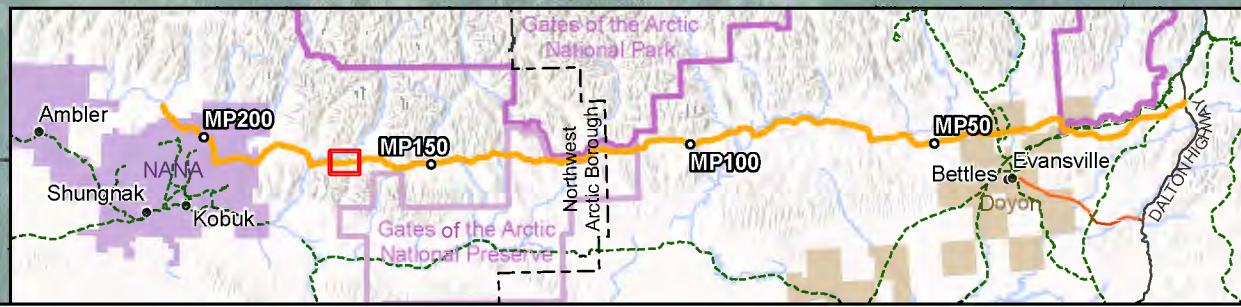
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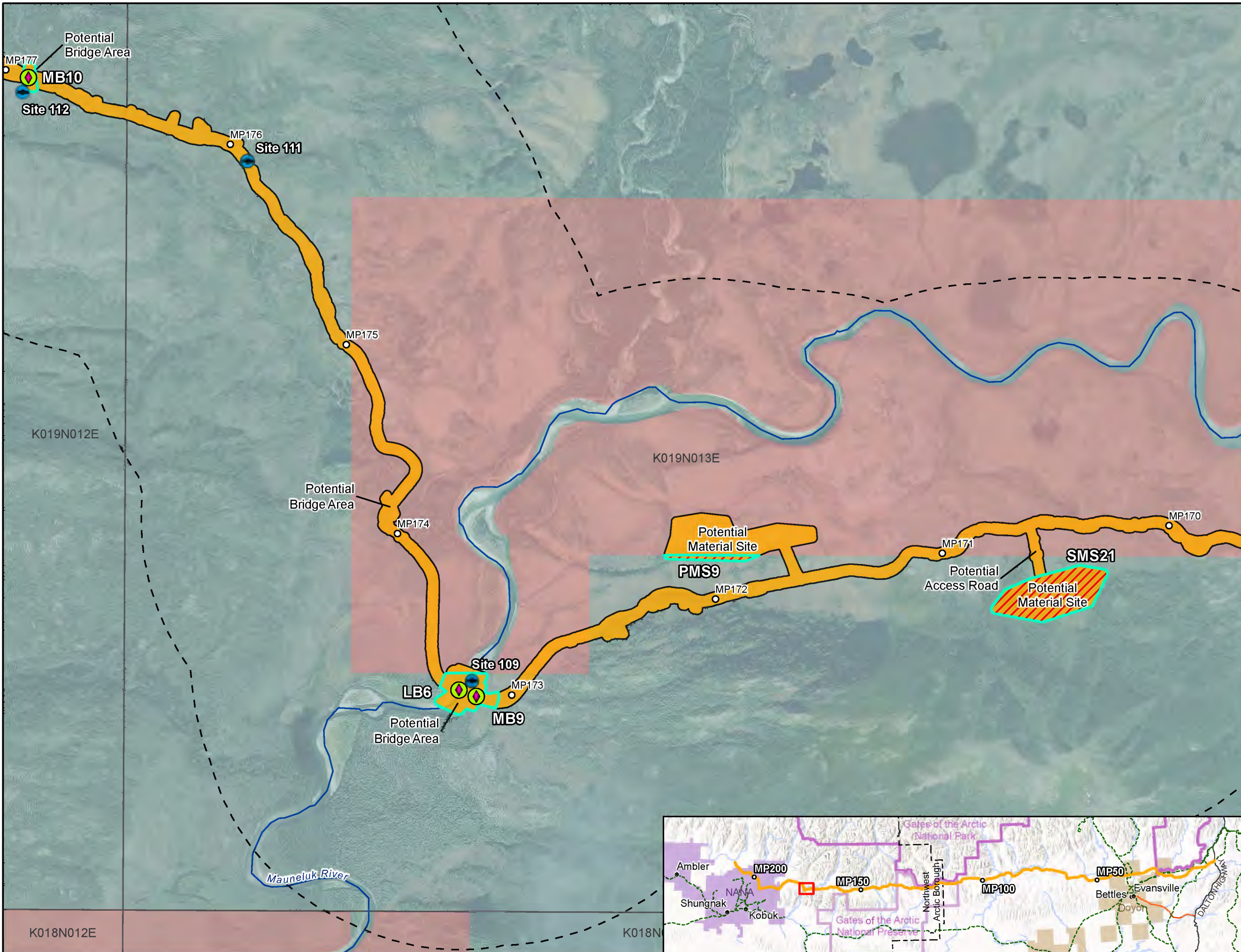
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2022 ADNRL LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- Direct APE
- Indirect APE
- Streams (USGS NHD)

Land Manager/Owner

- Northwest Arctic Borough
- State

Proposed Activities

- H&H Investigations
- Fish Habitat Studies
- Geotechnical Investigations
- 2022 Cultural Resources Activity

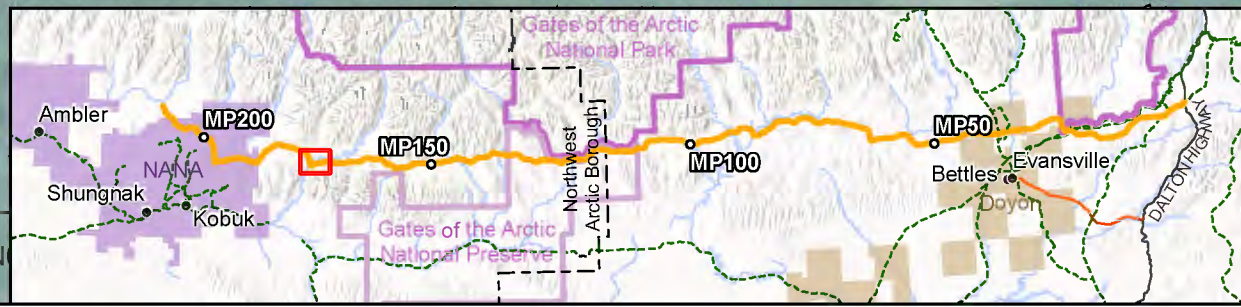
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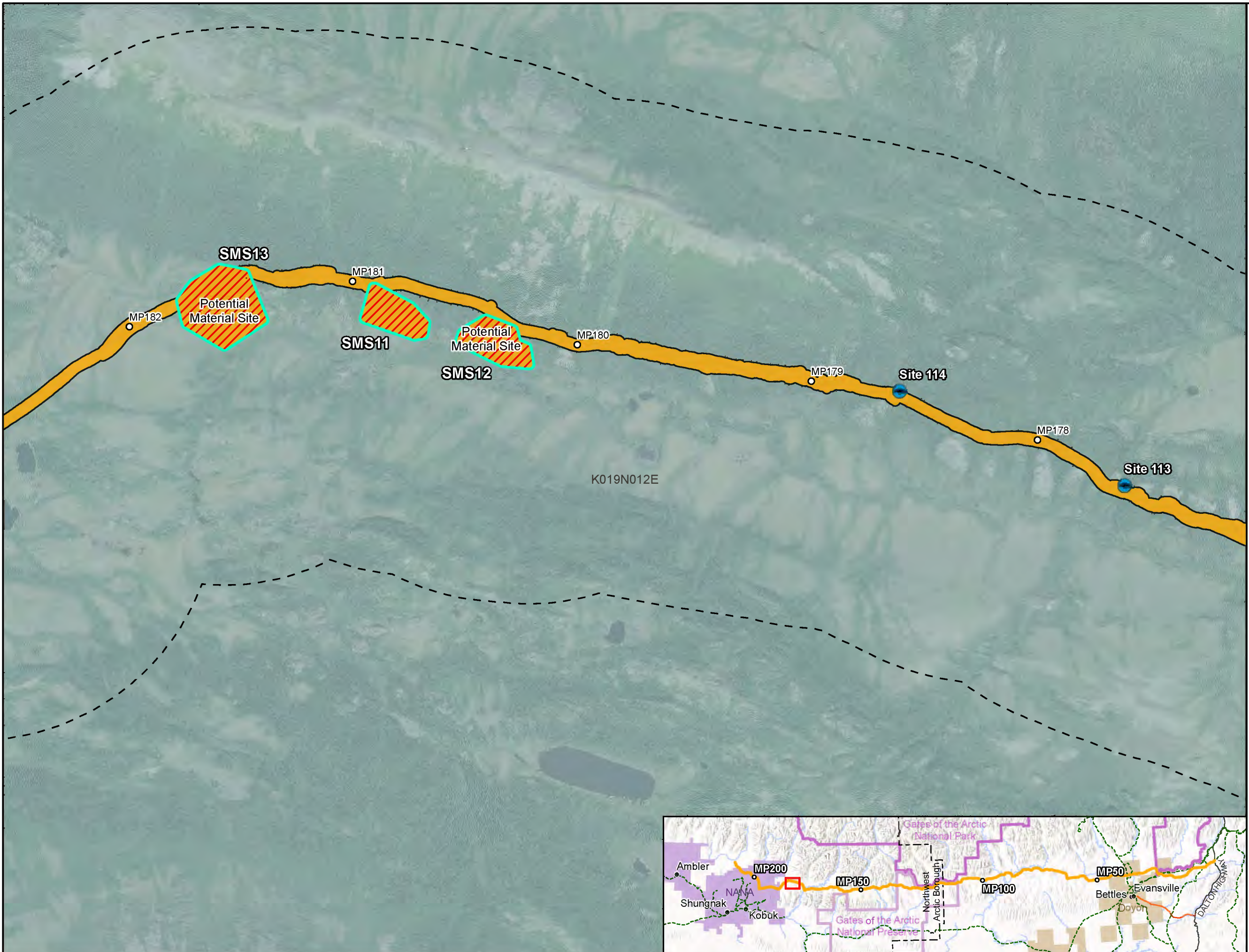
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2022 ADNRL LAND USE PERMIT APPLICATION
 PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ▭ Direct APE
- - - Indirect APE

Land Manager/Owner

- State

Proposed Activities

- Fish Habitat Studies
- ▭ Geotechnical Investigations
- ▨ 2022 Cultural Resources Activity

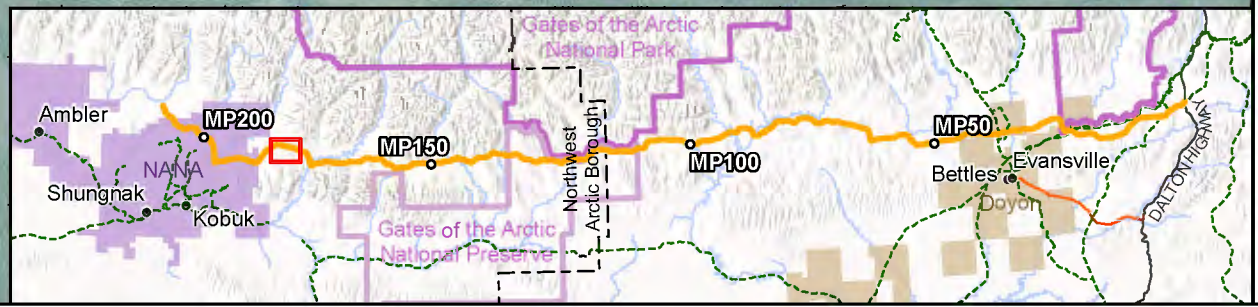
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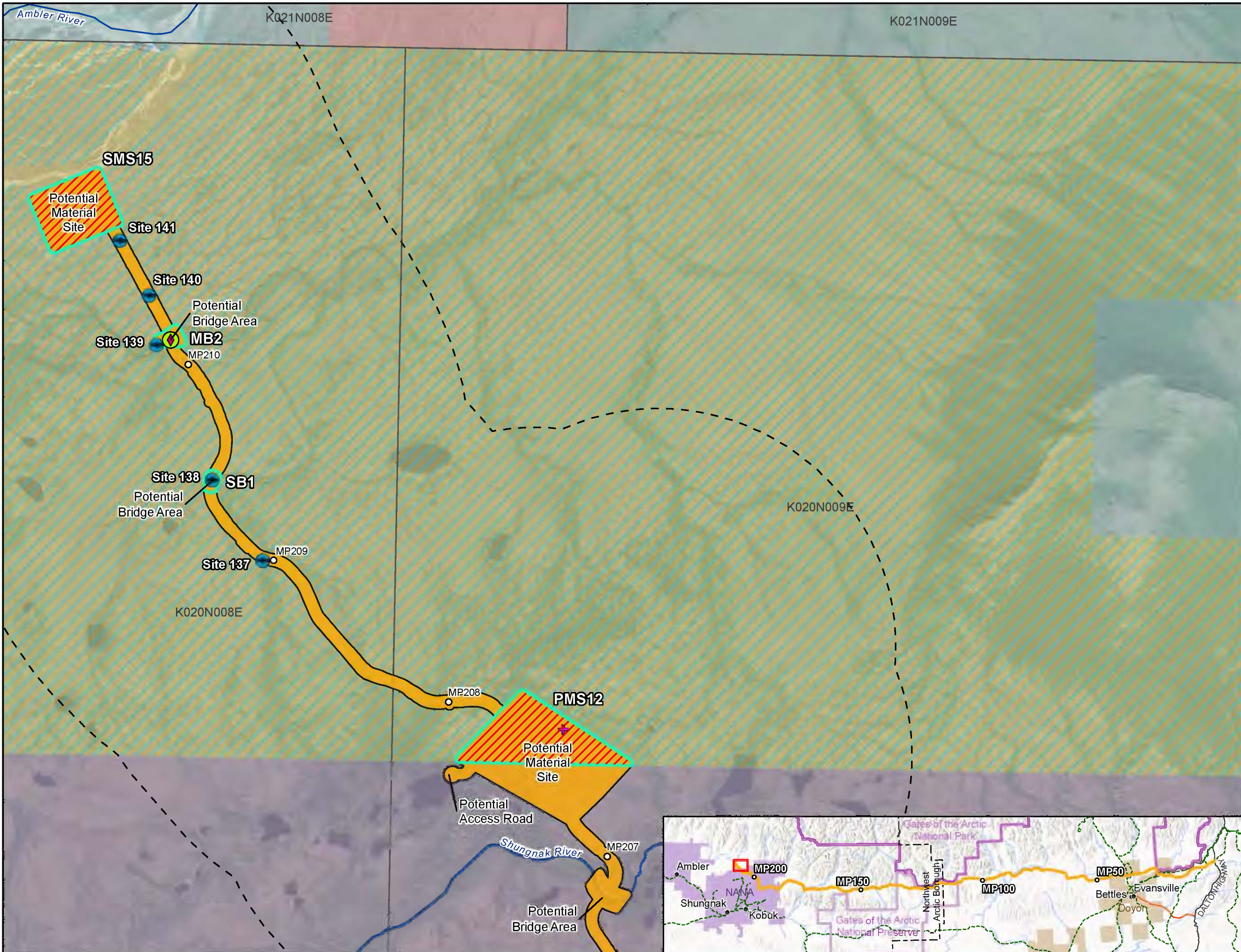
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2022 ADNR LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT





LEGEND

Project Features

- Mile Posts
- ✚ Wind/Weather Data Station
- ▭ Direct APE
- ▭ Indirect APE
- ~ Streams (USGS NHD)

Land Manager/Owner

- Northwest Arctic Borough
- State Selected
- NANA
- State
- Bureau of Land Management

Proposed Activities

- ◆ H&H Investigations
- Fish Habitat Studies
- ▭ Geotechnical Investigations
- ▨ 2022 Cultural Resources Activity

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2022 ADNRL LAND USE PERMIT APPLICATION
PROPOSED ACTIVITIES

AMBLER ACCESS PROJECT

