

2016 ASAP Conceptual Design Changes and Design Refinements Since SEIS Project Scoping

Item	FEIS (USACE, 2012)	Joint Application for Permit (AGDC, 2015)
Conceptual Design Changes		
Gas Composition	Enriched Natural Gas: <ul style="list-style-type: none"> • Contains Natural Gas Liquids (NGLs) • Requires higher-pressure, dense-phase gas pipeline (2,500 psig Maximum Allowable Operating Pressure (MAOP)) • Requires multiple compressor stations • Requires NGL extraction facility to make gas accessible 	Lean Natural Gas (non-enriched): <ul style="list-style-type: none"> • 89 mole % methane; No NGLs • Lower pressure pipeline (1,480 psig MAOP) • Transport of preconditioned gas for general use • Does not require additional facilities to make gas accessible
West Dock at Prudhoe Bay	Modification Undefined: <ul style="list-style-type: none"> • 9-barge sealift importing GCF components and materials • Build facility from smaller modular components onsite • Use of West Dock without additional dredging (assumed BPXA would dredge under its permit) 	Modification Defined: <ul style="list-style-type: none"> • 23-barge sealift importing prefabricated modules • Winter dredging of a navigation channel and turn basin at West Dock • Nearshore disposal of dredge material on bottomfast sea ice in Prudhoe Bay, landward of Territorial Sea Boundary • Modification to DH3 berths and widening of the causeway road • Temporary bridge composed of two ballasted barges to facilitate offload and transport of large modules (bypass of weight-limited causeway bridge)
Design Refinements		
GCF-CGF Connection	<ul style="list-style-type: none"> • Two feeder lines (natural gas and NGL) and two return lines (undefined diameter) • Connecting lines were described as a Connected Action • Four lines supported on 17 Vertical Support Members (VSMs) spaced 60 ft apart; approximately 1k ft of line required 	<ul style="list-style-type: none"> • One natural gas feeder line, one 8-inch CO₂ return line, one 3-inch liquid return line, and an interface module • Design has advanced to allow connecting lines to be assimilated into the Project Description • Three lines supported on 171 VSMs, spaced 25 ft apart; approximately 4200 ft of line required
Mainline Characteristics	<ul style="list-style-type: none"> • 737 miles • 24-inch diameter • 2,500 pounds per square inch gage (psig) • Right-of-Way corridor, as follows: <ul style="list-style-type: none"> ○ Construction: A 100-foot-wide ROW, nominally, for the full length of the pipeline (9.5k acres; includes operational footprint) ○ Operation and Maintenance: 52-foot-wide ROW on federal lands, and 30-foot-wide ROW elsewhere for the full length of the pipeline (3.3k acres) • Coating and double-jointing in Fairbanks • First 7 miles aboveground; remainder belowground • 29 Mainline Block Valves (MLBVs) • Topsoil layer stripped and replaced when possible • Pipeline generally within existing transportation corridor ROWs 	<ul style="list-style-type: none"> • 733 miles (difference of about -4 miles) • 36-inch diameter • 1,480 psig • Right-of-Way corridor, as follows: <ul style="list-style-type: none"> ○ Construction: variable width, 120 ft-wide minimum temporary ROW, plus additional lands out to 350 ft to construct ○ Operation and Maintenance: A 53 ft-wide minimum permanent ROW, plus additional lands out to 350 ft to maintain land • Coating and double-jointing prior to arrival in Alaska • Buried along entire route, except at elevated bridge crossings, fault crossings, pigging facilities, and valves • 40 MLBVs (location changes) • Topsoil layer stripped and replaced only on agricultural lands • Pipeline largely outside of existing ROWs; alignment shifts include North Slope, Minto Flats / Summer Ridge, Anderson/Clear, and Nancy Lake State Recreation Area

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Fairbanks Lateral Characteristics	<ul style="list-style-type: none"> • 34 miles • Routed through Goldstream Valley along the ARR route • 2 Fairbanks Lateral block valves • ROW corridor as follows: <ul style="list-style-type: none"> ○ Construction: A 100-foot-wide ROW, nominally, for the full length of the pipeline (0.4k acres; includes operational footprint) ○ Operation and Maintenance: A 52-foot-wide ROW on federal lands, and 30-foot-wide elsewhere for the full length of the pipeline (0.1k acres) 	<ul style="list-style-type: none"> • 30 miles (difference of about -4 miles) • Routed along Murphy Dome and Old Murphy Dome Roads • 1 Fairbanks Lateral block valve • ROW corridor, as follows: <ul style="list-style-type: none"> ○ Construction: variable width, 100 ft-wide minimum temporary ROW, plus additional lands out to 350 ft to construct ○ Operation and Maintenance: 30 ft-wide minimum permanent ROW, plus additional lands out to 350 ft to maintain land
Support Facilities	<ul style="list-style-type: none"> • GCF (69 acres for GCF pad; additional GCF facilities undefined in acreage) • Multiple compressor stations • Straddle Plant at Fairbanks Lateral • NGL extraction facility at Pt. Mackenzie 	<ul style="list-style-type: none"> • GCF Facility Pad & Workspace: 90.6 acres • GCF Camp: 20.2 acres • Compression incorporated into GCF
Stream Crossings^a	<p>Total Defined Stream Crossings: 515</p> <ul style="list-style-type: none"> • Total anadromous waterbodies: 75 • Preferred Alternative for Yukon River Crossing: New Suspension Bridge • Crossing methods: <ul style="list-style-type: none"> ○ Horizontal Directional Drilling (HDD) (also called Trenchless Drilling): 41 ○ Open Cut / Isolated Open Cut: 470 ○ Bridge: 4 • Access road stream crossings not yet defined 	<p>Total Project Stream Crossings: 312</p> <ul style="list-style-type: none"> • Centerline Stream Crossings: 272 <ul style="list-style-type: none"> ○ 265 Mainline crossings <ul style="list-style-type: none"> - 50 anadromous - Crossing Modes: <ul style="list-style-type: none"> ▪ Bridge: 6 ▪ Isolated Open Cut: 155 ▪ Open Cut: 97 ▪ HDD: 7 ○ 7 Fairbanks Lateral crossings <ul style="list-style-type: none"> - 0 anadromous - Crossing Modes: <ul style="list-style-type: none"> ▪ Open Cut: 3 ▪ Isolated Open Cut: 4 • Access Road Stream Crossings: 40 <ul style="list-style-type: none"> ○ 14 anadromous ○ Access Road Crossing Modes <ul style="list-style-type: none"> - 17 Bridges <ul style="list-style-type: none"> ▪ 14 Temporary ▪ 3 Permanent - 23 Culverts <ul style="list-style-type: none"> ▪ 4 Temporary ▪ 19 Permanent
Material Sites and Volume^b	<ul style="list-style-type: none"> • 546 potential existing sites • 13.1 Million Cubic Yards (MCY) required for preliminary features and facilities that were defined; expectation that this number will increase as features became defined / quantified 	<ul style="list-style-type: none"> • 91 total material sites <ul style="list-style-type: none"> ○ Development of 89 material sites <ul style="list-style-type: none"> - Use and expansion of existing sites - Development of new sites - Total of 5,200 acres of lands used for material sites; primarily uplands ○ Use of 2 existing commercial sites; near Willow and Fairbanks • Approximately 25 MCY of material needed from gravel sources, project-wide.
Pipe Storage Yards	<ul style="list-style-type: none"> • 26 PSY locations 	<ul style="list-style-type: none"> • 29 PSY locations
Construction Camps and Workforce^b	<ul style="list-style-type: none"> • 15 camp locations (camp capacities in parentheses, if available), including: 	<ul style="list-style-type: none"> • 13 camp locations (camp capacities in parentheses):

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	<ul style="list-style-type: none"> ○ Prudhoe Bay ○ Franklin Bluffs (500) ○ Happy Valley (500) ○ Galbraith Lake (500) ○ Atigun (250) ○ Chandler (500) ○ Coldfoot (500) ○ Old Man (500) ○ Seven Mile (500) ○ Livengood (500) ○ Nenana (500) ○ Healy (500) ○ Cantwell (500) ○ Chulitna Butte (500) ○ Sunshine (500) ● Total camp capacity: 6,750 + Prudhoe Bay (undetermined) <ul style="list-style-type: none"> ○ Mainline Construction: 5,500 employees ○ GCF Construction: 900 employees ○ Operations: 50-75 employees 	<ul style="list-style-type: none"> ○ GCF/Prudhoe Bay (800) ○ Franklin Bluffs (600) ○ Happy Valley (1,000) ○ Galbraith Lake (1,000) ○ Dietrich (1,000) ○ Prospect (600) ○ Five Mile (1,000) ○ Livengood (1,000) ○ Dunbar (600) ○ Healy (1,000) ○ Cantwell (600) ○ Swan Lake (1,000) ○ Rustic Wilderness (1,000) ● Total camp capacity: 11,200 ● Mainline Construction: 6,000 employees or contractors at peak construction ● GCF Construction: 130+ employees and additional contractors ● Operations: 240 employees or contractors ● Most camps collocated with a PSY location
Access Roads^b	<ul style="list-style-type: none"> ● 133 access roads; additional roads not yet defined or quantified in acreage ● 91 new roads; additional roads not yet defined or quantified in acreage ● 42 existing roads; additional roads not yet defined or quantified in acreage 	<ul style="list-style-type: none"> ● 298 new access roads totaling 174.4 miles ● 23 temporary ice access roads totaling 22.9 miles
Additional Infrastructure and Facilities	<ul style="list-style-type: none"> ● Not yet determined 	<ul style="list-style-type: none"> ● 8 sets of HDD Entry Pads (1.4 acres), Exit Pads (0.5 acres), and False ROWs ● Pig Launchers and Receivers <ul style="list-style-type: none"> ○ 36" Launcher at GCF ○ 36" Launcher / Receiver at Coldfoot ○ 36" Launcher / Receiver at Mainline / Lateral Tie-in ○ 36" Receiver at Mainline / ENSTAR Tie-in at Big Lake ○ 12" Launcher at Mainline / Lateral Tie-in ○ 12" Receiver at Lateral Offtake ● 70 Temporary Workspaces (TWs) totaling 74.9 acres (size range of 0.3 to 1.5 acres; TW ROW width out to 800 ft max. width) <ul style="list-style-type: none"> ○ 29 TWs partially or fully outside permanent impact areas (57.8 acres) ○ 41 TWs inside permanent impact areas (17.1 acres) ● 9 Rail Sidings ● 2 metering stations with terminus facilities <ul style="list-style-type: none"> ○ Mainline tie-in at Big Lake ○ Fairbanks Lateral Terminus at Fairbanks ● 2 Marshalling Yards <ul style="list-style-type: none"> ○ Seward ○ Fairbanks ● 3 Operations & Maintenance Response Bases (MRBs) <ul style="list-style-type: none"> ○ GCF MRB ○ Fairbanks MRB ○ Big Lake MRB ● ASAP Headquarters <ul style="list-style-type: none"> ○ Anchorage Offices

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Transportation and Equipment^b	<ul style="list-style-type: none"> • 3,800 rail cars of pipe • 9,000 truckloads of pipe • Standard pipeline construction equipment list 	<ul style="list-style-type: none"> • 6,000 rail cars of pipe • 17,700 truckloads of pipe • Revised equipment list
Project Footprint^b	<p>Project Footprint & Impacts Developing</p> <ul style="list-style-type: none"> • Permanent Land Impacts For Facilities that were Defined and Quantified at that time: 4.1k acres • Additional Temporary Land Impacts for Facilities Defined and Quantified at that time: 10.9k acres^c <ul style="list-style-type: none"> ○ Material Site Investigation Areas and other facilities not yet defined at that time 	<p>Project Footprint & Impacts Defined</p> <p>Wetlands Impacts: 8,907.0 acres</p> <ul style="list-style-type: none"> • Freshwater Wetlands: 8,734.6 acres <ul style="list-style-type: none"> ○ Permanent Impact: 7,573.2 acres ○ Temporary Impact: 1,161.4 acres ○ Includes PEM, PSS, PFO, Pond, Lake, Intermittent, Perennial streams • Intertidal Wetlands: 0.9 acres <ul style="list-style-type: none"> ○ Permanent Impact: 0.8 acres ○ Temporary Impact: 0.1 acres • Subtidal Wetlands: 171.5 acres <ul style="list-style-type: none"> ○ Permanent Impact: 171.5 acres ○ Temporary Impact: 0.0 acres <p>Upland Impacts: 12,330.3 acres</p> <p>Total Project Footprint: 21,237.3 acres</p>

Notes:

- a. In addition to the stream crossings identified, ASAP Project engineers and scientists have identified several hydrologic points of interest that, while not meeting the wetlands standard for a stream, do require special consideration for pipeline design
- b. The FEIS (USACE, 2012) acknowledged that 2012 information related to these categories was preliminary as some specific components of the Project were developing; current data estimates are more accurate due to project refinement. Area calculations were summarized from geospatial data from the FEIS Geodatabase developed by CardnoEntrix in 2012.
- c. The temporary impact defined in the FEIS (USACE, 2012) includes some operational footprint acreage; therefore, some of the FEIS operational impact was also tallied as temporary impact.

ARR - Alaska Railroad
 BPXA - British Petroleum Exploration Alaska
 CGF - Central Gas Facility
 CO₂ - carbon dioxide
 DH - Dock Head
 GCF - Gas Conditioning Facility
 GIS - Geographic Information System
 HDD - Horizontal Directionally Drilled
 MAOP - maximum allowable operating pressure
 MCY - million cubic yards
 MLBV - Mainline block valve
 NGL - natural gas liquid
 PEM - palustrine emergent wetland
 PFO - palustrine forested wetland
 psig - pounds per square inch gauge
 PSS - palustrine shrub wetland
 PSY - pipe storage yard
 ROW - Right-of-Way
 VSM - vertical support member