STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

NORTHERN REGION

INTERIM

CORRIDOR ANALYSIS / MATRIX

Project No. 62210

May, 2010

EXECUTIVE SUMMARY:

The Foothills West Transportation Access Project proposes to develop a transportation corridor from the Dalton Highway to Umiat. The purpose of the corridor is to provide access to oil and gas resources both along the northwestern foothills of the Brooks Range and within the National Petroleum Reserve-Alaska (NPRA). The corridor would provide exploration and development opportunities for the area and facilitate a more economically feasible NPRA development.

The project study area ranges from a northern limit at Franklin Bluffs on the Dalton Highway near MP 376, south to Galbraith Lake near MP 278, and from those points west converging at the state airport located at Umiat. Initial discussions with government and industry experts identified five potential routes from the Dalton Highway to Umiat: Franklin Bluffs, Pump Station Two, Pump Station Three, Galbraith, and Galbraith West Alternate.

To select the most favorable route option(s) to study, a total of nine criteria, combining engineering, environmental and land status considerations, were identified. Using a multidisciplinary approach, each criterion was further weighted by its importance in decision-making based on a range of viewpoints typically expressed in public input processes. Five different viewpoints were selected, and each criterion was then evaluated based on its importance to each, specific viewpoint. Viewpoint importance rankings for each criterion were then averaged to model a typical spectrum of input opinion and a final, averaged decisional weight for each criterion was determined. These viewpoints will be further refined and verified in future project meetings to provide "real world" confirmation of the weighting values selected.

Data available for each corridor were then ranked by their ability to support required engineering, environmental and land-status criteria and, by applying weighting factors, generated a numerical score shown in the below Corridor Decisional Matrix . The resulting matrix scored the Galbraith Route as the most advantageous corridor option based on the nine primary, weighted criteria. The Galbraith West Alternate Route was second most advantageous, and the Pump Station Three Route the third most desirable. The Pump Station Two Route and Franklin Bluffs Route ranked fourth and fifth, respectively.

		Weighted Scores for Corridors				
Criterion	**Weight**	**Franklin Bluffs**	**Pump Station 2**	**Pump Station 3**	**Galbraith**	**Galbraith West Alternate**
Project Purpose	**2.8**	8.4	2.8	5.6	11.2	14
Construction Cost	**1.8**	5.4	3.6	1.8	9	7.2
Engineering Considerations	**2.4**	2.4	4.8	9.6	12	7.2
Hydrologic Considerations	**2.4**	2.4	4.8	7.2	12	9.6
Geologic and Geotechnical Considerations	**2.4**	2.4	4.8	7.2	12	9.6
Land Ownership	**2.6**	13	10.4	7.8	5.2	2.6
Environmental Considerations	**2.8**	2.8	5.6	8.4	14	11.2
Maintenance Costs	**2.2**	11	8.8	2.2	6.6	4.4
Subsistence	**2.4**	7.2	12	9.6	2.4	4.8
Totals		**55.0**	**57.6**	**59.4**	**84.4**	**70.6**

It is important to note that this document should be considered a "Work in Progress." As more information becomes available, any criterion ranking could change for any corridor option, modeled weightings could change as a result of public input, and additional decisional factors could emerge. This document is a snapshot of the project as it stands today, and is flexible enough to continue to represent this project in the future as more information becomes available.

INTRODUCTION

The Foothills West Transportation Access Project proposes to develop a transportation corridor from the Dalton Highway to Umiat. The purpose of the corridor is to provide access to oil and gas resources both along the northwestern foothills of the Brooks Range and within the National Petroleum Reserve-Alaska (NPRA). The corridor would provide exploration and development opportunities for the area and facilitate a more economically feasible NPRA development.

A large project study area was initially evaluated to determine a potential all-season road access routes between the Dalton Highway and Umiat (Figure 1). The eastern boundary of this study area ranges from the Franklin Bluffs along the Dalton Highway near MP 376 to the north, south to Galbraith Lake near milepost 278. From these endpoints, the study area boundaries extend to the west from Franklin Bluffs and to the northwest from Galbraith Lake, converging at the state owned airport at Umiat. The study area was developed through discussions with both the State of Alaska DNR Division of Oil and Gas, and representatives of the oil and gas exploration and development industries to determine the most beneficial location of potential corridors.

After discussions with government and industry experts, five corridors were identified as potential routes from the Dalton Highway to Umiat. They were named according to their entry points at the Dalton Highway, and all end in Umiat (Figure 2). The five corridors discussed in this document include: Franklin Bluffs, Pump Station Two, Pump Station Three, Galbraith, and Galbraith West Alternate. All corridors were analyzed equally utilizing the best information available.

Corridors were then ranked based on a combination of available data and nine engineering, environmental and land-status criteria, which were weighted based on a variation of an experimental, multidisciplinary approach utilized by developers of a similar road to Bathhurst Inlet in the Province of Nunavut, Canada[1]. While this method will require further refinement, it represents a potential best-available-technology approach to reducing bias in decision-making processes for projects of this magnitude. Within the process used for this project, five differing societal viewpoints were considered, and the nine criteria evaluated for each corridor option based on an averaging of each specific criterion's importance to various societal viewpoints. It is recommended that since this ranking is subjective, additional effort should be put into developing "real world" viewpoints through, and meetings with, agency personnel, local community members, environmental specialists, engineers, and industry representatives. These stakeholders should review project criteria and help DOT&PF develop more verifiable weightings based on their importance and applicability.

It is important to note that this document should be considered a "Work in Progress." As more information becomes available, any criterion score could change, as well as additional criteria or weighting factors could be

[1] Atkinson, D. M., P. Deadman, D. Dudycha and S. Traynor. (2005). Multi-criteria evaluation and least cost path analysis for an arctic all-weather road. Applied Geography 25 (2005); pp. 287-307.

added. This document is a snapshot of the project as it stands today, and is flexible enough to continue to represent this project in the future as more information becomes available.

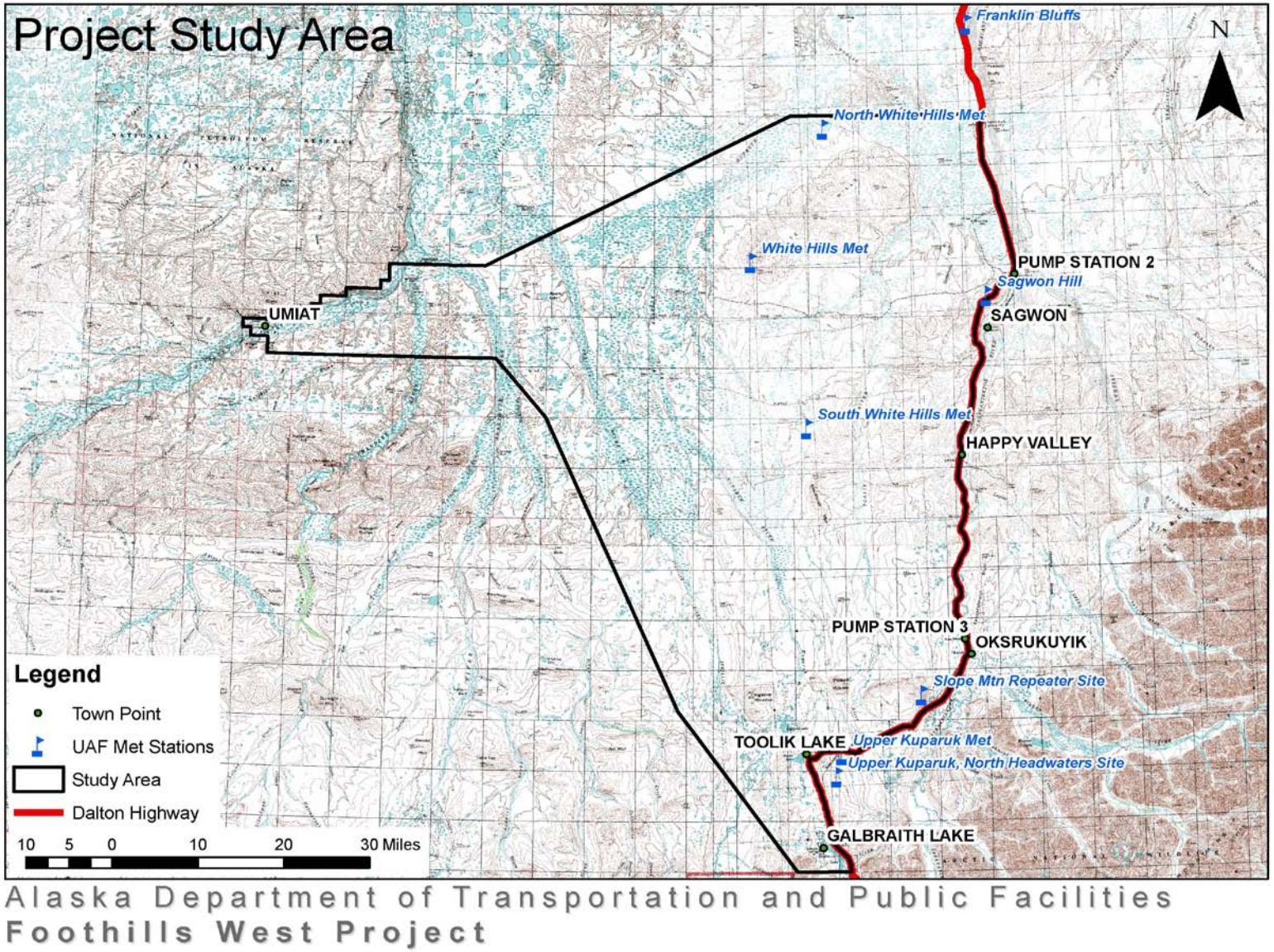


Figure 1. Foothills West Transportation Access Project Study Area. September, 2009.

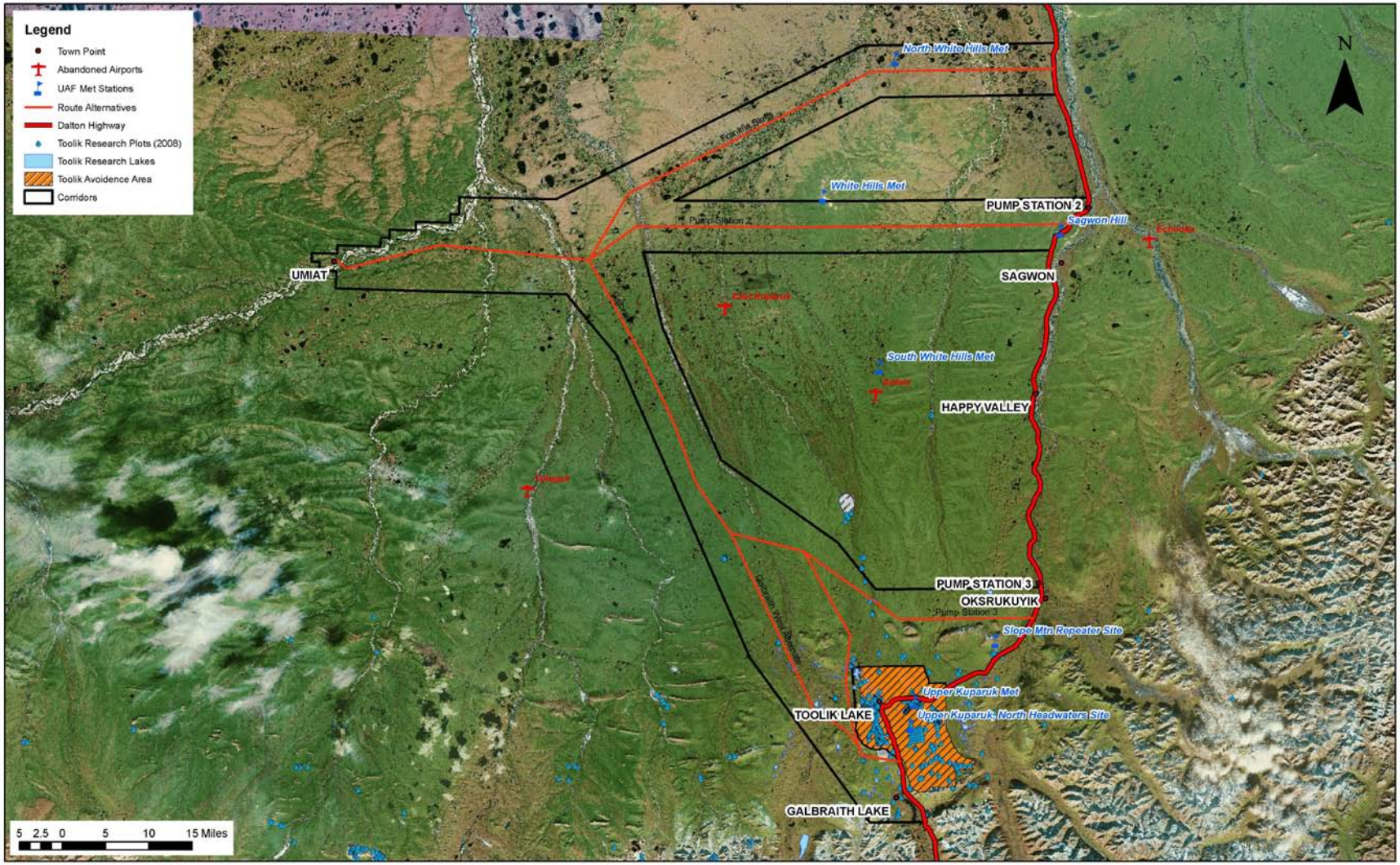


Figure 2. Interim Foothills West Transportation Access Project Preliminary Corridor Options. September, 2009.

CORRIDOR MATRIX CRITERIA

Evaluation criteria have been selected to develop a weighted route Decisional Matrix for the Foothills West Transportation Access Project. This matrix will be utilized as a tool to assist with road alternative development and evaluation, and will be considered a working document as the project progresses. At all times, the best available data will be used to evaluate alternatives. This matrix may be used to assist in documenting decisions to eliminate certain alternatives or to investigate new alternatives entirely. GIS technologies will be used to the greatest extent possible to analyze data quickly, accurately, and objectively.

All route alternatives are analyzed for their full length, from origins at the Dalton Highway to Umiat, to ensure equal comparisons. If limited analyses are performed, the extent of each limited analysis is documented, and a comparison is made to other alternatives. DOT&PF will strive to analyze all alternatives equally until any are dismissed. At that point, dismissed alternatives will no longer be analyzed unless new information becomes available that may affect their potential outcome in the analyses.

Initial study corridors were chosen based on discussions with representatives of industries operating in the area, State of Alaska DNR, Division of Oil and Gas personnel, and DOT&PF staff. The currently viable corridors are considered to be "Works in Progress," and may be adjusted as field data is collected and research performed during the upcoming field season.

Nine criteria were selected for evaluation based on internal DOT&PF discussions, preliminary research, and informal scoping with governmental agencies and industry. These criteria include: 1) Project Purpose; 2) Construction Cost; 3) Engineering Considerations; 4) Hydrologic Impacts; 5) Geologic and Geotechnical Considerations; 6) Land Ownership; 7) Environmental Impacts; 8) Maintenance Costs; and 9) Subsistence Impacts. Each criterion was scored based on multiple factors considered for each one. These internal factors are generally weighted equally when considering an overall score for each criterion. Factors that may carry more weight are identified independently. Additional criteria may be identified during the project and added to the decisional matrix. The best available data used to evaluate the matrix criteria are identified within each criterion. It is important to note that as more data is collected and additional research performed, criteria scores may change.

CRITERIA DESCRIPTIONS

PROJECT PURPOSE

The purpose of the Foothills West Transportation Access Project is to provide access to oil and gas resources both along the northwestern foothills of the Brooks Range between the Dalton Highway and Umiat and within the NPRA. A proposed transportation corridor would provide access to oil and gas resources both along the northwestern foothills of the Brooks Range and within the National Petroleum Reserve-Alaska (NPRA). The corridor would provide exploration and development opportunities for the area and facilitate a more economically feasible NPRA development.

An all season access road and associated pipeline infrastructure within the corridor would provide exploration and development opportunities for the area and facilitate more economically feasible NPRA development.

In discussions with oil and gas industry representatives and the State of Alaska DNR Division of Oil and Gas, an "Area of Influence" for exploration and development extends 25 miles outward from, and perpendicular to an existing permanent resource road. Within this "Area of Influence", the industry considers it more economically feasible to access, explore for, and develop oil and gas resources. Due to the high cost of constructing both conventional all-season and temporary ice roads in the area, the economics of exploration and development are substantially improved if a permanent road exists within 25 miles of a prospect, and is available for year-round mobilization and transport of materials, equipment and personnel. The economic viability of exploration, and development potential of prospects within the project study area, will be considered far more positive if transportation infrastructure is already in place.

In order to develop a transportation corridor that optimizes access to oil and gas resources, two sources of information on oil and gas resources within the project study area have been identified for the corridor analysis: a) the current database of oil and gas leases, and, b) a USGS Central North Slope Oil and Gas Resource Assessment, conducted in 2005. In addition, as an ancillary result of a road being constructed the potential of oil and gas pipeline construction along that road will likely increase and is also considered, as are the logistical costs of transporting goods and supplies to the region.

ALASKA DNR – DIVISION OF OIL AND GAS CURRENT LEASE ACCESS ANALYSIS

The Alaska Department of Natural Resources (DNR), Division of Oil and Gas, leases state land tracts to oil and gas companies for exploration and development activities. Many of these leases are located within the Foothills West project study area (Figure 3). The data used for this analysis was downloaded from the DNR website and is current as of January 12th, 2009. The data was downloaded in GIS formats, and was extrapolated to include specific tract and leaseholder information for analysis.

A 25-mile radius Area of Influence was developed from the centerline of each corridor and analyzed to evaluate oil and gas lease access. Within the resulting 50-mile wide corridor, GIS was utilized to calculate the acreage of accessible gas and oil leases and determine how much potential leased acreage would benefit from a new road. In analyzing each corridor, leases within the 25-mile radius of influence from

the Dalton Highway were excluded, as a new road constructed further west would not provide additional, significant access benefits to these leases.

The results of this analysis are displayed both as total leases by company, and a total,net-leased acreage benefit within each corridor's "Area of Influence." The number of leases anticipated to focus primarily on gas production are also identified as a major scoring factor due to the emphasis on natural gas production by this project's Purpose and Need.

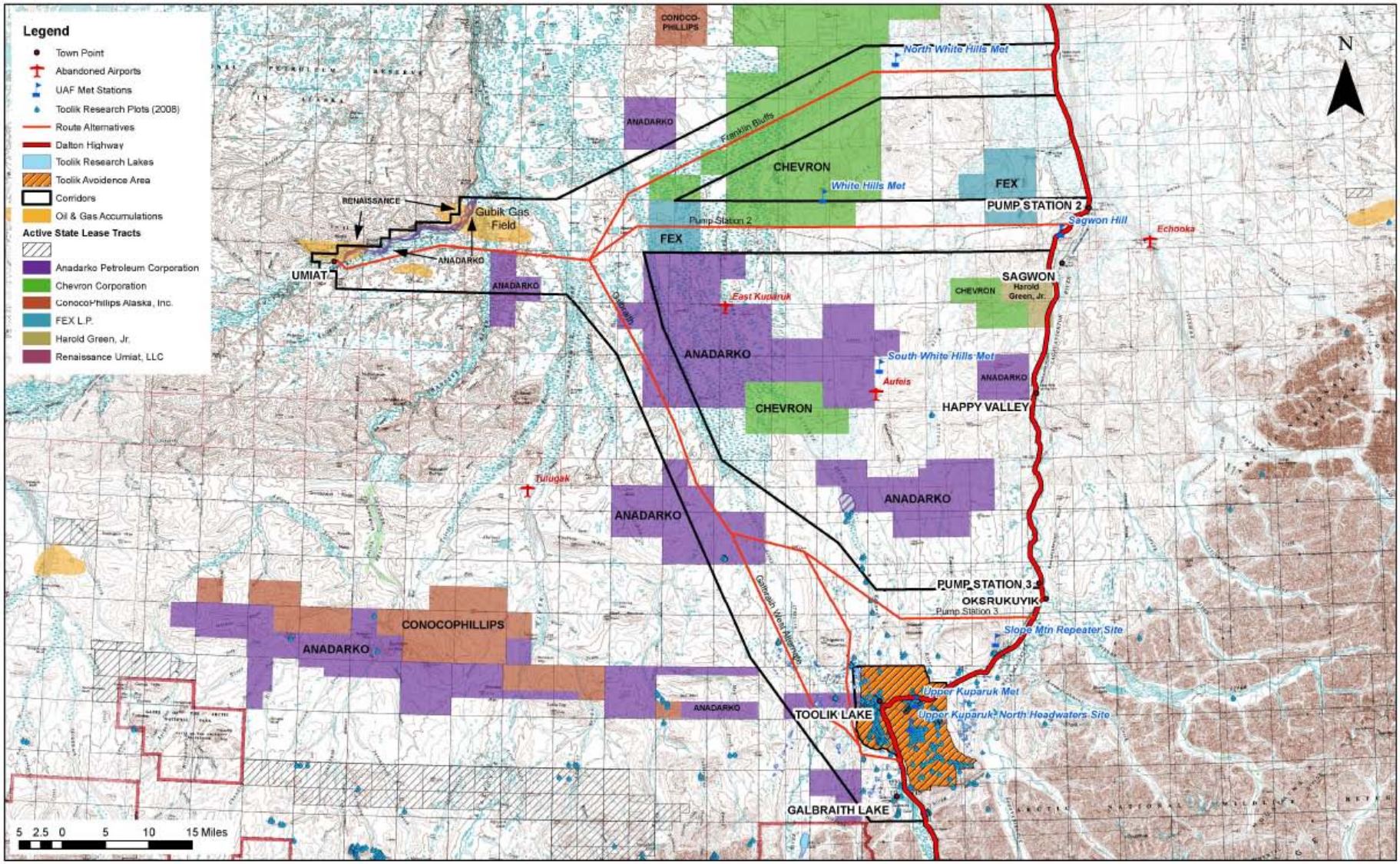


Figure 3. Foothills West Transportation Access Project Oil and Gas Lease Information. September, 2009.

USGS 2005 CENTRAL NORTH SLOPE OIL AND GAS ASSESSMENT

The United States Geological Survey (USGS) conducted an assessment of the oil and gas resources on the central North Slope in 2005 which included the entire project study area. GIS layers of individual oil and gas "Plays", or potentially viable resource fields, were extracted from USGS data and evaluated for oil and gas exploration and development potential, based on guidance from the Alaska Department of Natural Resources, Division of Oil and Gas. General guidance was evaluated based on the geologic resource potential of each corridor. This potential is described in more detail below, and was rated as low, moderate, or high.

ACCESS TO NPRA

A long term goal of the Foothills West project is to provide long-term access to NPRA for the purposes of oil and gas exploration and development. Since all potential road options end at Umiat, all alternatives scored equally for this criterion. Actual road miles to Umiat are scored under the Project Costs criterion, and are not considered here.

GAS TO MARKET AND TRANSPORT SAVINGS CONSIDERATIONS

Depending on the distance of each routes origin from Fairbanks, consideration was given to gas and oil pipeline routing and the savings realized by routes that reduce additional Dalton Highway mile distances to appropriate markets. For example, a Foothills West route with an origin at Galbraith Lake would begin closer to Fairbanks or Anchorage than a route starting near Pump 2 or Franklin Bluffs, thereby reducing the distance to market for shipping gas or transporting supplies and cargo to Umiat.

GEOLOGIC RESOURCE POTENTIAL

The overall geologic structures within the project study area trend east-west. Consequently, corridors that follow an east-west alignment generally parallel geologic formations that may contain oil and gas resources. Alternatively, corridors trending north-south cross those same geologic structures perpendicularly, maximizing the routes' exposures to a large number of structures rather than following the same structures for their lengths. Therefore, roads that trend north-south may present a higher potential for exploration and discovery of new resources.

SCORING CONSIDERATIONS

If the Project Purpose is not realized, oil and gas resource access is not optimized and other considerations will not be as important. The corridor that provides the greatest access to state-owned oil and gas lease acreage, the greatest potential access to possible reserve areas identified by the USGS, that optimizes gas-to-market distances, and traverse the greatest range of geologic resource potential is given a pre-weighted score of "5." The corridor that provides the least of access to leases and potential reserves is given a pre-weighted score of "1."

CONSTRUCTION COSTS

Construction costs of the project are evaluated equally for all routes based on the following road Design Criteria:

ROAD ESTIMATE ASSUMPTIONS:

- Special Purpose Resource Recovery Road as defined by AASHTO
- Road Width: 24’ with 3’ shoulders (30’ total width)
- Road Construction: gravel embankment with gravel surfacing – 8’ depth at shoulders (requires further thermal analysis)
- 200’ long x 25’ wide Turnouts every 5 miles (allows for 2-3 hour delays during drill rig transport, rather than closing road)
- Public Road –no access restrictions
- Roadway width designed to accommodate typical Drill Rigs currently operating on the North Slope (needs research for type of drilling that may occur in this region)
- Assume $15/cy for embankment material - $30/cy for crushed surfacing

BRIDGE ESTIMATE ASSUMPTIONS:

- The Major rivers encountered within the project study area:
  - ❖ Toolik River
  - ❖ Kuparuk River
  - ❖ Itkillik River
  - ❖ Anaktuvuk River
  - ❖ Chandler River
  - ❖ Colville River
- Bridges accommodate 30’ wide driving surface
- Bridges designed to standard AASHTO HL-93 bridge loadings (more research needed on design vehicles to be utilized in this region)
- Bridges designed to include gas/oil pipeline loads
- Removable Bridge Rails to accommodate large equipment passage
- Designed to pass 100 year flood event plus 1 foot
- Bridge to span 50 year flood plain (hydrology work needed)

- Bridge Costs estimated at $20,000 per lineal foot for 30’ wide bridge described above
- Additional cost for significant drainage structures is estimated at $100,000 per drainage crossing.
- Costs for small pipes and minor drainage work are considered subsidiary to the embankment costs.

SCORING CONSIDERATIONS

Costs are an integral factor in determining the economic viability of a project. The weight was chosen to reflect the importance of having the most economically feasible corridor possible. The route with the least overall cost was given a pre-weighted score of “5” and the route with the greatest estimated overall cost was given a pre-weighted score of “1.”

ENGINEERING CONSIDERATIONS

Engineering considerations play an important role in determining the most favorable corridor for this project. Considerations should be given to road/pipeline geometry as related to terrain, grades and elevations, and how these relate to design vehicles and proposed road activities. Environmental factors such as snow drifting and general drainage considerations are evaluated individually. Constructability issues are also considered in the evaluations.

- Road Length
- Starting elevation
- Ending Elevation
- Highest Point
- Maximum Grade
- Road/pipeline Geometry related to terrain
- Design Vehicles and road activities related to road geometry
- Environmental factors such as snow drifting and general drainage.
- Constructability
- Special considerations

EMBANKMENT STABILITY

Long term embankment stability is an important factor in determining how well a particular embankment may withstand settlement and consolidation as related to additional maintenance required in the future. The stability of subsurface soils, as well as the ability of the embankment to prevent thaw settlement of

the subsurface, both contribute to embankment stability. Uncertainties in future, regional climate trends may also affect embankment stability. This consideration is evaluated using existing information on both the type and potential ice content of subsurface soils.

SNOW DRIFTING/AUFEIS

In evaluating snow drifting potential each corridor is evaluated for terrain that may contribute to snow drifting conditions. The dominant winds in the area are assumed to be northeast and southwest, with more local variations in specific areas of the project. These prevailing wind directions will be verified using existing meteorological stations in the project area. Additional considerations are given to road orientation and whether routes are aligned parallel with or perpendicular to prevailing wind directions.

Aufeis is also considered as an additional cost factor if corridors cross areas prone to these conditions. Areas of aufeis are identified, and corridors with greater aufeis potential are scored lower.

SCORING CONSIDERATIONS

Engineering considerations were evaluated for each corridor individually. The corridor option that optimizes these considerations the best is given a pre-weighted score of “5”, and the corridor option that poses the most engineering challenges is given a pre-weighted score of “1.”

HYDROLOGIC IMPACTS

MAJOR RIVERS

Six major rivers exist within the project study area: the Toolik River; Kuparuk River; Itkillik River; Anaktuvuk River; Chandler River; and the Colville River. For all of the proposed corridors, similar locations exist for crossings of the Anaktuvuk, Chandler, and Colville Rivers. These three river crossings are included in the individual evaluations, but are considered equally for all corridors.

All corridors are evaluated based on their estimated river crossing width (bridge length), and the total floodplain impacts. These measurements are estimated using the best available imagery (Digiglobe/Land sat) and should be considered preliminary. Current studies will assist in making these estimates more accurate, and these factors will be updated as more detailed information becomes available.

SMALLER SIGNIFICANT DRAINAGES

Additional consideration is given to the number of minor drainages that are crossed by each corridor. These drainages were identified using a combination of USGS maps, Digiglobe/Land Sat imagery and

ADNR DGGS mapping. These drainages are counted, and the corridor that impacts the fewest drainages is considered more beneficial. Special considerations are also given to incised drainages and icing hazards that exist on any route.

RIVER NAVIGABILITY

Although the definition of river navigability has many connotations, for this evaluation, rivers that have been determined by the State of Alaska as navigable or non-navigable are identified and used in the corridor evaluation. Rivers that have been determined navigable will likely require additional considerations for the requirements of river crossing structures and permitting. Rivers that have been identified as non-navigable are considered simpler to cross.

SCORING CONSIDERATIONS

The corridor that minimizes impacts to hydrological parameters is given a pre-weighted score of "5", and the corridor that is least favorable considering hydrologic considerations is given a pre-weighted score of "1." Routes are scored based on the number of major river crossings, the extent of river and floodplain impacts; the number of minor drainages impacted, and river navigability.

GEOLOGICAL AND GEOTECHNICAL CONSIDERATIONS:

The Geological and Geotechnical criterion is evaluated based on several factors, including the potential for material sources along the route, subsurface soil conditions, potential icing hazards along the route, slope stability, avalanche hazards in areas of mountainous terrain, and potential seismic hazards.

MATERIAL SOURCES

Each corridor is evaluated for potential material sources along the routes, based upon on-going office studies and research. To date, field work has been limited to reconnaissance studies performed by consultants and DOT&PF staff. A thorough geologic field investigation is planned for summer, 2009, and this information will be updated as it is developed.

This criterion is scored based on the probability of a route having at least one suitable material site every 10 miles within the project corridor. Potential upland sites are scored higher than material sites in rivers and floodplains due to their reduced environmental impacts. Material sources meeting DOT&PF road construction quality standards allow for a route to be scored higher as well.

SUBSURFACE SOIL CONDITIONS

Subsurface conditions for the entire project area are anticipated to be frozen. Based on available geologic mapping in the project study area, areas to the south have higher potentials for sands and gravels in the subsurface, while farther north routes area anticipated to contain organic fine grained subsurface soils in the flats, with gravel within the river floodplains. Corridors are scored by estimating the number of miles of anticipated subsurface soil conditions. Routes with stable subsurface conditions are scored higher than unstable subsurface conditions.

ICING HAZARDS

Potential icing hazards exist within the project study area, and several large icing areas have been documented by DGGS and DOT&PF staff. Areas prone to icing hazards threaten roads and drainage structures, cause additional maintenance concerns, and should be avoided. Routes with limited icing hazards are scored higher than routes with significant icing hazards. Additional research will be performed to ensure icing hazards do not exist within the study corridors.

SLOPE STABILITY AND AVALANCHE HAZARDS

In mountainous terrain, slope stability and avalanche hazards are analyzed based on USGS maps and potential soil properties. These analyses are only based on the best available information from USGS maps, existing geologic maps, and current Digiglobe and Land Sat imagery. Additional work will be performed in future studies to identify and verify existing hazards, as well as determine the potential for other unmapped hazards to exist.

SEISMIC HAZARDS

Seismic hazards were evaluated within the project study area. Historical records of seismic events obtained from the University of Alaska, Fairbanks, Geophysical Institute were evaluated. The seismic activity in the region is considered very low. The potential seismic hazard within the project study area is also very low. No further analysis was performed for the individual corridors.

SCORING CONSIDERATIONS

Each corridor is scored based on the number of potential material sites along the route, the potential quality of materials, the assumed subsurface soil conditions along the route, areas of icing hazards within the corridor, potential areas of slope stability problems, and avalanche hazards. The corridor with the greatest potential of suitable material sites for construction, the most stable subsurface soil conditions, the smallest areas of icing, and the lowest slope instability/avalanche hazard potential is given a pre-weighted score of “5.” The least favorable route regarding these geological and geotechnical considerations is given a pre-weighted score of “1.”

LAND OWNERSHIP

Land ownership is an important factor in comparing project corridors. Within the project study area, land ownership includes the State of Alaska, Arctic Slope Regional Corporation (ASRC), BLM, and various Native allotments (Figure 4). Crossing State of Alaska-owned lands provides a positive rating for this criterion due to the reduced cost and time required for acquisition of Rights of Way (ROW). In contrast, crossing federal land is considered a negative factor due to the additional time needed for acquisitions and coordination required of federal agencies. In general, as all corridors impact ASRC lands equally, these ASRC lands are not considered in the route scoring.

For this criterion analysis, a 300' wide ROW was identified using the centerline of each corridor evaluated as its basis. A 300' ROW is considered by the State and the oil and gas industry as sufficient to satisfy the needs of proposed development activities. The ROW is then overlain on current land status maps developed by the State of Alaska, Department of Natural Resources, to generate total acreages of impacts to specific landholders.

One caveat exists on BLM lands within the project study area near Toolik Lake. Portions of this area have been designated a "Utility Corridor" by BLM. BLM has identified language within ANILCA that allows for a ROW, dedicated to ASRC, for the purposes of oil and gas development activities. BLM has stated that if the State and ASRC agree on a corridor location, a ROW could be granted for the purpose of oil and gas development, pipelines, and transportation infrastructure without the need for environmental documentation. This would allow for a ROW to accessing State Lands across federal land, but without administratively invoking the same degree of land status consideration as would be required in other areas.

SCORING CONSIDERATIONS

All corridors were evaluated using the 300' ROW constraints described above. Individually, each corridor is scored on the basis of acquisition acreage within the 300' total ROW width, and the percentage of ROW acquisition required from each landowner (state, BLM, Native, etc). The route that minimizes both total ROW acquisition, as well as ROW required acquisitions on federal lands, is given a pre-weighted score of "5." A route that will acquire the most amount of ROW, as well as the greatest amount of ROW on federal lands is given a pre-weighted score of "1."

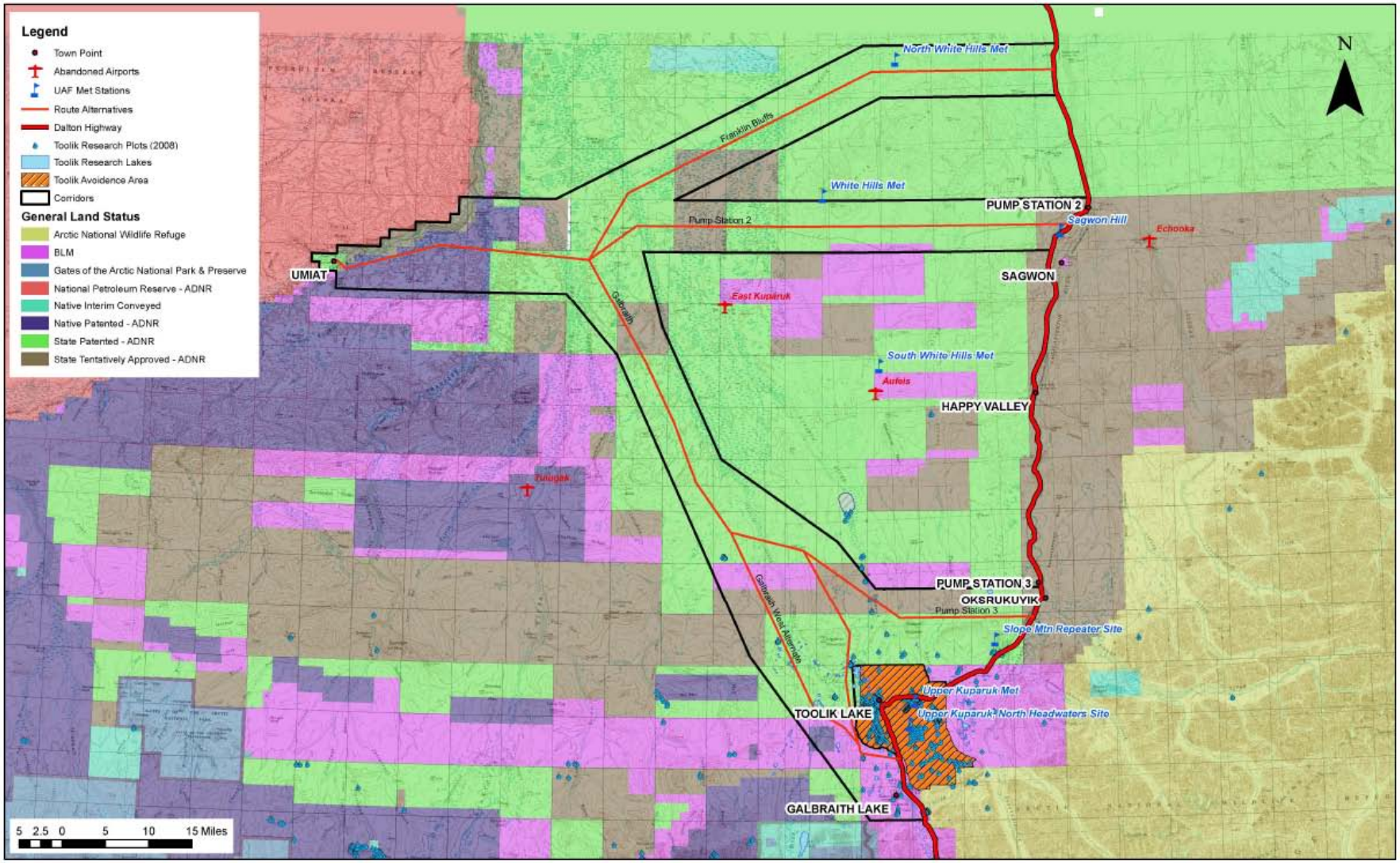


Figure 4. Foothills West Transportation Access Study Area Land Ownership. September, 2009.

ENVIRONMENTAL IMPACTS

Quantifiable environmental considerations evaluated for this matrix include area impacts to wetlands and uplands, area impacts to habitat, impacts to wildlife, the number of fish streams impacted by each corridor option, and the number of previously identified cultural resource sites within the six mile corridor identified for the study.

AREA IMPACTS TO WETLANDS

It is assumed that the majority of the project study area is wetlands, except for obvious areas of upland and mountain/bluff acreage. At the current level of analysis, no effort has been made to evaluate high vs. low value wetlands. All impacts are based on a road design using factors identified in the Costs criterion section, and which are quantified as "wetland acres filled." An additional 30% contingency factor was included in these calculations for all corridors due to the current unavailability of detailed wetland information.

AREA IMPACTS TO HABITAT

Areas identified by resource agencies as important wildlife habitat are the shrub-dominated acreage within river floodplains which provide habitat for moose, and songbirds, and the perimeter areas around tundra ponds and lakes which provide emergent habitat for birds. Impacts to habitat by corridors will be considered on the basis of their entire 6 mile width, since some type of secondary impacts to habitat are expected due to the establishment of a permanent.

AREA IMPACTS TO WILDLIFE

Areas that have been identified by resource agencies as important to wildlife populations have been determined on a preliminary basis using agency maps, available scientific literature and through direct discussions with resource agency personnel. Impacts to wildlife populations and distribution by individual corridors includes those within the entire 6 mile corridor width, since some impacts may be effected by the presence of permanent disturbance factors in the corridors beyond those impacts by road construction or infrastructure.

FISH STREAM IMPACTS

Corridors that cross streams identified by Alaska Department of Fish and Game as containing fish are analyzed. The number of fish bearing streams crossed by each route are counted, and any potential

anadromous fish streams are identified for consideration. Additional studies may be needed to identify additional fish streams that may be impacted.

CULTURAL RESOURCE IMPACTS

The AHRS database was consulted to identify potential cultural resources within the project study area. Any cultural resources identified within each six mile corridor are considered to be impacted. The number of resources are counted and identified. No weight is given to the potential importance of these resources, or how that importance may apply to the specific corridor. Additional resources may exist that have yet to be identified as, and the project study area will require additional cultural resource studies in the future.

SCORING CONSIDERATIONS

All five environmental criteria are evaluated and weighted equally in determining the optimal corridor. The corridor that minimizes wetland and habitat acreage impacts, wildlife impacts, the number of fish bearing streams crossed, and cultural resource impacted receives a pre-weighted score of "5." The corridor that yields the greatest potential to impact these resources receives a pre-weighted score of "1."

MAINTENANCE COSTS

Maintenance costs are important as related to how transportation infrastructure performs after it is constructed. For this criterion considerations include typical per mile maintenance costs; embankment stability; dust control; snow drifting; and maintenance camp needs.

TYPICAL PER MILE MAINTENANCE COSTS

Per-mile maintenance costs are important in considering the long term maintenance for an individual road option. Maintenance costs for FY08 have been extracted from the DOT&PF Dalton Highway maintenance section, and are applied to this analysis to evaluate costs. This criterion also considers embankment stability, terrain, and the number of bridges requiring long-term maintenance. Although an actual cost is not available at this time, these factors were considered when scoring the criterion.

MAINTENANCE CAMPS

Assuming the new road would be maintained by DOT&PF, an expanded network of maintenance camps would be required to provide timely maintenance for the infrastructure. This consideration is evaluated on the basis of the existing maintenance camps on the Dalton Highway, how they may interact with the starting point of a new road, and what maintenance considerations and operations would be required along any new route.

SCORING CONSIDERATIONS

The corridor that minimizes maintenance costs is given a pre-weighted score of "5." The corridor that appears to be the most costly is given a pre-weighted score of "1."

SUBSISTENCE IMPACTS

Subsistence use within the project study area was determined using subsistence use and designation maps published by the North Slope Borough in association with the Alaska Department of Fish and Game and the Alaska Department of Natural Resources (Figures 5-8). Additional studies are needed based on preliminary public meetings with affected communities in the region and consultations with the responsible resource agencies and governments. Corridors were evaluated on the basis of their impacts to subsistence use areas and trails.

SCORING CONSIDERATIONS

Each route was evaluated based on a six mile wide corridor and the potential impacts to subsistence use areas. Routes that overlay the greatest linear distance of known subsistence use area scored lower. Routes that impacted the least linear distance of subsistence use area scored higher. The Corridor with the least amount of subsistence impacts receives a pre-weighted score of "5," and the corridor exhibiting the greatest amount of subsistence impacts receives a pre-weighted score of"1."

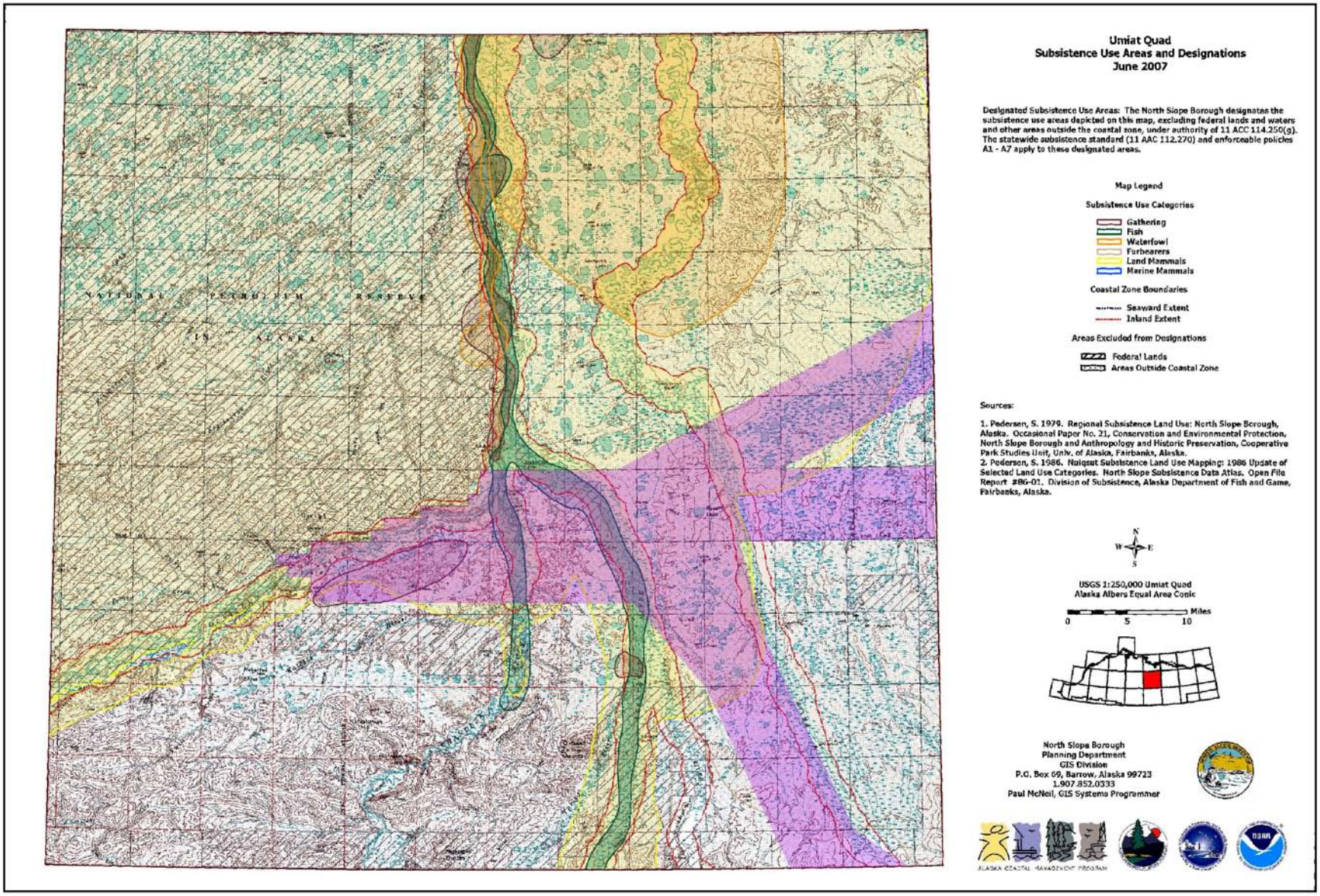


Figure 5. Umiat Quad. Subsistence Use Areas and Designations; Foothills West Transportation Access Project

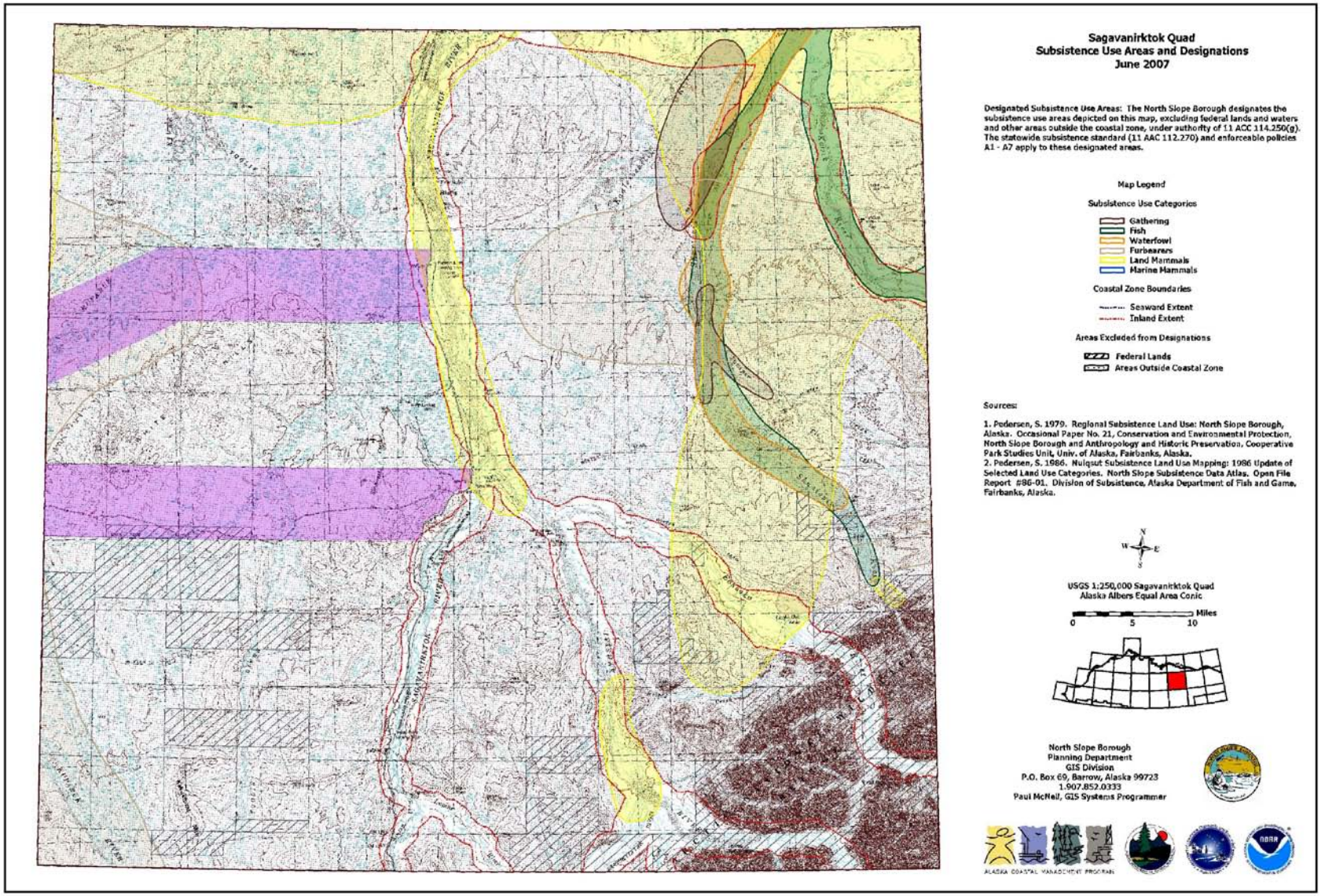


Figure 6. Sagavanirktok Quad. Subsistence Use Areas & Designations; Foothills West Transportation Access Project.

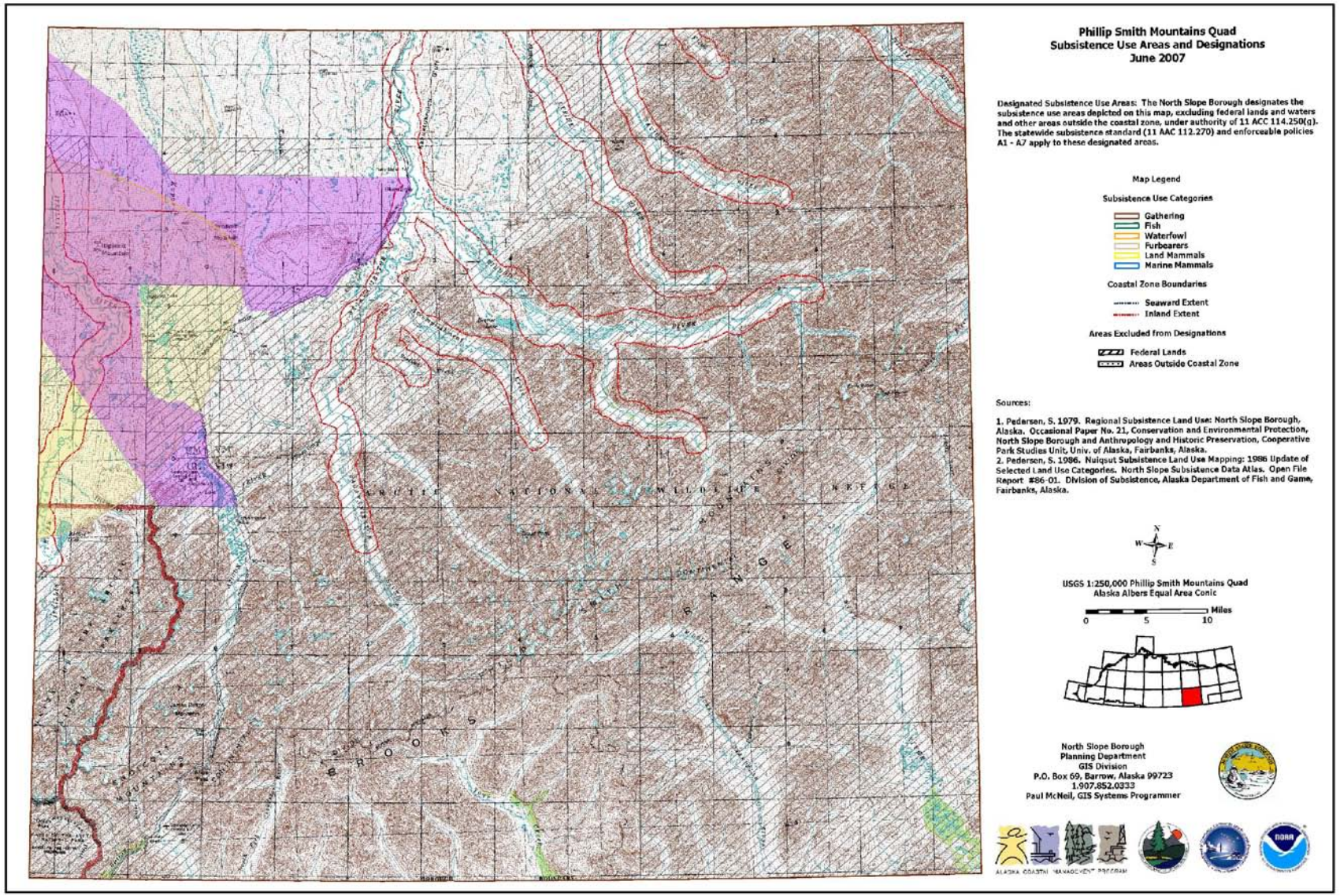


Figure 7. Phillip Smith Mtns. Quad. Subsistence Use Areas & Designations; Foothills West Transportation Access Project.

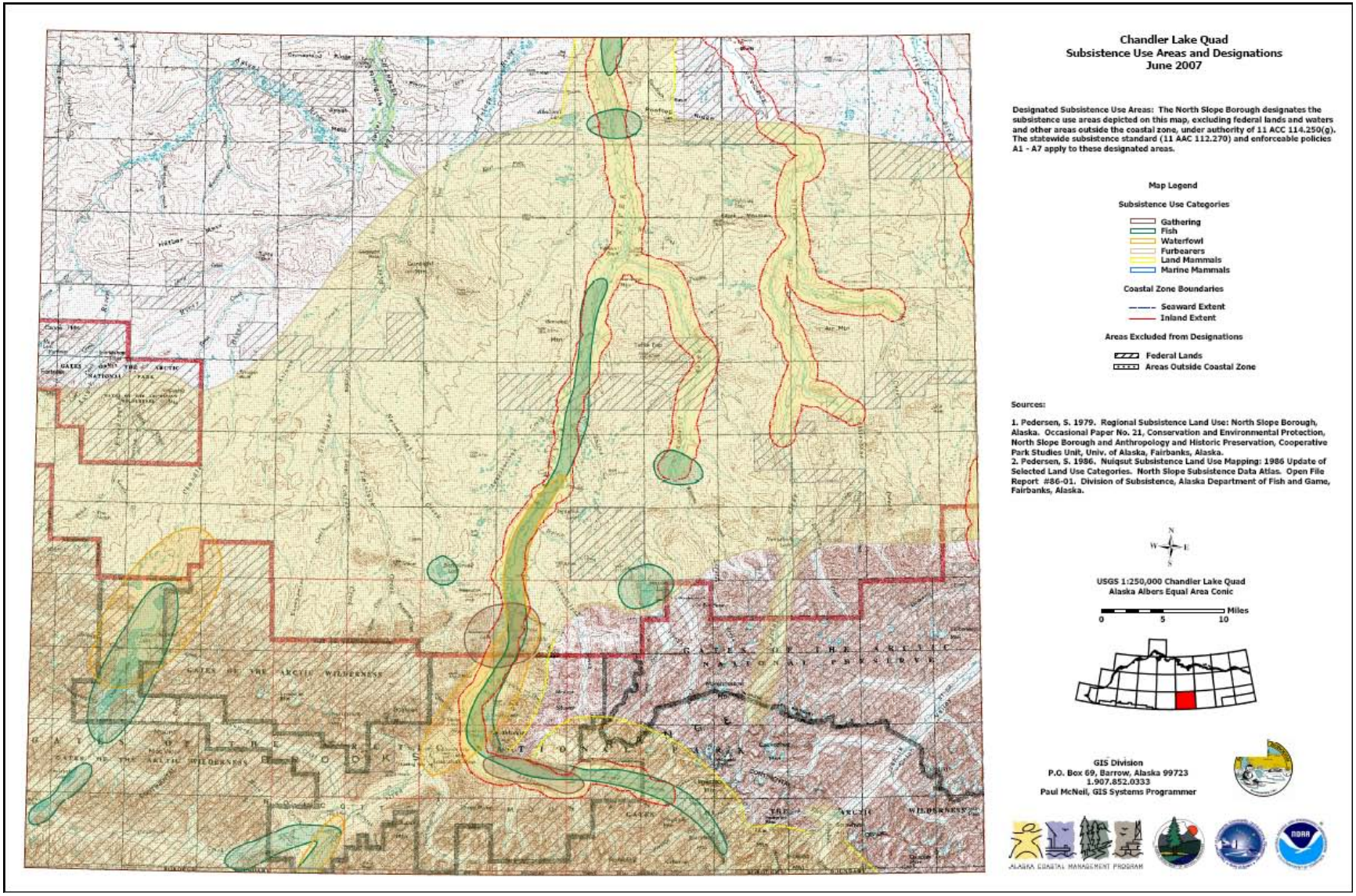


Figure 8. Chandler Lake Quad. Subsistence Use Areas and Designations; Foothills West Transportation Access Project.

CRITERIA WEIGHTING

WEIGHTING METHODOLOGY

Each criterion was analyzed from five "interest" viewpoints: State, Community, Environmental, Engineering, and Industry. Each viewpoint seeks to subjectively rate each criterion, assigning a score from 0 to 4, with 0 identifying a criterion as least important to a specific viewpoint, and a 4 inferring a criterion is most important to a viewpoint.

VIEWPOINT DESCRIPTIONS

State Interest: This viewpoint considers what criterion are the most and least important for the State of Alaska, in terms of supporting the people and finances of the State.

Community Interest: This viewpoint considers local issues and needs when considering criterion weights. What is the most important criterion for the communities that may be affected by this project?

Environmental Issues: This viewpoint considers issues important to environmental advocates. Which criteria most affect the environment, and which criteria are less important?

Engineering Interest: From an engineering standpoint, which criterion are the most and least important?

Industry Interest: From an Industry stance, how important is each criterion to oil and gas development?

Table 2 identifies viewpoints considered, criteria, and compiled weights for each criterion. Average weight for each criterion represents averaged importance across all viewpoints as may be considered a representative sample of public input. Preliminary weightings for each viewpoint were generated in as objective a manner as possible by a multidisciplinary group of DOT&PF staff, though may change as the amount of public input increases.

Table 1. Interim criteria weighting by viewpoint for Foothills West Transportation Access Project. September 2009.

State	Community	Environmental	Engineering	Industry	Average Weight
Project Purpose 4	Project Purpose 1	Project Purpose 3	Project Purpose 2	Project Purpose 4	Project Purpose 2.8
Construction Cost 3	Construction Cost 0	Construction Cost 0	Construction Cost 3	Construction Cost 3	Construction Cost 1.8
Engineering 1	Engineering 1	Engineering 2	Engineering 4	Engineering 4	Engineering 2.4
Hydrologic 1	Hydrologic 2	Hydrologic 3	Hydrologic 3	Hydrologic 3	Hydrologic 2.4
Geologic 1	Geologic 2	Geologic 3	Geologic 4	Geologic 2	Geologic 2.4
Land Ownership 3	Land Ownership 4	Land Ownership 3	Land Ownership 2	Land Ownership 1	Land Ownership 2.6
Environmental 2	Environmental 4	Environmental 4	Environmental 2	Environmental 2	Environmental 2.8
Maintenance 3	Maintenance 1	Maintenance 1	Maintenance 2	Maintenance 4	Maintenance 2.2
Subsistence 2	Subsistence 4	Subsistence 3	Subsistence 1	Subsistence 2	Subsistence 2.4

CORRIDOR DECISONAL MATRIX EVALUATION

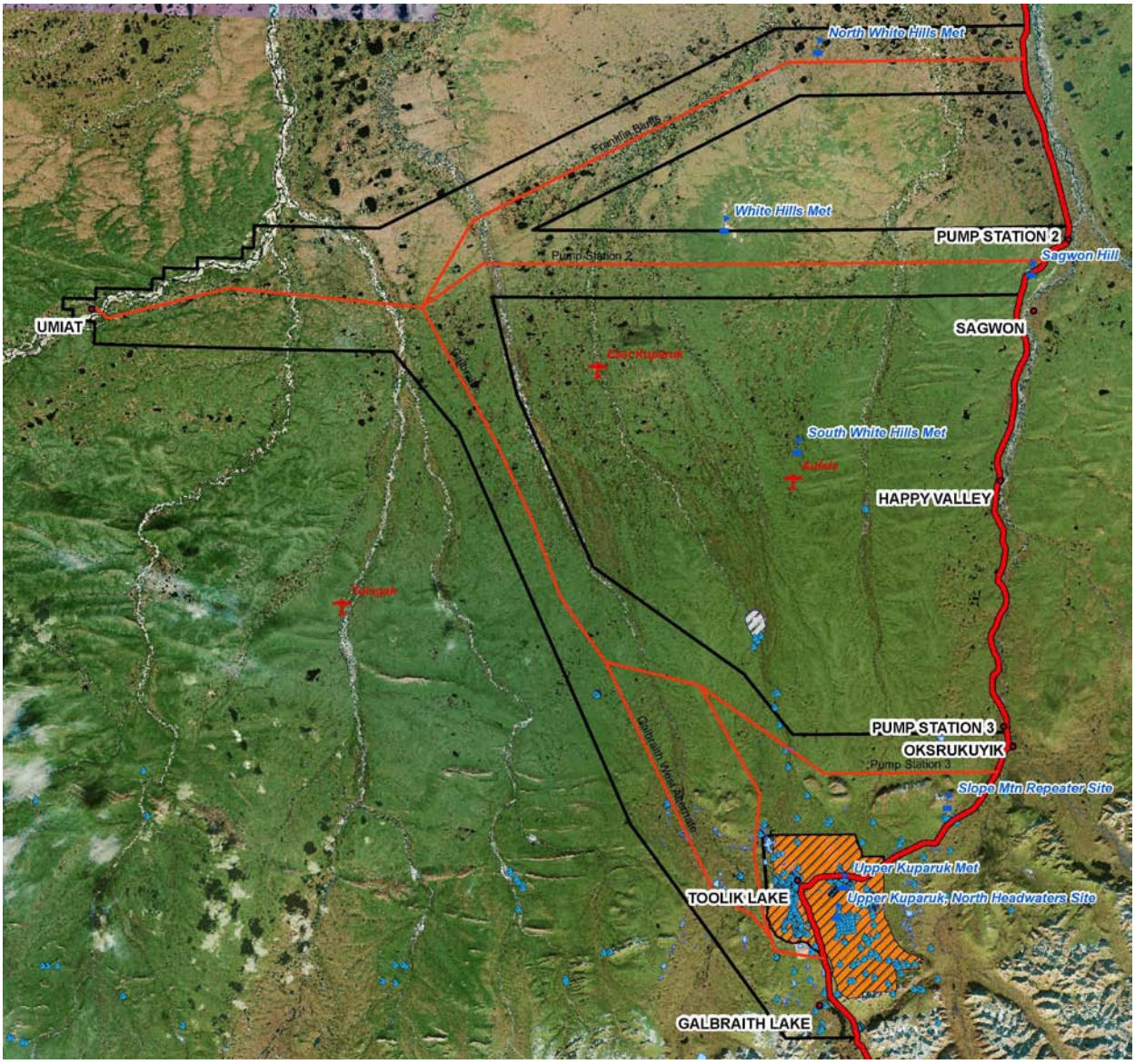
DECISIONAL MATRIX RANKINGS

Data available for each corridor were then ranked by their ability to support required engineering, environmental and land-status criteria and, by applying weighting factors, generated a numerical score in the Corridor Decisional Matrix (Table 2) . The resulting matrix scored the Galbraith Route as the most advantageous corridor option based on the nine primary, weighted criteria. The Galbraith West Alternate Route was second most advantageous, and the Pump Station Three Route the third most desirable. The Pump Station Two Route and Franklin Bluffs Route ranked fourth and fifth, respectively.

Table 2. Interim Corridor Decisional Matrix for Foothills West Transportation Access Project. September 2009.

		Weighted Scores for Corridors				
Criterion	**Weight**	**Franklin Bluffs**	**Pump Station 2**	**Pump Station 3**	**Galbraith**	**Galbraith West Alternate**
Project Purpose	**2.8**	8.4	2.8	5.6	11.2	14
Construction Cost	**1.8**	5.4	3.6	1.8	9	7.2
Engineering Considerations	**2.4**	2.4	4.8	9.6	12	7.2
Hydrologic Considerations	**2.4**	2.4	4.8	7.2	12	9.6
Geologic and Geotechnical Considerations	**2.4**	2.4	4.8	7.2	12	9.6
Land Ownership	**2.6**	13	10.4	7.8	5.2	2.6
Environmental Considerations	**2.8**	2.8	5.6	8.4	14	11.2
Maintenance Costs	**2.2**	11	8.8	2.2	6.6	4.4
Subsistence	**2.4**	7.2	12	9.6	2.4	4.8
Totals		**55.0**	**57.6**	**59.4**	**84.4**	**70.6**

INDIVIDUAL CORRIDOR DESCRIPTIONS & ANALYSES



Corridor Analysis

GALBRAITH ROUTE

GENERAL ROUTE DESCRIPTION

Overall Length:	102 miles
Starting Point:	Approximately 4 miles north of Galbraith Lake at Dalton Hwy. MP 278
Ending Point:	State of Alaska airport at Umiat
Major River Crossings:	Itkillik, Anaktuvuk, Chandler, Colville
Terrain:	Grades overall are very gentle, with maximum grades of 3%-5%

The Galbraith Route (Figure 9) begins in the vicinity of MP 278 of the Dalton Highway, and trends due west for approximately 3 miles through moderately rolling terrain before heading north. This route then proceeds north for approximately 11 miles toward Itigaknit Mountain, avoiding the Toolik Lake basin to its east, as well as Itigaknit Lake and numerous smaller lakes in the area. The route then curves to the west around the east side of Itigaknit Mountain through gradual terrain, avoiding potential avalanche and slope stability hazards.

Once past Itigaknit Mountain, the route descends northwesterly for 10 miles on a gently sloping, dry terrace between the Itkillik and Kuparuk Rivers. In the vicinity of VABM 2063 (as shown on the USGS maps), the route trends more westerly for 4 miles and gradually descends to cross the Itkillik River (estimated channel width of 250' and a floodplain width of 300'). From the crossing, the route ascends 3 miles due west through the floodplain before once again turning northwest on an elevated terrace west of the Itkillik River.

Along the western terrace, the route generally parallels the Itkillik River for approximately 36 miles, with the first 15 miles characterized by rolling, gradually descending terrain crossing numerous small tributaries of the Itkillik River as well as several larger, incised drainages. Over the remainder of this segment, the tributary crossings decrease, grades flatten, and overall drainage becomes poor. North of VABM 1069, the area is characterized by numerous lakes, cross-flow drainage patterns and marshy ground. Sub-soil conditions are generally anticipated to be unstable. The final 6 miles of this route segment contain numerous, established winter trails trending east-west, as well as abandoned drilling wells and old development features.

The route then trends due west for 3 miles to the Anaktuvuk River in the vicinity of VABM 515 and VABM 555 to the south of Square Lake. Crossing the Anaktuvuk River near this point, the route continues west through poorly drained soils for 7 miles to the Chandler River crossing, accessing the southern extents of the Gubik oil and gas field. West of the Chandler River, the route proceeds west-southwest for 17 miles, descending to the Colville River floodplain and crossing the Colville River main channel near Umiat.

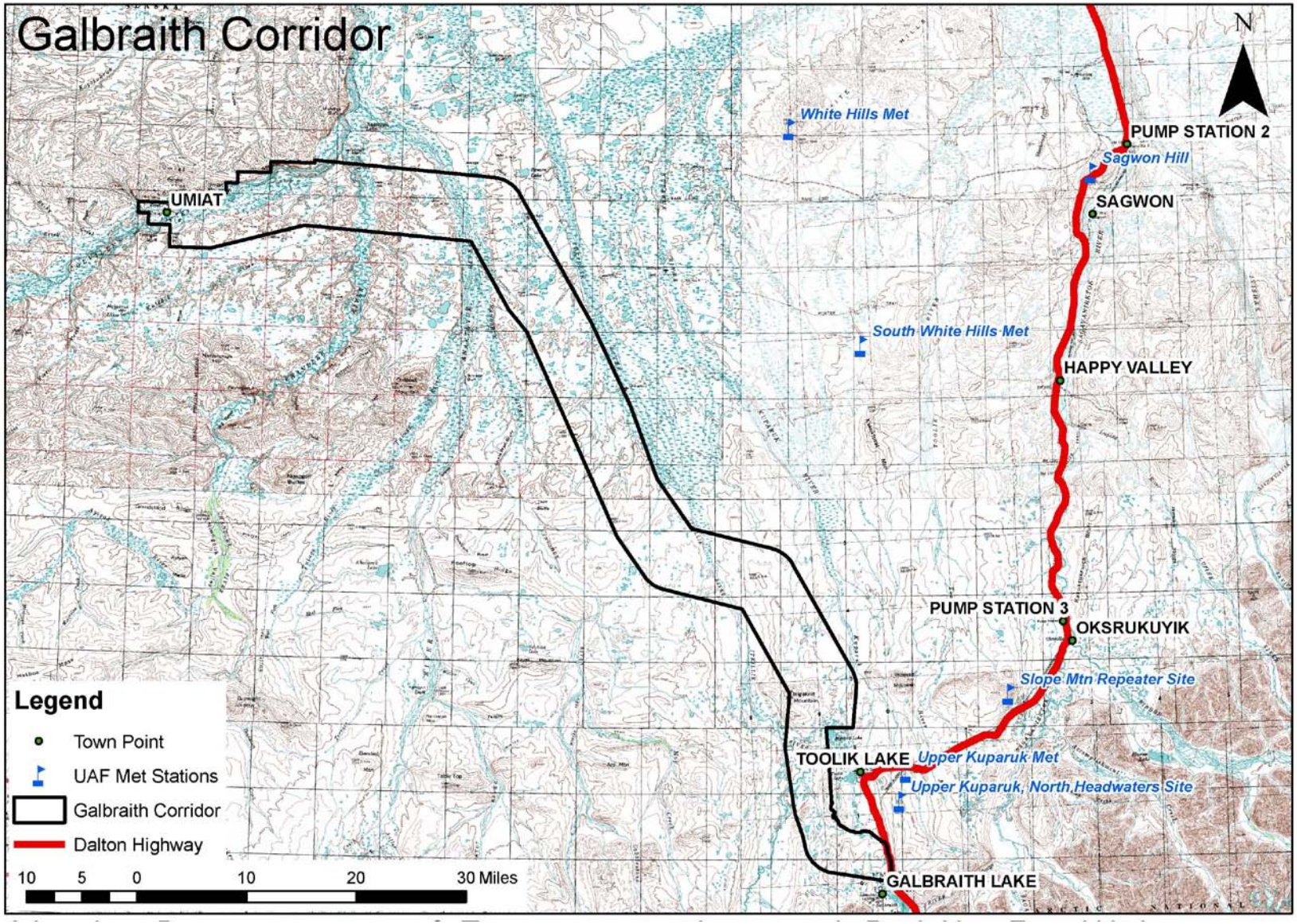


Figure 9. Galbraith Corridor option; Foothills West Transportation Access Project, Sept., 2009.

2009 STATE OIL AND GAS LEASE ANALYSIS

Table 3 identifies the current State of Alaska leaseholders in the area, and both the number and acreage of leases within the Galbraith Route "Area of Influence." Figure 10 illustrates the existing oil and gas lease holdings on state land and the described Area of Influence. Note that all calculations exclude lease holdings located within the Dalton Highway "Area of Influence." Due to the emphasis of gas production in the Project Purpose, an additional total is provided for leases anticipated to be focused solely on gas production. These totals are based on discussions with industry representatives and the Alaska DNR database of current leaseholders.

Table 3. Galbraith Corridor "Area of Influence" oil and gas leases.

Company	**Number of Oil and Gas Leases**
Anadarko	71
Chevron	24
FEX	4
Conoco Phillips	6
Other	3
Total	**108**
Total Gas Leases Only	**77**
Acreage of Leases within the Galbraith Corridor "Area of Influence"	**477,402 acres**

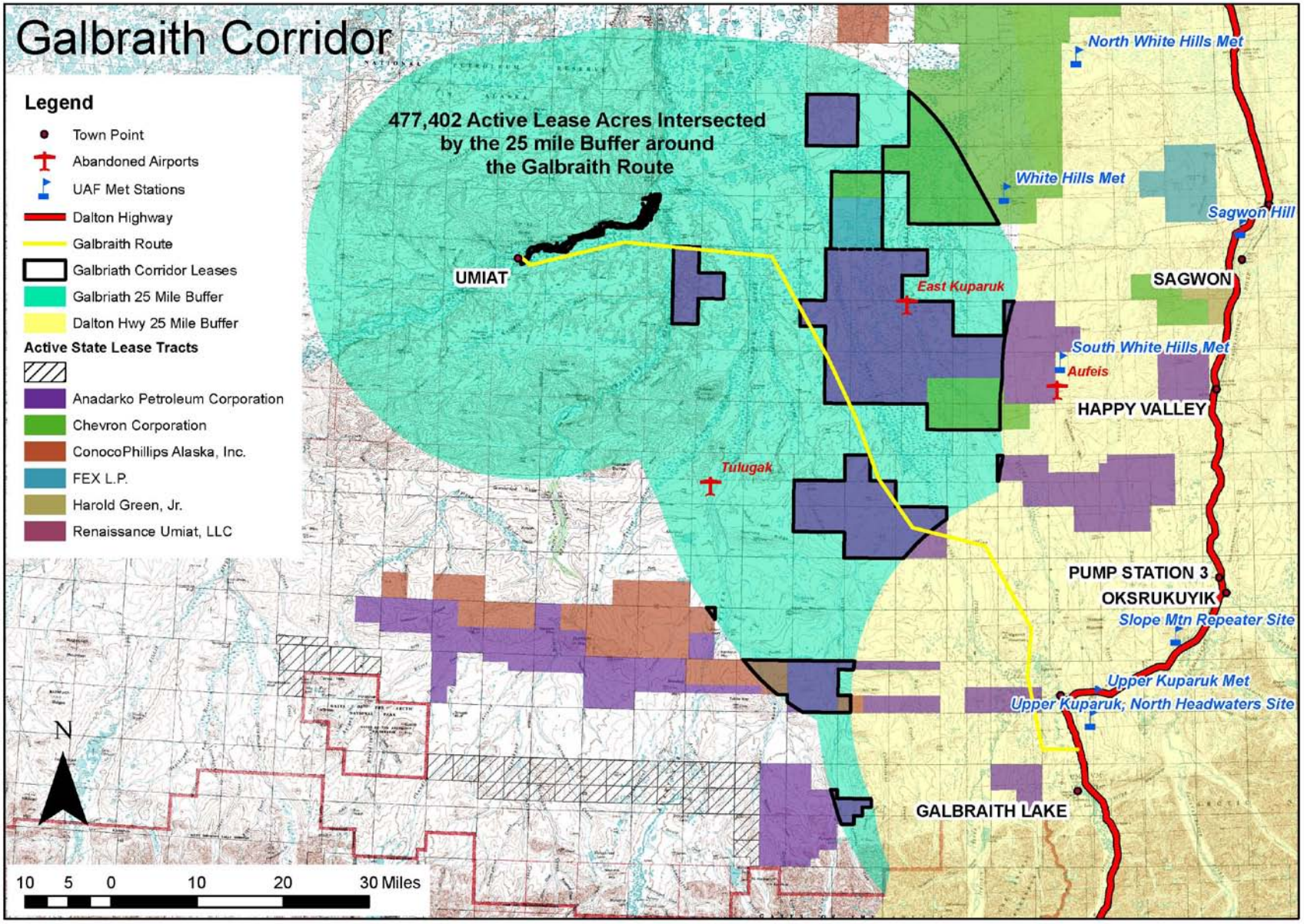


Figure 10. Galbraith Corridor Area of Influence; Foothills West Transportation Access Project, Sept., 2009.

2005 CENTRAL NORTH SLOPE USGS ASSESSMENT ANALYSIS*

Potential new resource discoveries within Galbraith Corridor "Area of Influence" are characterized as "high."

GAS TO MARKET/TRANSPORT SAVINGS

The Galbraith Route begins at Dalton Highway Milepost 278 and is the route origin nearest to Fairbanks (approximately 350 miles distant). The implication of additional mileage from major supply points for each route is the increased cost for additional miles traveled in comparison to this origin of the two Galbraith-based routes.

The Galbraith Route trends overall northwest-southeast to the Dalton Highway, eliminating additional Dalton Highway miles in comparison to routes intersecting the Dalton Highway farther north. It is anticipated that pipeline construction would generally follow a road constructed to the Dalton Highway from Umiat, and roads trending more directly northwest-southeast from a Dalton Highway intersection would require less overall pipeline. A cost savings would be realized by using the Galbraith Route, both by reduction of necessary pipeline should a gas pipeline be realized, and a decreased distance of supply transport from Anchorage or Fairbanks to Umiat. The Galbraith Route is one of the most advantageous routes for this purpose.

Distance from Starting Point of Road to Fairbanks (approx.)	350 miles
Distance from Fairbanks to Umiat utilizing this route (approx.)	452 miles

CONSTRUCTION COST **$357,000,000**

Unweighted Score = 5

ROAD CONSTRUCTION COST $224,000,000

Includes road embankment, surfacing, dust palliative, signage/marking, and minor drainage requirements.

*Road design criteria are described in the Matrix Criteria section.

BRIDGE/DRAINAGE STRUCTURE CONSTRUCTION COST $113,000,000

Includes bridges across the Itkillik, Anaktuvuk, Chandler and Colville Rivers as applicable. The estimate includes structures, associated scour protection, and approaches. Additional costs are included for road segments travelling through active floodplains to account for additional erosion protection measures and drainage considerations. These costs also include large drainage structures other than those crossing the major rivers discussed above.

*Bridge design criteria are described in the Matrix criteria section.

ADDITIONAL CONSTRUCTION COST $20,000,000

Includes Contractor Furnished Items, Mobilization/Demobilization, Erosion and Sediment Control, and Potential Wetlands Mitigation costs

ENGINEERING CONSIDERATIONS: UNWEIGHTED SCORE = 5

GENERAL TOPOGRAPHY

Road Length	102 Miles (approx.)
Starting Elevation	3000 feet (msl)
Ending Elevation	250 feet (msl)
Highest Point	3000 feet (msl)
Maximum Grade	5%

ROAD GEOMETRY RELATED TO TERRAIN:

The road will be designed to the vehicles described in the Design Criteria section. The terrain is very gradual with few obstructions of concern that disallow appropriate AASHTO grade and curve criteria to be applied. Areas around significant drainages may require special consideration in meeting the design criteria. For the assumptions made for this study, there do not appear to be any major issues preventing appropriate road geometry criteria from being applied.

ENVIRONMENTAL FACTORS (SNOW DRIFTING AND GENERAL DRAINAGE):

Snow drifting is a concern due to the large open spaces and lack of trees allowing a substantial wind and snow "fetch." Winds have been reported as predominately out of the northeast (further study/analysis is currently ongoing), and caution will be required in routing alignments to the southwest of terrain and other wind obstructions such as taller vegetation. Dalton Highway experience recommends that road alignments be constructed a minimum of 6' above ground level to allow the road to be naturally blown clear of snow. Due to the primarily northwest-southeast orientation of the Galbraith Route, prevailing winds are anticipated to be perpendicular to the road, and snow drifting potential is moderate.

Based on the assumptions used in this study, general drainage for the route can be described as good to fair for the southernmost 30 miles, and fair to poor for the remaining 72 miles to Umiat. In poor drainage areas, unstable soils, permafrost, and polygonal ground and cross drainage problems are anticipated. This

route crosses four major rivers in the project study area, and additionally requires an estimated 38 minor but significant water crossings. While this route will require additional engineering consideration to address its water crossings, it contains the fewest, both major and minor, of all routes considered.

CONSTRUCTABILITY:

Constructability issues include the ability to stage a construction project from several locations along the route, access to lakes for ice road construction and soil compaction, as well as any special conditions that may exist along the route causing problems with settlement, unforeseen conditions and complications.

For the first 30 miles of the Galbraith Route, ponds and lakes are fairly scarce and water supply may be limited until the Itkillik River is crossed. Beyond that point the route parallels the Itkillik River until turning west to Umiat and, across that expanse, water sources appear to be abundant based on imagery and USGS maps. Additional considerations will be required if lakes are fish bearing or freeze to the bottom. Settlement has a high potential of being an issue during construction throughout this route, especially in northwestern segments where unstable soils are likely. If winter construction is chosen as the most economical method, settlement should be anticipated for any areas with unstable subsurface conditions during summertime thaw.

SPECIAL CONSIDERATIONS:

This route will require further studies on potential aufeis conditions along major river crossings. Assumptions made for this study rate this area as having low potential for aufeis conditions. Some consideration should be given to the moderate slopes around Itigaknit Mountain, and this area requires further analysis regarding avalanche and slope stability concerns. All river crossings should be analyzed to determine the full extent of individual thaw bulbs for bridge crossing locations.

HYDROLOGIC IMPACTS: UNWEIGHTED SCORE = 5

MAJOR RIVERS

Crossing	Estimated river crossing length (feet)	Estimated Total Floodplain Impact (feet)
Itkillik River	250	300
Anaktuvuk River	400	2000
Chandler River	300	1500
Colville River	900	2600

Both Galbraith-based routes cross the fewest major rivers in the study area, impacting river drainages the least. The Itkillik River floodplain impacts are also significantly reduced due to its more southerly crossing as compared to all other routes. This Galbraith Route crosses the Itkillik River at its second most southerly point. All routes cross the Anaktuvuk, Chandler, and Colville rivers in generally the same locations, and as a result, their impacts to these drainages are equal.

SMALLER SIGNIFICANT DRAINAGES

This route contains approximately 38 additional, smaller drainages identified by USGS maps and satellite imagery. More study is required to determine their significance, and several may be larger, incised, and exhibit significant discharge events. Overall, the Galbraith Route crosses the fewest number of these smaller, significant drainages.

RIVER NAVIGABILITY

Of the rivers within the project study area, the Colville River has been determined as “Navigable” by the State of Alaska DNR. According to the Alaska DNR Division of Mining, Land and Water Navigable Waters Webmap, the Toolik, Kuparuk, Itkillik, Anaktuvuk and Chandler Rivers’ navigability status is “Unknown.”

Additional study and consideration will be required in developing bridge concepts for navigable rivers to ensure adequate chord clearance and design standards are met. The U.S. Coast Guard also has permitting authority for crossings of rivers deemed “Navigable.

GEOLOGIC AND GEOTECHNICAL CONSIDERATIONS — UNWEIGHTED SCORE = 5

MATERIAL SITES

Based on the assumptions made for this report, the Galbraith Route appears to meet the criteria of providing for access to a material site every 10 miles along the route. Itigaknit Mountain is a potential material site approximately 20 miles from the southern route origin, and the southernmost 30 miles of this route hold the potential to acquire material from more upland-dominated, gravel moraine features. Northwest of that segment, riparian floodplains are anticipated to yield the most suitable material sources. Gravel for the project appears available in sufficient quantities within these areas. Mining within floodplains will require additional consultation with ADF&G and USF&W.

For this analysis, the quality of materials from upland, river and floodplain sources are assumed to be similar, though upland material sources are rated as more desirable due to their lower environmental impact. The Galbraith Route is estimated to have five potential upland sources, and seven potential floodplain or river sources. Although field confirmation has not been conducted, this route appears to hold the potential to access coarse materials, suitable as rip rap, from sources near Itigaknit Mountain.

SUBSURFACE SOIL CONDITIONS

All soils are anticipated to be underlain by permafrost. However, preliminary evaluations of published data indicate the Galbraith Route may traverse gravel moraine soils for much of its southernmost 30 miles, providing for a solid soil foundation. Northwest of that segment, foundation soils are expected to be poor, consisting of fine grained materials and, in some locations, massive ice. Soils near Itagaknit Mountain are anticipated to be better than along adjacent sections of Galbraith West Alternate Route.

Potential miles of stable subsurface conditions (gravels): 30

Potential miles of unstable subsurface conditions (fine grained soils and ice): 72

ICING HAZARDS

Miles of low potential for icing hazards: 102

Miles of high potential for icing hazards: 0

SLOPE STABILITY AND AVALANCHE HAZARDS

Number of areas with potentially unstable slopes: 1 (Itigaknit Mountain)

Number of areas with high potential for avalanche: 1 (Itigaknit Mountain)

LAND OWNERSHIP — UNWEIGHTED SCORE = 2

Three landowners are affected by the Galbraith Route (Figure 11). ROW impacts are calculated using a 300' ROW width. The parcel areas were obtained from the Alaska DNR's General Land Status of Alaska dataset, current as of May 11th, 2009.

Landowner	Acquisition Acres	Percentage of Total
State of Alaska	2700	73%
ASRC	650	18%
BLM*	330	9%

*ANILCA Section 1431 has a provision for ASRC to establish a Right of Way for "related transportation facilities and other such facilities as are necessary for the construction, operation and maintenance of such pipelines". If the State and ASRC agree on a Utility Corridor for the proposed first 10 miles of the Galbraith Route, a ROW could be established without requiring Bureau of Land Management (BLM) environmental documentation. Although this was one of only two routes analyzed that include BLM land acquisition, this provision should be considered when evaluating the optimum routing option.

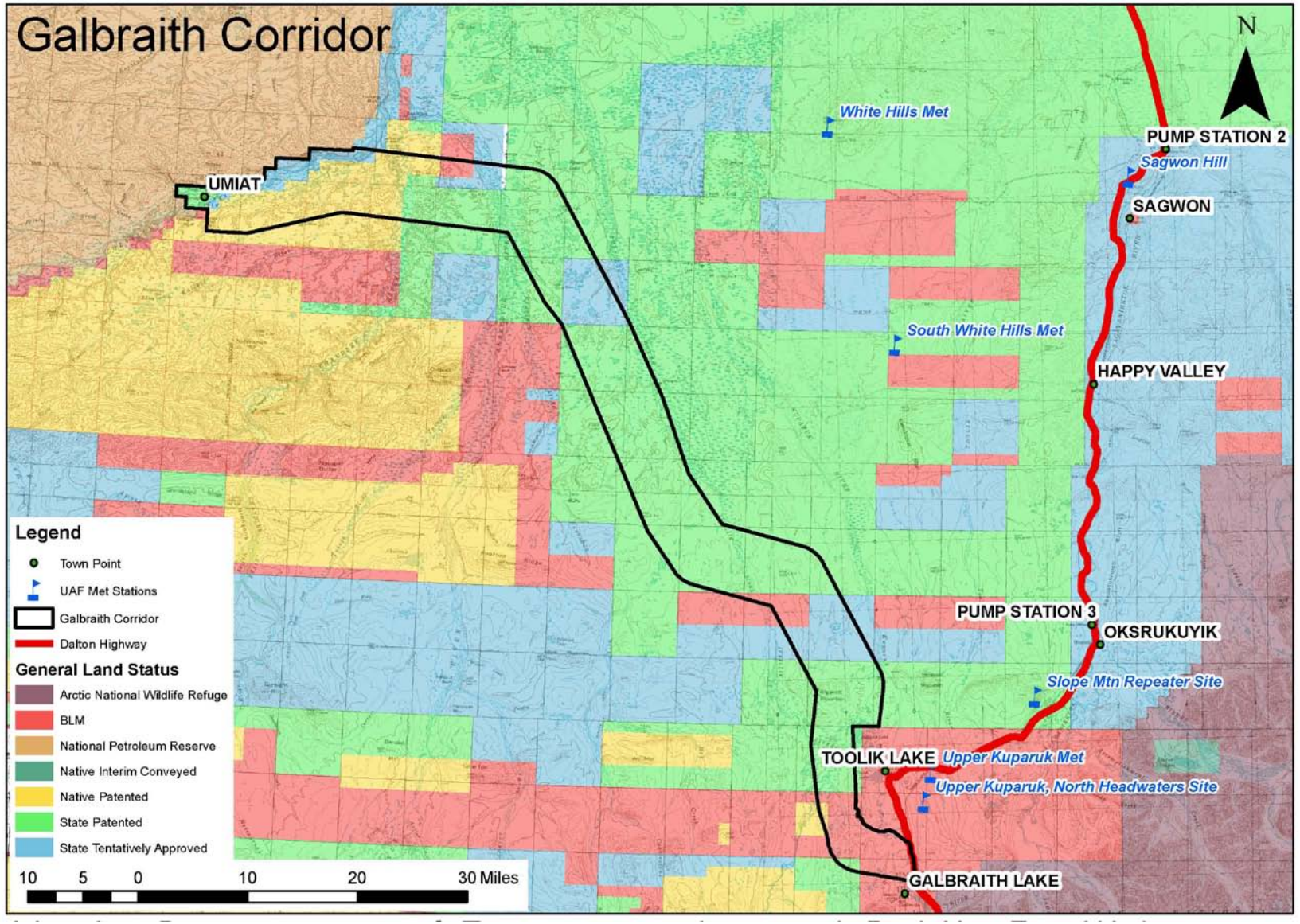


Figure 11. Galbraith Corridor Landowner Status; Foothills West Transportation Access Project, Sept., 2009.

ENVIRONMENTAL IMPACTS — UNWEIGHTED SCORE = 5

Consideration was given to wetlands, habitat, fish stream, wildlife and cultural resource impacts.

POTENTIAL WETLANDS IMPACTS

The entire area of the Galbraith Route corridor is assumed to be wetlands of varying value. Higher value wetlands for habitat have been identified in the northern and western project limits, within the lower elevation floodplains of major rivers, as well as in other areas associated with numerous tundra ponds and lakes. From its origin at the Dalton Highway and westward, the Galbraith Route crosses the Itkillik River in the southern portion of its drainage, and then the Anaktuvuk, Chandler and Colville Rivers lower in their floodplains. Consequently, the southern 30 miles of the Galbraith Route is more elevated, generally following a northwest-southeast terrace of the upper Itkillik River that is likely comprised of lower quality wetland classes. While definitive wetland information is currently unavailable, it is assumed that the southern portion of this route will effect less impact on wetland functions and values than more northerly routings. In the more northerly sections of the Galbraith Route, the crossing of the lower Anaktuvuk, Chandler and Colville drainages will likely impact a greater area of higher quality wetlands characterized by tundra ponds and the more dispersed channel morphology of lower elevation floodplains.

Comparatively, it is likely that the fewest areas of high- value wetlands would be encountered by the Galbraith Route as compared to all other routing options.

POTENTIAL WILDLIFE HABITAT IMPACTS

Generally, three high-value wildlife habitats have been identified through discussions with state and federal resource agencies. Emergent vegetation along the margins of tundra ponds and lakes is considered important habitat for migratory songbird nesting, breeding and rearing. Similarly, the generally scarce, shrub-dominated riparian floodplains provide these same habitat values for other suites of songbirds. Important components of biological diversity in their own right, migratory songbirds also provide a food source for various species of predatory birds (raptors) common to the region. Emergent and shrub dominated habitats are additionally important food and cover habitats for moose. Bluff and cliff habitats associated with the Colville River and other major drainages within the potential alignment corridor provide nesting, breeding and rearing habitat for a variety of predatory birds. The Galbraith Route minimizes major river crossings to only the Itkillik, Anaktuvuk, Chandler and Colville Rivers, and maintains a more elevated alignment on the landscape for the southerly 30 miles of its routing. Thus it is likely to effect fewer significant impacts to habitat elements associated with high value wetlands, shrub-dominated areas and bluffs.

The Galbraith Route with its southern origin, by crossing only four major rivers including the Itkillik River far south in its drainage, and by crossing the fewest number of minor drainages, will likely impact less wetland and shrub-dominated habitats than all other routes.

POTENTIAL FISH STREAM IMPACTS

The Galbraith Route minimizes major river crossings, and therefore will impact fewer areas of known and potential anadromous and resident fish habitat. Additionally, by maintaining an alignment that generally parallels the Itkillik River for a significant distance, fewer drainages will be potentially subjected to material source removal from floodplains and/or in-stream locations. This routing entirely avoids two resident fish bearing drainages, those of the Toolik and Kuparuk Rivers. Potential impacts at any crossing point or riparian floodplain material site include the disturbance of natural flow regimes due to bridges, construction activities, and other temporary or permanent infrastructure; the establishment or destruction of fish habitat elements that alter the species composition or distribution of various fish populations within a drainage; the compromising of overwintering potential in areas associated with bridge and culvert crossings or material removal; and short- or long-term impacts associated with sedimentation, thermal variation or other contamination that alters the life history or survival of existing fish resources.

POTENTIAL WILDLIFE IMPACTS

Caribou are present throughout the region potentially crossed by the Galbraith Route. Preliminary review of ADF&G reports on the Central Arctic Herd (CAH) suggest that fewer impacts to caribou populations may be effected by approaching the Gubik area from a more southern versus eastern direction. Historic caribou distribution and calving area data suggest that northern portions of the greater project study area are more heavily utilized by both CAH and occasionally Western Arctic Herd (WAH) caribou. Consequently, the Galbraith Route may pose fewer risks both in terms of human impact to caribou distribution or populations and, additionally, to travel safety by crossing caribou range in its direct, northwest-southeast orientation.

Brown bear are wide ranging residents of the project study area, and thus are likely to be impacted regardless of the route selection or orientation. In summer 2009, data will be gathered to determine the locations of known bear denning sites or use areas, and this information will be factored into alignment configuration at that time.

Moose are common residents of the shrub-dominated floodplains and riparian areas throughout the project study area. Due to its scarcity in the project area, protection of shrub-dominated habitat has been identified as an environmental priority of the Foothills West project. The Galbraith Route would potentially impact the least shrub-dominated habitat due to its minimization of crossing major drainages. While three other alignments cross up to six river systems in more northern floodplains containing shrub-dominated habitat components, the Galbraith Route crosses only the Itkillik, Anaktuvuk, Chandler and Colville rivers. Additionally, the Itkillik River is crossed in a far southern portion of its drainage where

shrub-dominated habitats are less prevalent as compared to along routes crossing more northern floodplains of this drainage.

Muskoxen are reported by ADF&G to be potentially present throughout the entire Foothills West project area, though in recent years the numbers of this eastern Brooks Range sub-population have fallen precipitously due to unknown factors. Current research and management goals for muskoxen in the North Slope region focus on identifying mortality factors and stabilizing the declining population. It is unquestionable that greater year-round access through the project study area by any potential routing will allow for greater accessibility to muskoxen herds, and DOT&PF must work closely with ADF&G to insure that protocols are put in place that reduce the potential for adverse impacts to this relatively vulnerable species. Insufficient information is available to determine if any individual routing option poses a greater or lesser potential for impact to muskoxen. It is anticipated that environmental fieldwork scheduled for 2009 will aid in making determinations of this potential.

Many avian species are permanent or seasonal residents of the potential Galbraith Route corridor. Of those, three general classes - songbirds, raptors and waterfowl – have been considered as potentially impacted. Based on preliminary discussions with the U.S. Fish and Wildlife Service (FWS), there is little probability that waterfowl will be impacted by the Galbraith Route. Impacts to songbirds are minimized along the Galbraith Route due to much of its alignment generally avoiding both emergent and shrub-dominated habitats associated with high quality wetlands and riparian floodplains. Similarly, the minimization of major drainage crossings will likely reduce potential impacts to scarp and bluff habitats used by raptors. However, it will remain necessary to carefully assess any crossing points along the more northerly drainages of the Anaktuvuk, Chandler and, especially, the Colville Rivers to determine the presence of raptor populations. Special management regulations are in effect along the Colville River through the BLM Colville River Special Management Area Plan. These regulations restrict access and development activities to insure that nesting populations of Arctic peregrine falcons are not deleteriously impacted. Discussions with the FWS have indicated that it will be important for DOT&PF to assess other drainages and bluff systems on the Galbrath Route for the presence of nesting raptors during the 2009 field season, and these investigations have been incorporated into the environmental studies recently contracted.

POTENTIAL CULTURAL RESOURCE IMPACTS

The AHRS database shows several areas of potential cultural significance associated with the southern portions of this route. While it appears that the route will avoid direct impact to areas of significance, additional field study is needed, and material sites will need to be evaluated closely. Areas of potential, cultural resources include the tops of hills and along rivers with high bluffs. In the more northerly portions of the Galbraith Route, many AHRS data points are associated with early industrial development of the region, including preliminary U.S. Navy drilling sites to the east of the National Petroleum Reserve-Alaska (NRPA), various abandoned airstrips and several remote, Department of Defense installations present during the Cold War.

MAINTENANCE COSTS — UNWEIGHTED SCORE = 3

PROJECTED ROAD MAINTENANCE COSTS

Road Maintenance costs are based on current State of Alaska maintenance costs for the Dalton Highway as projected to dollars/mile. Based on averages from FY05 through FY08, the per-mile annual costs of maintenance for the area from Coldfoot through the Sag River camps is approximately $23,000/mile. Other factors considered in this criterion include embankment stability, terrain, and the number of bridges. Although a cost for these factors was not determined, they were considered when scoring the criterion.

Projected annual maintenance costs for the Galbraith Route (102 miles) = $2,346,000

MAINTENANCE CAMPS

This criterion is scored on the basis of the route being a state maintained road and requiring additional state resources. The nearest state-owned and operated maintenance camps serving this area are on the Dalton Highway, with the Sagwon Maintenance Camp at Milepost 389 and the Chandalar Maintenance Camp at Milepost 240. Due to the distance from this route's origin at MP 286, an additional camp along the Dalton Highway would be needed to serve a new road to Umiat starting from this location. A second new camp would be required in the vicinity of the Gubik gas fields to serve the northwestern portion of the road.

New camp cost construction is estimated between $10 to $15 million dollars per camp. Annual facility maintenance costs averaged from FY08 for Coldfoot, Chandalar and Sag River camps is $342,817.

Total New Camp Construction Costs = $20-$30 million

Projected annual facility maintenance costs (2 Camps) = $685,634

SUBSISTENCE IMPACTS — UNWEIGHTED SCORE = 1

Based on 2007 ADNR-ACMP Subsistence Use Area and Designation mapping, the Galbraith Route would traverse approximately 95 miles of unique and/or overlapping linear miles of designated subsistence use areas. Primary subsistence resources include caribou, moose, brown bear, muskoxen, furbearers, whitefish species, pink and chum salmon and various plant materials. Of the 95 linear, subsistence area miles crossed by the Galbraith Route, 75 miles are designated as land mammal use areas, 95 miles are designated as furbearer use areas, 10 miles are designated as gathering areas, and 5 miles are designated as fish use areas. No designated waterfowl use areas are crossed.

To date, public concern has been expressed that any alignment developed for the Foothills West project will deleteriously impact subsistence resources in two manners. The first is through direct impacts to subsistence species' habitats, life history, distribution or abundance resulting from conflicts with project construction or use by the public of any completed road. An additional concern is that non-local, public access to a completed road would result in competition for subsistence resources by recreational fishing and hunting interests from outside the immediate area. While this latter consideration could potentially be mitigated by regulatory measures either by the Alaska Boards of Fisheries and Game and/or access restrictions imposed by DOT&PF, there is significant opinion that greater public access to currently remote, local subsistence areas would irreparably harm habitat, the resources using those habitats and traditional subsistence activities based on those resources.

GALBRAITH WEST ALTERNATE ROUTE

GENERAL ROUTE DESCRIPTION

Overall Length:	98 miles
Starting Point:	Approximately 4 miles north of Galbraith Lake at Dalton Hwy. MP 278
Ending Point:	State of Alaska airport at Umiat
Major River Crossings:	Itkillik, Anaktuvuk, Chandler, Colville
Terrain:	Grades overall are very gentle, with maximum grades of 3%-5%

Galbraith West Alternate Route (Figure 12) begins in the vicinity of MP 286 of the Dalton Highway, and trends due west for approximately 4.5 miles through moderately rolling terrain before heading north. This route then proceeds north for approximately 1 mile before trending northwest through undulating hills and across several small drainages for 5.5 miles until reaching the Itkillik River. Crossing the Itkillik River (estimated at 300' wide 400' floodplain width), the route continues northwest for another mile before turning north-northwest.

The north-northwest segment parallels the drainage of the Itkillik River for 23 miles, crossing undulating hills and tributary drainages of the Itkillik River, with transverse grades of approximately 5% for approximately 10 miles. The segment generally maintains an elevation of 1750' MSL (USGS contours) until descending 2.5 miles to a lower elevation terrace parallel to and west of the Itkillik River. Several drainages channels in this area appear to be incised based on imagery analysis and wintertime field observations.

On the western terrace, the route generally parallels the Itkillik River for approximately 36 miles, with the first 15 miles characterized by rolling, gradually descending terrain crossing numerous small tributaries of the Itkillik River as well as several larger, incised drainages. Over the remainder of this segment, the tributary crossings decrease, grades flatten, and overall drainage becomes poor. North of VABM 1069, the area is characterized by numerous lakes, cross-flow drainage patterns, and marshy ground. Sub-soil conditions are generally anticipated to be unstable. The final 6 miles of this route segment contain numerous, established winter trails trending east-west, as well as abandoned drilling wells and old development features.

The route then trends due west for 3 miles to the Anaktuvuk River in the vicinity of VABM 515 and VABM 555 to the south of Square Lake. Crossing the Anaktuvuk River near this point, the route continues west through poorly drained soils for 7 miles to the Chandler River crossing, accessing the southern extents of the Gubik oil and gas field. West of the Chandler River, the route proceeds west-southwest for 17 miles, descending to the Colville River floodplain and crossing the Colville River main channel near Umiat.

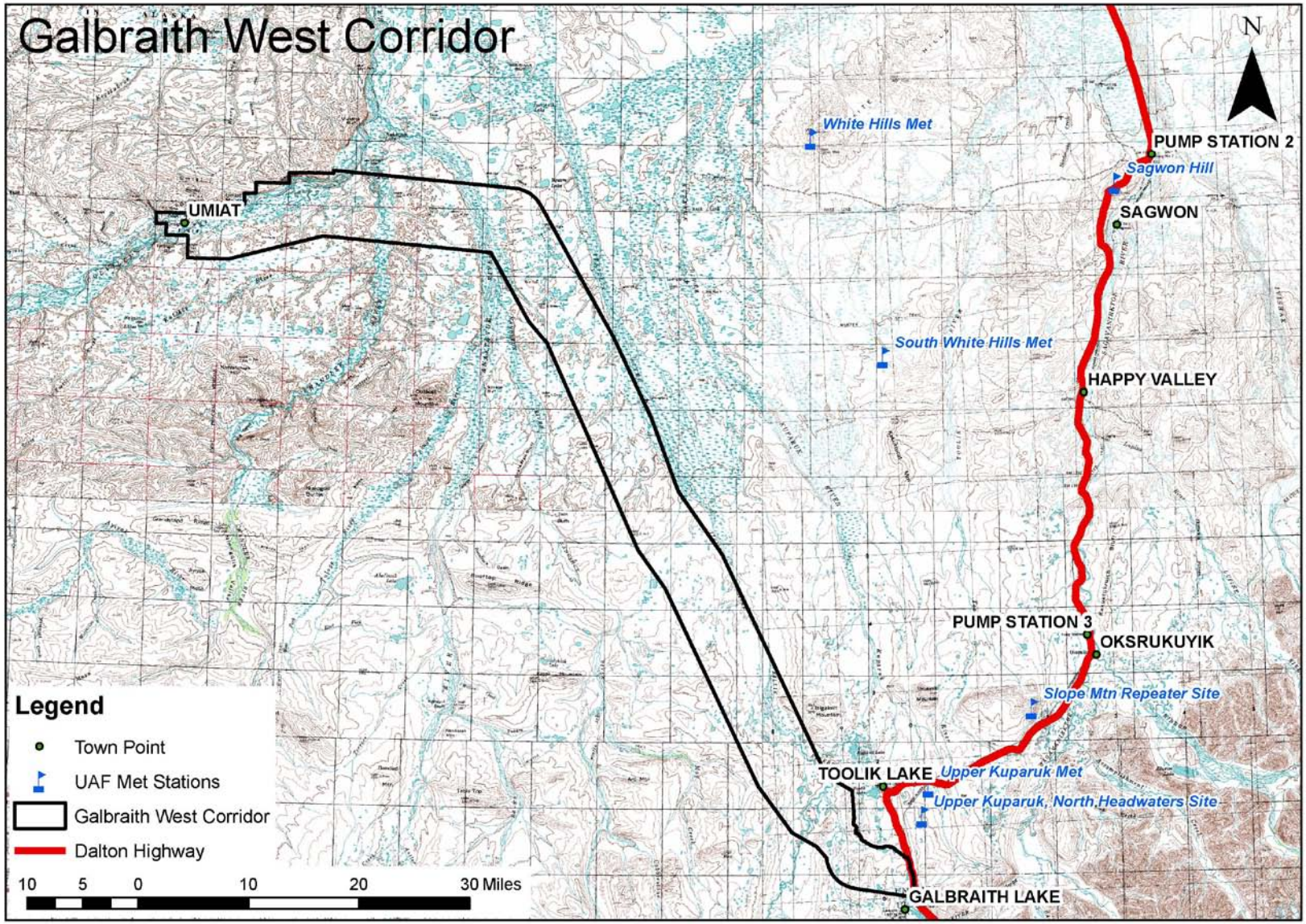


Figure 12. Galbraith West Corridor option; Foothills West Transportation Access Project, Sept., 2009.

2009 STATE OIL AND GAS LEASE ANALYSIS

Table 4 identifies the current State of Alaska leaseholders in the area, and both the number and acreage of leases within the Galbraith West Alternate Route "Area of Influence." Figure 13 illustrates the existing oil and gas lease holdings on state land and the described Area of Influence.. Note that all calculations exclude lease holdings located within the Dalton Highway "Area of Influence." Due to the emphasis of gas production in the Project Purpose, an additional total is provided for leases anticipated to be focused solely on gas production. These totals are based on discussions with industry representatives and the Alaska DNR database of current leaseholders.

Table 4. Galbraith West Corridor "Area of Influence" oil and gas leases.

Company	**Number of Oil and Gas Leases**
Anadarko	76
Chevron	24
FEX	4
Conoco Phillips	6
Other	3
Total	**113**
Totals Gas Leases Only	**82**
Acreage of Leases within the Galbraith West Alt. Corridor "Area of Influence"	**496,167 acres**

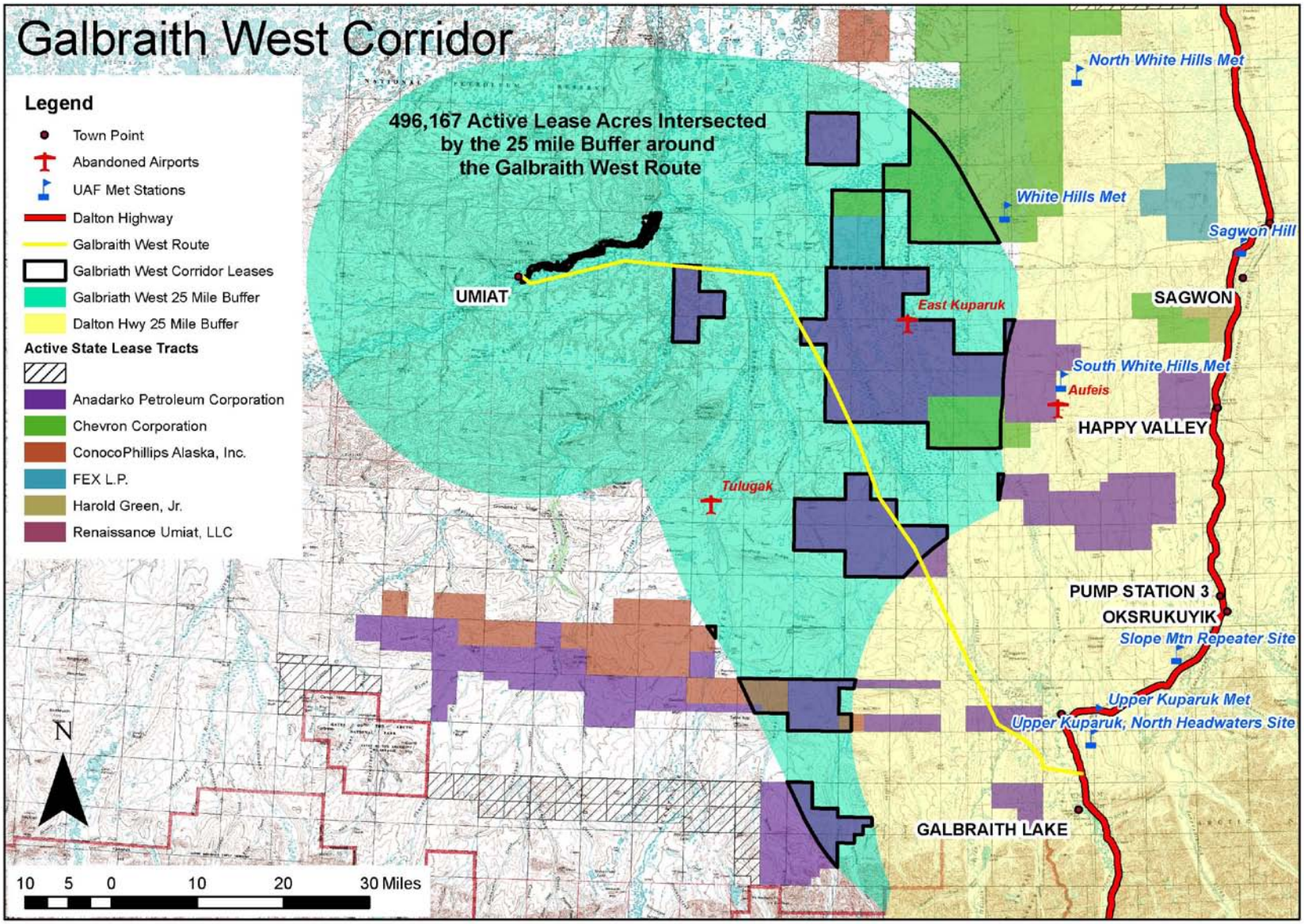


Figure 13. Galbraith West Corridor Area of Influence; Foothills West Transportation Access Project, Sept., 2009.

2005 CENTRAL NORTH SLOPE USGS ASSESSMENT ANALYSIS

Potential new resources discoveries within corridor “Area of Influence” are characterized as high.

GAS TO MARKET/TRANSPORT SAVINGS

This route begins at Dalton Highway Milepost 278 and is the nearest route origin, along with the Galbraith Route, to Fairbanks (approximately 350 miles distant). The implication of additional mileage from major supply points for each route is the increased cost for additional miles traveled in comparison to this origin of the two Galbraith-based routes.

The Galbraith West Alternate Route trends overall northwest-southeast to the Dalton Highway, eliminating additional Dalton Highway miles in comparison to routes intersecting the Dalton Highway farther north. It is anticipated that pipeline construction would generally follow a road constructed to the Dalton Highway from Umiat, and roads trending more directly northwest-southeast from a Dalton Highway intersection would require less overall pipeline. A cost savings would be realized by using the Galbraith West Alternate Route both by reduction of necessary pipeline should a gas pipeline be realized and a decreased distance of supply transport from Anchorage or Fairbanks to Umiat. The Galbraith West Alternate Route is one of the most advantageous routes for this purpose. The Galbraith West Alternate route is the most advantageous option for this purpose.

Distance from Starting Point of Road to Fairbanks (approx)	350 miles
Distance from Fairbanks to Umiat utilizing this route (approx)	448 miles

CONSTRUCTION COST **$362,000,000**

Unweighted Score = 4

ROAD CONSTRUCTION COST $216,000,000

Includes road embankment, surfacing, dust palliative, signage/marking, and minor drainage requirements.

*Road design criteria are described in the Matrix Criteria section.

BRIDGE / DRAINAGE STRUCTURE CONSTRUCTION COST $126,000,000

Includes bridges across Itkillik, Anaktuvuk, Chandler and Colville Rivers as applicable. The estimate includes structures, associated scour protection, and approaches. Additional costs are included for road segments through the active floodplains to account for additional erosion protection measures and drainage considerations. These costs also include large drainage structures other than those crossing the major rivers discussed above.

*Bridge design criteria are described in the Matrix criteria section.

ADDITIONAL CONSTRUCTION COST $ 20,000,000

Includes Contractor Furnished Items, Mobilization/Demobilization, Erosion and Sediment Control, and Potential Wetlands Mitigation costs

ENGINEERING CONSIDERATIONS: UNWEIGHTED SCORE = 3

GENERAL TOPOGRAPHY

Road Length	98 Miles (approx.)
Starting Elevation	3000 feet (msl)
Ending Elevation	250 feet (msl)
Highest Point	3000 feet (msl)
Maximum Grade	5% - 10%

ROAD GEOMETRY RELATED TO TERRAIN:

The road will be designed to the vehicles described in the Design Criteria section. The terrain is very gradual with few obstructions of concern that disallow appropriate AASHTO grade and curve criteria to be applied. Areas around significant drainages may require special consideration in meeting the design criteria. For the assumptions made for this study, there do not appear to be any major issues preventing appropriate road geometry criteria from being applied.

ENVIRONMENTAL FACTORS (SNOW DRIFTING AND GENERAL DRAINAGE):

Roadway snow drifting is a concern due to large open spaces and the lack of trees allowing an extensive wind and snow "fetch." Winds have been reported as predominately out of the northeast (further study/analysis is currently ongoing), and caution will be required in routing road alignments to the southwest of terrain and other wind obstructions such as taller vegetation. Dalton Highway experience recommends that road alignments be constructed a minimum of 6' above ground level to allow the road to be naturally blown clear of snow. Due to the primarily northwest-southeast orientation of the Galbraith West Alternate Route, prevailing winds are anticipated to be perpendicular to the road, and snow drifting potential is moderate.

Based on the assumptions used in this study, general drainage for the route can be described as good to fair for the southernmost 30 miles, and fair to poor for the remaining 72 miles to Umiat. In poor drainage

areas, unstable soils, permafrost, and polygonal ground and cross drainage problems are anticipated. This route crosses only four major rivers in the project study area, but additionally requires an estimated 56 minor but significant water crossings generally concentrated in a 23 mile segment west of the Itkillik River. This segment will require additional engineering consideration to address the numerous crossings.

CONSTRUCTABILITY:

Constructability issues include the ability to stage a construction project from several locations along the route, access to lakes for ice road construction and soil compaction, as well as any special conditions that may exist along the route causing problems with settlement, unforeseen conditions and complications.

For approximately the first 30 miles of the Galbraith West Alternate Route, ponds and lakes are generally scarce and water supplies may be limited until the Itkillik River is crossed. Beyond that point the route parallels the Itkillik River until turning west to Umiat and, across that expanse, water sources appear to be abundant based on imagery and USGS maps. Additional considerations will be required if lakes are fish bearing or freeze to the bottom. Settlement has a high potential of being an issue during construction throughout this route, especially in northwestern segments where unstable soils are likely. If winter construction is chosen as the most economical method, settlement should be anticipated for any areas with unstable subsurface conditions during summertime thaw.

SPECIAL CONSIDERATIONS:

This route will require further studies on potential aufeis conditions along major river crossings. Assumptions made for this study rate this area as having low potential for aufeis conditions. Some consideration should be given to the transverse slopes and drainages for the 23 mile segment after crossing the Itkillik River, and this area requires further analysis regarding aufeis and slope stability concerns (solifluction). All river crossings should be analyzed to determine the full extent of individual thaw bulbs for bridge crossing locations.

HYDROLOGIC IMPACTS: UNWEIGHTED SCORE = 4

MAJOR RIVERS

Crossing	Estimated river crossing length (feet)	Estimated Total Floodplain Impact (feet)
Itkillik River	300	400
Anaktuvuk River	400	2000
Chandler River	300	1500
Colville River	900	2600

Both Galbraith-based routes cross the fewest major rivers in the study area, impacting river drainages the least. The Itkillik River floodplain impacts are also significantly reduced due to its more southerly crossing as compared to all other routes. The Galbraith West Alternate Route crosses the Itkillik River at its most southerly point where its drainage is the narrowest. All routes cross the Anaktuvuk, Chandler, and Colville rivers in generally the same locations, and as a result their impacts to these drainages are equal.

SMALLER SIGNIFICANT DRAINAGES

This route contains approximately 56 additional, smaller drainages identified by USGS maps and satellite imagery. More study is required to determine their significance, and several may be larger, incised, and exhibit significant discharge events. This route requires many minor, significant water crossings primarily concentrated in a 23 mile segment west of the Itkillik River, and these will require additional hydrologic considerations. Overall, the Galbraith West Alternate Route crosses the greatest number of these smaller, significant drainages.

RIVER NAVIGABILITY

Of the rivers within the project study area, the Colville River has been determined as "Navigable" by the State of Alaska DNR. According to the Alaska DNR Division of Mining, Land and Water Navigable Waters Webmap, the Toolik, Kuparuk, Itkillik, Anaktuvuk and Chandler Rivers' navigability status is "Unknown." Additional study and consideration will be required in developing bridge concepts for navigable rivers to ensure adequate chord clearance and design standards are met. The U.S. Coast Guard also has permitting authority for crossings of rivers deemed "Navigable."

GEOLOGIC AND GEOTECHNICAL CONSIDERATIONS — UNWEIGHTED SCORE = 4

MATERIAL SITES

Based on the assumptions made for this report, the Galbraith West Alternate Route appears to meet the criteria of providing for access to a material site every 10 miles along the route. The southernmost 30 miles of this route could potentially allow access to material sources from more upland areas and from within alluvial outwash and moraine features. Along the Itkillik River corridor there appear to be several potential outwash and alluvial sources that would provide sufficient sources of gravel. Beyond 30 miles from the origin of the route, the river floodplains are anticipated to be the most suitable material sources. Gravel appears to be in sufficient quantities within these areas for the corridor. Mining within floodplains will require consultations with ADF&G and USF&W.

For this analysis, the quality of materials from upland, river and floodplain sources are assumed to be similar, though upland material sources are rated as more desirable due to their lower environmental impact. The Galbraith West Alternate Route is estimated to have five potential upland sources, and seven potential floodplain or river sources. Although field confirmation has not been conducted, this route also appears to hold the potential to access coarse materials, suitable as rip rap, from sources in the Itigaknit Mountain area.

SUBSURFACE SOIL CONDITIONS

All soils are anticipated to be underlain by permafrost. However, preliminary evaluations of published data indicate the Galbraith West Alternate Route may traverse gravel moraine soils for much of its southernmost 30 miles, providing for a solid soil foundation. Northwest of that segment, foundation soils are expected to be poor, consisting of fine grained materials and, in some locations, massive ice.

Potential miles of stable subsurface conditions (gravels): 30

Potential miles of unstable subsurface conditions (fine grained soils and ice): 68

ICING HAZARDS

The potential for icing is high along a 23 mile segment west of the Itkillik River, primarily due to the necessity of frequently crossing smaller, significant drainages.

Miles of low potential for icing hazards: 75

Miles of high potential for icing hazards: 23

SLOPE STABILITY AND AVALANCHE HAZARDS

Number of areas with potentially unstable slopes: 0

Number of areas with high potential for avalanche: 0

LAND OWNERSHIP — UNWEIGHTED SCORE = 1

Three landowners are affected by the Galbraith West Route. ROW impacts are calculated using a 300' ROW width. The parcel areas were obtained from the Alaska DNR's General Land Status of Alaska dataset, current as of May 11th, 2009.

Landowner	Acquisition Acres	Percentage of Total
State of Alaska	2545	70%
ASRC	650	17%
BLM*	550	13%

*ANILCA Section 1431 has a provision for ASRC to establish a Right of Way for "related transportation facilities and other such facilities as are necessary for the construction, operation and maintenance of such pipelines". If the State and ASRC agree on a Utility Corridor for the proposed first 10 miles of the Galbraith West Alternate Route, a ROW could be established without requiring Bureau of Land Management (BLM) environmental documentation. Although this was one of only two routes analyzed that include BLM land acquisition, this provision should be considered when evaluating the optimum routing option. For this route, a BLM "Wilderness Study Area" is potentially crossed, adding additional complications to ROW acquisition.

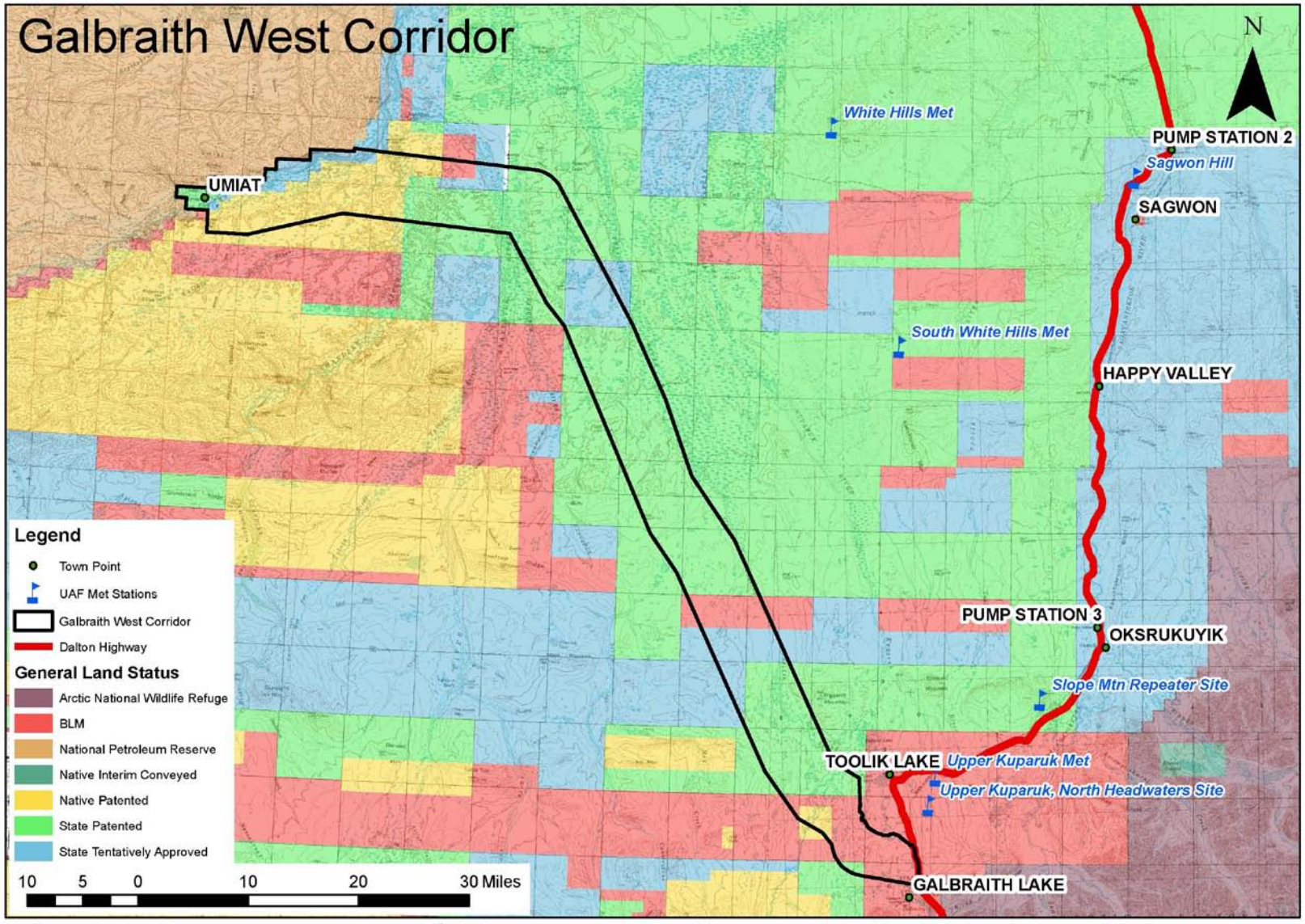


Figure 14. Galbraith West Corridor Landowner Status; Foothills West Transportation Access Project, Sept., 2009.

ENVIRONMENTAL IMPACTS — UNWEIGHTED SCORE = 4

Consideration was given to wetlands, habitat, fish stream, wildlife and cultural resource impacts.

POTENTIAL WETLANDS IMPACTS

The entire area of the Galbraith West Alternate Route corridor is assumed to be wetlands of varying value. Higher value wetlands have been identified in the northern and western project limits, within the lower elevation floodplains of major rivers, as well as in other areas associated with numerous tundra ponds and lakes. The Galbraith West Alternate Route crosses the Itkillik River in the most southern portion of its drainage, and then the Anaktuvuk, Chandler and Colville Rivers lower in their floodplains. Consequently, the southern 40 miles of the Galbraith West Alternate Route is more elevated, generally following northwest-southeast terraces of the upper Itkillik River which are likely comprised of lower quality wetland classes. While definitive wetland information is currently unavailable, it is assumed that the southern portion of this route will effect less impact on wetland functions and values than more northerly routings. In the more northerly sections of the Galbraith West Alternate Route, the crossing of the lower Anaktuvuk, Chandler and Colville drainages will likely impact a greater area of higher quality wetlands characterized by tundra ponds and the more dispersed channel morphology of lower elevation floodplains.

POTENTIAL WILDLIFE HABITAT IMPACTS

Generally, three high-value wildlife habitats have been identified through discussions with state and federal resource agencies. Emergent vegetation along the margins of tundra ponds and lakes is considered important habitat for migratory songbird nesting, breeding and rearing. Similarly, the generally scarce, shrub dominated riparian floodplains provide these same habitat values for other suites of songbirds. Important components of biological diversity in their own right, migratory songbirds also provide a food source for various species of predatory birds (raptors) common to the region. Emergent and shrub dominated habitats are additionally important food and cover habitats for moose. Bluff and cliff habitats associated with the Colville River and other major drainages within the potential corridor provide nesting, breeding and rearing habitat for a variety of raptors. The Galbraith West Route minimizes major river crossings to only the Itkillik, Anaktuvuk, Chandler and Colville Rivers, and maintains a more elevated alignment on the landscape for the southerly 40 miles of its routing. Thus, it is likely to effect fewer significant impacts to habitat elements associated with high-value wetlands, shrub-dominated areas and bluffs.

POTENTIAL FISH STREAM IMPACTS

The Galbraith West Alternate Route minimizes major river crossings, and therefore will impact fewer areas of known and potential anadromous and resident fish habitat. Additionally, by maintaining an alignment that generally parallels the Itkillik River for a significant distance, fewer drainages will be potentially subjected to material source removal from floodplains and/or in-stream locations. This routing entirely avoids two resident fish bearing drainages, those of the Toolik and Kuparuk Rivers. Potential impacts at any crossing point or riparian floodplain material site include the disturbance of natural flow regimes due to bridges, construction activities and other temporary or permanent infrastructure; the establishment or destruction of fish habitat elements that alter the species composition or distribution of various fish populations within a drainage; the compromising of overwintering potential in areas associated with bridge and culvert crossings or material removal; and short- or long-term impacts associated with sedimentation, thermal variation or other contamination that alter the life history or survival of existing fish resources.

POTENTIAL WILDLIFE IMPACTS

Caribou are present throughout the region potentially crossed by the Galbraith West Alternate Route. Preliminary review of ADF&G reports on the Central Arctic Herd (CAH) suggest that potentially fewer impacts to caribou populations may be effected by approaching the Gubik area from a more southern versus eastern direction. Historic caribou distribution and calving area data suggest that northern portions of the greater project study area are more heavily utilized by both CAH and occasionally Western Arctic Herd (WAH) caribou. Consequently, the Galbraith West Route may pose fewer risks both in terms of human impact to caribou distribution or populations and, additionally, to travel safety by crossing caribou range in this northwest-southeast orientation.

Brown bear are wide ranging residents of the project study area, and thus are likely to be impacted regardless of the route selection or orientation. In summer 2009, data will be gathered to determine the locations of known bear denning sites or use areas, and this information will be factored into alignment configuration at that time.

Moose are common residents of the shrub-dominated floodplains and riparian areas throughout the project study area. Due to its scarcity in the project area, protection of shrub-dominated habitat has been identified as an environmental priority of the Foothills West project. The Galbraith West Alternate Route would potentially impact the least shrub-dominated habitat than more northern routes due to its minimization of crossing major drainages. While three other alignments cross up to six river systems in more northern floodplains containing shrub-dominated habitat components, the Galbraith West Alternate Route crosses only the Itkillik, Anaktuvuk, Chandler and Colville rivers. Additionally, the Itkillik River is crossed in the most southern portion of its drainage by the Galbraith West Alternate Route, and this crossing is in an area where shrub-dominated habitats are less prevalent as compared to along routes crossing more northern floodplains of this drainage.

Muskoxen are reported by ADF&G to be potentially present throughout the entire Foothills West project area, though in recent years the numbers of this eastern Brooks Range sub-population have fallen precipitously due to unknown factors. Current research and management goals for muskoxen in the North Slope region focus on identifying mortality factors and stabilizing the declining population. It is unquestionable that greater year-round access through the project study area by any potential routing will allow for greater accessibility to muskoxen herds, and DOT&PF must work closely with ADF&G to insure that protocols are put in place that reduce the potential for adverse impacts to this relatively vulnerable species. Insufficient information is available to determine if any individual routing option poses a greater or lesser potential for impact to muskoxen. It is anticipated that environmental fieldwork scheduled for 2009 will aid in making determinations of this potential.

Many avian species are permanent or seasonal residents of the potential Galbraith West Alternate Route corridor. Of those, three general classes - songbirds, raptors and waterfowl – have been considered as potentially impacted. Based on preliminary discussions with the U.S. Fish and Wildlife Service (FWS), there is little probability that waterfowl will be impacted by the Galbraith West Alternate Route. Impacts to songbirds are minimized along the Galbraith West Alternate Route due to much of its alignment generally avoiding both emergent and shrub-dominated habitats associated with high quality wetlands and riparian floodplains. Similarly, the minimization of major drainage crossings will likely reduce potential impacts to scarp and bluff habitats used by raptors. However, it will remain necessary to carefully assess any crossing points along the more northerly drainages of the Anaktuvuk, Chandler and, especially, the Colville Rivers to determine the presence of raptor populations. Special management regulations are in effect along the Colville River through the BLM Colville River Special Management Area Plan. These regulations restrict access and development activities to insure that nesting populations of Arctic peregrine falcons are not deleteriously impacted. Discussions with the FWS have indicated that it will be important for DOT&PF to assess other drainages and bluff systems on the Galbrath West Alternate Route for the presence of nesting raptors during the 2009 field season, and these investigations have been incorporated into the environmental studies recently contracted.

POTENTIAL CULTURAL RESOURCE IMPACTS

The AHRS database shows several areas of potential cultural significance associated with the southern portions of this route. While it appears that the route will avoid direct impact to areas of significance, additional field study is needed, and material sites will need to be evaluated closely. Areas of potential, cultural resources include the tops of hills and along rivers with high bluffs. In the more northerly portions of the Galbraith West Alternate Route, many AHRS data points are associated with early industrial development of the region, including preliminary U.S. Navy drilling sites to the east of the National Petroleum Reserve-Alaska (NRPA), various abandoned airstrips and several remote, Department of Defense installations present during the Cold War.

MAINTENANCE COSTS — UNWEIGHTED SCORE = 2

PROJECTED MAINTENANCE COSTS

Maintenance costs are based on current State of Alaska maintenance costs for the Dalton Highway as projected to dollars/mile. Based on averages from FY05 through FY08, the per-mile annual costs of maintenance for the area from Coldfoot through the Sag River camps is approximately $23,000/mile. Other factors considered in this criterion include embankment stability, terrain, and the number of bridges. Although a cost for these factors was not determined, they were considered when scoring the criterion.

Projected annual maintenance costs for the Galbraith West Alternate Route (98 miles) = $2,254,000

MAINTENANCE CAMPS

This criterion is scored on the basis of the route being a state maintained road and requiring additional state resources. The nearest state-owned and operated maintenance camps serving this area are on the Dalton Highway, with the Sagwon Maintenance Camp at Milepost 389 and the Chandalar Maintenance Camp at Milepost 240. Due to the distance from this route's origin at MP 286, an additional camp along the Dalton Highway would be needed to serve a new road to Umiat starting from this location. A second new camp would be required in the vicinity of the Gubik gas fields to serve the northwestern portion of the road.

New camp cost construction is estimated between $10 to $15 million dollars per camp. Annual facility maintenance costs averaged from FY08 for Coldfoot, Chandalar and Sag River camps is $342,817.

Total New Camp Construction Costs = $20-$30 million

Projected annual facility maintenance costs (2 Camps) = $685,634

SUBSISTENCE IMPACTS — UNWEIGHTED SCORE = 2

Based on 2007 ADNR-ACMP Subsistence Use Area and Designation mapping, the Galbraith West Alternate Route would traverse approximately 90 miles of unique and/or overlapping linear miles of designated subsistence use areas. Primary subsistence resources include caribou, moose, brown bear, furbearers, whitefish species, pink and chum salmon and various plant materials. Of the 90 linear, subsistence use miles crossed by the Galbraith West Alternate Route, 80 miles are designated as land mammal use areas, 90 miles are designated as furbearer use areas, 10 miles are designated as gathering areas, and 5 miles are designated as fish use areas. No designated waterfowl use areas are crossed.

To date, public concern has been expressed that any alignment developed for the Foothills West project will deleteriously impact subsistence resources in two manners. The first is through direct impacts to subsistence species' habitats, life history, distribution or abundance resulting from conflicts with project construction or use by the public of any completed road. An additional concern is that non-local, public access to a completed road would result in competition for subsistence resources by recreational fishing and hunting interests from outside the immediate area. While this latter consideration could potentially be mitigated by regulatory measures either by the Alaska Boards of Fisheries and Game and/or access restrictions imposed by DOT&PF, there is significant opinion that greater public access to currently remote, local subsistence areas would irreparably harm habitat, the resources using those habitats and traditional subsistence activities based on those resources.

Corridor Analysis

PUMP STATION THREE ROUTE

GENERAL ROUTE DESCRIPTION

Overall Length:	100 miles
Starting Point:	Approximately 4 miles south of Pump Station Three at Dalton Hwy. MP 310
Ending Point:	State of Alaska airport at Umiat
Major River Crossings:	Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler, Colville
Terrain:	Grades overall are very gentle, with maximum grades of 3%-5%

The Pump Station Three Corridor (Figure 15) begins approximately 4 miles south of Pump Station Three at Dalton Highway Milepost 310. The route must initially cross the Trans-Alaska Pipeline and proceed approximately 15.5 miles due west, ascending 8% grades for a vertical elevation gain of 1000', to traverse the north side of Slope Mountain. The route then descends to cross two channels of the Toolik River (estimated at 150' wide each), then traverses the north slope of Imnavait Mountain through undulating terrain.

The route then trends northwest for approximately 14 miles through fairly flat terrain, crossing the Kuparuk River near its origin (estimated at 150' channel width with a 250' wide floodplain), and several smaller headwater streams. Near VABM 2053, the route trends west-northwest, descends to then cross the Itkillik River and continues west for an additional 3 miles before again turning to the northwest.

Along the western terrace, the route generally parallels the Itkillik River for approximately 36 miles, with the first 15 miles characterized by rolling, gradually descending terrain crossing numerous small tributaries of the Itkillik River as well as several larger, incised drainages. Over the remainder of this segment, the tributary crossings decrease, grades flatten, and overall drainage becomes poor. North of VABM 1069, the area is characterized by numerous lakes, cross-flow drainage patterns, and marshy ground. Sub-soil conditions are generally anticipated to be unstable. The final 6 miles of this route segment contain numerous, established winter trails trending east-west, as well as abandoned drilling wells and old development features.

The route then trends due west for 3 miles to the Anaktuvuk River in the vicinity of VABM 515 and VABM 555 to the south of Square Lake. Crossing the Anaktuvuk River near this point, the route continues west through poorly drained soils for 7 miles to the Chandler River crossing, accessing the southern extents of the Gubik oil and gas field. West of the Chandler River, the route proceeds west-southwest for 17 miles, descending to the Colville River floodplain and crossing the Colville River main channel near Umiat.

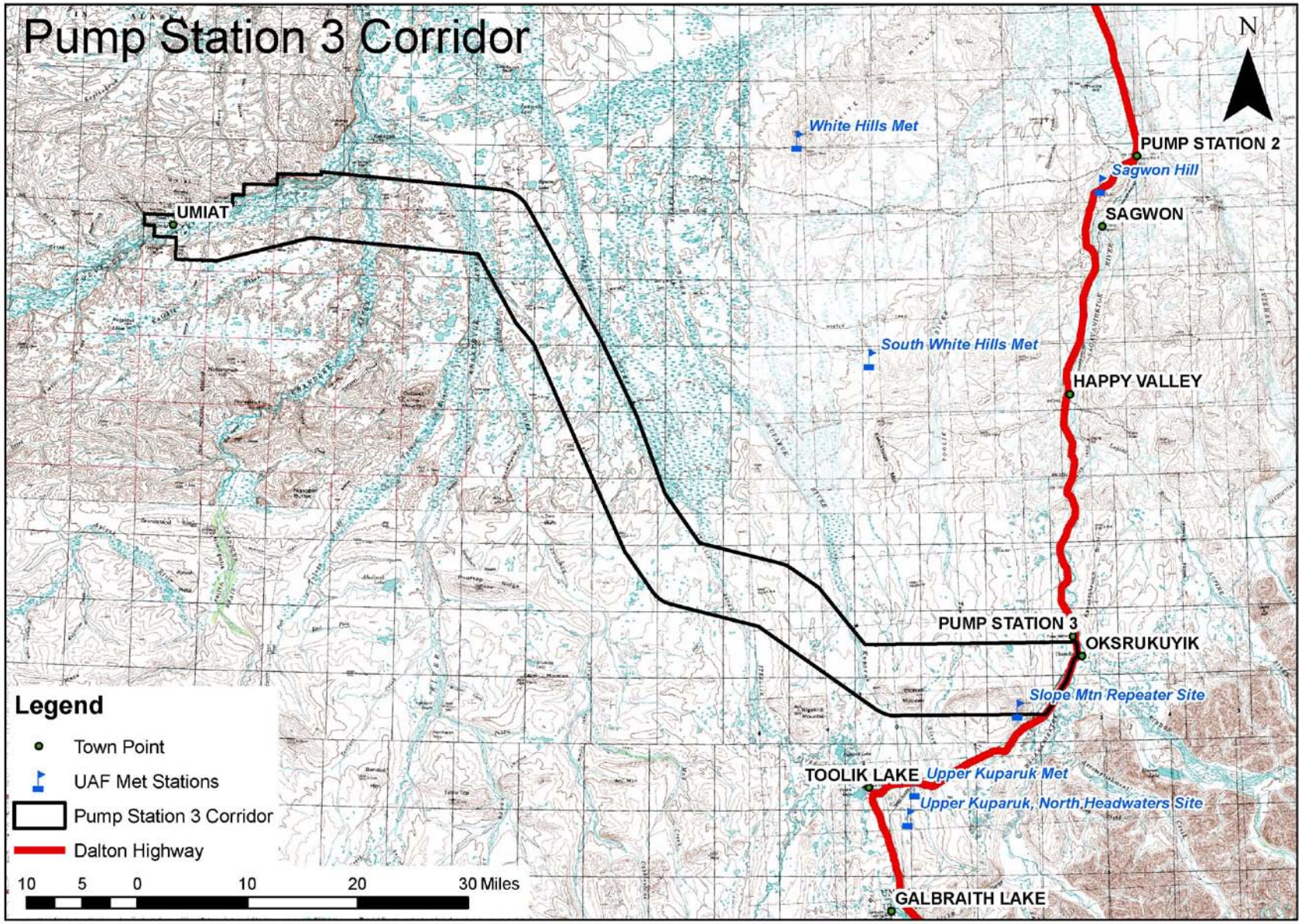


Figure 15. Pump Station 3 Corridor option; Foothills West Transportation Access Project, Sept., 2009.

2009 STATE OIL AND GAS LEASE ANALYSIS

Table 5 identifies the current State of Alaska leaseholders in the area, and both the number and acreage of leases within the Pump Station Three Route "Area of Influence." Figure 16 illustrates the existing oil and gas lease holdings on state land and the described Area of Influence.. Note that all calculations exclude lease holdings located within the Dalton Highway "Area of Influence." Due to the emphasis of gas production in the Project Purpose, an additional total is provided for leases anticipated to be focused solely on gas production. These totals are based on discussions with industry representatives and the Alaska DNR database of current leaseholders.

Table 5. Pump Station 3 Corridor "Area of Influence" oil and gas leases.

Company	**Number of Oil and Gas Leases**
Anadarko	67
Chevron	24
FEX	4
Conoco Phillips	6
Other	3
Total	**104**
Total Gas Leases Only	**73**
Acreage of Leases within the Pump Station Three Route "Area of Influence"	**470,825 acres**

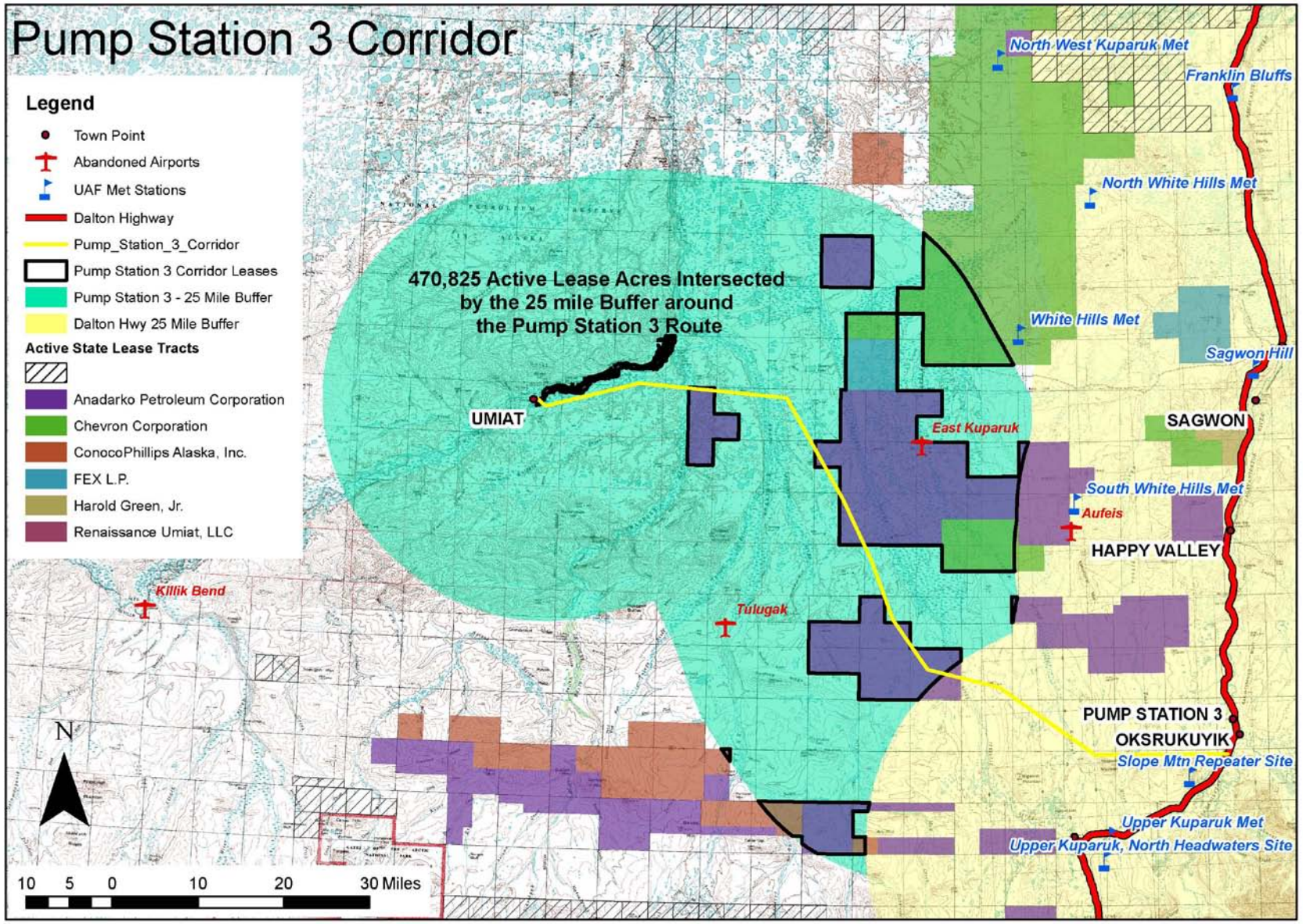


Figure 16. Pump Station 3 Corridor Area of Influence; Foothills West Transportation Access Project, Sept., 2009.

2005 CENTRAL NORTH SLOPE USGS ASSESSMENT ANALYSIS*

Potential new resource discoveries within Pump Station 3 Corridor "Area of Influence" are characterized as "Moderate."

GAS TO MARKET/TRANSPORT SAVINGS

This route begins at Dalton Highway Milepost 310 and is the second nearest route origin to Fairbanks (approximately 374 miles distant). The implication of additional mileage from major supply points for each route is the increased cost for additional miles traveled in comparison to the Galbraith Routes.

From Umiat, the Pump Station Three Route first trends east, then northwest-southeast to the Dalton Highway, requiring 24 additional Dalton Highway miles to reach a common origin with the two other routes which intersect the Dalton Highway farther south. It is anticipated that pipeline construction would generally follow a road constructed to the Dalton Highway from Umiat, and roads trending more directly northwest-southeast from a Dalton Highway intersection would require less overall pipeline. The Pump Station Three route would require some additional miles of gas pipeline construction, but not as many as more directly east-west route options originating further north on the Dalton Highway.

Distance from Starting Point of Road to Fairbanks (approx.)	374 miles
Distance from Fairbanks to Umiat utilizing this route (approx.)	474 miles

CONSTRUCTION COST **$384,000,000**

Unweighted Score= 1

ROAD CONSTRUCTION COST $220,000,000

Includes road embankment, surfacing, dust palliative, signage/marking, and minor drainage requirements.

*Road design criteria are described in the Matrix Criteria section.

BRIDGE / DRAINAGE STRUCTURE CONSTRUCTION COST $144,000,000

Includes bridges across the Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler, and Colville Rivers as required. The estimate includes structures, associated scour protection, and approaches. Additional costs are included for road segments through active floodplains to account for additional erosion protection measures and drainage considerations. These costs also include large drainage structures other than those crossing the major rivers discussed above.

An additional bridge is assumed necessary to cross the Trans-Alaska Pipeline near the route origin. Due to the complexities of a crossing at this location, a separate estimate for this specific bridge was developed.

*Bridge design criteria are described in the Matrix Criteria section.

ADDITIONAL CONSTRUCTION COST $ 20,000,000

Includes Contractor Furnished Items, Mobilization/Demobilization, Erosion and Sediment Control, and Potential Wetlands Mitigation costs.

ENGINEERING CONSIDERATIONS: UNWEIGHTED SCORE = 4

GENERAL TOPOGRAPHY

Road Length	100 Miles (approx.)
Starting Elevation	1600 feet (msl)
Ending Elevation	250 feet (msl)
Highest Point	2500 feet (msl)
Maximum Grade	8% - 10%

ROAD GEOMETRY RELATED TO TERRAIN:

The road will be designed to the vehicles described in the Design Criteria section. The beginning of the road will traverse relatively steep terrain (8% grades) for the initial 4 miles. From that point the terrain is very gradual with few obstructions of concern that disallow appropriate AASHTO grade and curve criteria to be applied. Areas around significant drainages may require special consideration in meeting the design criteria. For the assumptions made for this study, there do not appear to be any major issues preventing the application of appropriate road geometry criteria.

ENVIRONMENTAL FACTORS (SNOW DRIFTING AND GENERAL DRAINAGE):

Roadway snow drifting is a concern due to large open spaces and the lack of trees allowing an extensive wind and snow "fetch." Winds have been reported as predominately out of the northeast (further study/analysis is currently ongoing), and caution will be required in routing road alignments to the southwest of terrain and other wind obstructions such as taller vegetation. Dalton Highway experience recommends that road alignments be constructed a minimum of 6' above ground level to allow the road to be naturally blown clear of snow. Due to the westerly trend of the first route segment, and the overall northwest-southeast orientation of the Pump Station Three Route, prevailing winds are anticipated to be perpendicular to the road, and snow drifting potential is moderate.

Based on the assumptions used in this study, general drainage for the route can be described as good to fair for the southernmost 30 miles, and fair to poor for the remaining 70 miles to Umiat. In poor drainage areas, unstable soils, permafrost, and polygonal ground and cross drainage problems are anticipated. This route crosses all six major rivers in the project study area, and additionally requires an estimated 42 minor but significant water crossings. This route will require additional engineering consideration to address the numerous crossings.

CONSTRUCTABILITY:

Constructability issues include the ability to stage construction of a project from several locations along a route, access to lakes for ice road construction and soil compaction, as well as any special or unforeseen conditions that may exist along the route causing such problems as settlement or other complications.

Overall, the Pump Station Three Route initially travels west through relatively dry ground with available water sources between the Dalton Highway and Toolik River, then northwest along the Itkillik River until again turning west to Umiat through an area of abundant ponds and lakes. Additional considerations will be required if lakes are fish bearing or freeze to the bottom. Settlement has a high potential of being an issue during construction throughout this route, especially in northwestern segments where unstable soils are likely. If winter construction is chosen as the most economical method, settlement should be anticipated for any areas with unstable subsurface conditions during summertime thaw.

SPECIAL CONSIDERATIONS:

This route will require further studies on potential aufeis conditions along the major river crossings. The Kuparuk River has several large aufeis locations documented. Assumptions made for this study rate this area as having a medium to low potential for aufeis conditions. For the initial, steep segments near the Dalton Highway, consideration should be given to slope stability and solifluction issues. All river crossings should be analyzed to determine the full extent of individual thaw bulbs for bridge crossing locations.

HYDROLOGIC IMPACTS: UNWEIGHTED SCORE = 3

MAJOR RIVERS

Crossing	Estimated river crossing length (feet)	Estimated Total Floodplain Impact (feet)
Toolik River	150	250
Kuparuk River	150	250
Itkillik River	300	400
Anaktuvuk River	400	2000
Chandler River	300	1500
Colville River	900	2600

This corridor crosses all six major rivers in the project study area, though crosses the Toolik, Kuparuk and Itkillik Rivers farther south and at higher elevations, reducing both the bridge span length requirements and potential floodplain impacts. As all routes cross the Anaktuvuk, Chandler, and Colville rivers in generally the same locations, their potential impacts to those locations are comparatively equal.

SMALLER SIGNIFICANT DRAINAGES

This route contains approximately 42 additional, smaller drainages identified by USGS maps and satellite imagery. More study is required to determine their significance, and several may be larger, incised, and exhibit significant discharge events. Overall, the Pump Station Three Route crosses a moderate number of these smaller, significant drainages.

RIVER NAVIGABILITY

Of the rivers within the project study area, the Colville River has been determined as "Navigable" by the State of Alaska DNR. According to the Alaska DNR Division of Mining, Land and Water Navigable Waters Webmap, the Toolik, Kuparuk, Itkillik, Anaktuvuk and Chandler Rivers' navigability status is "Unknown." Additional study and consideration will be required in developing bridge concepts for navigable rivers to ensure adequate chord clearance and design standards are met. The U.S. Coast Guard also has permitting authority for crossings of rivers deemed "Navigable."

GEOLOGIC AND GEOTECHNICAL CONSIDERATIONS — UNWEIGHTED SCORE = 3

MATERIAL SITES

Based on the assumptions made for this report, the Pump Station Three Route appears to meet the criteria of providing for access to a material site every 10 miles along the route. The southernmost 30 miles of this route hold the potential to acquire material from more upland-dominated, gravel moraine features. Along Slope Mountain and the Itkillik River corridor there are several potential outwash and alluvial gravel sources evident. Northwest of that segment, riparian floodplains are anticipated to yield the most suitable material sources. Gravel for the project appears available in sufficient quantities within these areas. Mining within floodplains will require additional consultation with ADF&G and USF&W.

For this analysis, the quality of materials from upland, river and floodplain sources are assumed to be similar, though upland material sources are rated as more desirable due to their lower environmental impact. The Pump Station Three Route is estimated to have four potential upland sources, and seven potential floodplain orriver sources. Although field confirmation has not been conducted, this route also appears to hold the potential to access coarse materials, suitable as rip rap, from sources in the Imnavait Mountain area.

SUBSURFACE SOIL CONDITIONS

All soils are anticipated to be underlain by permafrost, and solifluction should be considered as a potential slope stability issue for the initial 4 miles of the route. However, preliminary evaluations of published data indicate the Pump Station Three Route may traverse gravel moraine soils for much of its southernmost 30 miles, providing for a solid soil foundation. Northwest of that segment, foundation soils are expected to be poor, consisting of fine grained materials and, in some locations, massive ice.

Potential miles of stable subsurface conditions (gravels): 30

Potential miles of unstable subsurface conditions (fine grained soils and ice): 70

ICING HAZARDS

Miles of low potential for icing hazards: 100

Miles of high potential for icing hazards: 0

SLOPE STABILITY AND AVALANCHE HAZARDS

Number of areas with potentially unstable slopes: 1 (Slope Mountain area)

Number of areas with high potential for avalanche: 1 (Slope Mountain area)

LAND OWNERSHIP — UNWEIGHTED SCORE = 3

Four landowners are affected by the Pump Station Three Corridor (Figure 17). ROW impacts are calculated using a 300' ROW width. The parcel areas were obtained from the Alaska DNR's General Land Status of Alaska dataset, current as of May 11th, 2009.

Landowner	Acquisition Acres	Percentage of Total
State of Alaska	2980	72%
ASRC	650	19%
BLM	0	0%
TAPS*	*	*

*This route includes crossing the Trans Alaska Pipeline System currently operated by the Alyeska Pipeline Company. This consideration presents the complications of both acquiring an easement over the pipeline and requiring additional Design and Environmental work in developing suitable designs and approaches to cross TAPS safely and effectively. At this location, TAPS has both above-ground and buried sections. This corridor is anticipated to cross over a buried section of the TAPS. The entire TAPS right-of-way is owned by a combination of federal government, state government, Native corporations, TAPS owners, and other private individuals. The TAPs right of way in the vicinity of this location is anticipated to be owned by the state and federal government

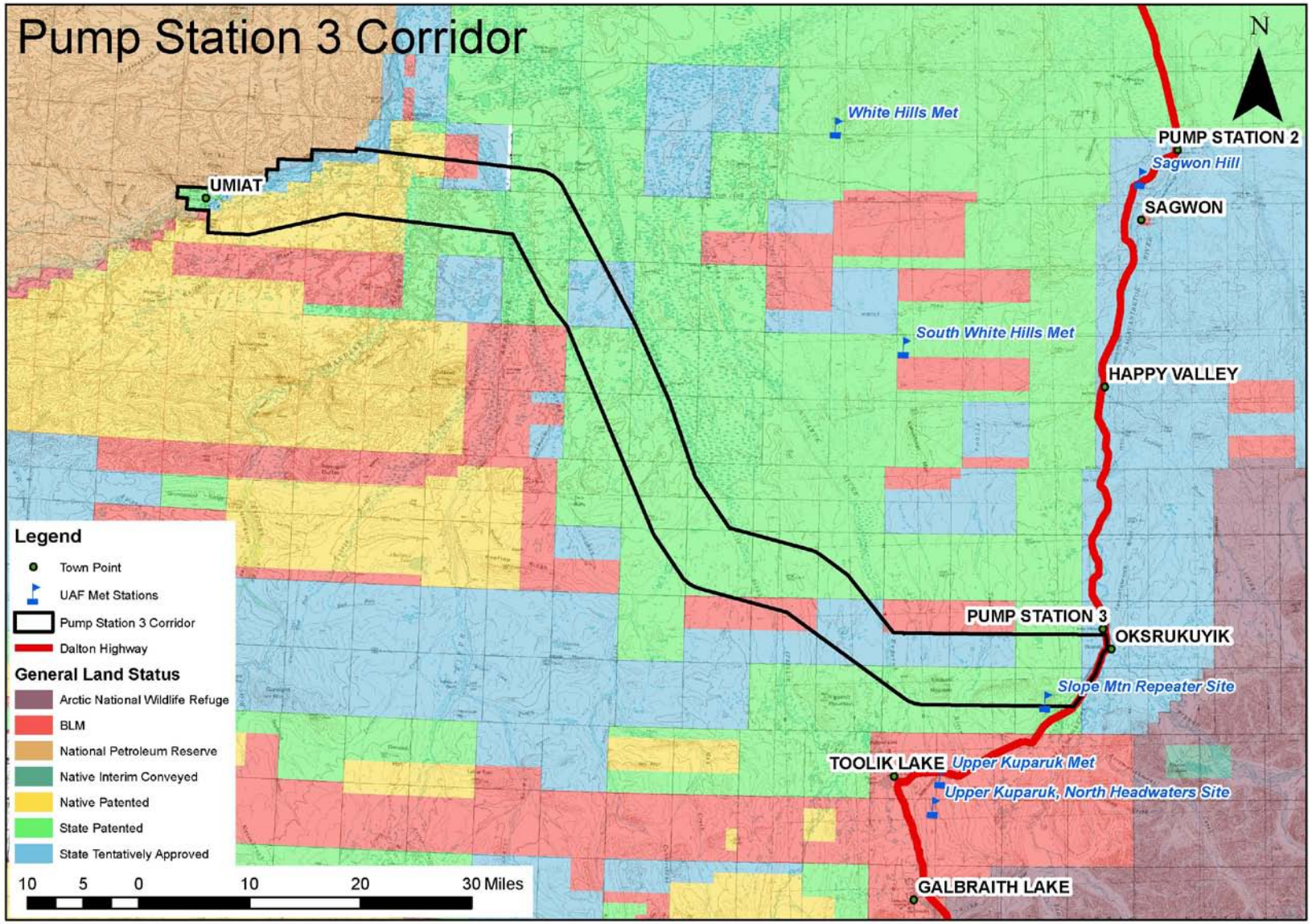


Figure 17. Pump Station 3 Corridor Landowner Status; Foothills West Transportation Access Project, Sept., 2009.

ENVIRONMENTAL IMPACTS UNWEIGHTED SCORE = 3

Consideration was given to wetlands, habitat, fish stream, wildlife and cultural resource impacts.

The entire area of the Galbraith West Alternate Route corridor is assumed to be wetlands of varying value. Higher value wetlands have been identified in the northern and western project limits, within the lower elevation floodplains of major rivers, as well as in other areas associated with numerous tundra ponds and lakes. The Galbraith West Alternate Route crosses the Itkillik River in the most southern portion of its drainage, and then the Anaktuvuk, Chandler and Colville Rivers lower in their floodplains. Consequently, the southern 40 miles of the Galbraith West Alternate Route is more elevated, generally following northwest-southeast terraces of the upper Itkillik River which are likely comprised of lower quality wetland classes. While definitive wetland information is currently unavailable, it is assumed that the southern portion of this route will effect less impact on wetland functions and values than more northerly routings. In the more northerly sections of the Galbraith West Alternate Route, the crossing of the lower Anaktuvuk, Chandler and Colville drainages will likely impact a greater area of higher quality wetlands characterized by tundra ponds and the more dispersed channel morphology of lower elevation floodplains.

POTENTIAL WETLANDS IMPACTS

The entire area of the Pump Station Three Route corridor is assumed to be wetlands of varying value. Higher value wetlands have been identified in the more northern and western portions of the project limits, as well as in other areas associated with numerous tundra ponds and lakes. From its origin at the Dalton Highway and westward, the Pump Station Three Route crosses the Toolik, Kuparuk and Itkillik Rivers in more southern, elevated portions of their drainages. While these crossings will necessitate impacting floodplain and riparian wetland habitats adjacent to crossing sites, these impacts should be less significant than those effected by more northerly routings that cross greater areas of lower elevation, dispersed floodplains dominated by tundra ponds and exhibiting a more variegated channel morphology. North and west of Imnavait Mountain, the Pump Station Three Route merges with and shares a proposed corridor with other route options originating near Galbraith Lake. The southern portion of the combined Pump Station Three and Galbraith-based routes is more elevated, generally following a northwest-southeast terrace of the Itkillik River that is likely comprised of lower quality wetland classes. While definitive wetland information is currently unavailable, it is assumed that the southern portion of this route will effect less impact on wetland functions and values than more northerly routings. In the more northerly sections of the Pump Three Route, the crossing of the lower Anaktuvuk, Chandler and Colville drainages will likely impact a greater area of higher quality wetlands characterized by tundra ponds and the more dispersed channel morphology of lower elevation floodplains

Comparatively, it is likely that fewer areas of high-value wetlands would be impacted by the Pump Station Three Route as compared to other routing options with more northerly origins on the Dalton Highway. Alternatively, routings with origins further to the south of Pump Station Three will cross fewer total drainages, cross the Itkillik River at a higher elevation, and likely impact less overall wetland acreage than this corridor.

POTENTIAL WILDLIFE HABITAT IMPACTS

Generally, three high-value wildlife habitats have been identified through discussions with state and federal resource agencies. Emergent vegetation along the margins of tundra ponds and lakes is considered important habitat for migratory songbird nesting, breeding and rearing. Similarly, the generally scarce, shrub-dominated riparian floodplains provide these same habitat values for other suites of songbirds. Important components of biological diversity in their own right, migratory songbirds also provide a food source for various species of predatory birds (raptors) common to the region. Emergent and shrub-dominated habitats are additionally important as food and cover habitats for moose. Bluff and cliff habitats associated with the Colville River and other major drainages within the potential corridor provide nesting, breeding and rearing habitat for a variety of raptors. The Pump Station Three Route, with its more southern origin and crossing the Toolik, Kuparuk and Itkillik Rivers in the southern portions of their drainages, will likely impact less wetland, emergent and shrub-dominated riparian habitat than other routes originating further north on the Dalton Highway. Once merged with the routings originating near Galbraith, the Pump Three Routing will additionally cross the Anaktuvuk, Chandler and Colville Rivers, maintaining a more elevated alignment along the Itkillik River for the southern, shared portion of that route .

POTENTIAL FISH STREAM IMPACTS

The Pump Station Three Route requires crossing all six major rivers in the project area, and therefore will impact a greater area of both known and potential anadromous and resident fish habitat than routes crossing fewer drainages. Potential impacts at any crossing point or riparian floodplain material site include the disturbance of natural flow regimes due to bridges, construction activities, and other temporary or permanent infrastructure; the establishment or destruction of fish habitat elements that alter the species composition or distribution of various fish populations within a drainage; the compromising of overwintering potential in areas associated with bridge and culvert crossings or material removal; and short- or long-term impacts associated with sedimentation, thermal variation or other contamination that alters the life history or survival of existing fish resources.

POTENTIAL WILDLIFE IMPACTS

Caribou are present throughout the region potentially crossed by the Pump Station Three Route. Preliminary review of ADF&G reports on the Central Arctic Herd (CAH) suggest that fewer impacts to caribou populations may be effected by approaching the Gubik area from a more southern versus eastern direction. Historic caribou distribution and calving area data suggest that northern portions of the greater project study area are more heavily utilized by both CAH and occasionally Western Arctic Herd (WAH) caribou. Consequently, the Pump Station Three Route may pose fewer risks both in terms of human impacts to caribou distribution and populations and, additionally, to travel safety by crossing caribou range in its generally northwest-southeast orientation.

Brown bear are wide ranging residents of the project study area, and thus are likely to be impacted regardless of the route selection or orientation. In summer 2009, data will be gathered to determine the locations of known bear denning sites or use areas, and this information will be factored into alignment configuration at that time.

Moose are common residents of the shrub-dominated floodplains and riparian areas throughout the project study area. Due to its scarcity in the project area, protection of shrub-dominated habitat has been identified as an environmental priority of the Foothills West project. The Pump Station Three Route would potentially impact less shrub-dominated habitat than more northern routing options due to its crossing the Toolik, Kuparuk and Itkillik drainages in their upper reaches where these habitats are less prevalent. However, once merged with routings shared by Galbraith-based corridors, there would be potentially greater additive impacts to habitat as compared to those routes that cross only the Anaktuvuk, Chandler and Colville rivers.

Muskoxen are reported by ADF&G to be potentially present throughout the entire Foothills West project area, though in recent years the numbers of this eastern Brooks Range sub-population have fallen precipitously due to unknown factors. Current research and management goals for muskoxen in the North Slope region focus on identifying mortality factors and stabilizing the declining population. It is unquestionable that greater year-round access through the project study area by any potential routing will allow for greater accessibility to muskoxen herds, and DOT&PF must work closely with ADF&G to insure that protocols are put in place that reduce the potential for adverse impacts to this relatively vulnerable species. Insufficient information is available to determine if any individual routing option poses a greater or lesser potential for impact to muskoxen. It is anticipated that environmental fieldwork scheduled for 2009 will aid in making determinations of this potential.

Many avian species are permanent or seasonal residents of the potential Pump Station Three Route corridor. Of those, three general classes - songbirds, raptors and waterfowl – have been considered as potentially impacted. Based on preliminary discussions with the U.S. Fish and Wildlife Service (FWS), there is little probability that waterfowl will be impacted by the Pump Station Three Route. Impacts to songbirds may be less than more northern routes due to the sharing of a significant portion of its alignment with Galbraith-based corridors that generally avoid emergent and shrub-dominated habitats associated with high-quality wetlands and riparian floodplains. However, the greater overall number of major drainage crossings will likely increase the potential for impacts to riparian shrub-dominated areas as well as associated scarp and bluff habitats used by raptors. It will be necessary to carefully assess the crossing points of the Toolik, Kuparuk and Itkillik drainages to ascertain the presence of songbird habitats and raptor populations. As with all other routes, it will also remain necessary to carefully assess any crossing points along the more northerly drainages of the Anaktuvuk, Chandler and, especially, the Colville River to determine the presence of raptor populations. Special management regulations are in effect along the Colville River through the BLM Colville River Special Management Area Plan. These regulations restrict access and development activities to insure that nesting populations of Arctic peregrine falcons are not deleteriously impacted. Discussions with the FWS have indicated that it will be important for DOT&PF to assess other drainages and bluff systems on the Pump Station Three Route for the presence of nesting raptors during the 2009 field season, and these investigations have been incorporated into the environmental studies recently contracted.

POTENTIAL CULTURAL RESOURCE IMPACTS

The AHRS database shows several areas of potential cultural significance associated with the southern portions of this route. While it appears that the route will avoid direct impact to areas of significance, additional field study is needed, and material sites will need to be evaluated closely. Areas of potential, cultural resources include the tops of hills and along rivers with high bluffs. In the more northerly portions of the Pump Station Three Route, many AHRS data points are associated with early industrial development of the region, including preliminary U.S. Navy drilling sites to the east of the National Petroleum Reserve-Alaska (NRPA), various abandoned airstrips and several remote, Department of Defense installations present during the Cold War.

MAINTENANCE COSTS — UNWEIGHTED SCORE = 1

PROJECTED MAINTENANCE COSTS

Maintenance costs are based on current State of Alaska maintenance costs for the Dalton Highway as projected to dollars/mile. Based on averages from FY05 through FY08, the per-mile annual costs of maintenance for the area from Coldfoot through the Sag River camps is approximately $23,000/mile. Other factors considered in this criterion include embankment stability, terrain, and the number of bridges. Although a cost for these factors was not determined, they were considered when scoring the criterion.

Projected annual maintenance costs for the Pump Station Three Route (100 miles) = $2,300,000

MAINTENANCE CAMPS

This criterion is scored on the basis of the route being a state maintained road and requiring additional state resources. The nearest state-owned and operated maintenance camps serving this area are on the Dalton Highway, with the Sagwon Maintenance Camp at Milepost 389 and the Chandalar Maintenance Camp at Milepost 240. Due to the distance from the Pump Station Three Route's origin at MP 310, an additional camp along the Dalton Highway would be needed to serve a new road to Umiat starting from this location. A second new camp would be required in the vicinity of the Gubik gas fields to serve the northwestern portion of the road.

New camp cost construction is estimated between $10 to $15 million dollars per camp. Annual facility maintenance costs averaged from FY08 for Coldfoot, Chandalar and Sag River camps is $342,817.

Total New Camp Construction Costs = $20-$30 million

Projected annual facility maintenance costs (2 Camps) = $685,634

SUBSISTENCE IMPACTS — UNWEIGHTED SCORE = 4

Based on 2007 ADNR-ACMP Subsistence Use Area and Designation mapping, the Pump Station Three Route would traverse approximately 85 miles of unique and/or overlapping linear miles of designated subsistence use areas. Primary subsistence resources include caribou, moose, brown bear, muskoxen, furbearers, whitefish species, pink and chum salmon and various plant materials. Of the combined 85 linear, subsistence area miles crossed by the Pump Station Three Route, 55 miles are designated as land mammal use areas, 85 miles are designated as furbearer use areas, 10 miles are designated as gathering areas, and 5 miles are designated as fish use areas. No designated waterfowl use areas are crossed.

To date, public concern has been expressed that any alignment developed for the Foothills West project will deleteriously impact subsistence resources in two manners. The first is through direct impacts to subsistence species' habitats, life history, distribution or abundance resulting from conflicts with project construction or use by the public of any completed road. An additional concern is that non-local, public access to a completed road would result in competition for subsistence resources by recreational fishing and hunting interests from outside the immediate area. While this latter consideration could potentially be mitigated by regulatory measures either by the Alaska Boards of Fisheries and Game and/or access restrictions imposed by DOT&PF, there is significant opinion that greater public access to currently remote, local subsistence areas would irreparably harm habitat, the resources using those habitats and traditional subsistence activities based on those resources.

PUMP STATION TWO ROUTE

GENERAL ROUTE DESCRIPTION

Overall Length:	95 miles
Starting Point:	Approximately 2 miles south of Pump Station Two at Dalton Hwy. MP 360
Ending Point:	State of Alaska airport at Umiat
Major River Crossings:	Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler, Colville
Terrain:	Grades overall are very gentle, with maximum grades of 3%-5%

The Pump Station Two Route (Figure 18) begins approximately two miles south of Pump Station Two near Dalton Highway Milepost 360. The route starts by traversing Sagwon Hill to the west, and then generally follows the "Hickel Highway" winter trail as shown on USGS Maps. The first segment travels approximately 12 miles due west toward the Toolik River, passing through gently rolling terrain with several small drainages. Approaching the Toolik River, the route enters into an area of poor drainage conditions.

The route continues due west across the Toolik River (estimated at 250' wide channel crossing, and a 4000' wide floodplain), and proceeds approximately 27 miles west toward the east channel of the Kuparuk River. This segment initially crosses an area of poorly drained Toolik River floodplain until reaching a small, westerly channel of the Toolik River. Crossing that westerly Toolik channel, the route then continues through flat terrain crossing only minor drainages while ascending onto the southern slopes of the White Hills. Once across the south slopes of the White Hills, the route crosses various potentially, incised drainages and descends gradually toward the crossing of the east channel of the Kuparuk River (estimated at 150' channel width and 250' floodplain width).

Crossing the east channel of the Kuparuk River, this route segment continues through undulating, poorly drained conditions for five miles until reaching the main channel of the Kuparuk River (estimated at a 400' channel crossing width, and a 5000' floodplain width). Once across the main channel of the Kuparuk, the corridor continues west for an additional eight miles through variously undulating and flat, poorly drained conditions with numerous lakes, and then descends into the Itkillik River floodplain on a course that avoids several incised drainages. The corridor then crosses the Itkillik River (estimated at a 300' channel width and 2000' floodplain width).

Once across the Itkillik River, the route ascends west from the Itkillik River floodplain, turning to the southwest and heading approximately seven miles to a point just south of Square Lake. This segment crosses numerous minor drainages and undulating terrain. Beyond this section, the route turns due west and descends into the Anaktuvuk

River floodplain where it first crosses numerous smaller channels of before crossing the main channel of the Anaktuvuk River (estimated at a 400’ channel width and and 2000’ floodplain width).

West of the Anaktuvuk River, the route continues due west for eight miles toward the Chandler River through undulating terrain, and crosses areas of poor drainage and several potentially incised drainages. Descending through the Chandler River floodplain to a crossing at the main channel (estimated 300’ channel width/2000’ floodplain width), the route again proceeds westerly approximately six miles through relatively flat, poorly drained ground to the Colville River floodplain as it crosses the southern extents of the Gubik oil and gas field. The route then proceeds west-southwest through the Colville River floodplain, avoiding numerous lakes and small drainage channels, to a crossing of the Colville River near Umiat.

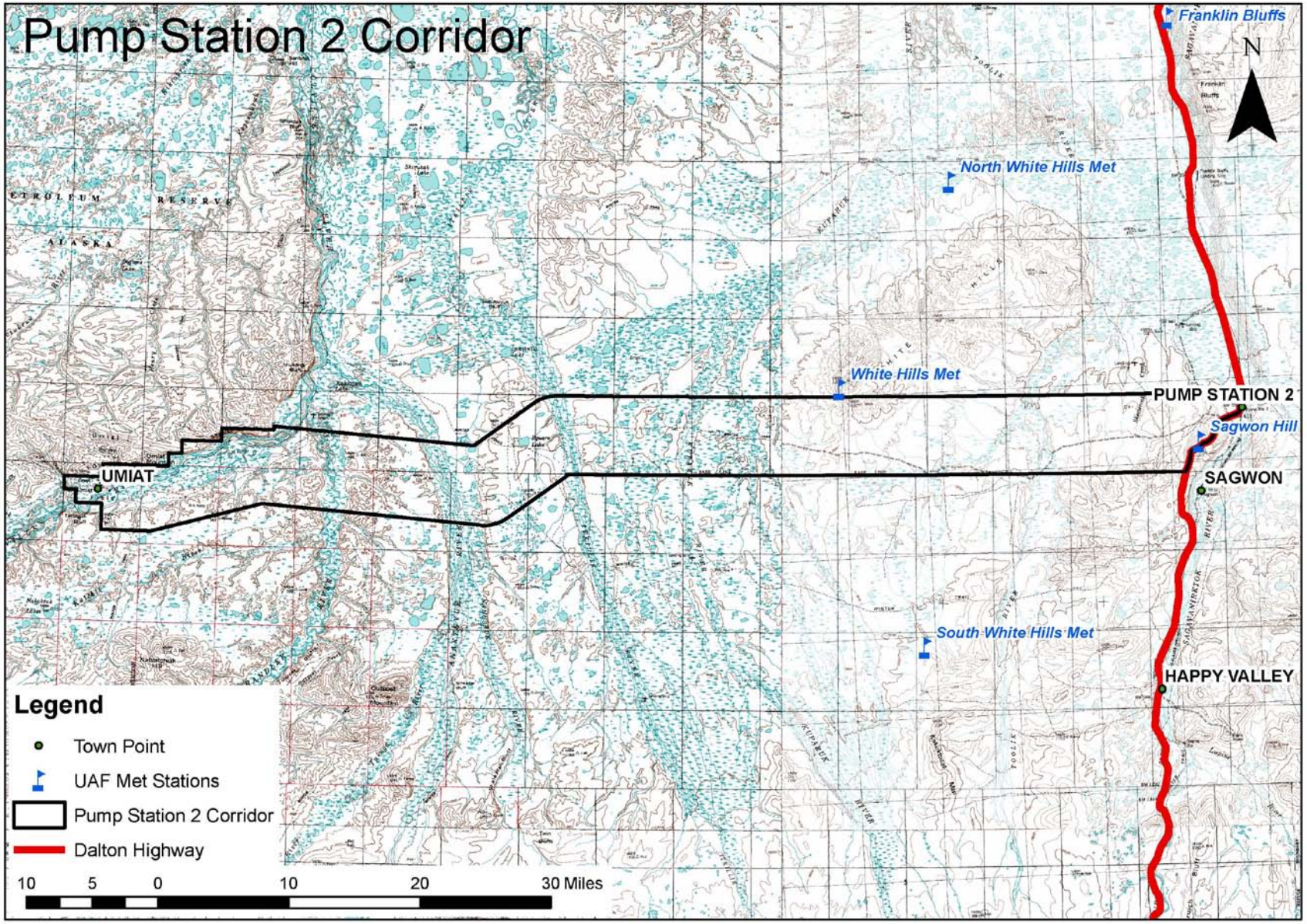


Figure 18. Pump Station 2 Corridor option; Foothills West Transportation Access Project, Sept., 2009.

2009 STATE OIL AND GAS LEASE ANALYSIS

Table 6 identifies the current State of Alaska leaseholders in the area, and both the number and acreage of leases within the Pump Station Two Route "Area of Influence." Figure 19 illustrates the existing oil and gas lease holdings on state land and the described Area of Influence.. Note that all calculations exclude lease holdings located within the Dalton Highway "Area of Influence." Due to the emphasis of gas production in the Project Purpose, an additional total is provided for leases anticipated to be focused solely on gas production. These totals are based on discussions with industry representatives and the Alaska DNR database of current leaseholders.

Table 6. Pump Station 2 Corridor "Area of Influence" oil and gas leases.

Company	**Number of Oil and Gas Leases**
Anadarko	47
Chevron	51
FEX	4
Conoco Phillips	4
Other	3
Total	**109**
Total Gas Leases Only	**51**
Acreage of Leases within the Pump Station Two Route "Area of Influence"	**517,852 acres**

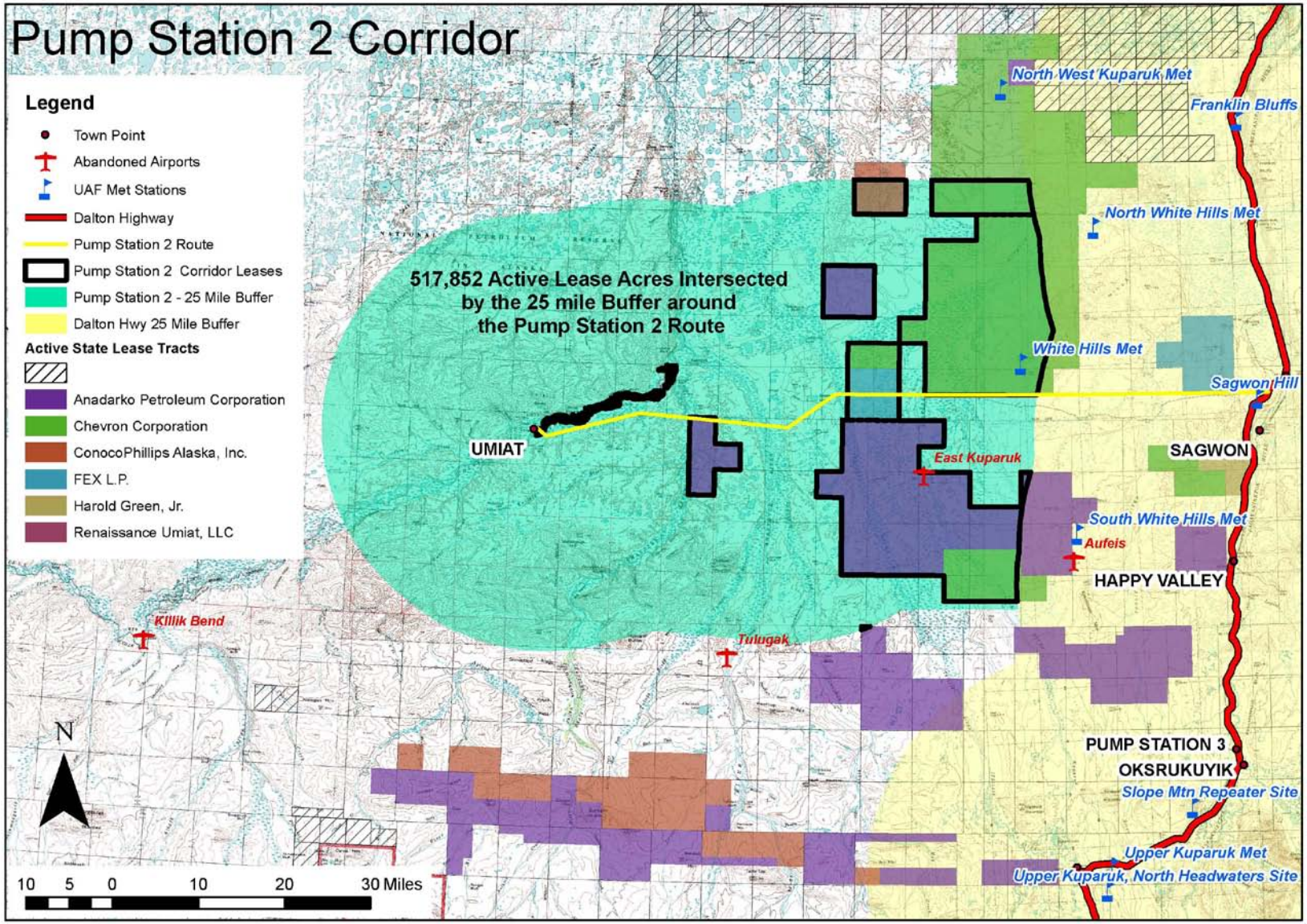


Figure 19. Pump Station 2 Corridor Area of Influence; Foothills West Transportation Access Project, Sept., 2009.

2005 CENTRAL NORTH SLOPE USGS ASSESSMENT ANALYSIS

Potential new resource discoveries within corridor “Area of Influence” are chacterized as “low.”

GAS TO MARKET/TRANSPORT SAVINGS

This route begins at Dalton Highway Milepost 360 and is the second farthest route origin from Fairbanks (approximately 424 miles distant). The implication of additional mileage from major supply points for each route is the increased cost for additional miles traveled in comparison to routes with their origin near Galbraith Lake.

From Umiat, the Pump Station Two Route trends overall west-east to the Dalton Highway, requiring 74 additional Dalton Highway miles to reach a common origin with the Galbraith-based routes which intersect the Dalton Highway farther south. Generally, its anticipated that pipeline construction would follow a road constructed to the Dalton Highway from Umiat. However, pipeline construction, and especially a “bullet line” type facility, may not follow a directly east-west route such as this due to the additional 74 miles of Dalton Highway pipeline required in comparison to a route with its origin near Galbraith Lake. Because of this, the Pump Station Two Route is at a disadvantage when considering the implications of gas pipeline construction.

Distance from Starting Point of Road to Fairbanks (approx.)	424 miles
Distance from Fairbanks to Umiat utilizing this route (approx.)	519 miles

CONSTRUCTION COST **$380,000,000**

Unweighted Score = 2

ROAD CONSTRUCTION COST $209,000,000

Includes road embankment, surfacing, dust palliative, signage/marking, and minor drainage requirements.

*Road design criteria are described in the Matrix Criteria section.

BRIDGE / DRAINAGE STRUCTURE CONSTRUCTION COST $ 151,000,000

Includes bridges across the Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler, and Colville Rivers as necessary. The estimate includes structures, associated scour protection, and approaches. Additional costs are included for road segments through active floodplains to account for additional erosion protection measures and drainage considerations. These costs also include large drainage structures other than those crossing the major rivers discussed above.

*Bridge design criteria are described in the Matrix Criteria section.

ADDITIONAL CONSTRUCTION COST $ 20,000,000

Includes Contractor Furnished Items, Mobilization/Demobilization, Erosion and Sediment Control, and Potential Wetlands Mitigation costs

ENGINEERING CONSIDERATIONS: UNWEIGHTED SCORE = 2

GENERAL TOPOGRAPHY

Road Length	95 Miles
Starting Elevation	700 feet (msl)
Ending Elevation	250 feet (msl)
Highest Point	700 feet (msl)
Maximum Grade	5%

ROAD GEOMETRY RELATED TO TERRAIN:

The road will be designed to the vehicles described in the Design Criteria section. The terrain is very gradual with few obstructions of concern that disallow appropriate AASHTO grade and curve criteria to be applied. For the assumptions made for this study, there do not appear to be any major issues preventing the application of appropriate road geometry criteria.

ENVIRONMENTAL FACTORS (SNOW DRIFTING AND GENERAL DRAINAGE):

Roadway snow drifting is a concern due to large open spaces and the lack of trees allowing an extensive wind and snow "fetch." Winds have been reported as predominately out of the northeast (further study/analysis is currently ongoing), and caution will be required in routing road alignments to the southwest of terrain and other wind obstructions such as taller vegetation. Dalton Highway experience recommends that road alignments be constructed a minimum of 6' above ground level to allow the road to be naturally blown clear of snow. Due to the east-west trend of the Pump Station Two Route, predominant winds are anticipated to be somewhat aligned parallel with the road, and snow drifting potential is comparatively lower than other route options with more northwest-southeast alignments..

Based on the assumptions used in this study, general drainage for the entire route can be described as poor due to unstable soils, permafrost, and polygonal ground and cross drainage problems. This route crosses all six major rivers in the project study area, and additionally requires an estimated 53 minor but

significant water crossings. This route will require additional engineering consideration to address the numerous crossings.

CONSTRUCTABILITY:

Constructability issues include the ability to stage construction of a project from several locations along a route, access to lakes for ice road construction and soil compaction, as well as any special or unforeseen conditions that may exist along the route causing such problems as settlement or other complications.

Overall, the Pump Station Two Route travels through poorly drained, unstable ground that appears to be abundant in lakes and cross drainages based on imagery and USGS maps. Additional considerations will be required if lakes are fish bearing or freeze to the bottom. Settlement has a high potential of being an issue during construction throughout this route. If winter construction is chosen as the most economical method, settlement should be anticipated for any areas with unstable subsurface conditions during summertime thaw.

SPECIAL CONSIDERATIONS:

This route will require further studies on potential aufeis conditions along the major river crossings. The Kuparuk River has several large aufeis locations documented. Assumptions made for this study rate this area as having the highest potential for aufeis conditions. All river crossings should be analyzed to determine the full extent of individual thaw bulbs for bridge crossing locations.

HYDROLOGIC IMPACTS: UNWEIGHTED SCORE = 2

MAJOR RIVERS

Crossing	Estimated river crossing length (feet)	Estimated Total Floodplain Impact (feet)
Toolik River	250	4000
Kuparuk River	400	5000
Itkillik River	300	2000
Anaktuvuk River	400	2000
Chandler River	300	1500
Colville River	900	2600

This corridor crosses all six major rivers in the project study area, and in addition, major channels of the Kuparuk River twice, for a total of seven major crossings. Accordingly, the Pump Station Two Route effects the greatest impact to river drainages of all routing options. River floodplain impacts are the highest for this route as compared to others considered. As all routes cross the Anaktuvuk, Chandler, and Colville rivers in generally the same locations, their potential impacts to those locations are comparatively equal.

SMALLER SIGNIFICANT DRAINAGES

This route contains approximately 53 additional, smaller drainages identified by USGS maps and satellite imagery. More study is required to determine their significance, and several may be larger, incised, and exhibit significant discharge events. Overall, the Pump Station Two Route crosses a significant number of these smaller drainages.

RIVER NAVIGABILITY

Of the rivers within the project study area, the Colville River has been determined as "Navigable" by the State of Alaska DNR. According to the Alaska DNR Division of Mining, Land and Water Navigable Waters web map, the Toolik, Kuparuk, Itkillik, Anaktuvuk and Chandler Rivers' navigability status is "Unknown." Additional study and consideration will be required in developing bridge concepts for navigable rivers to ensure adequate chord clearance and design standards are met. The U.S. Coast Guard also has permitting authority for crossings of rivers deemed "Navigable."

GEOLOGIC AND GEOTECHNICAL CONSIDERATIONS — UNWEIGHTED SCORE = 2

MATERIAL SITES

Based on the assumptions made for this report, the Pump Station Two Route appears to meet the criteria of providing for access to a material site every 10 miles along the route. River floodplains are anticipated to be the most suitable material sources for the entire route, with the exception of route segments crossing the southern flanks of the White Hills. Gravel for the project appears available in sufficient quantities within these areas. Mining within floodplains will require additional consultation with ADF&G and USF&W.

For this analysis, the quality of materials from upland, river and floodplain sources are assumed to be similar, though upland material sources are rated as more desirable due to their lower environmental impact. The Pump Station Two Route is estimated to have one potential upland source near the White Hills, and nine potential floodplain or river sources. Material sites developed for this route are anticipated to impact floodplains and rivers more than all other routes considered.

SUBSURFACE SOIL CONDITIONS

All soils are anticipated to be underlain by permafrost. The foundation soils are expected to be poor, consisting of fine grained materials as well as massive ice.

Potential miles of stable subsurface conditions (gravels): 0

Potential miles of unstable subsurface conditions (fine grained soils and ice): 95

ICING HAZARDS

Miles of low potential for icing hazards: 70

Miles of high potential for icing hazards: 25

SLOPE STABILITY AND AVALANCHE HAZARDS

Number of areas with potentially unstable slopes: 0

Number of areas with high potential for avalanche: 0

LAND OWNERSHIP — UNWEIGHTED SCORE = 4

Three landowners are affected by the Pump Station 2 Corridor (Figure 20). ROW impacts are calculated using a 300' ROW width. The parcel areas were obtained from the Alaska DNR's General Land Status of Alaska dataset, current as of May 11th, 2009.

Landowner	**Acquisition Acres**	**Percentage of Total**
State of Alaska	2800	81%
ASRC	650	19%
BLM	0	0%

The Trans-Alaska Pipeline is located on the east side of the Dalton Highway in this vicinity, and is not anticipated to be impacted.

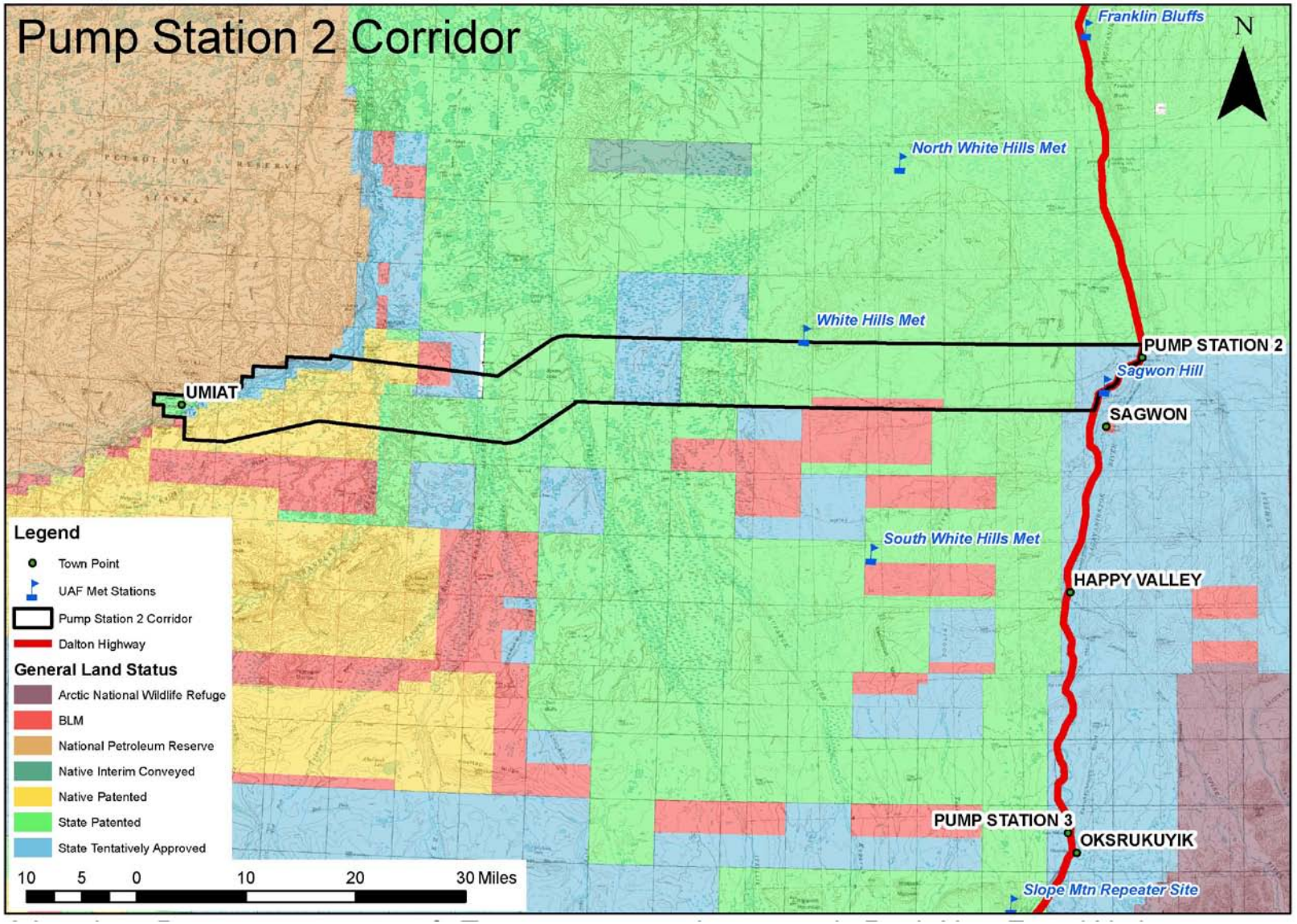


Figure 20. Pump Station 2 Corridor Landowner Status; Foothills West Transportation Access Project, Sept., 2009.

ENVIRONMENTAL IMPACTS — UNWEIGHTED SCORE = 2

Consideration was given to wetlands, habitat, fish stream, wildlife and cultural resource impacts.

POTENTIAL WETLANDS IMPACTS

The entire area of the Pump Station Two Route corridor is assumed to be wetlands of varying value. Higher value wetlands have been identified in the more western portion of the project limits, as well as in other areas associated with numerous tundra ponds and lakes. Previous wetlands assessments associated with Hickel Highway ROW work and recent energy exploration, as well as discussions with ADNR, have suggested that the more eastern, elevated portions of the Pump Station Two Route may contain some areas of lower quality wetland classes and, potentially, uplands associated with the White Hills. Due to the lack of definitive information currently available, it is assumed that the eastern half of this route, in the area south of the White Hills, will have less impact on wetland functions and values than more westerly sections. However, as the Pump Station Two Route by necessity crosses all six major river drainages in the project area (Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler and Colville), crosses an additional tributary of the Kuparuk for a total of seven major crossings, and additionally crosses them all in areas where their hydromorphology is typically expressed as dispersed floodplains versus discrete channels, it is likely that the greatest area of high-value wetland would be encountered and impacted by this route as compared to others considered.

POTENTIAL WILDLIFE HABITAT IMPACTS

Generally, three high-value, wildlife habitats have been identified through discussions with state and federal resource agencies. Emergent vegetation along the margins of tundra ponds and lakes is considered important habitat for migratory songbird nesting, breeding and rearing. Similarly, the generally scarce, shrub-dominated riparian floodplains provide these same habitat values for other suites of songbirds. Important components of biological diversity in their own right, migratory songbirds also provide a food source for various species of predatory birds (raptors) common to the region. Emergent and shrub-dominated habitats are additionally important as food and cover habitats for moose. Bluff and cliff habitats associated with the Colville River and other major drainages within the potential corridor provide nesting, breeding and rearing habitat for a variety of raptors. The Pump Station Two Route requires crossing all six major drainages along the potential corridor, and likewise requires doing so at much lower elevations in the project study area than routes originating farther south on the Dalton Highway. Therefore, it is likely there will be greater impacts to habitats associated with high-value wetlands, tundra pond and lake margins, and bluffs associated with each of those drainages.

POTENTIAL FISH STREAM IMPACTS

The Pump Station Two Route requires crossing all six major rivers in the project area, including two main channels of the Kuparuk River, and therefore will impact a greater area of both known and potential

anadromous and resident fish habitat than any other route considered. Potential impacts at any crossing point or riparian floodplain material site include the disturbance of natural flow regimes due to bridges, construction activities, and other temporary or permanent infrastructure; the establishment or destruction of fish habitat elements that alter the species composition or distribution of various fish populations within any drainage; the compromising of overwintering potential in areas associated with bridge and culvert crossings or material removal; and short- or long-term impacts associated with sedimentation, thermal variation or other contamination that alters the life history or survival of existing fish resources.

POTENTIAL WILDLIFE IMPACTS

Caribou are present throughout the region potentially crossed by the Pump Station Two Route. Preliminary review of ADF&G reports on the Central Arctic Herd (CAH) suggest that potentially greater impacts to caribou populations may be effected by approaching the Gubik area from the more directly east-west orientation proposed by this route. This presumption is based on ADF&G historic caribou distribution and calving data suggesting that northern portions of the greater project study area are more heavily utilized by both CAH and occasionally Western Arctic Herd (WAH) caribou. Consequently, the Pump Station Two Route may pose the second highest risk both in terms of human impacts to caribou distribution and populations and, additionally, to travel safety by crossing caribou range in this more northern portion of the study area..

Brown bear are wide-ranging residents of the project study area, and are likely to be impacted regardless of the route selected or its orientation. The proximity of the Pump Station Two Route to upland areas associated with the White Hills may present a potential for greater impacts to bear denning habitat than that of other routes originating farther south. In summer 2009, data will be gathered to determine the locations of known bear den sites or high-use areas, and this information will be factored into alignment configuration at that time.

Moose are common residents of the shrub-dominated floodplains and riparian areas throughout the project study area. Due to its scarcity in the project area, protection of shrub-dominated habitat has been identified as an environmental priority of the Foothills West project. The Pump Station Two Route potentially impacts the greatest amount of shrub-dominated habitat due to its crossing the maximum number of major drainages in the project area and, additionally, crossing two channels of one drainage for a total of seven crossings. While most other routes cross as few as four river systems in southern portions of the project area containing fewer shrub-dominated habitats, the Pump Station Two Route crosses the Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler and Colville Rivers in northern portions of their drainages where shrub-dominated habitats are more prevalent.

Muskoxen are reported by ADF&G to be potentially present throughout the entire Foothills West project area, though in recent years the numbers of this eastern Brooks Range sub-population have fallen precipitously due to unknown factors. Current research and management goals for muskoxen in the North Slope region focus on identifying mortality factors and stabilizing the declining population. It is unquestionable that greater year-round access through the project study area by any potential routing

will allow for greater accessibility to muskoxen herds, and DOT&PF must work closely with ADF&G to insure that protocols are put in place that reduce the potential for adverse impacts to this relatively vulnerable species. Insufficient information is available to determine if any individual routing option poses a greater or lesser potential for impact to muskoxen. It is anticipated that environmental fieldwork scheduled for 2009 will aid in making determinations of this potential.

Many avian species are permanent or seasonal residents of the potential Pump Station Two Route corridor. Of those, three general classes - songbirds, raptors and waterfowl – have been considered as potentially impacted. Based on preliminary discussions with the U.S. Fish and Wildlife Service (FWS), there is little probability that waterfowl will be impacted by the Pump Station Two Route. Impacts to songbirds may be greater along the Pump Station Two Route due to its alignment tending toward lower elevation floodplains where both emergent and shrub-dominated habitats associated with high quality wetlands and riparian floodplains occur. Similarly, the greater number of major drainage crossings will likely increase potential impacts to bluff habitats and raptor populations, and it will be necessary to carefully assess all crossing points to determine their presence or absence. Special management regulations are in effect along the Colville River through the BLM Colville River Special Management Area Plan. These regulations restrict access and development activities to insure that nesting populations of Arctic peregrine falcons are not deleteriously impacted. Discussions with the FWS have indicated that it will be important for DOT&PF to assess all drainages and bluff systems on the Franklin Bluffs Route for the presence of nesting raptors during the 2009 field season, and these investigations have been incorporated into the environmental studies recently contracted.

CULTURAL RESOURCE IMPACTS

The AHRS database shows several areas of potential cultural significance in the most western portions of this route and also in areas along the southern bluffs of the White Hills. While it appears that the route will avoid areas of significance, additional field study is needed, and individual material sites will need to be evaluated closely. Areas of potential cultural resources include the tops of hills, and along rivers with high bluffs. In the more westerly portions of the Pump Station Two Route, many AHRS data points are associated with early industrial development of the region, including preliminary Navy drilling sites to the east of the National Petroleum Reserve-Alaska (NRPA), various abandoned airstrips and several remote, Department of Defense installations present during the Cold War.

PROJECTED MAINTENANCE COSTS

Maintenance costs are based on current State of Alaska maintenance costs for the Dalton Highway as projected to dollars/mile. Based on averages from FY05 through FY08, the per-mile annual costs of maintenance for the area from Coldfoot through the Sag River camps is approximately $23,000/mile. Other factors considered in this criterion include embankment stability, terrain, and the number of bridges. Although a cost for these factors was not determined, they were considered when scoring the criterion.

Projected annual maintenance costs for the Pump Station Two Route (95 miles) = $2,185,000

MAINTENANCE COSTS

This criterion is scored on the basis of the route being a state maintained road and requiring additional state resources. The nearest state-owned and operated maintenance camps serving this area are on the Dalton Highway, with the Sagwon Maintenance Camp at Milepost 389 and the Chandalar Maintenance Camp at Milepost 240. Due to the proximity of this camp to the Pump Station Two Route's origin at MP 360, only one additional camp would be required in the vicinity of the Gubik gas fields to serve the northwestern portion of the road.

New camp cost construction is estimated between $10 to $15 million dollars per camp. Annual facility maintenance costs averaged from FY08 for Coldfoot, Chandalar and Sag River camps is $342,817.

Total New Camp Construction Costs = $10-$15 million

Projected annual facility maintenance costs (1 Camp) = $342,817

SUBSISTENCE IMPACTS — UNWEIGHTED SCORE = 5

Based on 2007 ADNR-ACMP Subsistence Use Area and Designation mapping, the Pump Station Two Route would traverse approximately 65 miles of unique and/or overlapping linear miles of designated subsistence use areas. Primary subsistence resources include caribou, moose, brown bear, muskoxen, furbearers, whitefish species, pink and chum salmon and various plant materials. Of the combined 65 linear, subsistence area miles crossed by the Pump Station Two Route, 45 miles are designated as land mammal use areas, 60 miles are designated as furbearer use areas, 10 miles are designated as gathering areas, and 5 miles are designated as fish use areas. No designated waterfowl use areas are crossed.

To date, public concern has been expressed that any alignment developed for the Foothills West project will deleteriously impact subsistence resources in two manners. The first is through direct impacts to subsistence species' habitats, life history, distribution or abundance resulting from conflicts with project construction or use by the public of any completed road. An additional concern is that non-local, public access to a completed road would result in competition for subsistence resources by recreational fishing and hunting interests from outside the immediate area. While this latter consideration could potentially be mitigated by regulatory measures either by the Alaska Boards of Fisheries and Game and/or access restrictions imposed by DOT&PF, there is significant opinion that greater public access to currently remote, local subsistence areas would irreparably harm habitat, the resources using those habitats and traditional subsistence activities based on those resources.

FRANKLIN BLUFFS ROUTE

GENERAL ROUTE DESCRIPTION

Overall Length:	88 miles
Starting Point:	Approximately 5 miles South of Franklin Bluffs at Dalton Hwy. MP 376
Ending Point:	State of Alaska airport at Umiat
Major River Crossings:	Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler, Colville
Terrain:	Grades overall are very gentle, with maximum grades of 3%-5%

The Franklin Bluffs Route (Figure 21) begins in the vicinity of MP 376 of the Dalton Highway, approximately 440 road miles north of Fairbanks, and approximately 57 miles south of Deadhorse. The route begins in very flat, poorly drained soils with numerous lakes, and trends due west for approximately 21 miles. The initial 8 miles of this route cross several small drainages, avoiding numerous lakes in the area until it intersects the Toolik River (estimated 300' channel width and 8000' floodplain width). Crossing the Toolik River, the corridor ascends westerly across the northern flanks of the White Hills, crosses several significant small drainages, and then descends southwesterly into the Kuparuk River floodplain.

A 31 mile long segment then parallels the Kuparuk River drainage in a southwesterly direction before crossing the Kuparuk River (estimated to be a 500' channel width, and a 9000' floodplain width) at a suitable site. West of the Kuparuk River, this entire segment , crosses very poorly drained terrain with numerous lakes and cross drainage issues before it crossing the Itkillik River (estimated at a 400' channel crossing width, and a 3000' floodplain width).

After crossing the Itkillik River, the route trends south-southwest to the Anaktuvuk River through undulating terrain for approximately 10 miles before turning due west. West of the Anaktuvuk River, the route continues to the west through poorly drained soils for 7 miles to the Chandler River, where it crosses the southern extents of the Gubik oil and gas fields. The route then proceeds to the west-southwest, descends to the Colville River floodplain, and crosses the Colville River near Umiat.

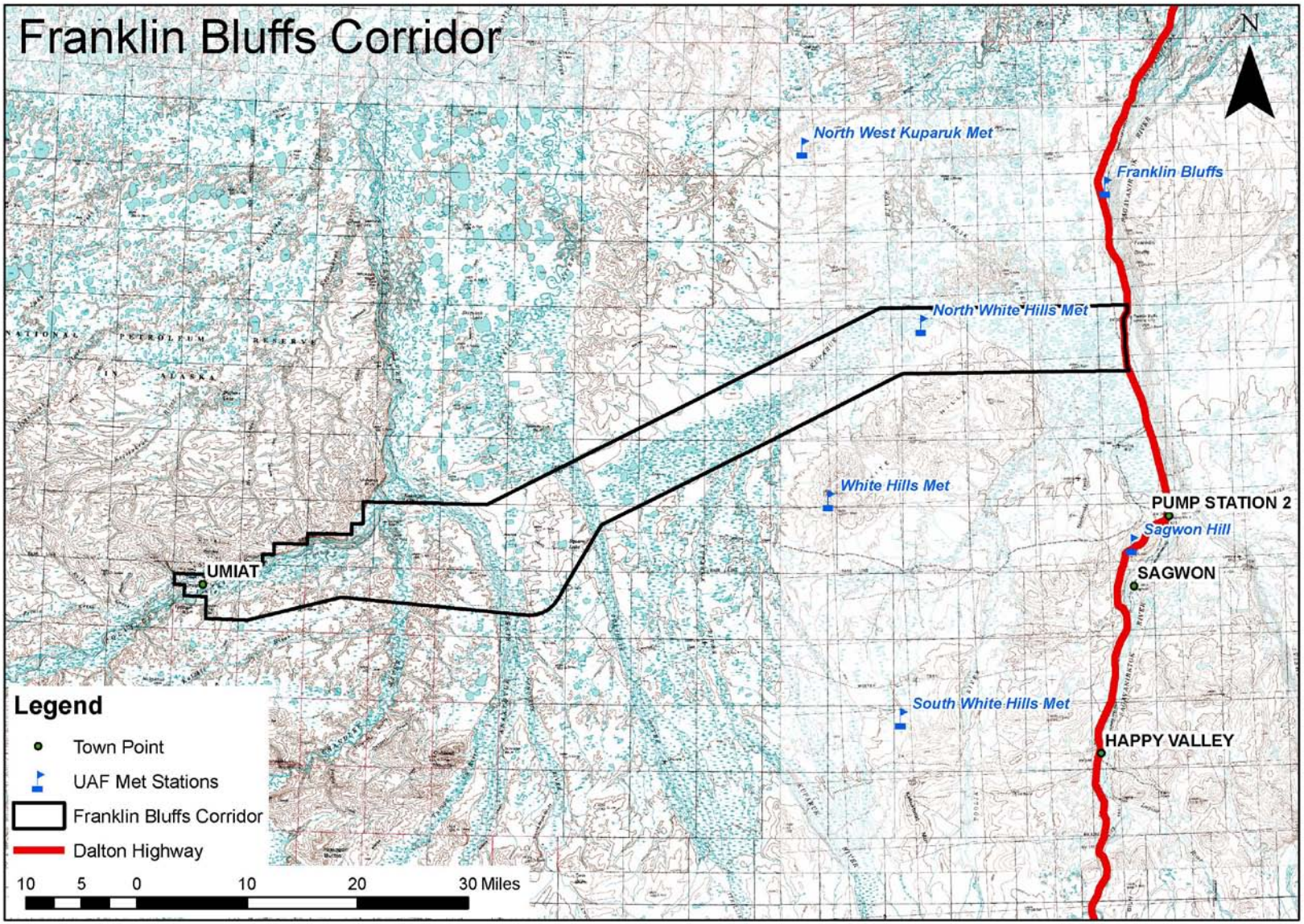


Figure 21. Franklin Bluffs Corridor option; Foothills West Transportation Access Project, Sept., 2009.

2009 STATE OIL AND GAS LEASE ANALYSIS

Table 7 identifies the current State of Alaska leaseholders in the area, and both the number and acreage of leases within the Franklin Bluffs Route "Area of Influence." Figure 22 illustrates the existing oil and gas lease holdings on state land and the described Area of Influence.. Note that all calculations exclude lease holdings located within the Dalton Highway "Area of Influence." Due to the emphasis of gas production in the Project Purpose, an additional total is provided for leases anticipated to be focused solely on gas production. These totals are based on discussions with industry representatives and the Alaska DNR database of current leaseholders.

Table 7. Franklin Bluffs Corridor "Area of Influence" oil and gas leases.

Company	**Number of Oil and Gas Leases**
Anadarko	48
Chevron	66
FEX	4
Conoco Phillips	4
Other	3
Total	**125**
Total Gas Leases Only	**52**
Acreage of Leases within the Franklin Bluffs Route "Area of Influence"	**582,395 acres**

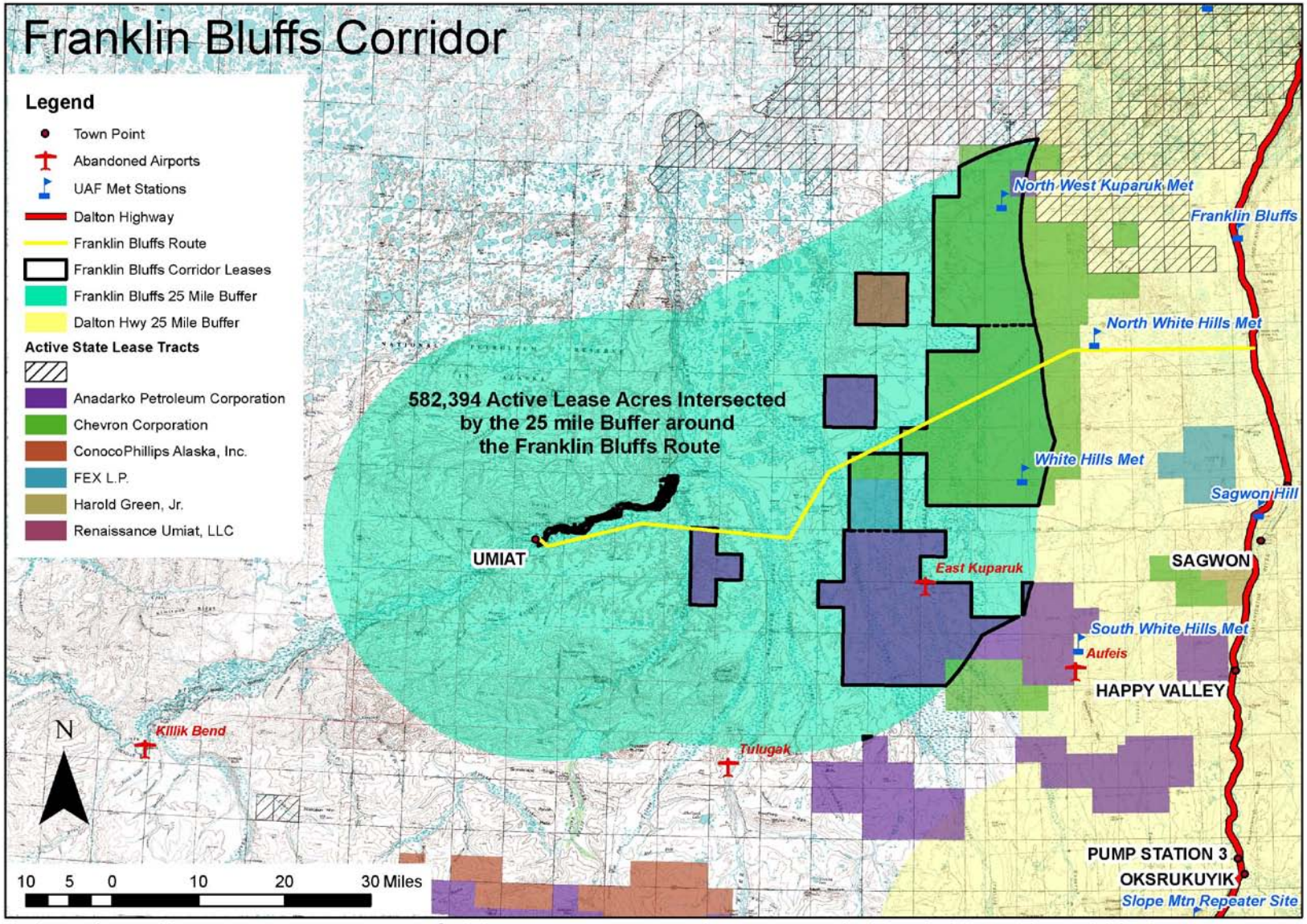


Figure 22. Franklin Bluffs Corridor Area of Influence; Foothills West Transportation Access Project, Sept., 2009.

2005 CENTRAL NORTH SLOPE USGS ASSESSMENT ANALYSIS

Potential new resource discoveries within the Franklin Bluffs Corridor "Area of Influence" are characterized as "low."

GAS TO MARKET/TRANSPORT SAVINGS

This route begins at Dalton Highway Milepost 376 and is the farthest route origin from Fairbanks (approximately 440 miles distant). The implication of additional mileage from major supply points for each route is the increased cost for additional miles traveled in comparison to routes with their origin near Galbraith Lake.

From Umiat, the Franklin Bluffs Route trends overall west-east to the Dalton Highway, requiring 90 additional Dalton Highway miles to reach a common origin with the Galbraith-based routes which intersect the Dalton Highway farther south. Generally, it's anticipated that pipeline construction would follow a road constructed to the Dalton Highway from Umiat. However, pipeline construction, and especially a "bullet line" type facility, may not follow a directly east-west route such as this due to the additional 90 miles of Dalton Highway pipeline required in comparison to a route with its origin near Galbraith Lake. Because of this, the Franklin Bluffs Route is at a disadvantage when considering the implications of gas pipeline construction.

Distance from Starting Point of Road to Fairbanks (approx.)	440 miles
Distance from Fairbanks to Umiat utilizing this route (approx.)	528 miles

CONSTRUCTION COST **$372,000,000**

Unweighted Score=3

ROAD CONSTRUCTION COST $194,000,000

Includes road embankment, surfacing, a dust palliative, signage/markings, and minor drainage requirements.

*Road design criteria are described in the Matrix Criteria section.

BRIDGE / DRAINAGE STRUCTURE CONSTRUCTION COST $ 158,000,000

Includes bridges across the Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler, and Colville Rivers as required. The estimate includes structures, associated scour protection, and approaches. Additional costs are included for road segments passing through active floodplains to account for additional erosion protection measures and drainage considerations. These costs also include large drainage structures other than those crossing the major rivers discussed above.

*Bridge design criteria are described in the Matrix Criteria section.

ADDITIONAL CONSTRUCTION COST $ 20,000,000

Includes Contractor Furnished Items, Mobilization/Demobilization, Erosion and Sediment Control, and Potential Wetlands Mitigation costs

ENGINEERING CONSIDERATIONS: UNWEIGHTED SCORE=1

GENERAL TOPOGRAPHY

Road Length	88 Miles (approx.)
Starting Elevation	370 feet (msl)
Ending Elevation	250 feet (msl)
Highest Point	370 feet (msl)
Maximum Grade	< 5%

ROAD GEOMETRY RELATED TO TERRAIN:

The road will be designed to the vehicles described in the Design Criteria section. The terrain is very gradual with few obstructions of concern that disallow appropriate AASHTO grade and curve criteria to be applied. For the assumptions made for this study, there do not appear to be any major issues preventing the application of appropriate road geometry criteria.

ENVIRONMENTAL FACTORS (SNOW DRIFTING AND GENERAL DRAINAGE):

Roadway snow drifting is a concern due to large open spaces and the lack of trees allowing an extensive wind and snow "fetch." Winds have been reported as predominately out of the northeast (further study/analysis is currently ongoing), and caution will be required in routing road alignments to the southwest of terrain and other wind obstructions such as taller vegetation. Dalton Highway experience recommends that road alignments be constructed a minimum of 6' above ground level to allow the road to be naturally blown clear of snow. Due to the east-west trend of the Franklin Bluffs Route, predominant winds are anticipated to be somewhat aligned parallel with the road, and snow drifting potential is comparatively lower than other, more northwest-southeast aligned route options.

Based on the assumptions used in this study, general drainage for the entire route can be described as poor due to unstable soils, permafrost, and polygonal ground and cross drainage problems. This route crosses all six major rivers in the project study area, and additionally requires an estimated 48 minor, but

significant, water crossings. This route will require additional engineering consideration to address the numerous crossings.

CONSTRUCTABILITY:

Constructability issues include the ability to stage construction of a project from several locations along a route, access to lakes for ice road construction and soil compaction, as well as any special or unforeseen conditions that may exist along the route causing such problems as settlement or other complications.

Overall, the Franklin Bluff Route travels through poorly drained, unstable ground that appears to be abundant in lakes and cross drainages based on imagery and USGS maps. Additional considerations will be required if lakes are fish bearing or freeze to the bottom. Settlement has a high potential to be an issue during construction throughout this route. If winter construction is chosen as the most economical method, settlement should be anticipated for any areas with unstable subsurface conditions during summertime thaw.

SPECIAL CONSIDERATIONS:

This route will require further studies on potential aufeis conditions along the major river crossings. The Kuparuk River has several large aufeis locations documented. Assumptions made for this study rate this area as having the highest potential for aufeis conditions. Poor drainage should be considered a major issue for construction in this area, as the Franklin Bluffs Route contains the worst drainage conditions of all routes considered. All river crossings should be analyzed to determine the full extent of individual thaw bulbs for bridge crossing locations.

HYDROLOGIC IMPACTS — UNWEIGHTED SCORE = 1

MAJOR RIVERS

Crossing	Estimated river crossing length (feet)	Estimated Total Floodplain Impact (feet)
Toolik River	300	8000
Kuparuk River	500	9000
Itkillik River	400	3000
Anaktuvuk River	400	2000
Chandler River	300	1500
Colville River	900	2600

This corridor crosses all six major rivers in the project study area and poses potentially significant impacts to their drainages.. River floodplain impacts are highly significant for this route as compared to others considered. As all routes cross the Anaktuvuk, Chandler, and Colville rivers in generally the same locations, their potential impacts to those locations are comparatively equal.

SMALLER SIGNIFICANT DRAINAGES

This route contains approximately 48 additional, smaller drainages identified by USGS maps and satellite imagery. More study is required to determine their significance, and several may be larger, incised, and exhibit significant discharge events. Overall, the Franklin Bluffs Route crosses a significant number of these smaller drainages.

RIVER NAVIGABILITY

Of the rivers within the project study area, the Colville River has been determined as “Navigable” by the State of Alaska DNR. According to the Alaska DNR Division of Mining, Land and Water Navigable Waters Webmap, the Toolik, Kuparuk, Itkillik, Anaktuvuk and Chandler Rivers’ navigability status is “Unknown.” Additional study and consideration will be required in developing bridge concepts for navigable rivers to ensure adequate chord clearance and design standards are met. The U.S. Coast Guard also has permitting authority for crossings of rivers deemed “Navigable.”

GEOLOGICAL AND GEOTECHNICAL CONSIDERATIONS

MATERIAL SITES

Based on assumptions made for this report, the Franklin Bluffs Route appears to meet the criteria of providing access to a material site every 10 miles along the route. River floodplains are anticipated to contain the most suitable material sources for the entire route, with the exception of route segments crossing the northern flanks of the White Hills. While gravel for the project appears available in sufficient quantities within these areas, rivers along this route are meandering and low-energy, suggesting materials will be finer grained and less well-suited for road building. Mining within floodplains will require additional consultation with ADF&G and USF&WS.

For this analysis, the quality of materials from upland, river and floodplain sources are assumed to be similar, though upland material sources are rated as more desirable due to their lower environmental impact. The Franklin Bluffs Route is estimated to have one potential upland source near the White Hills, and nine potential floodplain or river sources. Material sites developed for this route are anticipated to impact floodplains and rivers more than all other routes considered.

SUBSURFACE SOIL CONDITIONS

All soils are anticipated to be underlain by permafrost. Foundation soils are expected to be poor, consisting of fine grained materials and massive ice. Thaw-lake complexes dominate much of the route.

Potential miles of stable subsurface conditions (gravels): 0

Potential miles of unstable subsurface conditions (fine grained soils and ice): 88

ICING HAZARDS

Miles of low potential for icing hazards: 50

Miles of high potential for icing hazards: 48

SLOPE STABILITY AND AVALANCHE HAZARDS

Number of areas with potentially unstable slopes: 0

Number of areas with high potential for avalanche: 0

LAND OWNERSHIP — UNWEIGHTED SCORE = 5

Three landowners are affected by the Franklin Bluffs Corridor (Figure 23). ROW impacts are calculated using a 300' ROW width. The parcel areas were obtained from the Alaska DNR's General Land Status of Alaska dataset, current as of May 11th, 2009.

Landowner	**Acquisition Acres**	**Percentage of Total**
State of Alaska	2550	80%
ASRC	650	20%
BLM	0	0%

The Trans-Alaska Pipeline is located on the east side of the Dalton Highway in this vicinity, and is not anticipated to be impacted.

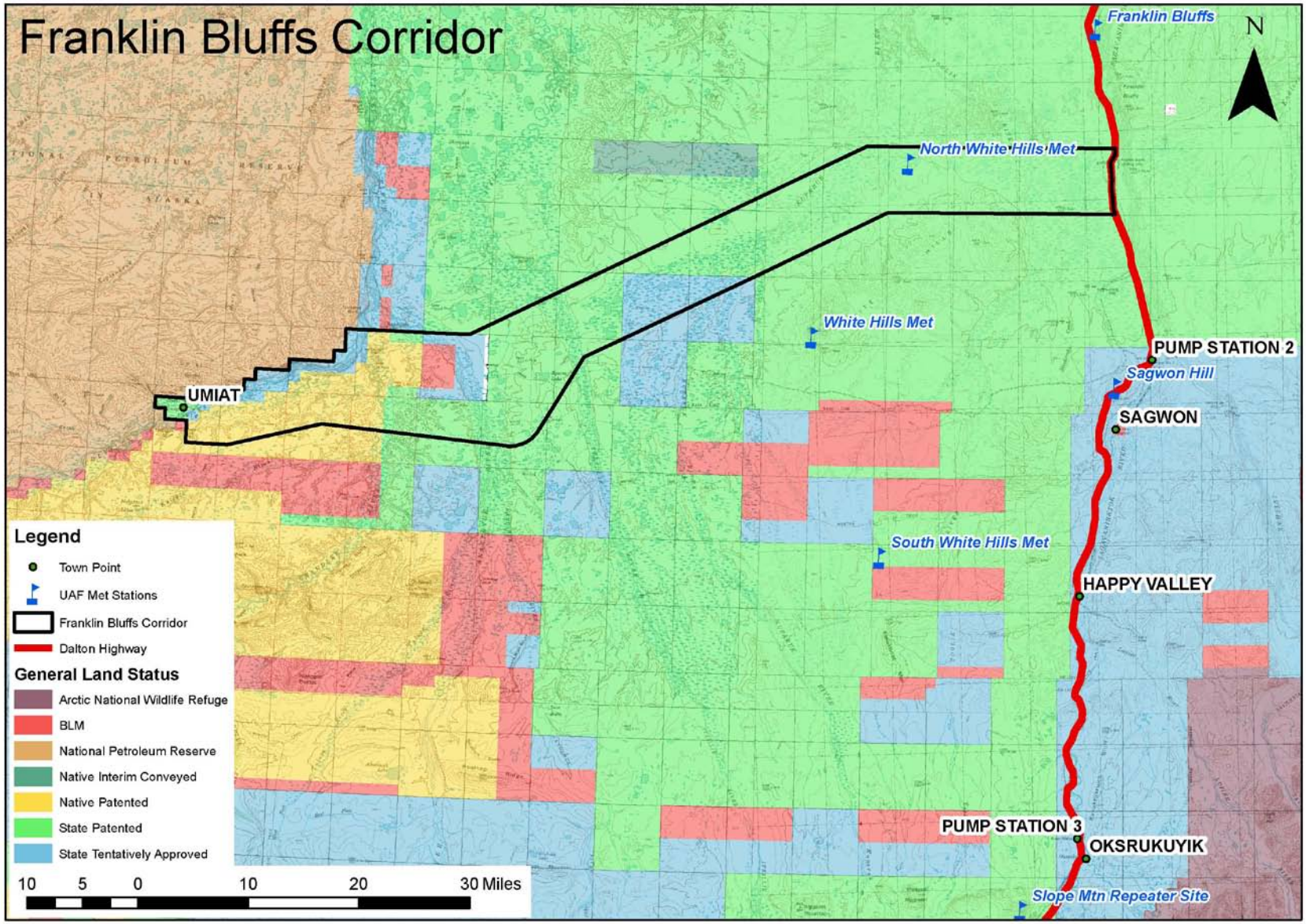


Figure 23. Franklin Bluffs Corridor Landowner Status; Foothills West Transportation Access Project, Sept., 2009.

ENVIRONMENTAL IMPACTS — UNWEIGHTED SCORE = 1

Consideration was given to wetlands, habitat, fish stream, wildlife and cultural resource impacts.

POTENTIAL WETLANDS IMPACTS

The entire area of the Franklin Bluffs Route corridor is assumed to be wetlands of varying value. Higher value wetlands have been identified in the more western portion of the project limits, as well in other areas associated with numerous tundra ponds and lakes. Previous wetland assessments associated with recent energy exploration, as well as discussions with ADNR, suggest that the more eastern, elevated portions of the Franklin Bluffs Route may contain some areas of lower quality wetland classes and, potentially, uplands associated with the White Hills. Due to a lack of definitive information currently available, it is assumed that construction of the eastern half of this route in the area north of the White Hills will have less impact on wetland functions and values than in more westerly sections. However, as the Franklin Bluffs Route crosses all six major drainages in the project area, crosses them in areas where their hydromorphology is typically expressed as dispersed floodplains versus discrete channels, and directly follows the floodplain of the Kuparuk River for a significant distance, it is likely that greater areas of high-value wetland would be impacted by this route as compared to most others considered.

POTENTIAL WILDLIFE HABITAT IMPACTS

Generally, three high-value, wildlife habitats have been identified through discussions with state and federal resource agencies. Emergent vegetation along the margins of tundra ponds and lakes is considered important habitat for migratory songbird nesting, breeding and rearing. Similarly, the generally scarce, shrub-dominated riparian floodplains provide these same habitat elements for other suites of songbirds. Important components of biological diversity in their own right, migratory songbirds also provide a food source for various species of predatory birds (raptors) common to the region. Emergent and shrub-dominated habitats are additionally important as food and cover habitats for moose. Bluff and cliff habitats associated with the Colville River and other major drainages within the potential corridor provide nesting, breeding and rearing habitat for a variety of raptors. The Franklin Bluffs Route requires crossing all six major drainages along the potential corridor, and likewise requires doing so at the lowest elevation in the project study area. Thus, it is likely there will be greater impacts to habitats associated with high-value wetlands, tundra pond and lake margins, and bluffs associated with each of those drainages.

POTENTIAL FISH STREAM IMPACTS

The Franklin Bluffs Route requires crossing all six major rivers in the project area, and therefore will impact a greater area of both known and potential anadromous and resident fish habitat than routes

crossing fewer drainages. Potential impacts at any crossing point or riparian floodplain material site include the disturbance of natural flow regimes due to bridges, construction activities, and other temporary or permanent infrastructure; the establishment or destruction of fish habitat elements that alter the species composition or distribution of various fish populations within any drainage; the compromising of overwintering potential in areas associated with bridge and culvert crossings or material removal; and short- or long-term impacts associated with sedimentation, thermal variation or other contamination that alters the life history or survival of existing fish resources.

POTENTIAL WILDLIFE IMPACTS

Caribou are present throughout the region potentially crossed by the Franklin Bluffs Route. Preliminary review of ADF&G reports on the Central Arctic Herd (CAH) suggest that greater impacts to caribou populations may be effected by approaching the Gubik area from the more directly east-west orientation proposed by this route. This presumption is based on ADF&G historic caribou distribution and calving data suggesting that more northern portions of the greater project study area are more heavily utilized by both CAH and occasionally Western Arctic Herd (WAH) caribou. Consequently, the Franklin Bluffs Route may pose the greatest risk both in terms of human impacts to caribou distribution or populations and, additionally, to travel safety on a route crossing caribou range this far north in the study area.

Brown bear are wide-ranging residents of the project study area, and are likely to be impacted regardless of the route selected or its orientation. The proximity of the Franklin Bluffs Route to upland areas associated with the White Hills may present a potential for greater impacts to bear denning habitat than that of other routes originating farther south. In summer 2009, data will be gathered to determine the locations of known bear den sites or high-use areas, and this information will be factored into alignment configuration at that time.

Moose are common residents of the shrub-dominated floodplains and riparian areas throughout the project study area. Due to its scarcity in the project area, protection of shrub-dominated habitat has been identified as an environmental priority of the Foothills West project. The Franklin Bluffs Route would potentially impact more shrub-dominated habitat than most other options due to its crossing nearly the maximum number of major drainages (six) in the project area. While several other alignments cross as few as four river systems in more southern portions of the project area containing fewer shrub-dominated habitat components, the Franklin Bluffs Route crosses the Toolik, Kuparuk, Itkillik, Anaktuvuk, Chandler and Colville Rivers in the most northern portions of their drainages where shrub-dominated habitats are the most prevalent.

Muskoxen are reported by ADF&G to be potentially present throughout the entire Foothills West project area, though in recent years the numbers of this eastern Brooks Range sub-population have fallen precipitously due to unknown factors. Current research and management goals for muskoxen in the North Slope region focus on identifying mortality factors and stabilizing the declining population. It is unquestionable that greater year-round access through the project study area by any potential routing will allow for greater accessibility to muskoxen herds, and DOT&PF must work closely with ADF&G to insure that protocols are put in place that reduce the potential for adverse impacts to this relatively

vulnerable species. Insufficient information is available to determine if any individual routing option poses a greater or lesser potential for impact to muskoxen. It is anticipated that environmental fieldwork scheduled for 2009 will aid in making determinations of this potential.

Many avian species are permanent or seasonal residents of the potential Franklin Bluffs Route corridor. Of those, three general classes - songbirds, raptors and waterfowl – have been considered as potentially impacted. Based on preliminary discussions with the U.S. Fish and Wildlife Service (FWS), there is little probability that waterfowl will be impacted by the Franklin Bluffs Route. Impacts to songbirds may be greater along the Franklin Bluffs Route due to its alignment generally tending toward lower elevation floodplains where both emergent and shrub-dominated habitats associated with high quality wetlands and riparian floodplains occur. This is particularly likely along the significant distance the route overlays the immediate floodplain of the lower Kuparuk River. Similarly, the greater number of major drainage crossings will likely increase potential impacts to bluff habitats and raptor populations, and it will be necessary to carefully assess all crossing points to determine their presence or absence. Special management regulations are in effect along the Colville River through the BLM Colville River Special Management Area Plan. These regulations restrict access and development activities to insure that nesting populations of Arctic peregrine falcons are not deleteriously impacted. Discussions with the FWS have indicated that it will be important for DOT&PF to assess all drainages and bluff systems on the Franklin Bluffs Route for the presence of nesting raptors during the 2009 field season, and these investigations have been incorporated into the environmental studies recently contracted.

CULTURAL RESOURCE IMPACTS

The AHRS database shows several areas of potential cultural significance in the most western portions of this route, and also in the area of the White Hills. While it appears that the route will avoid areas of significance, additional field study is needed, and individual material sites will need to be evaluated closely. Areas of potential, cultural resources include the tops of hills and along rivers with high bluffs. In the more westerly portions of the Franklin Bluffs Route, many AHRS data points are associated with early industrial development of the region, including preliminary U.S. Navy drilling sites to the east of the National Petroleum Reserve-Alaska (NRPA), various abandoned airstrips and several remote, Department of Defense installations present during the Cold War.

MAINTENANCE COSTS — UNWEIGHTED SCORE = 5

PROJECTED MAINTENANCE COSTS

Maintenance costs are based State of Alaska maintenance costs on the Dalton Highway projected to a per/mile cost;. Based on averages from FY05 through FY08, the per mile annual costs of maintenance for the area from Coldfoot through the Sag River camps is approximately $23,000/mile. Other factors considered in this criterion include embankment stability, terrain, and number of bridges. Although a cost was not associated, these factors were considered when scoring the criterion.

Maintenance costs are based on current State of Alaska maintenance costs for the Dalton Highway as projected to dollars/mile. Based on averages from FY05 through FY08, the per-mile annual costs of maintenance for the area from Coldfoot through the Sag River camps is approximately $23,000/mile. Other factors considered in this criterion include embankment stability, terrain, and the number of bridges. Although a cost for these factors was not determined, they were considered when scoring the criterion.

Projected annual maintenance costs for the Franklin Bluffs Route (88 miles) = $2,024,000

MAINTENANCE CAMPS

This criterion is scored on the basis of the route being a state maintained road and requiring additional state resources. The nearest state-owned and operated maintenance camps serving this area are on the Dalton Highway, with the Sagwon Maintenance Camp at Milepost 389 and the Chandalar Maintenance Camp at Milepost 240. Due to the proximity of this camp to the origin of the Franklin Bluffs Route at MP 376, only one additional camp would be required in the vicinity of the Gubik gas fields to serve the northwestern portion of the road.

New camp cost construction is estimated between $10 to $15 million dollars per camp. Annual facility maintenance costs averaged from FY08 for Coldfoot, Chandalar and Sag River camps is $342,817.

Total New Camp Construction Costs = $10-$15 million

Projected annual facility maintenance costs (1 Camp) = $342,817

SUBSISTENCE IMPACTS — UNWEIGHTED SCORE = 3

Based on 2007 ADNR-ACMP Subsistence Use Area and Designation mapping, the Franklin Bluffs Route would traverse approximately 85 miles of unique and/or overlapping linear miles of designated subsistence use areas. Primary subsistence resources include caribou, moose, brown bear, muskoxen, furbearers, whitefish species, pink and chum salmon and various plant materials. Of the combined 85 linear, subsistence area miles crossed by the Franklin Bluffs Route, 55 miles are designated as land mammal use areas, 80 miles are designated as furbearer use areas, 10 miles are designated as gathering areas, and 5 miles are designated as fish use areas. No designated waterfowl use areas are crossed.

To date, public concern has been expressed that any alignment developed for the Foothills West project will deleteriously impact subsistence resources in two manners. The first is through direct impacts to subsistence species' habitats, life history, distribution or abundance resulting from conflicts with project construction or use by the public of any completed road. An additional concern is that non-local, public access to a completed road would result in competition for subsistence resources by recreational fishing and hunting interests from outside the immediate area. While this latter consideration could potentially be mitigated by regulatory measures either by the Alaska Boards of Fisheries and Game and/or access restrictions imposed by DOT&PF, there is significant opinion that greater public access to currently remote, local subsistence areas would irreparably harm habitat, the resources using those habitats and traditional subsistence activities based on those resources.