

NORTH DAKOTA PUBLIC SERVICE COMMISSION

Application for Certificate of Corridor Compatibility

Arrow Field Services, LLC
4 Bears CDP Connect Pipeline Project

Prepared by E3 Environmental, LLC

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INTRODUCTION

Arrow Field Services, LLC (Arrow) owns and operates several crude oil, natural gas, and water facilities in Dunn and McKenzie Counties including assets located on the Fort Berthold Indian Reservation. Arrow is planning the 4 Bears CDP Connect Pipeline Project (Project) which is a new 1.5-mile, 8-inch-outside diameter crude oil (crude) pipeline project. The proposed Project will transport crude from Arrow's existing CDP Facility on the east end of the Project to an interconnect with the existing 4 Bears Pipeline on the western terminus of the Project. This Project will provide a transportation alternative for up to 9,600 barrels per day (Bpd) of Bakken crude production, reducing the need for surface transportation and enhancing the marketability of the product.

The application provides the requisite information as stipulated by:

- North Dakota Century Code, Energy Conversion and Transmission Facility Siting Act, Chapter 49-22-08; and,
- PCS Administrative Code, Chapter 69-06-04, Certificate of Site or Corridor Compatibility.

The information presented in this application is organized according to the format prescribed in the Public Service Commission (PSC or Commission) Application Guidelines for a Certificate of Site or Corridor Compatibility, which divides the information into the following five main categories:

SECTION 1: DESCRIPTION

SECTION 2: STUDIES

SECTION 3: NEED FOR FACILITY

SECTION 4: LOCATION

SECTION 5: MITIGATIVE MEASURES

SECTION 1: DESCRIPTION

1.1 PURPOSE OF FACILITY

The proposed Project includes the installation of approximately 1.5 miles of new 8-inch diameter pipeline. This Project will serve local producers in McKenzie County, North Dakota. The Project will take delivery of crude from the Arrow CDP Connect facility located at the eastern terminus of the Project and transport it to the existing 4 Bears Pipeline located at the western terminus of the Project. The capacity of this system once fully in service will be approximately 9,600 barrels per day (Bpd.) Project corridor maps are contained in Appendix B.

1.2 TYPE OF FACILITY

This Project is a transmission pipeline which will transport crude between Arrow's CDP Connect facility and interconnect with the existing 4 Bears Pipeline.

1.3 SIZE OF FACILITY

Arrow will utilize 8-inch outside diameter steel pipe for the Project.

1.4 LENGTH OF FACILITY

The Project is approximately 1.5 miles in length.

1.5 LOCATION OF FACILITY

The Project is located in McKenzie County, North Dakota approximately 18 miles west of Watford City, North Dakota; Project Maps are contained in Appendix B.

1.6 PROJECT SCHEDULE

1.6.1 CERTIFICATE OF CORRIDOR COMPATIBILITY

Arrow seeks a Certificate of Corridor Compatibility issued in September 2011.

1.6.2 ROUTE APPLICATION

Arrow submitted in July 2011 as part of this Consolidated Application for a Certificate of Corridor Compatibility and Route Permit.

1.6.3 ROUTE PERMIT

Arrow seeks a Route Permit granted in September 2011.

1.6.4 CONSTRUCTION SCHEDULE

Arrow plans to commence construction as early as September 2011 with a Project in-service date no later than October 2011.

SECTION 2: STUDIES

2.1 STUDY AREA

Arrow selected the proposed Transmission Facility Corridor (Corridor) based upon several criteria designed to conform with siting requirements, avoid and minimize socioeconomic and environmental impacts, while maximizing the benefits to local hydrocarbon producers in the Williston Basin. The study area is a one-mile wide corridor centered on the proposed pipeline alignment (e.g., one-half mile on either side of the proposed pipeline). Maps of the proposed Study Area, Corridor and route are located in Appendix B.

A comprehensive desktop analysis of the Study Area which was augmented with consultations with the Federal and state agencies identified below which included a Class I Cultural Resource Inventory. The results of this analysis are summarized below. Copies of the consultations are provided in Appendix C.

- U.S. Fish and Wildlife Service (FWS)
- U.S. Farm Service Agency (FSA)
- North Dakota Game and Fish Department (GFD)
- North Dakota Parks and Recreation-Natural Heritage Program (PRD)
- North Dakota State Preservation Office (SHPO)
- North Dakota State Lands Department (SLD)
- North Dakota Department of Health (NDDoH)

2.2 ENVIRONMENTAL DESKTOP ANALYSIS

2.2.1 TREE/SAPLING/SHRUB ANALYSIS

Desktop analysis of aerial photography was used to evaluate the location and extent of woody vegetation within the Study Area. The majority of the Study Area lacked woody vegetation. The density of the woody cover was sparse, and was typically either associated with cultivated windrows or associated with a natural feature. Arrow has commissioned additional studies of the Study Area and more specifically the proposed route to inventory woody vegetation, study avoidance mitigation and inventory proposed impacts for mitigation.

2.2.2 WETLAND AND WATERBODIES ANALYSIS

National Wetland Inventory Maps (NWIs) were utilized to complete the desktop analysis for wetland and waterbodies impacts. A small number of NWIs are mapped within the Study Area; these features appear to be associated with Dry Creek. Dry Creek, a mapped waterway, does cross the proposed pipeline alignment on the eastern end of the Project. An unnamed tributary to Dry Creek also occurs within the Study Area however, the proposed pipeline alignment would not cross this feature.

2.2.3 WILDLIFE INVENTORY

The Study Area is comprised primarily of agriculture (e.g.; cultivated crops or rangeland.) The agencies listed below were consulted regarding the potential occurrence of protected or sensitive species and their critical habitats within the Study Area. Wildlife species inhabiting or seasonally present in the Study Area are those commonly associated with western North Dakota region. These species may include avian, small mammals, and amphibians. Diversity of wildlife species would be expected to be greatest around the mapped streams versus cultivated fields.

2.2.3.1 U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service (FWS) administer several programs designed to identify and protect special status plant and animal species and critical habitats. E3 Environmental, LLC (E3), on behalf of Arrow, requested a project review of the Study Area by FWS and received comments as described below in a consultation dated April 20, 2011.

2.2.3.1.1 FEDERALLY PROTECTED SPECIES REVIEW

Under authority of the Endangered Species Act (ESA), the FWS (and National Oceanic and Atmospheric Administration (NOAA) Fisheries Service) has identified and maintains a list of species and critical habitats that have been afforded protection under the ESA. The ESA also provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they inhabit.

On behalf of Arrow, E3 provided technical assistance with protected species review and subsequent consultations with the FWS. E3 reviewed FWS published data and identified the following listed species and the potential for the species to occur within the Study Area.

- Least tern (*Sterna antillarum*) – Endangered
- Whooping crane (*Grus americana*) – Endangered
- Piping plover (*Charadrius melodus*) – Threatened
- Pallid sturgeon (*Scaphirhynchus albus*) – Endangered
- Gray wolf (*Canis lupus*) – Endangered
- Black-footed Ferret (*Mustela nigripes*)-Endangered

E3 reviewed the available information detailing the life history, critical habitats, and conservation measures associated with each species to assess the potential effects of the Project on these resources. The results of the assessment are provided below:

Least tern: The interior population(s) of the least tern has historically been associated with large river systems for breeding and migratory habitats. Breeding birds are known to breed in colonies, utilizing sandbar habitat common to larger rivers. The FWS cited the Missouri and Yellowstone Rivers as known to host breeding populations of the least terns. The Project is a minimum of approximately 12 miles

from the Missouri River and Lake Sakakawea. No other suitable habitat is present in the Study Area.

Whooping crane: The Aransas Wood Buffalo Population of whooping cranes engages in semi-annual migration through North Dakota. This flock breeds in the Wood Buffalo National Park in Alberta and Northwest Territories, Canada, and winters in the Aransas National Wildlife Refuge in Texas. This species has been closely studied and monitored in recent years due to its small, fragile population. North Dakota is within the migratory path and offers temporary roosting and feeding opportunities during migration. During migration this species is most closely associated with larger wetland complexes for roosting habitat, typically using adjacent uplands to forage. The FWS has noted that potential crane habitat is located within the Study Area; Arrow will work with agencies to mitigate potential impacts to crane habitat through construction timing and avoidance of suitable habitat during routing.

Piping plover: The piping plover is associated with shorelines along small alkaline lakes, large reservoir beaches, and river islands and adjacent sand pits. Breeding birds select wide beaches with highly clumped vegetation covering less than 25 percent of the area. Regionally, the FWS cited the Missouri and Yellowstone Rivers as critical habitat known to host breeding populations of the plovers. The Project is a minimum of approximately 12 miles from the Missouri River. No suitable habitat is present in the Study Area.

Pallid sturgeon: The pallid sturgeons' preferred habitat includes the benthic environment associated with swift waters of large turbid, free-flowing rivers with braided channels, dynamic flow patterns, periodic flooding of terrestrial habitats, and requiring extensive microhabitat diversity. Portions of the Missouri River are thought to provide the required habitat for the pallid sturgeon though much of the habitat has been compromised due to channelization, installation of impoundments and altered flow regimes. Due to the Project's distance from the Missouri River (e.g., approximately 12 miles), the Project will not affect the Pallid Sturgeon.

Gray wolf: The gray wolf is a large carnivore that through conservation measures has experienced strong population recovery, particularly in the Great Lakes states of the upper Midwest. As populations rebound, individuals may break from packs to explore opportunities to establish packs in unoccupied territory. Roaming individuals can cover great distances without establishing viable breeding populations in previously unoccupied habitat(s). This species is not tolerant of human disturbance and will tend to avoid interaction with humans. The activities associated with construction would likely serve as a deterrent to this species. Once the pipeline is in-service human interactions will be minimal and limited to only times of right-of-way/pipeline inspection, maintenance or repair.

Black-footed ferret: Black-footed ferrets are nocturnal, solitary carnivores. Ferrets inhabit extensive prairie dog complexes typically composed of several smaller colonies in proximity to one another that provide a sustainable prey base. North Dakota is host to experimental populations however; this species has not been observed in the wild for more than 20 years.

2.2.3.1.2 U.S. FISH AND WILDLIFE SERVICE MIGRATORY BIRD TREATY CONSULTATION

In April 20, 2011 consultation response from FWS, the agency noted that a July construction schedule may not completely mitigate all potential impacts to migratory birds that may be present during the breeding season. The FWS specifically noted that suitable breeding habitat for the piping plover is located along the Missouri River and Lake Sakakawea; Arrow acknowledges the presence of this habitat and proposes to mitigate by siting the Project a minimum of 12 miles from these breeding areas. The FWS also noted that the Study Area falls within the migratory corridor of the whooping crane. Arrow commissioned field surveys of the proposed route to determine the presence or absence of suitable crane habitat within the route or Study Area.

2.2.3.1.3 U.S. FISH AND WILDLIFE SERVICE BALD AND GOLDEN EAGLES ACT CONSULTATION

The Bald and Golden Eagle Act (BGEA) prohibits anyone without a permit from taking bald or golden eagle including their parts, nests, or eggs. The BGEA defines “take” as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. The BGEA also addresses impacts resulting from human-induced alterations occurring around previously used nesting sites. Several golden eagle nests have been previously documented in McKenzie County, North Dakota. Arrow commissioned field surveys to confirm the presence or absence of eagle’s nests within ½ mile of the proposed route, Arrow will work with the FWS as necessary if an eagle nest is identified within ½ mile of the proposed pipeline route.

2.2.3.1.4 U.S. FISH AND WILDLIFE SERVICE MANAGED LANDS

In the March 31, 2011 consultation response from FWS, the agency did not identify any FWS managed lands crossed by the Project.

The FWS offered recommendations that Arrow shall take under consideration related to minimization of wetland and waterbody impacts, and seeding recommendations should the Project impact native prairies. Arrow will work with regulatory authorities to develop appropriate mitigation plans.

2.2.4 U.S. FARM SERVICE AGENCY

On Arrow’s behalf, E3 consulted with the local U.S. Farm Service Agency (FSA) office to confirm the presence or absence of Conservation Reserve Program or Grassland Reserve Program lands within the proposed Study Area. The McKenzie County office of the FSA responded stating that the requested information is confidential and cannot

be shared due to privacy laws; as such, Arrow is unable to provide comment regarding the presence of FSA lands within the Study Area.

2.2.5 NORTH DAKOTA GAME AND FISH DEPARTMENT

The North Dakota Game and Fish Department (GFD) has oversight of the state’s game species and certain state managed lands (i.e.; PLOTS). On April 26, 2011 the GFD confirmed the absence of both state managed lands and wildlife concerns associated with the Project Study Area. See Appendix C for a copy the correspondence.

2.2.6 NORTH DAKOTA PARKS AND RECREATION DEPARTMENT

The North Dakota Parks and Recreation Department – Natural Resource Division (PRD) scope of authority and expertise covers recreation and biological resources (in particular rare species and ecological communities). The PRD also maintains a database of the location and recorded occurrences of plant and animal species of special concern. E3 conducted a desktop analysis of the Study Area and concluded that suitable habitat or the occurrence of protected species is unlikely. E3 on behalf of Arrow initiated consultations with the PRD on April 5, 2011 seeking concurrence with the results of the desktop analysis; the PRD’s response is pending. Arrow has commissioned field studies of the proposed route to determine the presence or absence of protected species or their critical habitat.

2.2.7 NORTH DAKOTA STATE HISTORIC PRESERVATION OFFICE

The North Dakota State Historic Preservation Office (SHPO) is responsible for managing the historic and archaeological resources of the state. Arrow enlisted SWCA to conduct a Class I Cultural Resources Inventory of SHPO records to identify previously completed cultural resource investigations and previously recorded cultural resources within Study Area.

On March 18 and April 26, 2011, SWCA completed the Class I Cultural Resources Inventory of SHPO records to identify previously completed cultural resource investigations and previously recorded cultural resources within the proposed Study Area. The previously recorded resources identified during this effort are detailed below.

Site Number	Site Type(s)	Cultural Affiliation	NRHP Eligibility
32MZ772	Cultural Material Scatter	Unknown Prehistoric	Unevaluated
32MZ782	Cultural Material Scatter and Stone Circle	Unknown Prehistoric	Recommended Not Eligible
32MZ793	Cultural Material Scatter and Other Rock Features	Unknown Prehistoric	Not Eligible

Site Number	Site Type(s)	Cultural Affiliation	NRHP Eligibility
32MZ2074	Depression, Dump, Foundation	Historic-Post 1960	Unevaluated
32MZX1094	Isolated Chipped Stone Find	Unknown Prehistoric	Not Eligible

2.2.8 NORTH DAKOTA STATE LANDS DEPARTMENT

The North Dakota State Lands Department (SLD) is in charge of managing surface acres and mineral interests held in trust for various schools and institutions.

On April 6, 2011, E3 initiated consultations with the SLD requesting comments regarding the presence of surface or mineral trust lands located within the Study Area. The SLD responded the same day identifying no school or mineral trust lands within the Study Area. See Appendix C for a copy of the correspondence.

2.2.9 NORTH DAKOTA DEPARTMENT OF HEALTH

The North Dakota Department of Health (NDDoH) administers regulatory programs governing the state’s interest water discharges. Arrow is currently in the process of preparing NDDoH permit application materials to acquire the requisite approval with respect to water discharges.

2.2.9.1 NDDOH POLLUTION DISCHARGE ELIMINATION SYSTEM

The Pollution Discharge Elimination System (ND PDES) is the regulatory program that regulates water discharges such as construction stormwater, site dewatering and hydrostatic discharge permits. Arrow will procure the following ND PDES permits from the NDDoH as described below.

Construction Stormwater: Arrow will be seeking coverage under NDR10-0000 *Authorization to Discharge Under the North Dakota Pollutant Discharge Elimination System* general permit for construction sites as required when disturbing an area greater than five (5) acres. A project-specific erosion control plan referred to as Storm Water Pollution Prevention Plan (SWPPP) will be prepared and maintained on-site for the duration of the Project. Arrow will properly implement the SWPPP which will be designed to manage run-off and trench dewatering discharges in a manner that will minimize exposure to chemicals, waste, or petroleum products as well as describing erosion control measures designed to minimize off-site transfer of sediments.

Hydrostatic Test Water Discharges: Arrow will be seeking coverage under NDG07-0000 *Authorization to Discharge Under the North Dakota Pollutant Discharge Elimination* a general permit for various temporary discharges including both construction site dewatering and hydrostatic test water discharges.

SECTION 3: NEED FOR FACILITY

3.1 ANALYSIS OF NEED BASED ON PRESENT AND PROJECTED DEMAND, INCLUDING SYSTEM STUDIES

The development of hydrocarbon production in the Williston Basin has increased significantly in recent years due to advancements in deep horizontal directional drilling techniques and subsequent oil extraction in the Bakken and Three Forks Shale formations. The total recoverable amount of Bakken Shale and Three Forks oil reserves are subject to interpretation and speculation. Studies conducted by the North Dakota Department of Mineral Resources and U.S. Geologic Survey (USGS) in 2008 and 2010 indicate that 4.0 to 6.3 billion barrels of recoverable crude oil reserves may be available in North Dakota's deep shale formations. Oil production statistics from the Bakken and Three Forks Formation indicates that oil production has increased dramatically over the past three years from nearly 110,000 barrels per day (bpd) in 2007 to nearly 386,600 bpd as of June, 2010. Oil production is expected to increase by an additional 200,000 to 300,000 bpd by 2015.

Producers in the region face a significant shipping constraint; effectively limiting production due to limited shipping/transmission capacity to markets outside of the region Interstate pipelines offering delivery of products out of the Bakken Formation are few and generally operating at full capacity. Firm transportation from the Bakken producers to market has been identified as a limiting factor in the region. Several projects have been proposed to address the limited shipping capacity of the region; generally, pipelines are preferred long-term solution, though alternatives involving surface transportation are often pursued.

Construction of this Project will provide firm, reliable service for 9,600 Bpd of crude and provide a critical transportation link between the existing 4-Bears Pipeline and the Arrow CDP Connect Facility. This will allow an increased production in the area while relieving local surface shipping of like volumes.

3.2 DESCRIPTION OF FEASIBLE ALTERNATIVE METHODS OF SERVING THE NEED

A thorough analysis of all reasonable alternatives was conducted. Various factors were considered by Arrow, including engineering, economic, and environmental factors in multidisciplinary and iterative fashion. This process identified the following alternatives.

No Action Alternative: Overall, regional production would continue to be constrained by the limited volume of product that existing infrastructure can accommodate, resulting in increased volume of product in storage facilities and not available for market use. This alternative is not desirable.

Increased Storage Facility Capacity and Ground Transportation: To accommodate the growing regional production and limits of ground transportation, Arrow could add additional storage capacity to existing facilities and increase the volume of trucks transporting product. Increased volume of truck transportation would increase use of already constrained roadways. Climate conditions in North Dakota, specifically through the winter months cause road conditions unsafe to transport crude by truck. Trucks are an integral part of the crude gathering and transportation network, however pipelines offer a more efficient and safer alternative; consequently, this Project alternative is not acceptable.

SECTION 4: LOCATION

4.1 STUDY AREA

Arrow’s Study Area includes a one-mile-wide Study Area orientated on the centerline of the proposed pipeline route. Arrow initialed agency consultations, and performed internet-based research and desktop analysis of the Study Area. These efforts were augmented by site visits, and biological and cultural resource field surveys which are discussed in detail in the Route Permit Application included in this consolidated application.

4.2 IDENTIFY AND MAP CRITERIA

The information presented in this section was developed to demonstrate conformation with the Commissions’ siting criteria for Energy Conversion and Transmission facilities. Arrow has conducted a thorough inventory of the resources that occur within Study Area to sufficiently assess the compatibility of the Project with the Commissions’ siting criteria. The following sections identify and discuss the presence or absence of siting criteria within the Study Area. Where siting criteria is identified, its location is shown on the maps in Appendix B.

4.3 EXCLUSION AREA INVENTORY AND ANALYSIS

Exclusion areas are geographic areas that should be excluded from consideration when siting an energy transmission facility. The following table and text identify and discuss exclusion areas identified within the Study Area.

Exclusion Area	Within Study Area
Federal	
National Parks or Memorial Parks	No
Historic Sites, or Landmarks	No
Natural Landmarks or Monuments	No
Wilderness Areas	No
State	
Parks	No
Historic Sites, Monuments, or Historical Markers	No
Archaeological Sites	No
Nature Preserves	No
County	
Parks	No
Recreation Areas	No
Municipal Parks	No
Other	
Areas Critical to the Life Stages of Threatened and Endangered Animal or Plant Species	No

Exclusion Area	Within Study Area
Areas where Animal or Plant Species that are Unique or Rare to this State would be Irreversibly Damaged	No

4.3.1 FEDERAL RESOURCE REVIEW

Based upon a review of publicly available information, Arrow has concluded that there are no national or memorial parks, historic sites or landmarks, natural monuments or landmarks, or wilderness areas within the Study Area. Arrow has completed consultations with the appropriate Federal agencies to support this conclusion. See Section 2 for a comprehensive discussion of Arrow’s consultations.

4.3.2 STATE RESOURCE REVIEW

Based upon a review of field surveys and publicly available information, Arrow has concluded that there are no state parks, historic sites, monuments or markers, archaeological sites, or nature preserves within the Study Area. Arrow has completed consultations with various agencies to confirm this conclusion. See Section 2 for a comprehensive discussion of Arrow’s efforts.

4.3.3 COUNTY RESOURCE REVIEW

Based upon a review of publicly available information Arrow has concluded that there are no county parks, recreation areas, municipal parks, or parks owned by other subdivisions of government bodies within the Study Area. Arrow has completed consultations with various agencies to confirm this conclusion. See Section 2 for a comprehensive discussion of Arrow’s efforts.

4.3.4 AREAS CRITICAL TO THE LIFE STAGES OF THREATENED AND ENDANGERED ANIMAL OR PLANT SPECIES

Arrow has reviewed published information, and has concluded that there are no areas critical to the life stages of threatened or endangered animal or plant species within the Study Area. Arrow has completed consultations with Federal and state agencies to confirm this conclusion. See Section 2 for a comprehensive discussion of Arrow’s efforts.

4.3.5 AREAS WHERE ANIMAL OR PLANT SPECIES THAT ARE UNIQUE OR RARE TO THIS STATE WOULD BE IRREVERSIBLY DAMAGED

Based upon consultations with agencies Arrow has not identified areas of critical habitat within the Study Area. See Section 2 for a comprehensive discussion of Arrow’s efforts.

4.4 AVOIDANCE AREA INVENTORY AND ANALYSIS

Avoidance Area	Within Study Area
National	
Historic Districts	No
Wildlife Areas	No
Wild, Scenic or Recreational Rivers	No
Wildlife Refuges	No
Grasslands	No
State	
Wild, Scenic, or Recreational Rivers	No
Game Refuges or Game Management Areas	No
Forests or Forest Management Areas	No
Grasslands	No
Other	
Other Historic Resources not meeting Exclusion Areas criteria	No
Areas of Known Geologic Instability	No
Areas within 500-Feet of a Residence, School, or Place of Business	No
Reservoirs and Municipal Water Supplies	No
Water Sources for Organized Rural Water Districts	No
Irrigated Land (does not apply to underground facilities)	NA
Areas of Recreational Significance which are not designated as Exclusion Areas	No

4.4.1 NATIONAL RESOURCE REVIEW

A review of publicly available information was conducted, and Arrow has concluded that there are no registered national parks, memorial parks, historic sites and landmarks, natural landmarks, monuments or wilderness areas within the Study Area.

4.4.2 STATE RESOURCE REVIEW

Arrow conducted a review of publically available resources and has concluded that there are no registered state parks, historic sites, monuments, historical markers, or nature preserves within the Study Area. Section 4.4.3 discusses the archaeological sites identified during a Class I review of the study area.

4.4.3 HISTORICAL RESOURCES NOT MEETING EXCLUSION AREA CRITERIA

Arrow conducted a Class I study of the Study Area, and coordinated to have a Class III Cultural Resource Inventory of the proposed pipeline route, these studies confirmed the absence of historical resources. Arrow has submitted these findings to the SHPO for review and comment, and seeking concurrence with this conclusion. On May 13, 2011, Arrow received SHPO concurrence. See Appendix C for a complete record of this consultation.

4.4.4 AREAS OF KNOWN GEOLOGIC INSTABILITY

There are no known areas of geological instability within the Study Area. North Dakota has not experienced an earthquake of sufficient magnitude to cause damage to welded steel piping or structural steel in recorded history. Sink holes are known to occur in North Dakota but are more closely related to mining activities and no evidence of mining or sink holes were identified. Finally, the potential for landslides was evaluated. Earth movement of this nature is closely associated with areas of great topographic relief, high gradient slopes, recent deposits that have yet to reach a stable angle of repose, or where underground water movement may create a slurry of rock and mud resulting in a subsidence. Nothing of this sort was found.

4.4.5 AREAS WITHIN 500-FEET OF A RESIDENCE, SCHOOL OR PLACE OF BUSINESS

Arrow has reviewed the Study Area and has confirmed there are not any schools or places of business within the Study Area. Five clusters of structures have been identified within the Study Area; none of these clusters are within 500-feet of the proposed Project pipeline alignment.

4.4.6 RESERVOIRS AND MUNICIPAL WATER SUPPLIES

Arrow has confirmed that the Study Area does not contain reservoirs or municipal water supply sources.

4.4.7 WATER SOURCES FOR ORGANIZED RURAL WATER DISTRICTS

Arrow has confirmed that the Study Area does not contain water sources that are utilized by organized rural water districts.

4.4.8 IRRIGATED LAND

This criterion does not apply to underground transmission facilities; as such it is not applicable to this Project.

4.4.9 AREAS OF RECREATIONANL SIGNIFICANCE WHICH ARE NOT DESIGNATED AS EXCLUSION AREAS

Arrow has confirmed that the Study Area does not contain areas of Recreational Significance.

4.5 FACTORS TO BE CONSIDERED IN EVALUATING APPLICATIONS AND DESIGNATION OF SITES, CORRIDORS, AND ROUTES (SECTION 49-22-09, N.D.C.C.)

4.5.1 SELECTION CRITERIA

The selection criteria require a study of environmental impacts and changes in land use that may result from the siting of the proposed Project. Arrow has evaluated these criteria and through this process, Arrow proposes that it has successfully avoided or minimized these effects to the maximum extent practicable.

4.5.1.1 AGRICULTURAL IMPACT ASSESSMENT

Agricultural Production: The Project will temporarily impact approximately 18.2 acres of land. Once the construction is complete, the land will be restored to its pre-construction contours and land use. Arrow will provide settlements to landowners for crop loss resulting from Project construction.

Family Farms and Ranches: The Project will temporarily impact approximately 51 acres of land. Once the construction is complete, the land will be restored to its pre-construction contours and land use. Arrow will negotiate easements with landowners. The Project will have no impacts to lifestyle or farm/ranch operations once construction has been completed.

Lands Suitable for Irrigation: The Project will not impact irrigation lands. All disturbed areas will be returned to pre-construction contours and land use. The Project does not include the construction of aboveground facilities.

Surface Drainage: The existing surface drainage pattern in the Study Area is towards Highway 73 and then east toward Dry Creek or to the south to the unnamed tributary to Dry Creek. Arrow has reviewed the Study Area with respect to stormwater run-off management and will utilize the information in selecting proper erosion and sediment control measures to be utilized to prevent sediment from entering Dry Creek or its tributaries during construction. All areas disturbed by construction will be returned to pre-construction contours resulting in no change in surface drainage.

Ground Water: The aquifers that underlay North Dakota are typically associated with two types of geologic formations, specifically bedrock and glacial drift. Bedrock aquifers in the area are known to occur from 3,000 to 5,000 feet below the surface while glacial drift aquifers are known to occur at depths of a few feet up to 500 feet below the surface. Ground excavation associated with the Project will generally be limited to depths no greater than 8 feet; as such, it is unlikely that the Project would have significant or permanent impact on groundwater resources.

4.5.1.2 THE IMPACTS UPON

Noise-Sensitive Land Uses: There are no noise-sensitive resources located within 500-feet of the proposed pipeline alignment. Arrow has identified five structure clusters within the Study Area. Arrow will route the proposed Project as such to maintain a minimum of 500-feet from these structures. The Project is located approximately 18 miles from Watford City in a rural setting, effectively isolating the Project from the majority of sensitive receptors. Once constructed and in-service, normal pipeline operations are not audible.

Visual Effect on Adjacent Areas: This Project will not result in any permanent above ground structures, as such the visual effect on adjacent areas will be temporary and occur during active construction.

Extractive and Storage Resources: This Project will not impact any extractive or storage resources.

Wetlands, Woodlands, and Wooded Areas: Arrow conducted a desktop review of available aerial and national wetland inventory data. It appears that the Study Area may contain some of these features. Arrow has commissioned field surveys to identify these sensitive areas and the results will be used to determine a preferred route to minimize impacts to wetlands, woodlands, and wooded areas.

Radio and Television Reception, and other Communication or Electronic Control Facilities: Arrow does not anticipate the Project impacting radio, television, or other electronic control facilities.

Human Health and Safety: Arrow promotes a safe and healthy workplace during construction and operations of all its assets. A corporate policy that meets or exceeds Federal and state laws, rules and regulations are enforced and adhered to by all regular and contract employees. Arrow governs operations and construction activities with various safe work procedures designed to protect property, and personnel while maintaining regulatory compliance.

Animal Health and Safety: The wildlife currently inhabiting the Study Area are common and are generally mobile. The local wildlife inhabitants will be temporarily displaced by the Project without a measurable impact to the viability of these populations. No species of special concern are anticipated to experience direct impacts due to construction or operation of the Project.

Plant Life: The Project will result in the loss of negligible amount of pastureland, when measured on a county or state-wide basis. No species of special concern will be

impacted by the Project. All impacts will be temporary in nature and disturbed areas will be returned to pre-construction conditions.

4.6 POLICY CRITERIA

4.6.1 POLICIES AND COMMITMENTS TO LIMIT ENVIRONMENTAL IMPACT

Arrow is committed to conducting its business in compliance with all applicable environmental laws and regulations. These laws, regulations, and standards are designed to safeguard the environment, human health, wildlife, and natural resources. Our commitment to observe them faithfully is an integral part of our business and our values.

Arrow will make environmental considerations contained in the permits and authorizations received for this project a priority. Arrow will conduct its activities with the objectives of providing a healthful and safe workplace for our employees, preventing accidents and environmental incidents, and controlling emissions and wastes to below harmful levels.

Arrow will require all persons and firms providing service to it to conduct their work in compliance with environmental conditions, permit authorizations, and regulations, and will hold them accountable for their actions in that regard.

4.6.2 LOCATION AND DESIGN

This Project will connect two existing facilities, the 4-Bears Pipeline, and Arrow's CDP Connect facility. The Study Area encompasses areas both north and south of highway 73. This area is predominantly agricultural land. Arrow will ensure the design of the pipeline to be in full compliance with U.S. Department of Transportation (DOT) standards.

4.6.3 TRAINING AND UTILIZATION OF AVAILABLE LABOR IN THIS STATE FOR THE GENERAL AND SPECIALIZED SKILLS REQUIRED

Pipeline construction is a specialized niche construction market and the labor force needed to build the Project will be primarily comprised of a non-local workforce. The primary contractor will be a non-local contractor, supplying specialized skilled labor. Arrow will draw upon the local labor force to supply general laborers. The workforce is anticipated to reach a peak of approximately 84 personnel of which up to 16 could be drawn upon locally.

4.6.4 ECONOMIES OF CONSTRUCTION AND OPERATION

Arrow will invest approximately \$1.2 million to develop this Project. Once constructed and in-service, the continued operation of the proposed pipeline will generate \$660,854.40 annually in tariffs and sales taxes.

4.6.5 USE OF CITIZEN COORDINATING COMMITTEES

Arrow has established and maintained a good relationship with the local residents through its long-term regional presence operating various assets in the area. Through these relationships, Arrow has maintained several grass roots communication channels to inform local residents regarding the developments associated with the Project.

4.6.6 COMMITMENT OF A PORTION OF THE TRANSMITTED PRODUCT FOR USE IN THIS STATE.

The proposed Project will interconnect with existing facilities. The products that are currently handled, transferred, and shipped at these facilities are currently delivered to both inter and intrastate destinations.

4.6.7 LABOR RELATIONS

Arrow does not anticipate encountering any adverse labor relations on this Project. The labor market in the Project area is supportive of the oil and gas industry.

4.6.8 THE COORDINATION OF FACILITIES

Arrow management has executed the requisite agreements and contracts associated with all affected parties. These agreements include terms required to coordinate the operations of interconnected facilities.

4.6.9 MONITORING OF IMPACTS

Arrow will coordinate with its primary contractor, Three Way, Inc., the oversight responsibilities for construction activities throughout the Project. Environmental responsibilities shall be coordinated in the same manner.

4.6.10 UTILIZATION OF EXISTING AND PROPOSED RIGHT-OF-WAY AND CORRIDORS

The suggested pipeline alignment within the Study Area would parallel an existing highway however; the pipeline would be sited in a newly established right-of-way.

4.6.11 OTHER EXISTING OR PROPOSED TRANSMISSION FACILITIES

Arrow does not currently own or operate any other transmission facilities. At this time, Arrow does not have any future plans to construct additional transmission facilities; Appendix F contains Arrow's 10-Year Plan.

SECTION 5: MITIGATIVE MEASURES

5.1 LOCATION

Arrow, through environmental and engineering design studies, has identified the proposed corridor to maximize the benefits of available infrastructure to minimize environmental and landowner impacts. The proposed Corridor will allow for routing between the origin, Arrow's CDP Connect Facility, and the terminus 4 Bears Pipeline, along a minimal distance between the two points. Alternative routes would cross greater distances and would potentially result in incrementally greater impacts simply due to a greater distance crossed.

Landowner considerations were factored into the Corridor selection. The proposed Corridor limits the number of potentially affected landowners while providing routing opportunities that would minimize individual impacts to current land practices. All affected landowners would be compensated for project impacts through negotiated easement agreements and settlements for seasonal crop losses.

The proposed Corridor selection was influenced by environmental studies that suggested the area lacked sensitive features such as critical wildlife habitat, major wetlands or waterbodies, or other unique environmental features. The proposed Corridor will allow routing options that will further minimize waterbody crossings and potentially avoid at least one waterbody crossing entirely.

5.2 CONSTRUCTION

The proposed construction of the pipeline will be conducted in an orderly sequence designed to complete the project in the minimum amount of time required to safely prepare the site, install the pipeline and restore the areas disturbed by construction.

Construction is estimated to require approximately 45 days with restoration to immediately follow. Construction techniques will be employed that minimize the area of ground disturbance, off site deposition of sediments and long-term impacts to agricultural productivity.

Restoration will immediately follow pipeline construction. Final grading will restore the original contours of the land. Disturbed areas will be prepared for re-seeding and restoration will be coordinated to meet landowner specifications.

5.3 OPERATION

Once constructed and put into service, the proposed pipeline will operate continuously delivering crude from Arrow's CDP to the 4 Bears Pipeline. Normal pipeline operations are imperceptible to the general public as they are silent, buried and therefore not visible, and require only minimal above ground activity. Standard operating

procedures will conform to U.S. Department of Transportation standards and requirements, as such periodic inspection, and maintenance of the right-of-way will likely be required to remain in compliance.

SECTION 6: LIST OF PREPARERS

Katie Schmidt, EIT
Environmental Engineer and Compliance Analyst
E3 Environmental, LLC, 817 Vandalia Street, St. Paul, MN 55114

B.S. Civil Engineering with an emphasis in Environmental Engineering-Iowa State University. Ms. Schmidt has pursued a career focused on regulatory compliance. Her experience includes providing permitting and compliance support associated with maintaining assets for safe and reliable distribution and transmission of energy throughout the continent. Ms. Schmidt has developed a broad working knowledge of NPDES construction stormwater compliance by working with distribution systems located in MN, OK, TX, LA and AR. Ms Schmidt also has extensive experience working with transmission assets involving COE permitting, ESA and SHPO consultations.

William McCarthy, C.W.B.
Senior Environmental Compliance Analyst
E3 Environmental, LLC, 817 Vandalia Street, St. Paul, MN 55114

M.S. Wildlife Biology, University of Minnesota – Twin Cities; and B.S. Wildlife Biology, Michigan State University. Mr. McCarthy is an environmental compliance analyst with 15 years of environmental consulting experience working with various energy assets and regulatory agencies. As a compliance analyst he has managed the environmental requirements for facility siting, pipeline routing, federal licensing, and various federal, state and local permits. Mr. McCarthy is a certified wildlife biologist and in this role conducts and coordinates field studies, agency consultations, mitigation and avoidance plans.

Judith Cooper. Ph.D.
Archaeologist/ Principle Investigator
SWCA, Inc., 116 North 4th Street, Suite 200, Bismarck, ND 58501

Ph.D. and M.A. Anthropology, Southern Methodist University and B.A. Anthropology, Pennsylvania State University. Dr. Cooper has over ten years of experience in North American archaeology and has worked on field (survey, testing, and recovery) and research projects in the northern Great BPE and Rocky Mountains. Dr. Cooper is experienced in federal and state cultural resources law and regulations, including Section 106 of the National Historic Preservation Act. As the Cultural Resources Lead in the SWCA's Bismarck office, she serves as a member of multi-disciplinary project teams to assure cultural resource concerns are appropriately addressed during the regulatory process.

