Appendix X

ExxonMobil Practicability Analysis

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May 13, 2011
ER-2011-OUT-116

ExxonMobil Development

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Mr. Tim Gallagher
Project Manager
HDR
2525 C Street Suite 305
Anchorage, Alaska 99503-2632

Re: ExxonMobil Point Thomson Project (PTP) PDEIS Alternatives Practicability Report

Dear Mr. Baij and Mr. Gallagher:

ExxonMobil was pleased to present the PDEIS Alternatives Practicability Workshop to EPA, DNR and HDR on May 5, 2011. We believe the workshop was vital and successful in conveying important practicability considerations for each Alternative including, logistics, schedule, technology and costs, as well as logistical constraints and execution risks. The questions, comments, discussion and clarifications during the workshop resulted in a deeper understanding of the challenges and limitations associated with each Alternative. Thanks are extended to everyone for taking the time to participate in the open discussion. The input was constructive and has been incorporated into the updated/revised Practicability Report.

The attached material includes the May 5 introductory PowerPoint presentation along with the full Practicability Report which includes the execution schedules, practicability matrices, logistics comparison bar charts and cost analysis presented and discussed during the workshop. The practicability analysis report has been enhanced to respond to the workshop discussion, and as such, supersedes the materials provided on May 5.

We look forward to continuing our support of the EIS process. Please contact Brien Reep at (907) 564-3617 or via email (brien.e.reep@exxonmobil.com) or Steve Calder at (907) 564-3787 or via email (steve.calder@exxonmobil.com)I if you have any questions or would like further follow-up.

Sincerely,

For and On Behalf of Exxon Mobil Corporation
BER:sc:mk

List of Attachments

1. Practicability Workshop PowerPoint Presentation (as modified)

2. Report entitled Section 404 (b)(1) Practicability Analysis of Point Thomson Project Preliminary Draft Environmental Impact Statement Alternatives along with the following tables, figures and appendices.

   - Table 1A Practicability Matrix Delta
   - Table 1B Practicability Matrix Total
   - Table 2 Environmental Comparison of Alternative C, D & E Relative to Alternative B
   - Figure 1 Comparison of Point Thomson PDEIS Alternatives Project Execution Schedules
   - Figure 2 PDEIS Alternative B Project Execution Schedule
   - Figure 3 PDEIS Alternative C Project Execution Schedule
   - Figure 4 PDEIS Alternative D Project Execution Schedule
   - Figure 5 PDEIS Alternative E Project Execution Schedule
   - Figure 6 Alternative C & D Ice Road Strategy Maps
   - Figure 7 Comparison of Infield Transportation Fuel Usage: Construction, Maintenance, and Operations - Alternative E's Infield Ice Roads vs. Alternative B's Infield Gravel Roads
   - Appendix A – Scope of Alternatives Used for the Practicability Analysis
   - Appendix B –Practicability Highlights
   - Appendix C – Example Practicability Bar Charts
   - Appendix D – Technical Brief Module Transport Using SPMT's
   - Appendix E – Guide to Reading the Practicability Matrix Tables 1A & 1B
   - Appendix F – Point Thomson Project Alternatives Cost Analysis

Practicability of EIS Alternatives Workshop Presentation

May 5, 2011 Updated May 13, 2011

Agenda

- Introductions and Safety Moment
  - Preparing for Emergencies
- Overview
  - Purpose of presentation
  - Alternatives descriptions and scope of analysis
  - Introductions of ExxonMobil Presenters
- Analysis Process and Methodology
  - ExxonMobil Team
  - Analysis Process and Methodology
- Execution Schedules for Alternatives B, C, D, and E
- Practicability Tables
  - Introduction to the Matrix
  - Walkthrough the Matrix
- Summary
- Cost

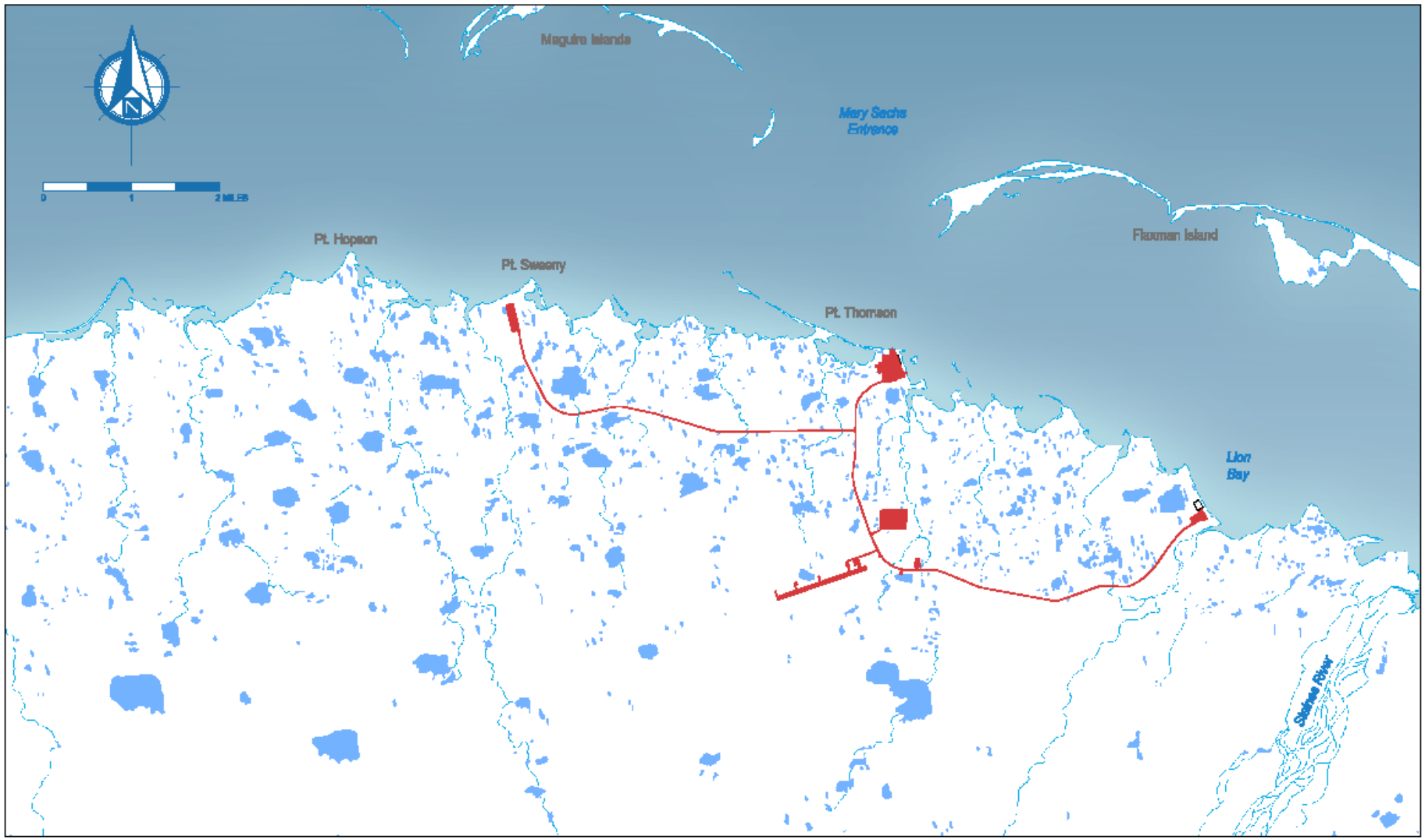
Two Concurrent Processes

1. The Point Thomson Project EIS
   - Corps and Cooperating Agencies conducting their alternatives evaluation and screening mindful of both the NEPA requirements and the 404(b)(1) Guidelines requirements

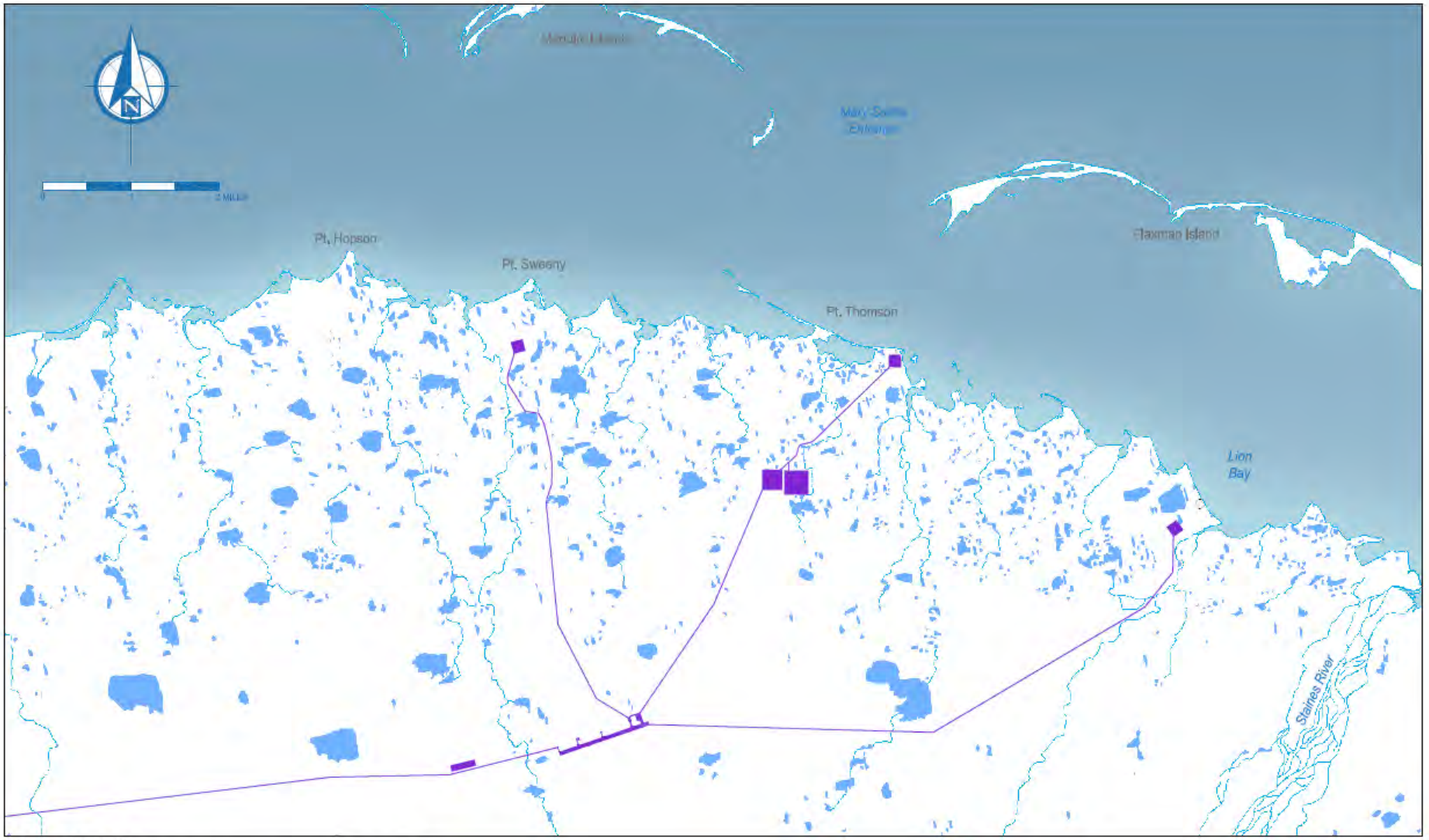
2. Clean Water Act, Section 404 Permit
   - 404(b)(1) Guidelines: "No discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences."
   - Practicability means it is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes"

3. Applicant to demonstrate that it has complied with the 404(b)(1) Guidelines

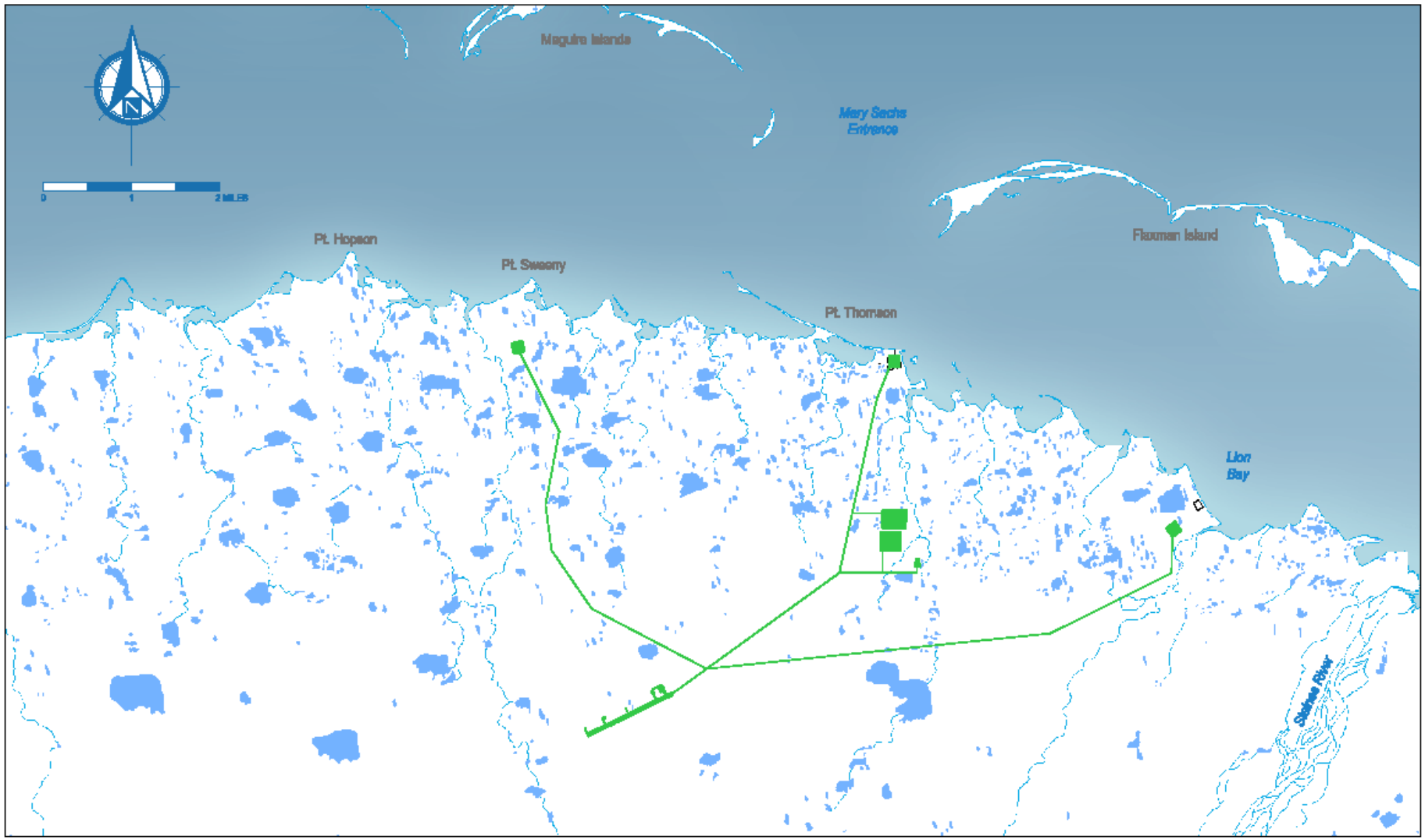
Alternative B



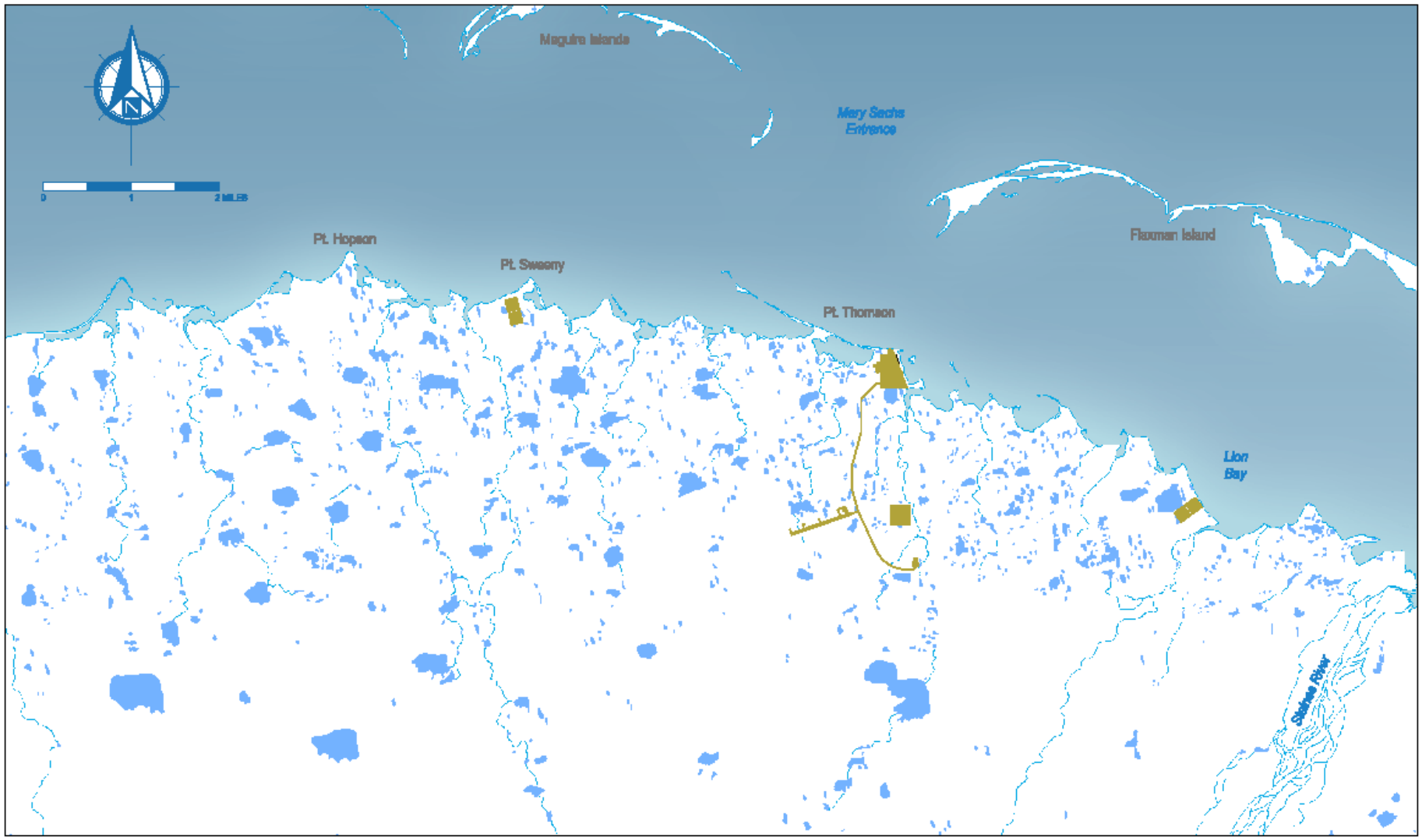
Alternative C



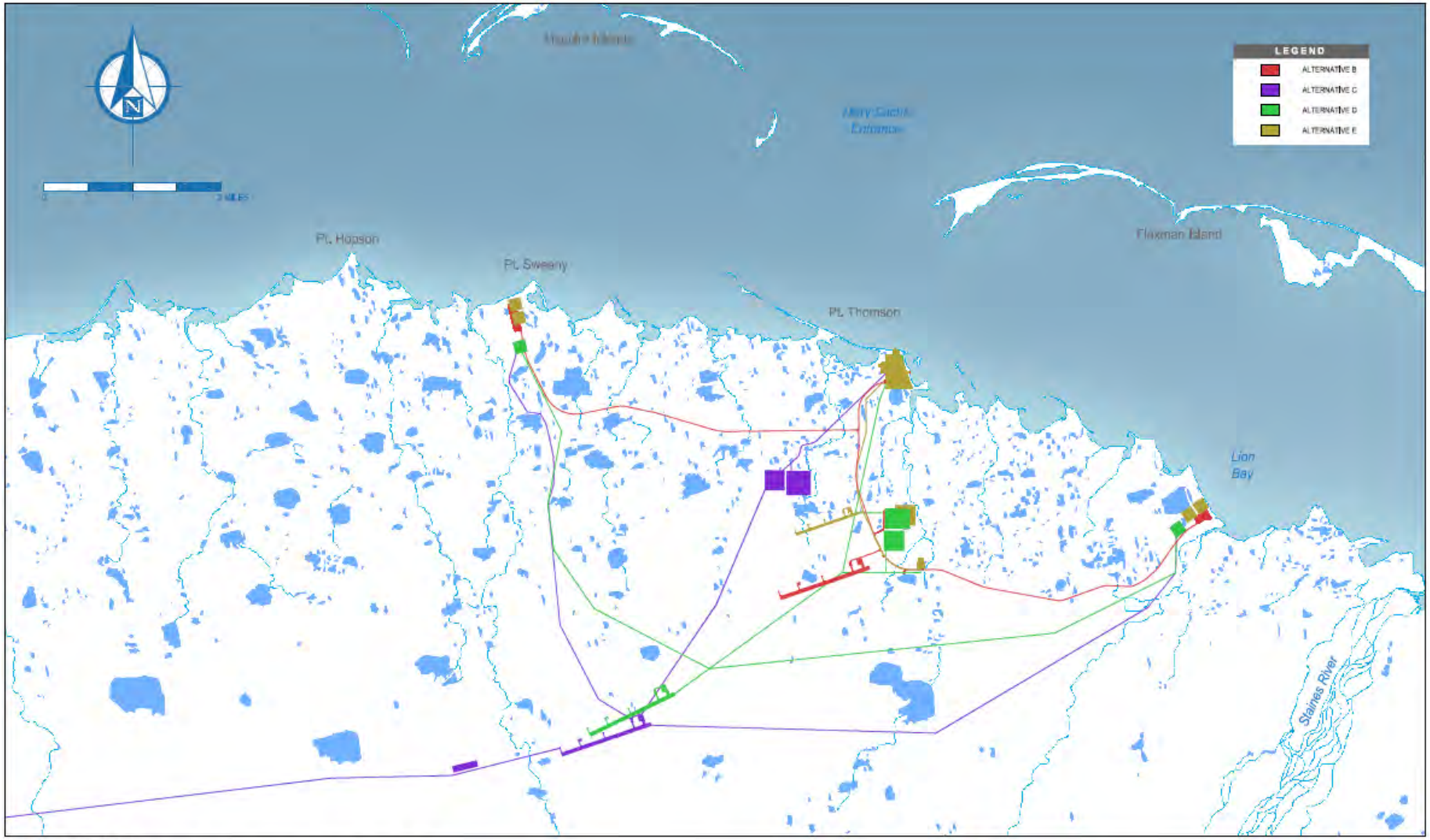
Alternative D



Alternative E



Overlay of Alternatives



Appendix A – Scope of Alternatives for Practicability Analysis

	PDEIS	April 25 Update to Alternative Descriptions	ExxonMobil Exceptions Related to Practicability
Alternative C			
Main Pads	New 36-acre Central Processing Pad - 2 miles inland New 12-acre Central Well Pad near coast New 19-acre East Pad ~ 1/2-mile inland New 19-acre West Pad ~ 1/2-mile inland	Originally-suggested Central Processing Pad and gravel mine transposed Emergency boat launch ramp from Central Well Pad to proposed launch location	49.5-acre Central Processing Pad - at least 1 mile from mine site 28.8-acre Central Well Pad near coast
Air Transport	Helicopter, fixed-wing aircraft (5,600-foot airstrip) 5,600-foot ice airstrip	Eliminated ice air infrastructure Airstrip power line buried in road or elevated on export pipeline	No ice air strip infrastructure assumed Assumed buried power line
Module Transport	42-mile heavy-duty tundra ice road for 1 year only 48-mile optional heavy-duty sea ice road for 1 year only	No change	No change
Gravel Roads	New 44-mile all-season gravel road to Endicott Spur Road New 17 miles of in-field gravel roads	No change	Would require detailed feasibility and risk assessment Additional 42-mile, 35-foot light duty ice road each year of module transport
Infield Pipeline	11 miles of 8-inch heat traced gathering pipelines 2 miles of 10-inch high pressure gas reinjection pipeline	8-inch gathering line only (East & Central Well to Processing Pad) 8-inch gathering, 10-inch reinjection lines (Central Well to Processing Pad) 8-inch gathering and 12-inch export line (Central Processing to West Pad)	Also addressed: 2-mile, 10-inch production line to between Central Well Pad and process pad 2-mile, 12-inch high pressure gast re-injection line
Export Pipeline	New 51-mile, 12-inch export pipeline; tie-in at Endicott	Export pipeline ties in at Endicott; generator at Endicott	No change; river crossings assumed to be on bridges
Water Supply	New insulated & heat traced pipeline on timber sleepers	No water line; water will be trucked for all project phases Water source for construction being identified & roads evaluated	No change for water trucking C-1 mine site assumed as primary water source
Alternative D			
Main Pads	New 36-acre Central Processing Pad - 2 miles inland New 12-acre Central Well Pad near coast New 19-acre East Pad ~ 1/2-mile inland New 19-acre West Pad ~ 1/2-mile inland	Gravel mine located in Applicant's proposed location Emergency boat launch ramp from Central Well Pad to proposed launch location	49.5-acre Central Processing Pad - at least 1 mile from mine site 28.8-acre Central Well Pad near coast
Air Transport	Helicopter, fixed-wing aircraft (5,600-foot airstrip) 5,600-foot ice airstrip	Tundra ice airstrip only for construction Airstrip power provided by power line elevated on export pipeline	No ice air strip assumed Assumed power line is buried
Module Transport	42-mile, heavy-duty tundra ice road for 1 year only 48-mile, optional heavy-duty sea ice road for 1 year only	No change	Would require detailed feasibility and risk assessment Additional 42-mile, 35-foot light duty ice road each year of module transport
Gravel Roads	New 17 miles of in-field gravel roads	No change	No change
Infield Pipeline	11 miles of 8-inch heat traced gathering pipelines 2 miles of 10-inch high pressure gas reinjection pipeline	8-inch gathering line only (East & Central Well to Processing Pad) 8-inch gathering, 10-inch reinjection lines (Central Well to Processing Pad) 8-inch gathering and 12-inch export line (Central Processing to West Pad)	Also addressed: 2-mile 10" production line between Central Well Pad and process pad 2-mile 12" high pressure gast re-injection line
Export Pipeline	New 22-mile, 12-inch export pipeline; tie-in at Badami	No change	No change
Water Supply	New insulated & heat traced pipeline on timber sleepers	Option of pipeline burial in gravel road C-1 mine site as primary water source	No water line assumed No change to C-1 mine site
Alternative E			
Main Pads	New enlarged 73-acre Central Pad near coast New 12-acre gravel East Pad, with 10-acre ice expansion New 12-acre gravel West Pad, with 10-acre ice expansion	Three gravel pads, slightly larger to accommodate drilling equipment & stagging Sealift bulkhead, service pier, associated mooring dolphins, and emergency boat launch ramp from Central Pad Gravel mine located in Applicant's proposed location	Would require detailed feasibility and risk assessment New 15-acre gravel East Pad, with 10-acre ice expansion New 15-acre gravel West Pad, with 10-acre ice expansion
Air Transport	Helicopter, fixed wing aircraft (3,700-foot airstrip) 5,600-foot ice airstrip	Gravel airstrip and helipad; power line on waterline Vertical Support Members (VSMs) Sea ice airstrip only for construction	Helipad at each East and West Pad, with appropriate safety spacing. No sea ice airstrip
Module Transport	Same as Alternative B	No change	No change
Gravel Roads	New 2 miles of gravel roads between airstrip and Central Pad	In-field roads to gravel mine and airstrip	No change
Infield Pipeline	10 miles of 8-inch heat traced gathering pipelines	Infield gathering lines on VSMs designed to accommodate both current and potential future gather lines	VSMs designed for Initial Production System (IPS) only
Export Pipeline	New 22-mile, 12-inch export pipeline; tie-in at Badami	No change	No change
Water Supply	New insulated & heat traced pipeline on timber sleepers	Water pipeline elevated on VSMs C-1 mine site as primary water source	No water line assumed; water trucked for all project phases No change to C-1 mine site
Alternative B			
Air Transport		Gravel airstrip and helipad; no ice air infrastructure	Clarification: The helipad is not a helipad per se, in that it does not have a separate set of approaches and associated equipment. It is a helicopter parking area. Helicopters will use the approaches to the airstrip and then hover over to the helicopter parking area.
Pipelines		Infield gathering lines on supports (VSMs) designed for 8-inch gathering line only (East to Central Pad) or 8-inch gathering and 12-inch export line (Central to West Pad)	Note: There will be VSMs supporting two 8-inch gathering lines and a 12-inch export line from Central Pad to East Pad Junction

Analysis Process and Methodology

- **Assembled a team** of highly experienced, multi disciplinary professionals
  - Facilities Engineering
  - Construction and Logistics Planning
  - Operations and Drilling Planning
  - Estimating (Cost & Schedule)
  - Engineering Support: Worley Parsons, Fluor, PND, Michael Baker Jr., etc.
  - Environmental Support: URS, Oasis Environmental, Canyon Creek Consulting, Applied Socio-cultural Research, Pentech/Hart Crowser, ABR, SLR and Chumis
  - North Slope Contractor experience and support

- **Invested a significant amount of time** to ensure an in depth, comprehensive, complete, thorough and technically sound analysis
  - Coordinated input from over 47 project personnel (not including contractor support)
  - Spent 12 weeks completing studies, estimates and schedules
  - Held 19 multi-disciplinary development workshops to ensure accuracy

- **Employed a high level of detail** from past 3 years project history
  - Used benchmarks & factors from current detailed engineering effort for Alternative B.
  - Applied practicability Lessons Learned from 2008-2011 drilling campaign
  - Leveraged contractor estimates for scope outside of Alternative B
  - Used industry standards for estimating practices

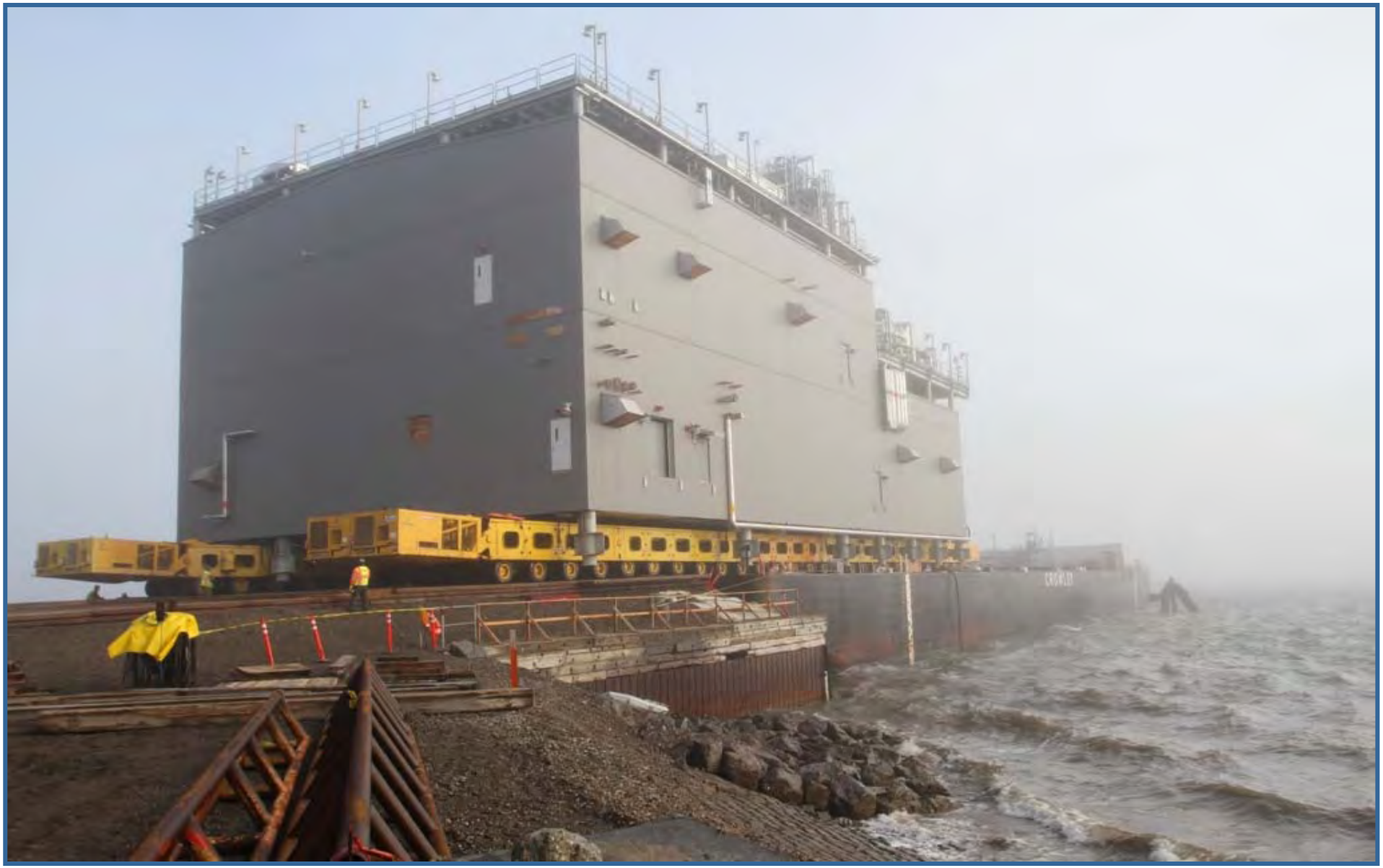
Schedule Drivers & Execution Risks

Schedule Drivers	Execution Risks
• Eliminating barging	• Ice road transport of modules • Ice road congestion • Fuel storage and supply
• Separating process & drilling pads	• Two high pressure pipelines • Gravel installation scope
• Adding a road & pipeline to Endicott	• 3 significant simultaneous projects • Significant manpower requirements
• Moving pads inland	• Limited drilling flexibility • Drilling schedule extension
• Eliminating infield gravel roads	• Long term multi-year ice pads • Helicopter dependence • Annual In-field ice roads
• Extending infield gravel roads	• Gravel installation scope

Execution Schedules

Module Transport by SPMT

Module Transport by SPMT

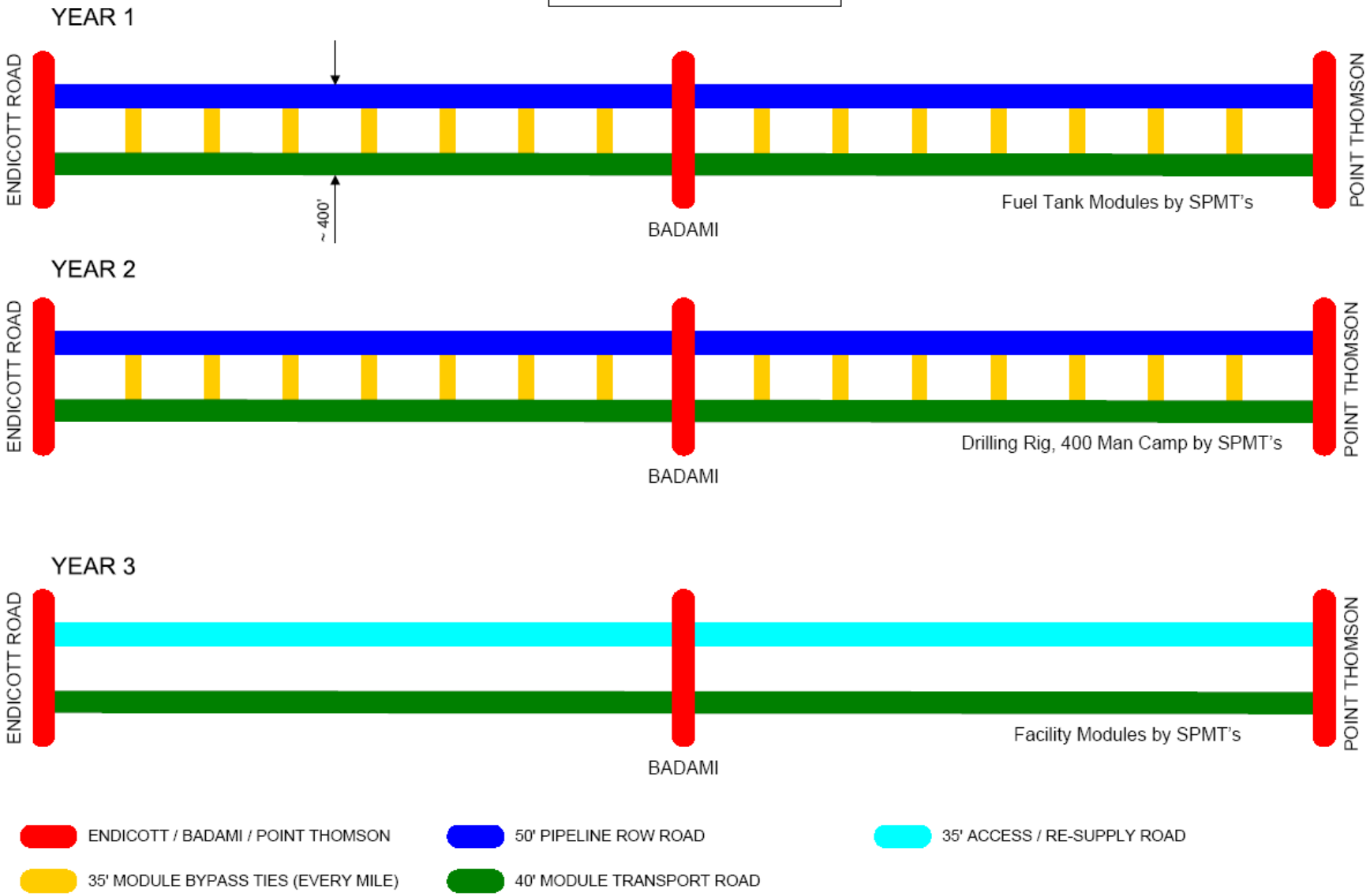


Module Transport by SPMT

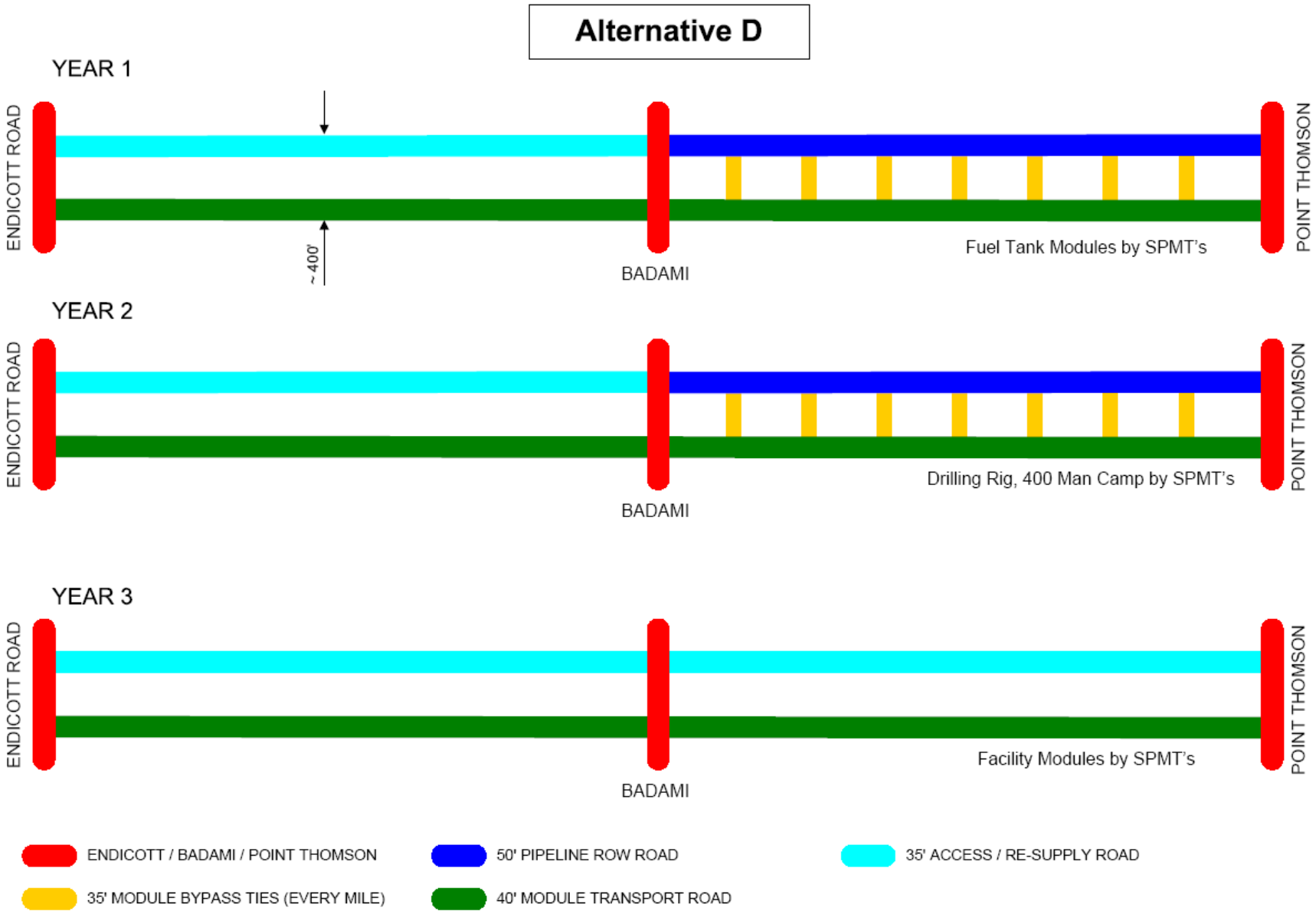
Module Transport by SPMT

POINT THOMSON PROJECT

Alternative C



ExxonMobil Development


Alternative D
YEAR 1
ENDICOTT ROAD
~ 400'
BADAMI
Fuel Tank Modules by SPMT's
POINT THOMSON
YEAR 2
ENDICOTT ROAD
BADAMI
Drilling Rig, 400 Man Camp by SPMT's
POINT THOMSON
YEAR 3
ENDICOTT ROAD
BADAMI
Facility Modules by SPMT's
POINT THOMSON
ENDICOTT / BADAMI / POINT THOMSON
50' PIPELINE ROW ROAD
35' ACCESS / RE-SUPPLY ROAD
35' MODULE BYPASS TIES (EVERY MILE)
40' MODULE TRANSPORT ROAD

Practicability Table Overview – Design

PROJECT SCOPE	Alternative B	Alternative C	Alternative D	Alternative E
PROJECT DESIGN				
INFRASTRUCTURE	PLANNED	DELTA / TOTAL	DELTA / TOTAL	DELTA / TOTAL
GRAVEL MINE	acres	acres	acres	acres
GRAVEL ROADS	miles	miles	miles	miles
Infield Gravel Roads	miles	miles	miles	miles
Gravel Road to Endicott	miles	miles	miles	miles
Gravel Road Acres	acres	acres	acres	acres
GRAVEL ACRES	acres	acres	acres	acres
Central Pad	acres	acres	acres	acres
East Pad	acres	acres	acres	acres
West Pad	acres	acres	acres	acres
Process Pad	acres	acres	acres	acres
Airstrip	acres	acres	acres	acres
CULVERTS	linear ft	linear ft	linear ft	linear ft
Infield Culverts	linear ft	linear ft	linear ft	linear ft
Long Gravel Road Culverts	linear ft	linear ft	linear ft	linear ft
BRIDGES	number	number	number	number
Infield Bridges	number	number	number	number
Long Gravel Road Bridges	number	number	number	number
Multi-Year Ice Pads	Acres	Acres	Acres	Acres
USE of Existing Pads	Acres	Acres	Acres	Acres

PIPELINE	PLANNED	DELTA / TOTAL	DELTA / TOTAL	DELTA / TOTAL
EXPORT PIPELINE	miles	miles	miles	miles
VSMs & HSMs	number	number	number	number
Line Pipe	miles	miles	miles	miles
GATHERING LINES	miles	miles	miles	miles
VSMs & HSMs	number	number	number	number
Line Pipe	miles	miles	miles	miles
PRODUCTION FLOWLINES	miles	miles	miles	miles
VSMs & HSMs	number	number	number	number
Line Pipe	miles	miles	miles	miles
RIVER CROSSINGS	number	number	number	number

IPS FACILITIES	PLANNED	DELTA / TOTAL	DELTA / TOTAL	DELTA / TOTAL
SEALIFT MODULES	number	number	number	number
TRUCKABLE MODULES	number	number	number	number
FUEL STORAGE TANKS	gallons	gallons	gallons	gallons

Practicability Table Overview – Execution

PROJECT SCOPE	Alternative B	Alternative C	Alternative D	Alternative E
CONSTRUCTION/ DRILLING / LOGISTICS	Const / Drilling / Ops (Cum. / Cum. / Annual)	Const / Drilling / Ops (Cum. / Cum. / Annual)	Const / Drilling / Ops (Cum. / Cum. / Annual)	Const / Drilling / Ops (Cum. / Cum. / Annual)
AIR TRAFFIC	PLANNED	DELTA / TOTAL	DELTA / TOTAL	DELTA / TOTAL
TOTAL HELICOPTERS	**Flights**	**Flights**	**Flights**	**Flights**
Helicopters (People)	Flights	Flights	Flights	Flights
Helicopters (Materials)	Flights	Flights	Flights	Flights
TOTAL FIXED WING	**Flights**	**Flights**	**Flights**	**Flights**
Fixed Wing (People)	Flights	Flights	Flights	Flights
Fixed Wing (Materials)	Flights	Flights	Flights	Flights

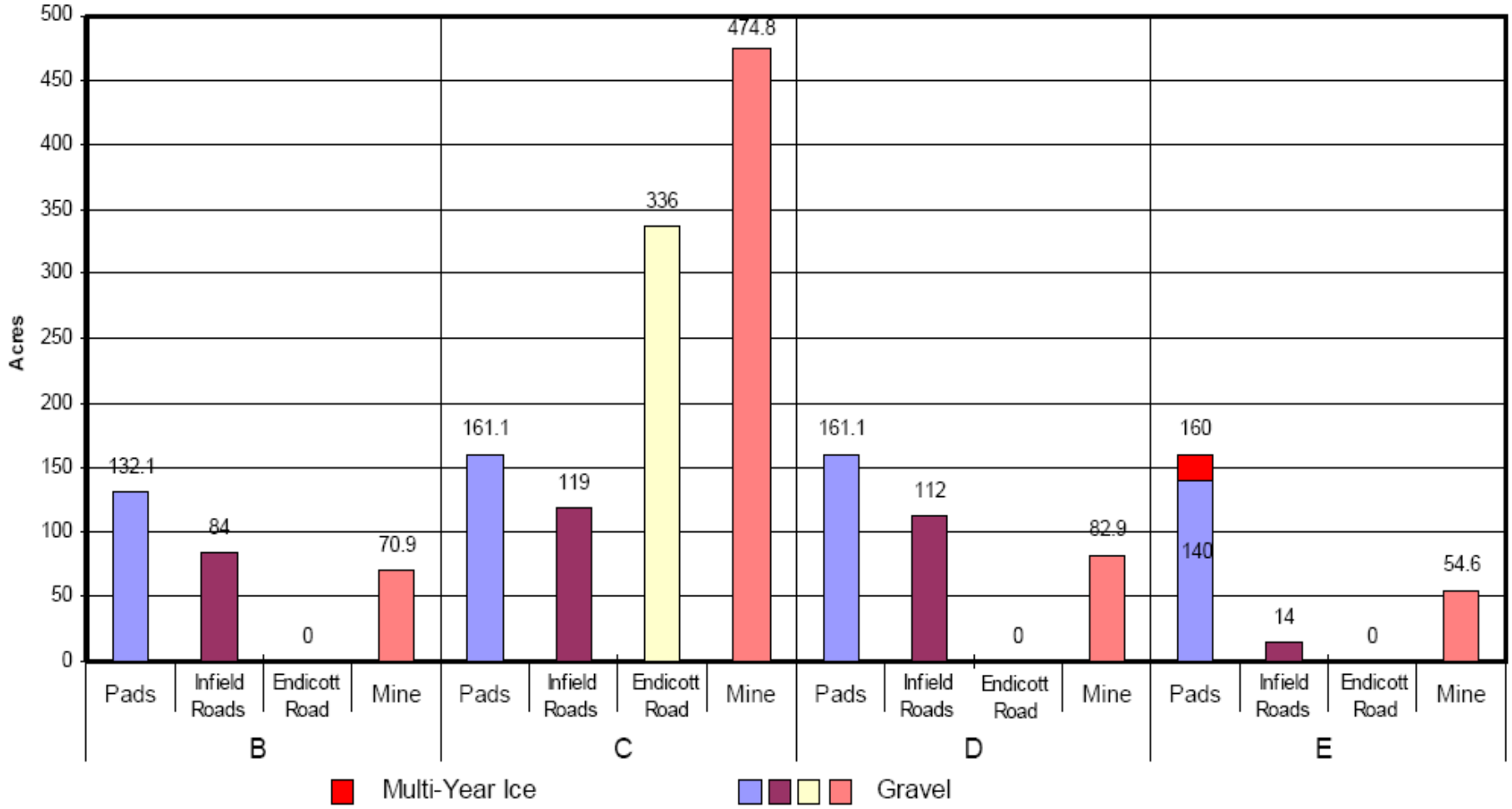
LAND TRAFFIC	PLANNED	DELTA / TOTAL	DELTA / TOTAL	DELTA / TOTAL
TOTAL LAND TRANSPORT	**Vehicles**	**Vehicles**	**Vehicles**	**Vehicles**
SPMTs	Trucks	Trucks	Trucks	Trucks
Fuel Trucks	Trucks	Trucks	Trucks	Trucks
Material Trucks	Trucks	Trucks	Trucks	Trucks
Tundra Travel	Trucks	Trucks	Trucks	Trucks
Crew Buses	Trucks	Trucks	Trucks	Trucks

BARGE TRAFFIC	PLANNED	DELTA / TOTAL	DELTA / TOTAL	DELTA / TOTAL
TOTAL BARGES	**Barges**	**Barges**	**Barges**	**Barges**
Sealift Barges to Point Thomson (Max 4KT)	Barges	Barges	Barges	Barges
Sealift Barges to West Dock (Max 4KT)	Barges	Barges	Barges	Barges
Coastal Barges (200x60x10) 400-800 T	Barges	Barges	Barges	Barges

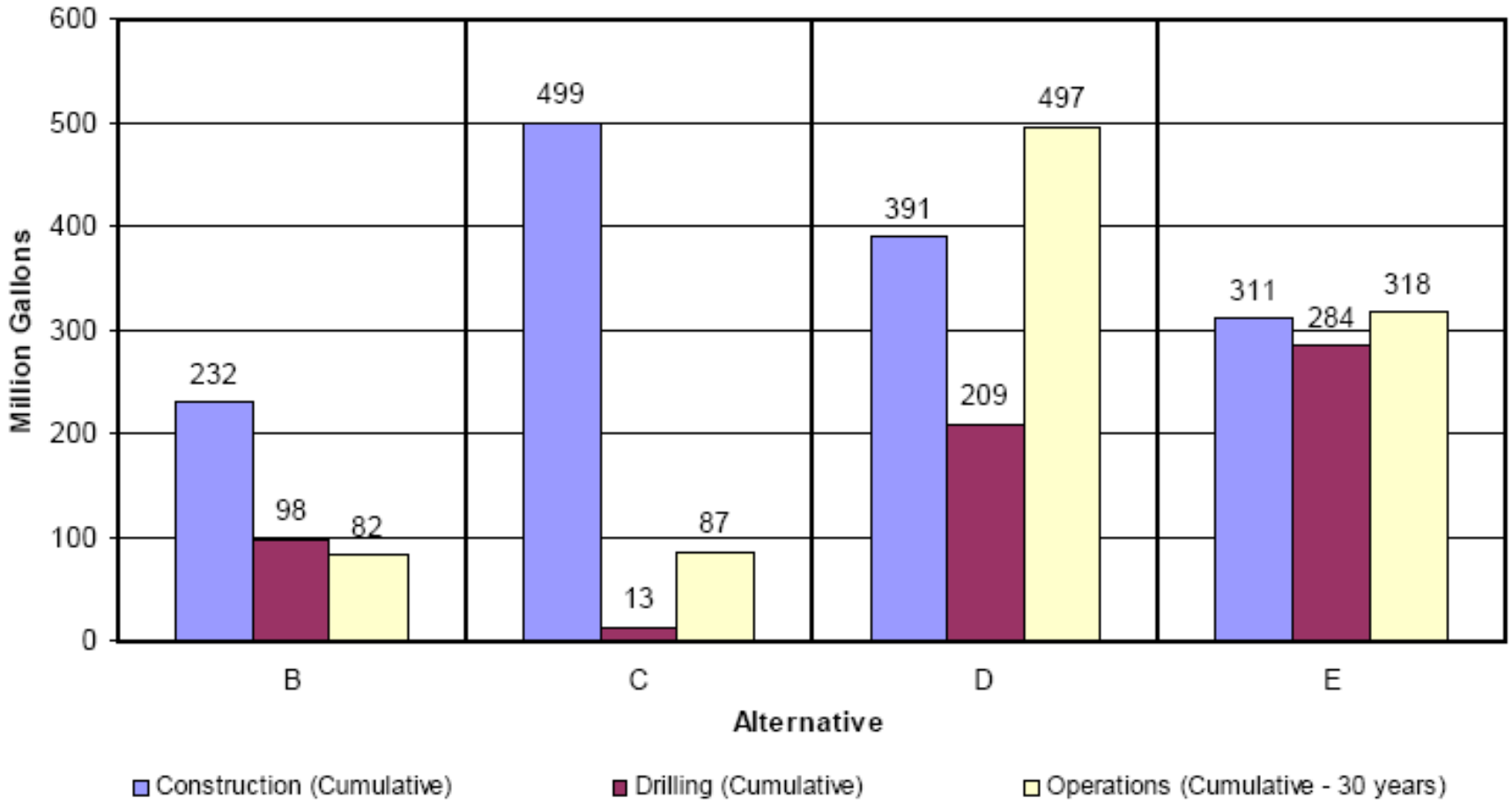
WATER CONSUMPTION	PLANNED	DELTA / TOTAL	DELTA / TOTAL	DELTA / TOTAL
TOTAL WATER CONSUMPTION	**Gallons**	**Gallons**	**Gallons**	**Gallons**
People / Equipment consumption	Gallons	Gallons	Gallons	Gallons
Ice Road Consumption	Gallons	Gallons	Gallons	Gallons
Ice Facilities Consumption	Gallons	Gallons	Gallons	Gallons

PROJECT SCHEDULE				
SCHEDULE	PLANNED	CUMULATIVE	CUMULATIVE	CUMULATIVE
INFRASTRUCTURE	**Years**	**Years**	**Years**	**Years**
PIPELINE	**Years**	**Years**	**Years**	**Years**
IPS FACILITIES	**Years**	**Years**	**Years**	**Years**
DRILLING	**Years**	**Years**	**Years**	**Years**

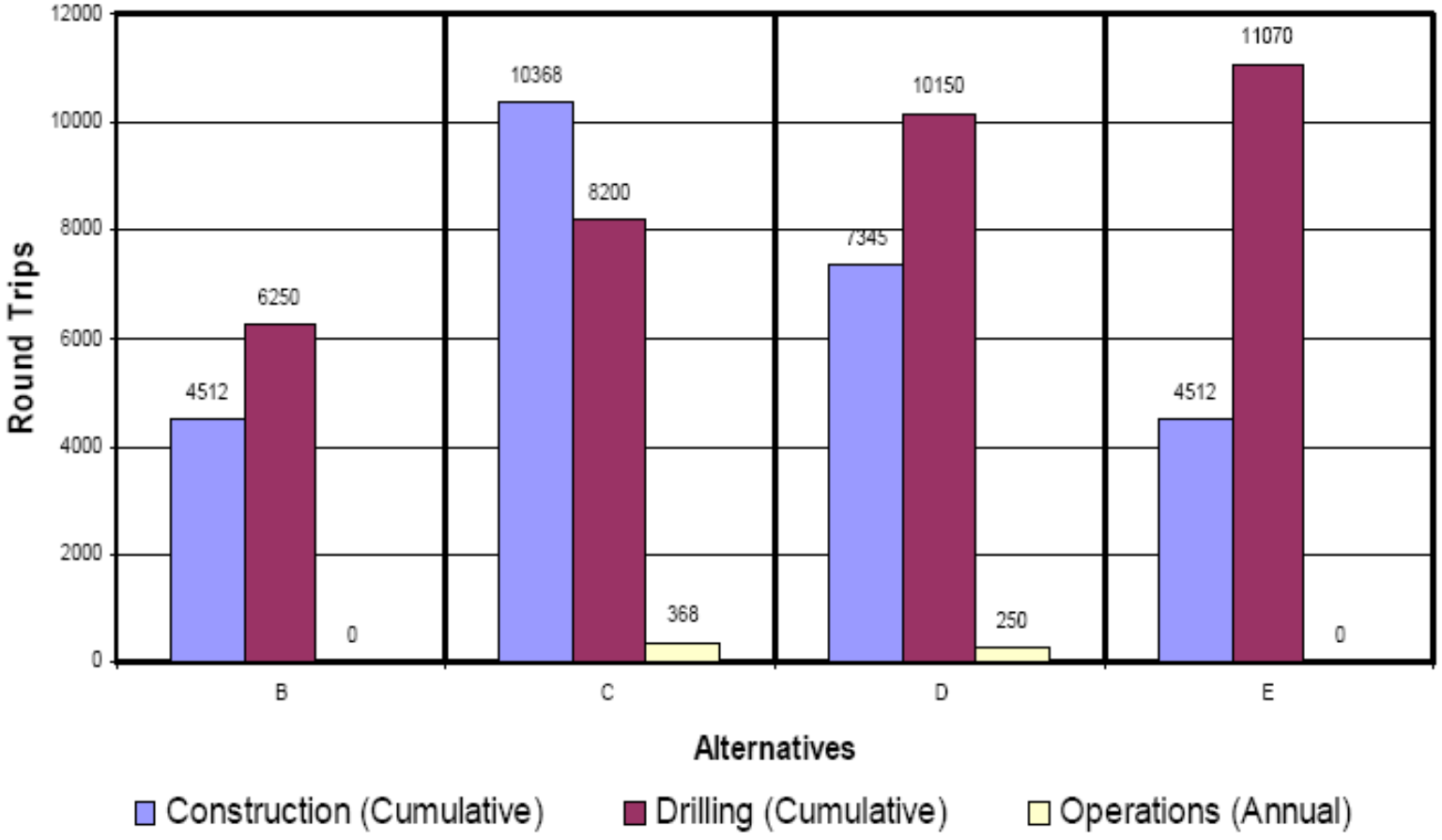
Wetlands Footprint



Water Consumption

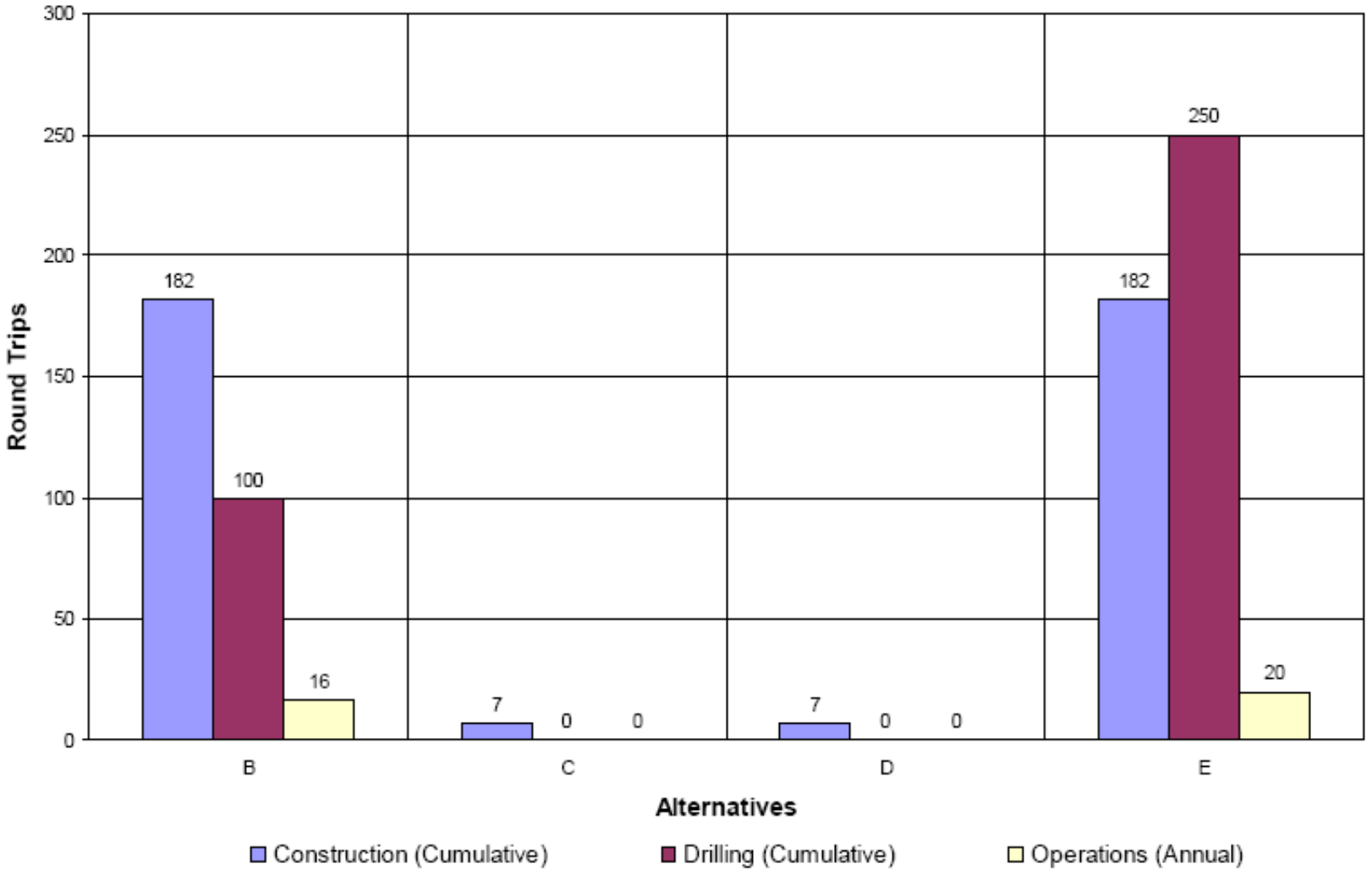


Logistics – Land Transport

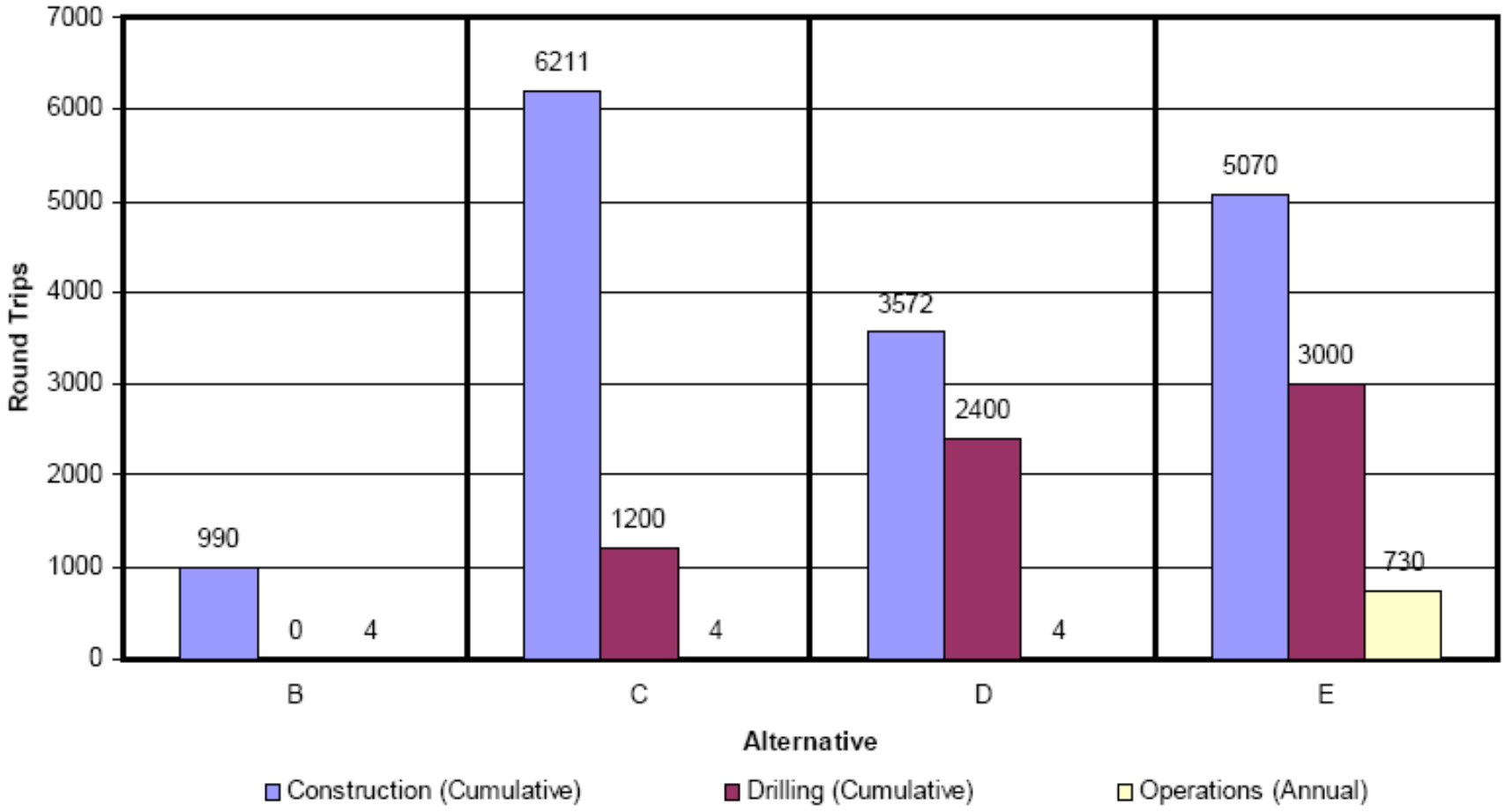


(Annual)

Logistics - Barging



Logistics - Helicopters



Practicability and Environmental Highlights

See Appendix B to the PTP Practicability Analysis

ExxonMobil

POINT THOMSON PROJECT

Section 404 (b)(1) Practicability Analysis of Point Thomson Project Preliminary Draft Environmental Impact Statement Alternatives

Rev. May 13, 2011

Table of Contents

1.0 INTRODUCTION

This Least Environmentally Damaging Practicable Alternative (LEDPA) practicability analysis and identification of execution and environmental impacts are submitted as part of ExxonMobil's (Applicant) continuing efforts to support the EIS and Section 404 processes by providing technical information to assist Agency review of the Preliminary Draft EIS (PDEIS) alternatives.

This submission builds upon earlier ExxonMobil comments and now addresses PDEIS Alternatives B, C, D, and E as well as HDR's April 25, 2011 meeting notes updating the alternatives descriptions.[1] Appendix A summarizes the basis of major scope elements included in this analysis and related execution assumptions. These Alternatives are considered more comprehensively and in significantly greater detail than previously. This is partly because ExxonMobil's proposed project execution planning and engineering (Alternative B) have progressed, thereby enabling a more realistic analysis of the Alternatives.

In considering practicability it is essential to understand that the challenging and expensive logistics required to transport and support personnel, materials, equipment and production modules for a remote site development with limited seasonal work and supply windows is the principal consideration driving schedule and cost. Logistics also drive potential impacts to personnel safety, health, emergency response and the environment.

The Point Thomson Project (PTP) area is accessible only in limited seasonal windows by means of winter ice roads, summer barging, and early winter tundra travel. Currently, helicopters provide the only year-round access mode. Further, these brief seasonal windows are uncertain due to unpredictable variations in weather, ice conditions, wildlife interactions and other circumstances. Maximizing use of these limited access opportunities – which is the basis for Alternative B - is paramount for achieving efficient logistics for construction, drilling and operation of the project.

Alternatives C, D and E significantly constrain the already limited logistics options and will have a significant impact on schedule and cost, and implications for safety and emergency response. Alternatives C, D, and E also have other potentially significant adverse environmental consequences as compared to Alternative B. Please note that while this analysis identifies direct effects arising from the alternatives within the current project scope, these effects may be greatly magnified when considered in light of reasonably foreseeable future development.

This analysis specifically evaluates practicability of the PDEIS alternatives and components in terms of execution requirements, technology, logistics, schedule, material quantities, qualitative costs, safety, security, health, and environmental effects. This also includes identification of additional Project requirements that would arise from the execution of the alternatives, whether or not specifically addressed in the PDEIS. Identified environmental impacts are shown in Table 2.

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[1] A summary of this practicability analysis and the related cost summary were presented to the EIS agencies and HDR for comment at a workshop on May 5, 2011. Prior to issuance of the PDEIS, ExxonMobil prepared conceptual project scenarios for three draft alternatives (3A, 3B and 4, now denominated as C, D and E) which described the major engineering and construction activities and related schedules for each scenario. These alternatives were developed without ExxonMobil's input by the Lead Federal Agency and Cooperating Agencies after which ExxonMobil was requested to provide technical comment and information. Preliminary risks, challenges and issues associated with the alternatives were also identified by ExxonMobil. These, in turn, supplemented ExxonMobil's June 25, 2010 comments to the EIS agencies and HDR with respect to practicability and purpose and need of the draft alternatives.

The analysis is presented for each alternative and component by showing the difference or "delta" vs. the Applicant's proposal (Alternative B) and the total quantities for each item (Table 1A and 1B, respectively). The delta table enables an accurate relative practicability comparison of the alternatives based upon the more fully engineered baseline of Alternative B. Both tables use current project estimates—for example, gravel quantities-- as a baseline for the alternatives.

This practicability analysis in turn provides the foundation of the cost comparison of the alternatives. Qualitative information is provided on the major cost drivers and comparisons for each of the alternatives. The methodology for the cost comparison can be seen in Appendix F. Quantitative cost information will be addressed in a separate future submission.

In performing this analysis ExxonMobil has applied the experience and knowledge gained from the past three years of engineering and planning for the proposed PTP (Alternative B) and the 2008-2011 Point Thomson drilling program. This effort relied upon PTP team personnel and contractors with a high degree of experience and technical expertise, including decades of experience in every aspect of design and construction of major North Slope projects, using their best professional judgment.

In contrast to the multi-year process of planning and engineering for the execution of the proposed Project (Alternative B), the other alternatives are conceptual in nature and based on overall goals to mitigate potential impacts. ExxonMobil believes these alternatives provide a sufficient and sound foundation for EIS and Section 404 permitting evaluation. Analysis of their practicability and related impacts is critical and must be taken into consideration in evaluating alternatives. The information provided is intended to assist in the practicability and impact analysis by the EIS agencies and HDR.

Practicability must also be considered in light of the overall project purposes. "In evaluating whether a given alternative site is practicable, the Corps may legitimately consider such facts as cost to the applicant and logistics. In addition, the Corps has a duty to consider the applicant's purpose." *Bering Strait v. U.S. Army Corps of Engineers*, 524 F3rd 938, 947 (9th Cir. 2008); *Sylvester v. U.S. Army Corps of Engineers*, 882 F.2d 407, 409 (9th Cir.1989) In the case of PTP, this includes the commitment to bring the project into production at the earliest possible time, to provide a cost effective investment for shareholders, and to establish a footprint which will facilitate full field development with the least environmental impact.

This practicability analysis is based upon the alternatives and components identified by the agencies in the PDEIS. NEPA and Section 404 regulatory guidelines expressly establish a single process and record for identification of all reasonable alternatives, whether for purposes of an EIS or a Clean Water Act permit. Indeed, "the Section 404 permitting process is also governed by NEPA." *Bering Strait, supra, at 947*. A determination of LEDPA can only properly be based on alternatives which have been timely identified and analyzed in this process. Based on an extensive intra-agency screening process and criteria, the agencies have identified the reasonable alternatives found to be appropriate for consideration. ExxonMobil has provided significant, ongoing technical feedback on the identified alternatives, and will continue to fully support the EIS and Section 404 processes with technical information and analysis. However, it is not possible for an applicant to assess advantages or disadvantages of other hypothetical alternatives that have not been advanced for consideration in the EIS and Section 404 process.

2.0 SUMMARY OF ALTERNATIVES

The Practicability Matrices in Tables 1A and 1B provide a comparison of practicability elements (e.g., project design, logistics and schedule) for Alternatives B, C, D and E. This summary is grouped by major project activities and components. Additionally, environmental and other impact considerations are summarized in Table 2 and Appendix B.

The analysis focuses on the major contrasts and the tradeoffs based on the study team's perspective and detailed knowledge and experience of North Slope construction, drilling and facility operations.

Logistical constraints inherent in Alternatives C, D and E are the main drivers that increase potential safety, health, environmental, and other risks or impacts, extend project schedule and significantly increase costs. For Alternatives C and D, the absence of barging and sole reliance on ice road and aircraft access for construction and drilling phases (the early part of drilling for Alternative C) create significant technical and logistical challenges for transporting modules, equipment, and supplies, especially fuel. For Alternative E, the lack of a gravel road for all season access between the Central and East and West Pads presents unique and particularly significant safety, health and environmental risks. Appendix B shows a comparison of some of the key logistical and environmental aspects of the different alternatives.

2.1 Alternative C

Alternative C effectively includes three separate major projects; Initial Production System (IPS) with modifications, a 50-mile gravel access road, and a 50-mile export pipeline (vs. 22-mile for Alternative B). This is important because the significant combined increase in construction activities, labor requirements, and the geographic footprint of the project cause related adverse environmental and socioeconomic impacts.

In addition to the significant environmental impact of increasing gravel fill by over 400 acres vs. Alternative B (nearly three times the amount), this alternative involves major design challenges (e.g., hydrology impact mitigation for the 50-mile gravel access road) and schedule impacts (e.g., must redesign modules to smaller units). Ice roads from the Prudhoe Bay infrastructure would still be required during construction and initial drilling because the gravel road will not be available in time. This alternative would use approximately twice the water required for construction compared to Alternative B.

Alternative C's proposed minimization of hydrology impacts by revising in-field road placement will not achieve the desired mitigation. First, this approach would add 5 more miles of wetland fill. Second, the strategy to relocate the roads inland and re-orient them in a general North-South alignment has greater hydrological impact than Alternative B.

There is a technology challenge of transporting sealift modules (approximately 1300 tons each) over 50 miles over ice roads from Prudhoe Bay to Point Thomson, which has not been done before on the North Slope and presents significant construction and execution risk.

Sufficient fuel to sustain project construction and drilling for about a year will have to be delivered over ice road and stored at Point Thomson because barging is not available for resupply. This increases on-site fuel and other consumables storage requirements and Central Pad footprint. This also doubles the truck traffic on ice roads, which has the potential to increase disturbance to denning polar bears.

A well planned ice road strategy (using two parallel ice roads with regular bypass interconnections) will be required to provide safe and efficient logistics support and fuel supply for three winter seasons of construction.

Set back of the West and East Pads from the coast one-half mile is not optimal to fully evaluate and develop the Thomson Sand reservoir, and thus may not satisfy the overall project purpose and need. ExxonMobil's response in Technical Brief #1 provides additional information on this issue, as does the RFI 63 submission by the State of Alaska addressing access to the Thomson Sand reservoir and drilling high departure wells into high pressure reservoirs.

The elimination of barging to Point Thomson significantly increases road and air traffic during all phases of the project, which has the potential for additional disturbance to fish and wildlife and subsistence activities. It would also increase potential impacts with regard to noise and visual characteristics of the project area. Also, ocean going barges are still required to travel around most of the Alaska coastline to sealift the modules to the Prudhoe Bay West Dock.

Construction and operation of the gravel access road would occur over numerous fish bearing streams and through the Central Arctic Caribou Herd main calving area. This gravel road will also introduce the potential for significant impact to traditional subsistence hunting practices, and adds a new linear feature that, along with the pipeline, would be visible between Point Thomson and Endicott.

Project construction of Alternative C would have several potential increased impacts on air quality and greenhouse gas emissions. Without barging access, the increase in truck and helicopter/fixed with traffic would create more emissions, as would extension of the drilling over an additional season. The Endicott Road and longer infield roads would also increase dust emissions.

There would be a significant re-engineering effort required for Alternative C resulting in a two year delay in the start of construction (vs. Alternative B). IPS construction duration remains at 2.5 years (similar to Alternative B). Facilities start-up is delayed about 1.5 years beyond Alternative B start-up. Assuming module delivery by ice road is found to be technically feasible, the logistical limitations and inefficiencies of Alternative C still remain, such as the delay in arrival of sealift modules and limitations on fuel and drilling consumable deliveries. Start of Drilling is delayed by one year (vs. Alternative B) and the duration of Drilling is now four seasons (vs. three seasons in Alternative B). The overall cost impact of Alternative C (vs. Alternative B) is significant and the most extreme of all the alternatives. Alternative C also raises execution feasibility risks.

2.2 Alternative D

Alternative D is similar to Alternative C except the 50-mile gravel access road is eliminated and the export pipeline is reduced, generally consistent with Alternative B. Another major difference is that, for future drilling and operations, over 50 miles of ice road to the Endicott road is required biannually for resupply and equipment mobilization or demobilization.

Most of the issues related to the infield infrastructure such as module redesign and delivery, pad and road locations, and lack of barge access are similar to Alternative C. Additional impacts would include hydrological impacts from infield road alignments; increased water consumption; increased truck traffic with potential disturbance to denning polar bears; and increased helicopter/fixed wing air traffic (twice the amount for construction and eight times the amount for drilling). This increased air traffic would result in potential attendant impacts on birds and wildlife, polar bears, and subsistence. There would also be increased noise and visual effects and air emissions from both the air traffic and extended drilling.

Alternative D schedule delays (vs. Alternative B) for re-engineering, construction and facility start-up are similar to Alternative C. Alternative D drilling program is delayed one year beyond Alternative B and the total Drilling duration is now five seasons (vs. three seasons for Alternative B) due to resupply limitations of a seasonal ice road (i.e. no summer barging). The overall cost impact of Alternative D (vs. Alternative B) is significant but less severe than Alternative C and greater than Alternative E.

2.3 Alternative E

Alternative E presents critical logistics challenges with respect to safe and efficient operations on the East and West Pads. In planning and engineering an oil and gas project, a number of formal risk assessment and management processes are performed to identify key risks to the project and personnel (safety, health, environment, costs, schedule, execution, etc.) and develop plans to mitigate those risks. The process focuses on a range of risks and consequences. High consequence risks/events include human safety and health (e.g. medical emergency) and other emergency response (e.g. major oil spill). The lack of gravel roads connecting the East and West Pads with the Central Pad requires design changes, additional support equipment and operational adjustments/inefficiencies to mitigate the range of risks.

Aviation support, specifically helicopters dedicated to the project to serve the East and West Pads, are a critical need. The shorter gravel airstrip further compounds the project's logistical support problems by limiting the amount of supplies and size of equipment that can be transported to the site when barging and ice roads are not available.

The extraordinary reliance on helicopters (five times the amount for construction, an extra 3,000 trips for drilling, and the estimated 700 extra helicopter trips annually for operations) to support East and West Pad operations greatly increases the potential for disturbance to wildlife and subsistence activities in the coastal zone. Helicopters in particular present significant subsistence concerns to North Slope residents, and the significant increase in such traffic in Alternative E is expected to be a major concern. In addition, the extended drilling resulting from Alternative E would result in several additional impacts. These include the potential for increased disturbance to polar bears from construction and operation of annual ice roads during the extension period and increased air emissions from the drilling rig and associated truck and air traffic.

Ice roads between the Central, East and West Pads are only available for about four months of the year. Other access to the East and West Pads is limited to tundra travel when seasonally allowed by DNR using limited capacity vehicles, and shallow draft emergency response boats that can beach close to the pads during the open water season.

The re-engineering effort required for Alternative E results in a one year delay in the start of construction (vs. Alternative B). Construction duration remains about 2.5 years (similar to Alternative B). Facilities start-up is delayed one year beyond Alternative B start-up. Although the drilling program starts at the same time as Alternative B, the project's drilling phase is now 5 seasons (vs. three seasons in Alternative B). This is due to the logistical limitations of conducting drilling operations without year-round in-field gravel road. The resulting overall cost impact of Alternative E (vs. Alternative B) is significant but less severe than Alternatives C and D.

3.0 ALTERNATIVE C DISCUSSION

3.1 Technology

Alternative C has two significant technology challenges.

The first relates to long reach directional drilling limitations and the requirement to set back the East and West well pads one half mile from the coast. This is not optimal to access the predominantly offshore reservoir and reduces the flexibility with respect to drilling targets. ExxonMobil's response in Technical Brief #1 provides additional information on this issue, as does the RFI 63 submission by the State of Alaska addressing access to the Thomson Sand reservoir and high departure wells drilled into high pressure reservoirs.

The second technology-related challenge of Alternative C is the requirement to transport the facility modules overland using ice roads from the Prudhoe Bay area because marine support is not allowed in this alternative (or in Alternative D) and the 50-mile gravel road from Endicott would not be completed in time to allow module transport. A more detailed engineering risk analysis could determine that large module transport on the lengthy ice road is not feasible. Alternative C would have the option to delay module transport until completion of the gravel road; however, this does not mitigate the risks of winter transport. These risks include malfunctioning of complex hydraulic systems in cold weather and ice road bypasses at bridge locations and are independent of the potential benefits of gravel road transport.

As described in the modularization study (ExxonMobil response to RFI No. 24), overland ice road transport limits module size to about 1300 tons thus increasing the number of sealift modules required (32 via the ice road vs. 11 for Alternative B over bulkhead or service pier). This 1300 ton limit was based on the Alpine project experience. The facility modules are still sealift size modules, which would be transported from their fabrication site by sea to West Dock.

The technology challenge is not building or assembling such modules but their safe and efficient transport along ice roads using Self Propelled Module Transporters (SPMT's). Modules have not been transported overland such long distances or over multiple major river crossings (assuming an inland access ice road route).

An access ice road specifically constructed for module transport would not be ready until about March. Once module transport started the ice road would not be available for other traffic thus tying up the road for a minimum of 30 days (estimated haul time for 19 expected modules during the peak season). This has significant logistical impacts by limiting the time available for transport of other equipment and supplies such as fuel (see below). The short ice road season, the slow speed of moving the modules (about 3 mph), and the number of modules to be moved in one ice road season, create significant transportation risk. Failure of the ice road or an SPMT could jeopardize the timely delivery of all modules as well as extend the facility construction schedule. At the same time the modules would be transported, there would be other major construction operations in the area related to the 50-mile gravel road from the Endicott to Point Thomson and the 50-mile export pipeline. Additional information on SPMT's and issues related to their use for long hauls is provided in Appendix A.

In addition to module and truck transport on the ice road, a significant number of rollagon trips are required to support the project prior to the ice road being available. Without this rollagon support, the schedule shown in Figure 3 cannot be maintained.

Costs

The qualitative cost differences between Alternative B and the other alternatives (excluding the No Action alternative) are detailed in Appendix F. Practicability Matrices in Tables 1A and 1 B show there are many project drivers that significantly increase project costs for Alternative C over Alternative B. Examples include:

- Capital and operational costs of the 50-mile road to Endicott;
- Capital and operational costs of the 50-mile export pipeline (vs. 22 mile in Alternative B);
- Capital and operating costs of the 40% increase (additional five-miles) of the infield road system;
- Capital and operating costs for splitting the Central Pad into two functional pads (drilling and processing/support infrastructure) and an additional of five miles of high pressure production and injection flowlines;
- Additional cost of extending duration of drilling program from two seasons to three seasons;
- Project costs related to re-engineering;
- Additional North Slope labor hours including triple-handling of modules and related cost to hook-up and commission more modules on-site; and
- Project escalation costs related to related two year delay in start of construction and one year delay in start of drilling program.

ExxonMobil believes the significant increase in the cost of Alternative C renders Alternative C impracticable under the LEDPA standard.

3.2 Logistics

In addition to technology and costs, there are major practicability differences of Alternative C compared with Alternate B in the area of logistics – particularly due to the elimination of barging to Point Thomson and the concurrent construction of the 50-mile gravel access road. This alternative relies on ice roads for support of all construction activities which presents significant logistical issues. One of the execution risks is the increased traffic and competing demands upon the ice road itself.

Although the availability of a year-round 50-mile gravel access road to the Endicott road has longer-term logistical benefits, it is not only available for construction or initial part of the drilling phase due to the time it takes to be constructed (approximately three years – Figure 2). As shown in Tables 1A and 1B, there is a significant increase in air traffic in Alternative C vs. Alternative B during the construction and drilling phases due to the unavailability of barging. In-field road traffic during construction also increases significantly due to the greater amount of gravel infrastructure required to be placed.

While sealift barging of modules to Point Thomson is eliminated from Alternative C, those barges would still be delivered by sea to the North Slope at West Dock because the 1300-ton modules are too large to transport by conventional roads. Depending upon barge capacity and deck space, a greater number of barges may be required to transport the 1300-ton modules to West Dock. The triple handling of these modules (off-loading at West Dock, temporary storage in the Deadhorse area, and ice road transport to Point Thomson) is not only logistically

inefficient, it imparts unnecessary transport risks that have to be managed as described in Section 3.1.

All bulk fuel supplies including fuel used during the construction and initial drilling phases of Alternative C would have to be supplied by ice road since summer barging is unavailable. Because of this, a significantly greater amount of fuel also has to be stored at Point Thomson (fuel storage tanks estimated at 6 million gallons vs. 2.4 million gallons for Alternative B). Delivery and storage of fuel are a critical need for the Project. To address this critical need the execution schedule for Alternative C is very different from Alternative B as shown on Figures 1 and 2.

Early in the first winter of construction, a temporary 1.5 million gallon fuel storage facility consisting of 60 (25,000 gallon each) double walled stackable tanks would delivered to the new Central Processing Pad by Rollagon and installed for receipt of fuel once the ice road is opened. Initial civil construction at Point Thomson would focus on opening the gravel mine constructing the road from the mine to the new Central Processing Pad as well as the Pad itself, and the road and bridge to the C-1 water source. The first winter's facility installation would include the 200 man camp, temporary fuel facility, and permanent fuel facility.

Because of this construction focus and priority, construction of the airstrip would be deferred to the second winter construction season. Consequently, significant helicopter support as indicated in Tables 1A and 1 B is required to execute Alternative C. Construction impacts adds one year to the civil construction schedule (vs. Alternative B) as shown on Figure 1. This would also delay the start of drilling by one year and extend completion of drilling by one season beyond Alternative B.

Prior to the first construction winter, off-site fabrication of fuel storage modules (5 vs. 2 for Alternative B) would be completed for delivery over ice road to Point Thomson during the winter season. The ice road capable to transport these fuel modules would not be available until approximately March. As a result, there is insufficient time to deliver, install, and commission the modules to receive the needed 10-month supply of fuel to the new Central Processing Pad. The fuel modules would be delivered and set on piles with the facility complete later in the fall to be ready for fuel deliveries during the next year's ice road season.

Water use also increases significantly for the construction phase of Alternative C vs. Alternative B due to many factors including 1) the longer pipeline ice roads; 2) the need for a separate heavy haul ice road to Deadhorse for transporting fuel tank modules, drill rig/camps and facility modules; 3) the need to provide bypass ice road connections every mile between the heavy haul ice road and pipeline ice road to effectively manage traffic flow and logistics support; 4) the requirement for a wider pipeline ice road (50 ft. vs. 35 ft.) to safely accommodate the bypass traffic to and from the heavy haul ice road, and 5) ice pads to build the larger infrastructure (e.g. 50-mile access road). The Figure 6 ice road diagram shown below portrays the ice roads required for logistics support for three winter seasons of construction in Alternatives C and D.

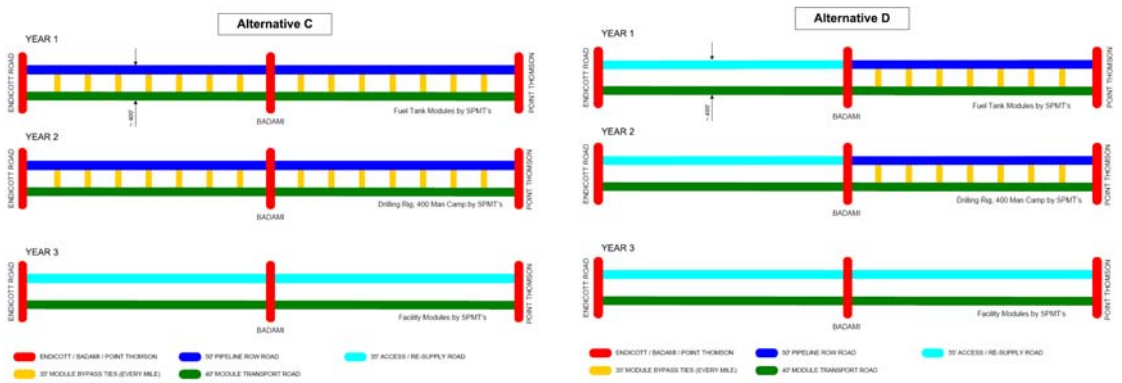


Figure 6 (Enlarged in attachments)

Environmental Considerations and Trade-offs

This section highlights the significant differences in potential environmental impacts and tradeoffs between Alternative C and Alternative B, based on the project team's perspective, knowledge, and experience of North Slope construction, drilling and facility operations. As explained below, Alternative C has potentially significant adverse environmental consequences as compared to Alternative B.

Wetlands

Table 1 documents the significant increase in direct impacts to tundra wetlands footprint. Major contributors to this are the 50-mile gravel access road to Endicott, increase in length of in-field gravel roads, splitting of the Central Pad into two separate pads, and decreased utilization of existing gravel pads. These increases in gravel footprint compound potential wetlands impacts including:

- Increase in number of gravel mine sites due to the 50-mile access road (7.5 times the acreage of Alternative B);
- Increase in dust shadow due the Endicott Road and longer infield roads;
- Increase in size of the Point Thomson area mine site;
- Greater potential for hydrology impacts (due mainly to longer roads and diversion or capture of break up flows); and
- Potential upgrades to Prudhoe Bay roads and storage pads and dredging at West Dock.

Alternative C utilizes the footprint of the former West Staines airstrip, which requires a longer gravel access road from the production pads. The use of this airstrip has no appreciable wetlands benefits since this site has minimal or no residual gravel and appears to have been naturally re-vegetated

Dust control is an issue for this alternative and a much greater operating challenge due to the 50-mile gravel access road from Endicott and, to a lesser degree, the increased length of in-field roads. In-field road watering is manageable with a moderate increase in related water consumption vs. Alternative B. Regular road watering for whole length of the gravel access road may not be practicable with respect to efficacy (duration) and costs.

Hydrology

The gravel road to Endicott crosses three major North Slope rivers and numerous small streams and requires an estimated 18 bridges and 32,500 lineal feet of culverts. The in-field road system, which is five miles longer than Alternative B, requires one less bridge than Alternate B but requires an estimated additional 3200 lineal feet of culverts.

The road to Endicott has the potential for significant hydrologic impacts such as creation of impoundments (and related thermokarst) and scour although much of the route is transverse (right angle) to the regional drainage and thus adverse effects can be mitigated though proper design and detailed route selection. However, the road also is located through large areas of unconcentrated flow thus requiring many culverts. To mitigate long-term hydrologic impacts a major inspection and maintenance program will be required due to the numerous culverts required.

Alternative B's infield road routing was selected to minimize the length and number of stream crossings by locating the roads inland but not so far south as to be in the area where sheet flow predominates. The majority of seasonal flow regime is confined to nine well-defined streams.

Alternative C's in-field road system contrasts with Alternative B's in that much of the road system is further south (inland) in areas predominated by sheet flow and indistinct drainages. The infield road layout of Alternative C only crosses one or two well-defined streams and most of the seasonal flow is not confined and will flow towards the road as sheet flow or shallow flooding. This makes it a challenge to appropriately locate culverts that will efficiently drain water.

Also the West and Central Pad road alignments in Alternative C run oblique to the water flow. This presents more of a challenge to assure hydraulic connectivity since the typical and most efficient design is to have culverts at approximately 90 degrees to the water flow. Alternative C attempts to mitigate hydrology impacts via revised routing but would have the opposite effect and would not assure natural drainage patterns and flows. These two roads have the potential to capture break up flows in those areas where drainage is at a slight tangent to the road orientation and, as a result, there may be downstream impacts to several streams whose flood and base flows may be either increased or reduced. At some locations culverts would not be effective where the road is at an oblique angle to the natural drainage and water could be diverted parallel to the roadway without passing through the culverts. Such diversion would create new drainages and/or eliminate existing ones.

The West Staines airstrip compared with the Alternative B airstrip does not appear to have any hydrology benefits being located in an area of predominant sheet flow and poorly defined drainages.

Fish and Wildlife

Much of the gravel road to Endicott passes through the main calving area of the Central Arctic Caribou Herd located between Badami and the Sagavanirktok River. Major construction activities and road traffic both during construction and long-term operations have the potential to disturb caribou of the Central Arctic Caribou. Year round construction would be required given the scale of the project and need to install many bridges.

In addition, there would be increased helicopter/fixed wing traffic and disturbance to wildlife and birds during construction (3.5 times Alternative B) and drilling (4 times Alternative B) increased truck traffic and disturbance to wildlife and birds during construction (2 times Alternative B) and drilling; and increased potential for wildlife and bird disturbance from longer infield roads,

splitting the Central Pad into two pads, and larger gravel mine site acreage (7.5 times Alternative B).

The potential hydrologic impacts of the road to Endicott also translate to potential fish impacts. Unlike the in-field road system, the road from Point Thomson to the Endicott involves construction across several major rivers with anadramous and resident fish and fish overwintering sites in deep sections. Erosion and increased sedimentation could occur adjacent to culvert batteries and bridge abutments. Proper selection of the road route and bridge and culvert locations can mitigate impacts to anadramous and resident fish (e.g. avoiding potential overwintering habitat, providing adequate fish passage).

Polar Bears

Increased ice road traffic would increase potential disturbance to denning polar bears during construction and drilling. There would also be potential for disturbance to denning polar bears from extending the drilling program an additional season. Finally, there is additional potential disturbance to polar bears from the increased helicopter traffic during construction (3.5 times Alternative B) and drilling (4 times Alternative B).

Workforce and Socioeconomic Considerations

There are two major issues related to Alternative C that have important workforce and socioeconomic implications and potential impacts.

First, is the significantly larger workforce required than for Alternative C than for B. The Endicott access road is itself a major construction project that will be executed concurrently with construction of the IPS and a 50-mile export pipeline. The use of smaller modules as a result of elimination of barging will require a major increase in transportation and handling and of the on-site labor to install, hook up and commission the modules.

This larger construction workforce will have to be housed at various locations in temporary camps along the Endicott access road pipeline rights-of-way, the long haul gravel road, and at Point Thomson. All this activity will increase road and air traffic and the numbers of camps, potential encounters with wildlife, water use etc. Major challenges will also be created by the associated waste management including camp discharges and solid waste generation. Given the large workforce requirements and activity level in Deadhorse it is likely the existing Deadhorse infrastructure (e.g. hotels/camps) would require expansion (not assessed for purposes of this analysis).

The second socioeconomic issue is the potential access provided to the eastern North Slope for resource development, recreation, and sport fishing and hunting among others. These impacts are difficult to predict without knowledge of how the road will be managed and maintained. There are also safety and security implications that would have to be managed.

Subsistence Impacts

Construction and operation of the Endicott Road creates potential public access and competition for subsistence resources. In addition, the increased helicopter/fixed wing traffic during construction (3.5 times) and drilling (4 times) would potentially disturb subsistence activities and resources.

Air Emissions

There would be increased air emissions from the increase in truck and helicopter/fixed wing air traffic during construction and drilling. Dust emissions would also increase from operation of the Endicott Road and longer infield roads and road traffic. In addition, there would be increased air emissions from the extended drilling program.

Other Impacts

Alternative C splits the Central Pad into two pads with the drilling pad at the current location of the Central Pad and the process and support facility functions on a new pad located about two miles inland. This increases wetland footprint by 23 acres and adds approximately five-miles of high-pressure in-field gathering and gas re-injection lines. Rather than consolidating activities at a single location, potential impacts are created at two locations such as those related to noise and visual effects and between those locations due to regular traffic on the connecting road. Based on this practicability analysis, Alternatives C and D will require both the Central Well Pad and Central Processing Pad to be larger than described in the PDEIS. This is due to many factors including the increased number of smaller modules, increased fuel storage and drilling rig materials storage, etc. This scheme is logistically and operationally less inefficient. The longer gravel road to the airstrip increases vehicle emissions and noise.

The longer in-field roads, division of the Central Pad into two functional pads and larger required mine site increase the in-field construction schedule and construction related traffic with related wildlife disturbance potential and air quality effects. This is in addition to the schedule penalties from elimination of barging in this alternative.

3.3 Health and Safety Considerations

Project scope and schedule are affected by the requirement to assure activities are conducted to high standards of safety and health. As noted above, Alternative C would significantly increase the labor force and their support needs and require the management of essentially three concurrent projects (access road, IPS and export pipeline). The related health and safety issues needing to be managed are likewise increased. The significant increase in road traffic (access ice roads and gravel access road when operational) compared with Alternative B, including major fuel hauling operations, all have to be managed from health and safety perspectives.

3.4 Schedule

Figures 1 and 3 show that an additional two years are required to re-engineer the project, conduct hydrology and geotechnical studies, obtain permits for the Endicott access road and order long lead-time equipment and materials. This results in a two year delay for start of construction for Alternative C (vs. Alternative B) of the IPS facilities/ infrastructure and export pipeline. While this would normally translate into a similar two year delay in startup of the Project, project optimizations were identified that may be able to reduce the startup delay to one and one-half years. It should be recognized there is significant execution risk of further delay.

The elimination of barging significantly constrains the construction effort. This is a primary contributor to construction schedule delay because it is no longer possible to deliver camps in the first open water season, which constrains peak manpower during the start of construction.

Lack of barging causes facility module delivery at Point Thomson to be delayed by about 8 months (vs. Alternative B). Specifically, Alternative C requires that the facility modules (process plant etc.) be constructed and delivered to the North Slope via sealift barge one year earlier,

relative to the construction sequence in Alternative B, (exclusive of the re-engineering phase). This is because the modules delivered to West Dock have to be staged to be moved out by ice road during the following winter when the ice road is built for module transport (about March). Once on site at Point Thomson, more time is required to install, hook up, and commission the modules because there are more modules required (32 IPS modules vs. 11 in Alternative B). This schedule would require establishing engineering design priorities during the re-engineering phase and would incur at a significant increase in costs including redesign, earlier purchase expenditures and on-site construction.

Start of the drilling program is delayed by one year under Alternative C and takes an estimated four seasons versus three seasons for Alternative B. As with infrastructure and IPS facilities construction schedule impacts, this delay is the result of eliminating barging and longer civil construction. Until the all weather gravel access road from the Endicott Road is available, drilling can only be supported by ice road for fuel and other supplies.

Alternative C is not practicable because it does not meet the applicant's Purpose and Need objectives to evaluate and develop the Point Thomson hydrocarbon resources in a timely fashion.

3.5 Other

The Central Processing Pad (accommodation/camp) is too close to the mine site and related mining/blasting activities. A minimum safe separation distance of one mile would be required.

4.0 ALTERNATIVE D DISCUSSION

4.1 Technology

The technology issues discussed in Section 3.1 for Alternative C regarding the setback of the East and West Pad from the coast and ice road transport from the Prudhoe Bay area to Point Thomson for sealift modules are the same for Alternative D.

4.2 Costs

The qualitative cost differences between Alternative B and the other alternatives (excluding the No Action alternative) are detailed in Appendix F. However, as examination of the Table 1A and 1 B Practicability Matrix shows, there are many project drivers that will significantly increase project costs for Alternative D over Alternative B. Examples include:

- Capital and operating costs of the additional five-miles of the infield road system and splitting the Central Pad into two functional pads (drilling and processing/support infrastructure);
- Additional cost of extending duration of drilling program from three seasons to five seasons;
- Project costs related to re-engineering;
- Additional on-site labor hours and related schedule impacts to hook up and commission more modules on-site;
- Project escalation costs related to two year delay in start of construction to re-engineer the project and one year delay in start of the drilling program; and
- Construction and operating costs for an annual ice access road from the Endicott during the life of the project due to inability to barge equipment and supplies.

ExxonMobil believes the significant increase in the cost of Alternative D renders Alternative D impracticable under the LEDPA standard.

4.3 Logistics

Alternative D relies on an annual ice road from the Endicott road to support construction, including transport of sealift modules from the Prudhoe Bay area, mobilization of the drilling rig and other equipment and supplies for the duration of drilling. Without the option of barging, the drilling program is significantly extended due to the limitations of logistical support being restricted to an annual ice road, tundra travel and air. During operations, an ice road from Endicott would be required every other year. As a result there is a significant increase in land and aviation transport for this alternative as indicated in Tables 1A and 1B.

The logistical challenges of fuel delivery to and storage at Point Thomson and ice road congestion discussed in Section 3.3 are also applicable to this alternative. However, without the all-season 50-mile gravel road, fuel delivery continues to be a challenge for drilling and to a lesser extent operations.

Module transport issues and risks for Alternative C as discussed in Section 3.3 also apply to Alternative D.

4.4 Environmental Considerations and Trade-offs

Although there are many significant differences in potential environmental impacts between Alternative D and Alternative B, this section focuses on the major contrasts and the tradeoffs based on the Project team's perspective and knowledge of North Slope construction, drilling and facility operations experience. As explained below, Alternative D has potentially significant adverse environmental consequences as compared to Alternative B as summarized in Table 2.

Wetlands

Although not as significant as the increase in wetlands impacts in Alternative C, Alternative D nevertheless substantially increases wetlands fill over Alternative B (by 57 acres) due to the increase in length of the in-field roads, splitting the Central Pad into two pads, and the need for a larger mine site to provide the related increase in gravel amounts.

Hydrology

The discussion of hydrology impacts with respect to the in-field roads and pads (but not the gravel access road from Endicott) in Section 3.4 is also applicable to Alternative D.

Fish and Wildlife

The increased air and road traffic during construction and drilling have the potential to increase wildlife disturbance as does the 50-mile ice road to Endicott needed biannually for operations. Increased helicopter/fixed wing traffic would create disturbance to wildlife and birds during construction (2 times Alternative B) and drilling (8 times Alternative B). In addition, the extended drilling program would create potential disturbance to terrestrial mammals and birds over an additional two seasons.

Polar Bears

Increased ice road traffic would increase potential for disturbance to denning polar bears during construction and drilling. There would also be potential for disturbance to denning polar bears from extended drilling program over an additional two seasons. Finally, the increased helicopter traffic and potential for disturbance to polar bears during construction (2 times Alternative B) and drilling (8 times Alternative B).

Workforce and Socioeconomic Considerations

The discussion in Section 3.4 is also applicable to this alternative excluding issues related to the Endicott gravel access road and the longer export pipeline. Of particular note are the increased labor requirements and needed support infrastructure to transport modules over ice roads to Point Thomson and hook up and commission the larger number of modules.

Subsistence Impacts

Alternative D, as shown in Tables 1A and 1 B, would require a substantial increase in aviation support (fixed wing and helicopter) due to the lack of barge access and extended construction (2 times Alternative B) and drilling phases (8 times Alternative B). Although specific routes could be adjusted related to wildlife concentrations or subsistence activities (depending upon weather conditions), there would nevertheless be more potential disturbance to those resources and activities.

Noise and Visual Impacts

The increase in helicopter/fixed wing traffic, and the two season extension of the drilling program would create additional noise and visual impacts.

Air Emissions

There would be increased air emissions from the increase in truck and helicopter/fixed wing air traffic. Dust emissions would potentially increase from longer infield roads and road traffic. Finally, there would be increased air emissions from the two additional seasons of drilling.

4.5 Health and Safety Considerations

The discussion in Section 3.5 is also applicable to this alternative.

4.6 Schedule

Figures 1 and 4 show that an additional two years are required to re-engineer the project, conduct hydrology and geotechnical studies, and order long lead-time equipment and materials. This results in a one and one-half year delay for start of construction for Alternative D (vs. Alternative B) of the IPS facilities/ infrastructure and export pipeline. While this would normally translate into a similar two year delay in startup of the Project, project optimizations were identified that may be able to reduce the startup delay to one and one-half years. It should be recognized there is significant execution risk of further delay.

The elimination of barging significantly constrains the construction effort. This is a primary contributor to construction schedule delay because it is no longer possible to deliver camps in the first open water season, which constrains peak manpower during the start of construction.

Lack of barging causes facility module delivery at Point Thomson to be delayed by about 8 months (vs. Alternative B). As was the case for Alternative C, Alternative D also requires that the facility modules (process plant etc.) be constructed and delivered to the North Slope via sealift barge one year earlier, relative to the construction sequence in Alternative B, (exclusive of the re-engineering phase). This is because the modules delivered to West Dock have to be staged to be moved out by ice road during the following winter when the ice road is built for module transport (about March). Once on site at Point Thomson, more time is required to install, hook up and commission the modules because there are more modules required (32 IPS modules vs. 11 in Alternative B). This schedule would require establishing engineering design priorities during the re-engineering phase and would incur at a significant increase in costs including redesign, earlier purchase expenditures and on-site construction.

Start of the drilling program is delayed by one year under Alternative D and takes an estimated five seasons versus three seasons for Alternative B. As with infrastructure and IPS facilities construction schedule impacts, this delay is the result of eliminating barging and longer civil construction. .

Alternative D is not practicable because it does not meet the applicant’s Purpose and Need objectives to fully evaluate the Point Thomson hydrocarbon resources and to develop those resources in a timely fashion.

5.0 ALTERNATIVE E DISCUSSION

5.1 Technology

The principal technology issue of Alternative E vs. Alternative B is the design and construction of the multi-year insulated ice pad extensions of the East and West Pads during the drilling phase. Multi-season ice pads on the North Slope have only been constructed for two projects and only for short-term exploration purposes including Yukon Gold located southeast of the Point Thomson Project area. These ice pads have been constructed with approximately 6 inches of ice with insulation board on top and used only to extend a single exploratory drilling season. There is no experience with construction, maintenance and operation of a thick (nominal 5 feet – for a common work surface elevation) ice pad that would have to be in service for over five years.

In addition, the tundra impact of multi-year ice pads is unknown and may likely prove to be significant. Further, additional drilling in the future will likely occur from the pad sites, and the presumed advantage of these temporary, multi-year ice pads may not be realized.

5.2 Costs

The qualitative cost differences between Alternative B and the other alternatives (excluding the no action alternative) are detailed in Appendix F. However, in review of the Table 1A and 1B Practicability Matrix there are many project drivers that will significantly increase project costs for Alternative E over Alternative B even though some gravel roads have been eliminated and the airstrip made smaller. Examples include:

- Increased air and logistics support due to lack of all weather infield roads (e.g. dedicated helicopters to serve the East and West Pads);
- Project escalation costs related to one year delay in start of construction to re-engineer the project;
- Additional cost of extending duration of drilling program from three seasons to 5 seasons;
- Project costs related to re-engineering;
- Increased costs related to additional on-site equipment and support facilities at the East and West Pads; and
- Operational costs of annual infield ice roads linking the Central Pad with the East and West pads

ExxonMobil believes the significant increase in the cost of Alternative E renders Alternative E impracticable under the LEDPA standard.

5.3 Logistics

Alternative E presents critical logistics challenges with respect to safe and efficient operations on the East and West Pads. In planning and engineering an oil and gas project, a number of formal risk assessment and management processes are performed to identify key risks to the project (safety, health, environment, costs, schedule, execution, etc.) and develop plans to mitigate those risks. The process focuses on a range of risks and consequences. In Alternative E high consequence risks/events include human safety and health (e.g. medical emergency) and other emergency response (e.g. major oil spill). The lack of gravel roads connecting the

East and West Pads with the Central Pad requires design changes, additional support equipment and operational adjustments/inefficiencies to mitigate the range of risks.

Aviation support, specifically helicopters dedicated to the project, becomes a critical need. Infield ice roads are only available for about four months of the year and other non-aircraft access is limited to tundra travel using certified vehicles when allowed by DNR and shallow draft boats that can beach close to the pads.

Alpine CD-3 Roadless Drilling/Production Pad Experience

ExxonMobil reviewed ConocoPhillips experience at their CD-3 drilling/production pad (Alpine Satellite), which is not connected by gravel road to the main Alpine facility. Ice roads are utilized to access the pad in the winter. A major difference with proposed Alternative E is that the CD-3 pad has an airstrip, which mitigates the absence of a gravel access road. Another major difference is that CD-3 is connected to existing facilities by a diesel fuel line, thus reducing needs for transport and significant storage of diesel fuel.

At CD-3, the absence of year round road access has imposed significant constraints on operations. Personnel have been stranded at the pad by bad weather for several days at a time. Aircraft operations are restricted to two flights a week during the late spring-early summer bird nesting period. Drilling operations at CD-3 are a particular challenge and incur additional costs and inefficiencies due to the logistical limitations. The CD-3 pad also necessarily contains additional supplies, maintenance equipment, spill response equipment and emergency living quarters. Human wastes must be flown out when the ice road is not available.

The experience at CD-3 confirms that the absence of year-round gravel road access imposes significant operational limitations even with an airstrip and diesel fuel line.

Helicopter Support Needed

A significant difference between Alternative B and Alternative E indicated in Tables 1A and 1 B is the need for dedicated helicopter support when infield ice roads are not available. A permanent facility to house the helicopter will be needed along with additional support personnel at Point Thomson. This helicopter capability is needed to provide access to the East and West Pads for drilling and production including routine inspections of wells and other equipment, and emergency response including medical evacuations and spill response. During the drilling phase it is estimated that about 3,000 more helicopter trips will be required and during operations over 700 trips more annually vs. Alternative B. Based on the experience of the recently completed drilling program, helicopter weather downtime occurs about 20% of the time.

Because of the shorter airstrip in Alternative E and thus smaller aircraft, more fixed wing air flights are required to deliver supplies, equipment and people. During construction and drilling this translates to approximately an additional 3,300 fixed wing trips vs. Alternative B. The planned fixed wing cargo aircraft for Alternative B is a DC 6 with a 24,000 load capacity. The shorter airstrip will only accommodate cargo fixed wing aircraft with load capacity of about 5000 lbs.

It should be noted that Hercules C-130 aircraft are not in this consideration and comparison. They are not planned for routine use but these aircraft would be invaluable in the event of a major spill response or well control effort and to meet certain operational needs. Alternative E's shorter airstrip would not allow landing C-130 aircraft and would constrain response to these situations.

Annual Infield Ice Road and Impacts to the Drilling Program

Alternative E requires annual in-field ice roads to be constructed and this is reflected in the water use estimates in Tables 1A and 1 B. The absence of a gravel road between the pads significantly impacts the drilling schedule because rig moves can only be accomplished when the ice road is available – from late January through mid to late April. The drilling program is also impacted by the short ice road season available for resupply of bulk materials (e.g. chemicals, fuel) to the East and West Pads and would likely require significant use of rollagons. Supply of drilling water also becomes a logistical problem and would likely require installation of temporary water pipelines. Larger pads would be required to mitigate these resupply problems.

As noted in Section 5.6 there is a significant drilling schedule impact as a result of these logistical limitations. When drilling or demobilization activity extends beyond the ice road season, the rig is stranded on the pad until the next ice road season. Because a rig-ready ice road would not be available till late January, three months of the winter drilling season are potentially lost if the rig could have been mobilized over a gravel road

As indicated in Table 1A, coastal barge traffic increases by as much as 150 trips due to the extended drilling program.

5.4 Environmental Considerations and Trade-offs

Although there are many significant differences in potential environmental impacts between Alternative E and Alternative B, this section focuses on the major contrasts and tradeoffs based on the project team's perspective and knowledge of North Slope construction, drilling, and facility operations experience. As explained below, Alternative E has potentially significant adverse environmental consequences as compared to Alternative B which are summarized in Table 2.

Infield Ice Roads - Water Use

Alternative E requires an annual ice road to be constructed to the East and West Pads and this is reflected in the water use estimates on Tables 1A and 1 B which indicates an additional water consumption of over 129 million gallons during construction, nearly 50 million gallons during drilling. This reflects the extended drilling schedule and annual ice road needs. The multi-year ice pad extensions for the East and West Pads require about 19 million gallons of water each. This incremental amount of water is not available locally in the Point Thomson project areas so an ice road would have to be constructed to access sources to the west.

Infield Ice Roads– Wetlands Impacts

The construction of annual ice roads between the Central Pad and East and West Pads over 30 years could result in some damage to vegetation and longer recovery time. Although well planned, designed, and managed ice roads are relatively benign with respect to wetlands and hydrology impacts, there are special circumstances concerning annual ice roads required to access the East and West pads. To minimize water consumption and construction time (to maximize ice road availability) and avoid lengthy inland deviations, the shortest distance between the pads would be preferred for a similar route each year. Although there is limited information on the additive impacts to tundra wetlands from multiple years of ice road construction, it is known that potential impacts of ice roads are greater in areas of moist to dry and/or areas of tundra with microrelief (e.g. tussocks and strangmoor ridges) than in wetter tundra and/or tundra with less microrelief. Much of the near-coastal corridor between the Central Pad and East and West Pads for Alternative E is moist/wet (Walker Type IV) and moist

or dry tundra (Walker Type V) types that would have a higher potential for impacts/damage from ice roads, especially after multiple years of ice road construction.

East and West Pad Sizes – Wetlands Impacts

A more detailed examination of Alternative E has indicated that the East and West Pads will need to be larger than the sizes identified in the PDEIS to address the logistical and safety impacts of not having connecting gravel roads.

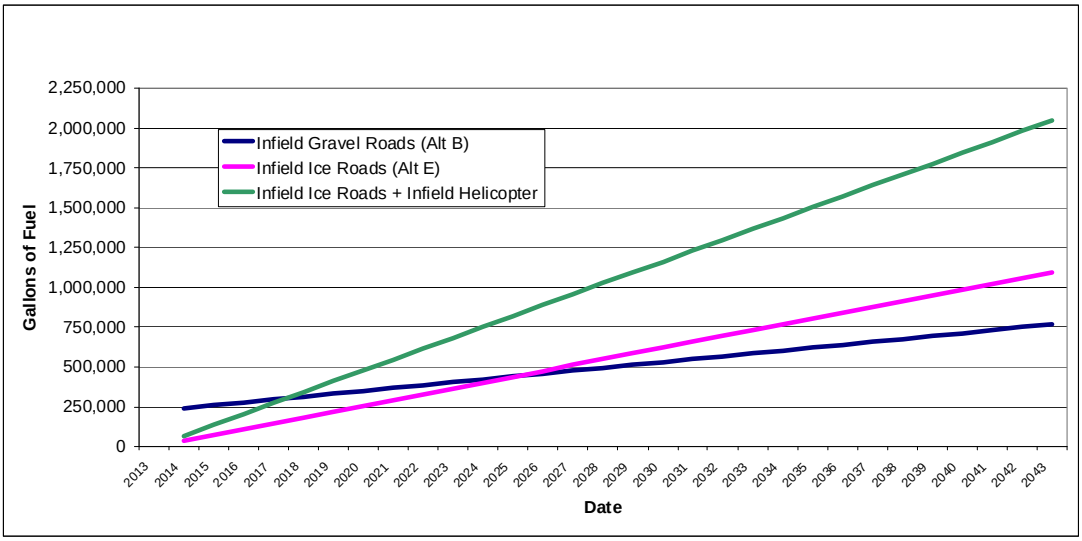
Multi-Year Ice Pad Extensions – Wetlands Impacts

Multi-year ice pads are considered to comprise permitted "fill" under Corps precedent. There is no data beyond the experience of the short-lived exploration pads noted above on the specific impacts to wetlands as a result of multi-year ice pad extensions required in Alternative E. It is unclear whether or to what extent presumed advantages of mulit-year ice pads over gravel pads may be realized.

Fuel Usage – Air Emissions Impacts

Figure 7 below (and attached) presents a comparison of the fuel required to construct and maintain infield gravel roads and travel usage in Alternative B with that required to construct and maintain annual infield ice roads and to use helicopters to access the East and West Pads when ice roads are not available in Alternative E. This is a 30 year, "life of the project" analysis that primarily addresses operations needs. It does not include the additional helicopter flights or ground transport that would be required to support drilling which, if included, would make the difference in fuel use even greater. The increase in fuel consumption can be directly related to an increase in air emissions and cost.

Figure 7: Comparison of Infield Transportation Fuel Usage for Construction, Maintenance, and Operations- Alternative E's Infield Ice Roads vs. Alternative B's Infield Gravel Roads



Alt B

West Pad Road Construction= 48,430 Gallons
East Pad Road Construction= 29,310 Gallons
Gravel Mining for West & East Pad Roads= 37,690 Gallons
West Bridge Construction= 77,760 Gallons
Summer Gravel Farming= 45,430 Gallons
Annual Winter Gravel Road Maintenance & Traffic= 15,840 Gallons
Annual Summer Gravel Road Maintenance & Traffic= 3,600 Gallons

Alt E

Anual Ice Road Construction= 22,340 Gallons
Annual Ice Road Maintenance & Traffic= 14,100 Gallons
Annual Infield Helicopter Usage= 31,870 Gallons

Fish and Wildlife Impacts

The increased helicopter/fixed wing traffic described in Section 5.3 for Alternative E results in additional potential disturbance to wildlife and birds during construction, drilling, and operations. In the case of drilling, the air traffic disturbance will continue for the full duration of the extended drilling program (2 additional seasons vs. Alternative B).

Subsistence Impacts

As described in Section 5.3, nearly year-round helicopter support is required for Alternative E to provided essential transport between the Central Pad and East and West Pads when ice roads are not available. This would result in extra trips during construction (5 times Alternative B), drilling (3 times Alternative B) and 30 years of operations (700 helicopter trips annually). Given the coastal location of the East and West Pads, there are limited opportunities to adjust helicopter routes to mitigate impacts to wildlife concentrations or subsistence activities (depending upon weather conditions), and there would necessarily be significantly more potential disturbance to those resources and activities than would occur with Alternatives B, C and D which have gravel roads to the East and West Pads. Additional round trip flights each day may be required depending on the length of the work and multiple demands on the helicopter resource that will require the helicopter to leave and return later for pickup of passengers from each pad.

Helicopters in particular present significant subsistence concerns to North Slope residents, and the significant increase in such traffic in Alternative E is expected to be a major concern. In addition, the extended drilling resulting from Alternative E would result in several additional impacts. These include the potential for increased disturbance to polar bears from construction and operation of annual ice roads, and increased air emissions from the drilling rig as well as associated truck and air traffic.

Extended Drilling Program – Visual and Noise

The logistical limitations related to access to the East and West Pads of Alternative E extend the drilling program from an estimated three seasons (in Alternative B) to 5 seasons, and the drilling rig will be visible for a much longer period than in Alternative B. In addition, the extra trips associated with helicopter/fixed wing traffic during construction (5 times Alternative B), drilling (3 times Alternative B) and 30 years of operations (700 helicopter trips annually) would create additional noise and visual impacts.

Air Quality

Alternative E would substantially increase air emissions from Alternative B. Air emissions from the increase in trucking and air traffic during construction, drilling, and 30 years of operations would occur. There would be increased air emissions from the additional two seasons of drilling. Finally, annual infield ice road construction would Increase air emissions.

Spill Prevention and Response

Without a year-round gravel access road to the East and West Pads, spill response is more limited at these locations. Additionally, the smaller aircraft loads allowed by the shorter airstrip in Alternative E results in reduced capability to fly in spill response equipment and personnel. Another significant concern is the potential delay due to weather or other circumstances in conducting routine inspections and the detection of spills or other facility condition issues that warrant immediate attention and rectification.

During the drilling phase, the absence of gravel roads will require more fuel storage (diesel) at the East and West pads with increased spill risk.

Overall, the above issues indicate that the East and West pads would need to have more on-site spill response equipment, as would the Central Pad due to aircraft cargo limitations. This translates to greater wetlands impacts for larger pads and increased costs.

5.5 Health and Safety Considerations

Human health and safety are the most important considerations in the design and operation of the Point Thomson Project. This includes emergency response planning for a medical emergency such as heart attack or serious injury. Such situations clearly require rapid response and transport, which is compromised when no gravel road is available to get personnel to the Central Pad medical facilities or airstrip for evacuation.

An emergency shelter for personnel safety at East and West Pads would be required at a safe distance from the wells for workers that may be stranded due to weather. In addition, particularly during the drilling phase, provision will have to be made for emergency evacuation of workers to a safe location away from the East or West Pad due to a serious well control emergency or blow-out). This would include provision of a temporary shelter possibly on the adjacent tundra wetlands and staged logistics support for quick evacuation of large numbers of workers when an ice road is not available. There will be more risk to personnel in case of an evacuation event than there would be with year round connecting infield roads.

5.6 Schedule

The re-engineering effort required for Alternative E results in a one year delay in the start of construction (vs. Alternative B). Construction duration remains about 2.5 years (similar to Alternative B). Facilities start-up is delayed one year beyond Alternative B start-up. The drilling program is extended to 5 seasons (vs. three seasons for Alternative B) due to the logistical limitations of access to the East and West Pads. This adds a significant cost premium to the project.

Alternative E is not practicable because it does not meet the applicant’s Purpose and Need objectives to fully evaluate the Point Thomson hydrocarbon resources and to develop those resources in a timely fashion.

6.0 ATTACHMENTS

Table 1A Practicability Matrix Delta

Table 1B Practicability Matrix Total

Table 2 Environmental Comparison of Alternative C, D & E Relative to Alternative B

Figure 1 Comparison of Point Thomson PDEIS Alternatives Project Execution Schedules

Figure 2 PDEIS Alternative B Project Execution Schedule

Figure 3 PDEIS Alternative C Project Execution Schedule

Figure 4 PDEIS Alternative D Project Execution Schedule

Figure 5 PDEIS Alternative E Project Execution Schedule

Figure 6 Alternative C & D Ice Road Strategy Maps

Figure 7 Comparison of Infield Transportation Fuel Usage for Construction, Maintenance, and Operations - Alternative E's Infield Ice Roads vs. Alternative B's Infield Gravel Roads

Appendix A – Scope of Alternatives Used for the Practicability Analysis

Appendix B –Practicability Highlights

Appendix C – Example Practicability Bar Charts

Appendix D – Technical Brief Module Transport Using SPMT’s

Appendix E – Guide to Reading the Practicability Matrix Tables 1A & 1B

Appendix F – Point Thomson Project Alternatives Cost Analysis

Table 1A Practicability Matrix Deltas (changes relative to Alternative B)

Point Thomson Project Final EIS - Appendix X

PROJECT SCOPE		Alternative B		Alternative C		Alternative D		Alternative E		Assumptions
PROJECT DESIGN										Assumptions
INFRASTRUCTURE		PLANNED	UNITS	DELTA	UNITS	DELTA	UNITS	DELTA	UNITS	
GRAVEL MINE	**Size**	**70.9**	**acres**	**403.9**	**acres**	**12.0**	**acres**	**(16.3)**	**acres**	**Cumulative total of gravel mine surface impacts**
Overburden	Cubic Yards	1,100,000	cy	7,107,692	cy	160,000	cy	(226000)	cy	Relative cubic yards factored from engineering for Alternative B
Gravel	Cubic Yards	2,200,000	cy	3,184,000	cy	320,000	cy	(500000)	cy	Relative cubic yards factored from engineering for Alternative B
Mine	Acres	57.2	Acres	369.6	Acres	8.5	Acres	(14)	Acres	Relative cubic yards factored from engineering for Alternative B
Stockpile	Acres	13.7	Acres	34.3	Acres	3.5	Acres	(2.3)	Acres	Relative cubic yards factored from engineering for Alternative B
GRAVEL ROADS	**Length**	**12**	**miles**	**53**	**miles**	**4**	**miles**	**(10)**	**miles**	**PDEIS alternatives description**
Infield Gravel Roads	Length	12	miles	5	miles	4	miles	(10)	miles	PDEIS alternatives description
Gravel Road to Endicott	Length	0	miles	48	miles	0	miles	0	miles	PDEIS alternatives description
Gravel Road Acres	Size	84	acres	371	acres	28	acres	(70)	acres	Road width of 58ft per PDEIS description
GRAVEL ACRES	**Size**	**216.1**	**acres**	**400**	**acres**	**57**	**acres**	**(62)**	**acres**	**Cumulative total of near field gravel pads**
Central Pad	Size	55.3	acres	(26.5)	acres	(26.5)	acres	22	acres	PDEIS alternatives with near field maps & Worley Parsons conceptual layouts
East Pad	Size	15.6	acres	4	acres	4	acres	(1)	acres	PDEIS alternatives with near field maps & Worley Parsons conceptual layouts
West Pad	Size	18.9	acres	2	acres	2	acres	(4)	acres	PDEIS alternatives with near field maps & Worley Parsons conceptual layouts
Process Pad	Size	0	acres	49.5	acres	49.5	acres	0	acres	PDEIS alternatives with near field maps & Worley Parsons conceptual layouts
Airstrip	Size	42.3	acres	0	acres	0	acres	(9)	acres	PDEIS alternatives with near field maps & Worley Parsons conceptual layouts
CULVERTS	**Length**	**6900**	**linear ft**	**35700**	**linear ft**	**2600**	**linear ft**	**(5700)**	**linear ft**	**Cumulative total of culverts associated with each alternative**
Infield Culverts	Length	6900	linear ft	3200	linear ft	2600	linear ft	(5700)	linear ft	500 ft culvert spacing factored from Alternative B engineering
Long Gravel (Endicott) Road Culverts	Length	0	linear ft	32,500	linear ft	0	linear ft	0	linear ft	500 ft culvert spacing factored from Alternative B engineering
BRIDGES	**Each**	**4**	**number**	**18**	**number**	**(1)**	**number**	**(4)**	**number**	**Cumulative total of bridges associated with each alternative**
Infield Bridges	Number	4	number	0	number	(1)	number	(4)	number	PDEIS alternative description and near field maps
Long Gravel (Endicott) Road Bridges	Number	0	number	18	number	0	number	0	number	PND report Bullin Point Study for State of Alaska dated 10/21/2005
Multi-Year Ice Pads	**Acres**	**0**	**Acres**	**0**	**Acres**	**0**	**Acres**	**20**	**Acres**	**PDEIS alternative description**
USE of Existing Pads	**Acres**	**20**	**Acres**	**(3)**	**Acres**	**(3)**	**Acres**	**(4)**	**Acres**	**PDEIS alternative description**

PIPELINE		PLANNED	UNITS	DELTA	UNITS	DELTA	UNITS	DELTA	UNITS	
EXPORT PIPELINE	**Length**	**22**	**miles**	**29**	**miles**	**0**	**miles**	**0**	**miles**	**PDEIS alternative description**
VSMs & HSMs	Number	2250	number	2950	number	0	number	0	number	Approximately 1 VSM/55 ft spacing factored from Alternative B engineering
Line Pipe	Length	22	miles	29	miles	0	miles	0	miles	PDEIS alternative description
GATHERING LINES	**Length**	**10**	**miles**	**0**	**miles**	**0**	**miles**	**0**	**miles**	**No change assumed across alternatives**
VSMs & HSMs	Number	1000	number	640	number	640	number	0	number	Approximately 1 VSM/55 ft spacing factored from Alternative B engineering
Line Pipe	Length	10	miles	0	miles	0	miles	0	miles	No change assumed across alternatives
PRODUCTION FLOWLINES	**Length**	**0.2**	**miles**	**1.8**	**miles**	**1.8**	**miles**	**0**	**miles**	**Change due to separation of process facilities from well pad**
VSMs & HSMs	Number	20	number	180	number	180	number	0	number	Approximately 1 VSM/55 ft spacing factored from Alternative B engineering
Line Pipe	Length	0.2	miles	1.8	miles	1.8	miles	0	miles	Change due to separation of process facilities from well pad
RIVER CROSSINGS (3)	**Each**	**0**	**number**	**3**	**number**	**0**	**number**	**0**	**number**	**Based on Michael Baker Jr conceptual analysis**

IPS FACILITIES		PLANNED	UNITS	DELTA	UNITS	DELTA	UNITS	DELTA	UNITS	
SEALIFT MODULES	**Each**	**11**	**number**	**21**	**number**	**21**	**number**	**0**	**number**	**Maximum module weight of 1300 Tons for ice road transport**
TRUCKABLE MODULES	**Each**	**18**	**number**	**4**	**number**	**4**	**number**	**0**	**number**	**Separation of process pad from well pad requires additional pigging**
FUEL STORAGE TANKS	**Capacity**	**2.4 M**	**gallons**	**3 - 4 M**	**gallons**	**3 - 4 M**	**gallons**	**0**	**gallons**	**Based on methods and schedule for resupply**

CONSTRUCTION/ DRILLING / LOGISTICS		CONST. (CUM.)	DRILL. (CUM.)	OPS. (ANNUAL)	UNITS	CONST. (CUM.)	DRILL. (CUM.)	OPS. (ANNUAL)	UNITS	CONST. (CUM.)	DRILL. (CUM.)	OPS. (ANNUAL)	UNITS	CONST. (CUM.)	DRILL. (CUM.)	OPS. (ANNUAL)	UNITS	Assumptions
AIR TRAFFIC		PLANNED			UNITS	DELTA			UNITS	DELTA			UNITS	DELTA			UNITS	
TOTAL HELICOPTERS	**Each**	**990**	**0**	**4**	**Flights**	**5221**	**1,000 - 1,200**	**0**	**Flights**	**2582**	**2,000 - 2,400**	**0**	**Flights**	**4080**	**2,500 - 3,000**	**726**	**Flights**	**Cumulative total for all helicopter flights to PTU (round trip)**
Helicopters (People)	Flights	502	0	0	Flights	2966	700 - 800	0	Flights	1372	1,500 - 1,800	0	Flights	2352	2,000 - 2,200	730	Flights	Additional flights due to loss of barging or infield gravel roads, or delayed airstrip depending upon alternative
Helicopters (Materials)	Flights	488	0	4	Flights	2255	300 - 400	0	Flights	1210	500 - 600	0	Flights	1728	500 - 800	0	Flights	Additional flights due to loss of barging or infield gravel roads, or delayed airstrip depending upon alternative
TOTAL FIXED WING	**Each**	**988**	**400**	**546**	**Flights**	**54**	**140**	**(491)**	**Flights**	**54**	**440**	**(82)**	**Flights**	**988**	**1375**	**218**	**Flights**	**Cumulative total for all fix wing flights to PTU (round trip)**
Fixed Wing (People)	Flights	800	350	328	Flights	40	140	(295)	Flights	40	280	(82)	Flights	800	1100	0	Flights	Additional flights due to additional workforce / schedule extension or shorter runway
Fixed Wing (Materials)	Flights	188	50	218	Flights	14	0	(196)	Flights	14	160	0	Flights	188	275	218	Flights	Loss of barging / infield gravel roads or schedule extension depending upon alternative

LAND TRAFFIC		PLANNED			UNITS	DELTA			UNITS	DELTA			UNITS	DELTA			UNITS	
TOTAL LAND TRANSPORT		**4512**	**5,200 - 6,250**	**0**	**Vehicles**	**5856**	**1,650 - 1,950**	**368**	**Vehicles**	**2833**	**3,325 - 3,900**	**250**	**Vehicles**	**0**	**4,280 - 4,820**	**0**	**Vehicles**	**Cumulative total for all land transport to PTU (round trip)**
SPMTs		0	0	0	Trucks	53	0	0	Trucks	53	0	0	Trucks	0	0	0	Trucks	Additional SPMTs required for reduced module sizes due to no barging
Fuel Trucks		883	Included	0	Trucks	2575	200	90	Trucks	2575	400	90	Trucks	0	600	0	Trucks	Additional fuel trucks due to elimination of barging, increased fuel for construction, or extended schedule
Material Trucks		3,387	5,000 - 6,000	0	Trucks	2948	1,400 - 1,650	122	Trucks	(75)	2,800 - 3,300	80	Trucks	0	3,500-4,000	0	Trucks	Additional trucks due to material scope change or schedule extension depending upon alternative
Tundra Travel		177	200 - 250	0	Trucks	160	50 - 100	0	Trucks	160	125 - 200	20	Trucks	0	180 - 220	0	Trucks	Ratio of material transport factors from engineering for Alternative B or drilling support historicals
Crew Buses		65	0	0	Trucks	120	0	156	Trucks	120	0	60	Trucks	0	0	0	Trucks	Additional crew changes based on forecasted additional seasonal ice roads and delay of airstrip during construction

BARGE TRAFFIC		PLANNED			UNITS	DELTA			UNITS	DELTA			UNITS	DELTA			UNITS	
TOTAL BARGES	**Each**	**182**	**50 - 100**	**16**	**Barges**	**(175)**	**(50)-(100)**	**(16)**	**Barges**	**(175)**	**(50)-(100)**	**(16)**	**Barges**	**0**	**120 - 150**	**4**	**Barges**	**Cumulative total for all North Slope barges (round trips)**
Sealift Barges to Point Thomson (Max 4KT)	Barges	10	0	0	Barges	(10)	0	0	Barges	(10)	0	0	Barges	0	0	0	Barges	PDEIS elimination of barging to Point Thomson
Sealift Barges to West Dock (Max 4KT)	Barges	0	0	0	Barges	7	0	0	Barges	7	0	0	Barges	0	0	0	Barges	Based on Worley Parson conceptual engineering analysis
Coastal Barges (200x60x10) 400-800 T	Barges	172	50 - 100	16	Barges	(172)	(50)-(100)	(16)	Barges	(172)	(50)-(100)	(16)	Barges	0	120 -150	4	Barges	Per season logistics support factored from Alternative B engineering

WATER CONSUMPTION		PLANNED			UNITS	DELTA			UNITS	DELTA			UNITS	DELTA			UNITS	
TOTAL WATER CONSUMPTION	**Gallons**	**231,527,500**	**97,617,800**	**2,737,500**	**Gallons**	**267,855,250**	**(84,127,400)**	**146,000**	**Gallons**	**159,562,080**	**111,432,700**	**18,375,000**	**Gallons**	**79,262,806**	**186,244,000**	**10,500,000**	**Gallons**	**Cumulative total from all consumers**
People / Equipment consumption	Gallons	24,090,000	10,117,800	2,737,500	Gallons	27,101,250	3,372,600	146,000	Gallons	12,540,000	6,745,200	0	Gallons	297,000	8,431,500	0	Gallons	Historic data from PTU-15/16 drilling & company practices
Ice Road Consumption	Gallons	193,937,500	87,500,000	0	Gallons	164,254,000	(87,500,000)	0	Gallons	146,572,080	104,687,500	18,375,000	Gallons	21,000,000	177,812,500	10,500,000	Gallons	Historic data from PTU-15/16 drilling & company practices; additional miles of road due to scope changes
Ice Facilities Consumption	Gallons	13,500,000	0	0	Gallons	76,500,000	0	0	Gallons	450,000	0	0	Gallons	57,965,806	0	0	Gallons	Historic data from PTU-15/16 drilling & company practices

PROJECT SCHEDULE	CUM.		CUM.		CUM.		CUM.		Assumptions
SCHEDULE	PLANNED	UNITS	CONCEPTUAL	UNITS	CONCEPTUAL	UNITS	CONCEPTUAL	UNITS	Values shown are based on Applicant submitted Alternative schedules
INFRASTRUCTURE	**2**	**Years**	**3**	**Years**	**3**	**Years**	**2.5**	**Years**	**Expanded civil construction scope, and limitations on material movement**
PIPELINE	**3**	**Years**	**3**	**Years**	**3**	**Years**	**3**	**Years**	**No change for Alt. C as pipeline utilizes crews on ice road as it is being constructed with longer season**
IPS FACILITIES	**1.5**	**Years**	**2.5**	**Years**	**2.5**	**Years**	**1.5**	**Years**	**Schedule changes due to allowed transportation method of facility modules**
DRILLING	**3**	**Seasons**	**4**	**Seasons**	**5**	**Seasons**	**5**	**Seasons**	**Changes due to variation of infield and to-site transportation methods for resupply and rig mobilization**

Notes: PLANNED - numbers in these columns represent the estimated total values required to execute Alternative B

DELTA - numbers in these columns represent only the increase or decrease over Alternative B (Alt B value + DELTA value = total estimated for the given Alt)

CUM. - numbers in these columns represent the total increase or decrease over Alternative B for the entire construction or drilling duration for the given Alt. (i.e. multiple years)

ANNUAL - numbers indicate the annual increase or decrease over Alternative B for one year of operation

("NUM") - numbers in parentheses are used to indicate a decrease in the value from Alternative B; numbers shown without parentheses indicate an increase in the value from Alternative B

Table 1B Practicability Matrix Totals
Point Thomson Project Final EIS - Appendix X

PROJECT SCOPE		Alternative B		Alternative C		Alternative D		Alternative E	
PROJECT DESIGN									
INFRASTRUCTURE		PLANNED	UNITS	EST. TOTAL	UNITS	EST. TOTAL	UNITS	EST. TOTAL	UNITS
GRAVEL MINE	Size	70.9	acres	474.8	acres	82.9	acres	54.6	acres
GRAVEL ROADS	Length	12.0	miles	65.0	miles	16.0	miles	2.0	miles
GRAVEL ACRES	Size	216.1	acres	616.1	acres	273.1	acres	154.1	acres
CULVERTS	Length	6900	linear ft	42600	linear ft	9500	linear ft	1200	linear ft
BRIDGES	Each	4	number	22	number	3	number	0	number
Multi-Year Ice Pads	Acres	0	Acres	0	Acres	0	Acres	20	Acres
USE of Existing Pads	Acres	20	Acres	17	Acres	17	Acres	16	Acres
PIPELINE		PLANNED	UNITS	EST. TOTAL	UNITS	EST. TOTAL	UNITS	EST. TOTAL	UNITS
EXPORT PIPELINE	Length	22	miles	51	miles	22	miles	22	miles
GATHERING LINES	Length	10	miles	10	miles	10	miles	10	miles
PRODUCTION FLOWLINES	Length	0.2	miles	2.0	miles	2.0	miles	0.2	miles
RIVER CROSSINGS (3)	Each	0	number	3	number	0	number	0	number
IPS FACILITIES		PLANNED	UNITS	EST. TOTAL	UNITS	EST. TOTAL	UNITS	EST. TOTAL	UNITS
SEALIFT MODULES	Each	11	number	32	number	32	number	11	number
TRUCKABLE MODULES	Each	18	number	22	number	22	number	18	number
FUEL STORAGE TANKS	Capacity	2.4 M	gallons	5.4 - 6.4 M	gallons	5.4 - 6.4 M	gallons	2.4 M	gallons

CONSTRUCTION/ DRILLING / LOGISTICS		CONST. (CUM.)	DRILL. (CUM.)	OPS. (ANNUAL)	UNITS	CONST. (CUM.)	DRILL. (CUM.)	OPS. (ANNUAL)	UNITS	CONST. (CUM.)	DRILL. (CUM.)	OPS. (ANNUAL)	UNITS	CONST. (CUM.)	DRILL. (CUM.)	OPS. (ANNUAL)	UNITS
AIR TRAFFIC		PLANNED			UNITS	EST. TOTAL			UNITS	EST. TOTAL			UNITS	EST. TOTAL			UNITS
TOTAL HELICOPTERS	Each	990	0	4	Flights	6211	1,000 - 1,200	4	Flights	3572	2,000 - 2,400	4	Flights	5070	2,500 - 3,000	730	Flights
TOTAL FIXED WING	Each	988	400	546	Flights	1042	540	55	Flights	1042	840	464	Flights	1976	1775	764	Flights
LAND TRAFFIC		PLANNED			UNITS	EST. TOTAL			UNITS	EST. TOTAL			UNITS	EST. TOTAL			UNITS
TOTAL LAND TRANSPORT	Each	4512	5,200 - 6,250	0	Vehicles	10368	6,850 - 8,200	368	Vehicles	7345	8,525 - 10,150	250	Vehicles	4512	9,480 - 11,070	0	Vehicles
BARGE TRAFFIC		PLANNED			UNITS	EST. TOTAL			UNITS	EST. TOTAL			UNITS	EST. TOTAL			UNITS
TOTAL BARGES	Each	182	50 - 100	16	Barges	7	0	0	Barges	7	0	0	Barges	182	170 - 250	20	Barges
WATER CONSUMPTION		PLANNED			UNITS	EST. TOTAL			UNITS	EST. TOTAL			UNITS	EST. TOTAL			UNITS
TOTAL WATER CONSUMPTION	Gallons	231,527,500	97,617,800	2,737,500	Gallons	499,382,750	13,490,400	2,883,500	Gallons	391,089,580	209,050,500	21,112,500	Gallons	310,790,306	283,861,800	13,237,500	Gallons

PROJECT SCHEDULE	CUMULATIVE		CUMULATIVE		CUMULATIVE		CUMULATIVE	
SCHEDULE	PLANNED	UNITS	CONCEPTUAL	UNITS	CONCEPTUAL	UNITS	CONCEPTUAL	UNITS
INFRASTRUCTURE	2	Years	3	Years	3	Years	2.5	Years
PIPELINE	3	Years	3	Years	3	Years	3	Years
IPS FACILITIES	1.5	Years	2.5	Years	2.5	Years	1.5	Years
DRILLING	3	Seasons	4	Seasons	5	Seasons	5	Seasons

NOTE: All Assumptions from Table 1A Apply

Additional Assumptions Used in the Practicability Matrix

55 gallons of water consumption per person per day during construction
100 gallons of water consumption per person per day during operations
9,240 gallons of water consumption per day for drilling activities

Water consumption for all roads includes annual road maintenance at approximately 25% of the construction consumption
132.58 gallons of water consumption per linear foot of 35-foot wide module bypass ties
700,000 gallons of water consumption per mile of 35-foot wide, 300,000 lb capacity tundra ice road + 25% of total construction consumption for annual maintenance
975,000 gallons of water consumption per mile of 40-foot wide module transport/rig-ready road
1,000,000 gallons of water consumption per mile of 50-foot wide, 300,000 lb capacity pipeline road

Water consumption for multi-year ice pads includes annual pad maintenance at approximately 10% of the construction consumption
150,000 gallons of water consumption per acre of ice pad constructed + 10% of total consumption for annual maintenance for multi-year pads only
Gravel overburden is approximately 1/2 of the mined gravel; Alt C also includes 9 40-acre mine sites in overburden
~7 acres of gravel per mile of gravel road
~ 570- 670 linear ft of culverts per constructed gravel road mile
~100 VSM/HSMs per mile of pipe laid

For a 5,600' x 200' airstrip, fixed wing flight landing capacities per flight are:
- maximum of 46,000 lbs of freight in special/emercency situations
- 26,000 lbs of freight during normal construction and operation activities
- 30 passengers

For a 3,700' x 200' airstrip, fixed wing flight landing capacities per flight are:
- 5,000 lbs of freight
- 15 passengers

LOGISTICS ASSUMPTIONS
Regular Tractor Trailer Load: 40,000 lbs.
coastal Barge(200x60) : 400 tons pre Dock / 800 tons after dock
Sealift Barge: (at abutment PT) 2000 tons, out as 3rd barge 4000 tons. (+ - depending on tide / winds)
Steigers: (unrestricted tundra travel) 80,000 lbs (depending on trailer)
Rolligon (CATCO): (unrestricted Tundra Travel) 60,000 Lbs.
Fuel Tanker Truck: (ice road) 9,000 gallons
Fuel Tankers on Barge: 10 tankers with tractor.
DC-6 aircraft: max 24,000 lbs payload
Twin-Otter / Casa: max. 5000 lbs payload
Bell 412 helicopter: MAX 4000 lbs sling load
AW 139 Helicopter: 2000 lbs sling load
L100-30 (C130) 45,000 lbs max
Dash 8 or SAAB 340: 30 passenger max
Twin-otter 400: 17 passenger max
Bell 412: 10 passenger
AW 139: 10 passenger
Heavy Haul Truck: (max via Dalton Haul road) 105 tons (short), 20' wide, 15' high, 100' long.

Table 2 – Environmental Comparison of Alternatives C, D & E Relative to Alternative B

Alternative C – Summary of Environmental Impacts

Aquatic Resources	Other Significant Resources
Wetlands • Increased wetland fill (3 times[1]) for Endicott and infield roads, gravel pads. • Increased Endicott and infield road length and traffic creates more dust shadow. • Increased gravel mine acreage (7.5 times) to support Endicott Road construction; Point Thomson gravel mine site larger (more gravel required). • Potential for additional wetlands fill from upgrading Prudhoe Bay pads and roads.	**Terrestrial Mammals and Birds** • Much of the Endicott Road would be located in the main calving area of the Central Arctic Caribou herd. • Increased helicopter/fixed-wing air traffic and disturbance to wildlife and birds during construction (3.5 times) and drilling (4 times). • Increased truck traffic and disturbance to wildlife and birds during construction (2 times) and drilling. • Increased potential for wildlife and bird disturbance from longer infield roads, splitting the Central Pad into two pads, and larger gravel mine site acreage (7.5 times).
Hydrology • Increased number of bridges, stream crossings, major river crossings, and hydrologic impacts for Endicott Road (Estimated 18 bridges and 32,500 lineal feet of culverts). • Potential for impoundments and related thermokarst and scour for Endicott Road. • Increased hydrological impacts with North-South infield road alignment.	**Fish** • Increased potential for impacts to anadromous and resident fish streams from Endicott Road drainage impacts.
Water Use • Increased water consumption (2 times) for annual ice roads during three year construction period.	**Polar Bears** • Increased ice road traffic and potential disturbance to denning polar bears during construction and drilling. • Potential for disturbance to denning polar bears from extended drilling program over additional year. • Increased helicopter traffic and potential disturbance to polar bears during construction (3.5 times) and drilling (4 times).
Marine Waters • Sealift barge traffic moved to West Dock for construction. • Dredging potentially required at West Dock for Sealift modules.	**Subsistence** • Endicott Road creates potential public access and competition for resources. • Increased helicopter/fixed wing traffic during construction. (3.5 times) and drilling (4 times)
	Recreation • Endicott Road creates potential public access and disturbance to recreation activities. • Increased helicopter/fixed-wing air traffic during construction (3.5 times) and drilling (4 times).
	Noise • Increased frequency and duration of noise from construction and truck and helicopter/fixed-wing air traffic. • Increased noise impacts from extended drilling program over additional year.
	Visual • Visual impacts would extend from Endicott to Point Thomson. • Increased frequency and duration of visual effects from construction and truck and helicopter/fixed-wing air traffic during construction and drilling. • Increased visual impacts from extended drilling program over additional year.
	Air Quality • Increased air emissions from increase in truck and helicopter/fixed-wing air traffic during construction and drilling. • Increased dust emissions from Endicott Road and longer infield roads and road traffic. • Increased air emissions from extended drilling program.

1 - Approximate amounts compared to Alternative B.

Table 2 – Environmental Comparison of Alternatives C, D & E Relative to Alternative B

Alternative D - Summary of Environmental Impacts

Aquatic Resources	Other Significant Resources
Wetlands • Increased wetland fill for pads and infield roads (additional four miles of infield roads). • Increased infield road length creates more dust shadow. • Point Thomson gravel mine site larger (more gravel required). • Potential for additional wetlands fill from upgrading Prudhoe Bay pads and roads.	**Terrestrial Mammals and Birds** • Increased helicopter/fixed-wing air traffic and disturbance to wildlife and birds during construction (2 times) and drilling (8 times). • Extended drilling program and potential disturbance to terrestrial mammals and birds over additional year.
Hydrology • Increased hydrological impact with North-South infield road alignment.	**Fish** • Increased potential for impacts to anadromous and resident fish streams from infield road drainage impacts.
Water Use • Increased water consumption for construction ice roads (1.4 times) and operations biannual ice road over 30 year period (8 times).	**Polar Bears** • Increased ice road traffic and potential disturbance to denning polar bears during construction (1.6 times), drilling (1.6 times), and operation of biannual ice road (250 annual trips). • Increased helicopter traffic and potential disturbance to polar bears during construction (2 times) and drilling (8 times). • Extended drilling program and potential disturbance to denning polar bears over 3 additional years.
Marine Waters • Sealift barge traffic moved to West Dock • Dredging potentially required at West Dock for Sealift modules.	**Subsistence** • Increased helicopter/fixed-wing air traffic and disturbance during construction (2 times) and drilling (8 times).
	Recreation • Increased helicopter/fixed-wing air traffic during construction (2 times) and drilling (8 times).
	Noise • Increased construction and truck and helicopter/fixed-wing air traffic noise. • Increased noise impacts from 3 years of extended drilling program.
	Visual • Increased helicopter/fixed-wing air traffic during construction and drilling. • Increased visual impacts from 3 years of extended drilling program.
	Air Quality • Increased air emissions from increase in truck and helicopter/fixed-wing air traffic. • Increased dust emissions from longer infield roads and road traffic. • Increased air emissions from 3 years of extended drilling program.

1 - Approximate amounts compared to Alternative B.

Table 2 – Environmental Comparison of Alternatives C, D & E Relative to Alternative B

Alternative E – Summary of Environmental Impacts

Aquatic Resources	Other Significant Resources
Wetlands • Potential for temporary impacts from annual infield ice roads built in the same area for multiple years during 30 years of operation. • Vegetation impacts from multi-year ice pads.	**Terrestrial Mammals and Birds** • Increased helicopter/fixed-wing air traffic and disturbance to wildlife and birds during construction (5 times), drilling (3 times), and 30 years of operations (2.7 times, 700 extra helicopter trips annually). • Extended drilling program and potential disturbance to terrestrial mammals and birds over 3 additional years.
Hydrology • Not applicable	**Fish** • Not applicable
Water Use • Increased water consumption (4 times) for operation's multi-year ice pad extensions and annual infield ice roads over 30 years	**Polar Bears** • Increased ice road traffic and potential disturbance to denning polar bears during construction and operation of annual infield ice roads and pads over 30-year period. • Extended drilling program and potential disturbance to denning polar bears over 3 additional years. • Increased helicopter traffic and potential disturbance to polar bears during construction (5 times), drilling (3 times), and 30 years of operations (2.7 times, 700 extra helicopter trips annually).
	Subsistence • Increased helicopter/fixed-wing air traffic during construction (5 times), drilling (3 times), and 30 years of operations (2.7 times, 700 helicopter extra trips annually).
	Recreation • Increased helicopter/fixed-wing air traffic during construction (5 times), drilling (3 times), and 30 years of operations (2.7 times, 700 extra helicopter trips annually).
	Noise • Increased helicopter/fixed-wing air traffic noise during construction (5 times), drilling (3 times), and 30 years of operations (2.7 times, 700 extra helicopter trips annually) • Increased noise impacts from extended drilling program over 3 additional years.
	Visual • Increased helicopter/fixed-wing air traffic during construction (5 times), drilling (3 times), and 30 years of operations (2.7 times, 700 extra helicopter trips annually). • Increased visual impacts from extended drilling duration over 3 additional years.
	Air Quality • Increased air emissions from increase in truck and helicopter/fixed-wing air traffic during construction, drilling, and 30 years of operations. • Increased air emissions from extended drilling program duration over 3 additional years. • Increased air emissions from annual infield ice road construction.

1 - Approximate amounts compared to Alternative B.

	PROJECT SCOPE
	■ TUNDRA ■ ICE ROAD ■ BARGING
	EIS/NEPA Process & Major Permits
Alternative "B"	**Engineering- Civil, Pipeline, Facilities**
	Civil & Infrastructure
	Pipelines
	Facilities
	Procurement & Fabrication
	Civil & Infrastructure
	Pipelines
	Facilities
	Construction
	Civil & Infrastructure
	Pipelines
	Facilities
	Drilling
	Ice Road & Maintenance
	Disposal Well, East Pad, West Pad & 5th Well
Alternative "C"	**Engineering- Civil, Pipeline, Facilities**
	Civil & Infrastructure
	Pipelines
	Facilities
	Procurement & Fabrication
	Civil & Infrastructure
	Pipelines
	Facilities
	Construction
	Civil & Infrastructure
	Pipelines
	Facilities
	50 Mile All Season Road
	Engineering, Procurement, & Fabrication
	Construction
	Drilling
	Ice Road & Maintenance
	Disposal Well, East Pad, West Pad & 5th Well
Alternative "D"	**Engineering- Civil, Pipeline, Facilities**
	Civil & Infrastructure
	Pipelines
	Facilities
	Procurement & Fabrication
	Civil & Infrastructure
	Pipelines
	Facilities
	Construction
	Civil & Infrastructure
	Pipelines
	Facilities
	Drilling
	Ice Road & Maintenance
	Disposal Well, East Pad, West Pad & 5th Well
Alternative "E"	**Engineering- Civil, Pipeline, Facilities**
	Civil & Infrastructure
	Pipelines
	Facilities
	Procurement & Fabrication
	Civil & Infrastructure
	Pipelines
	Facilities
	Construction
	Civil & Infrastructure
	Pipelines
	Facilities
	Drilling
	Ice Road & Maintenance
	Disposal Well, East Pad, West Pad & 5th Well

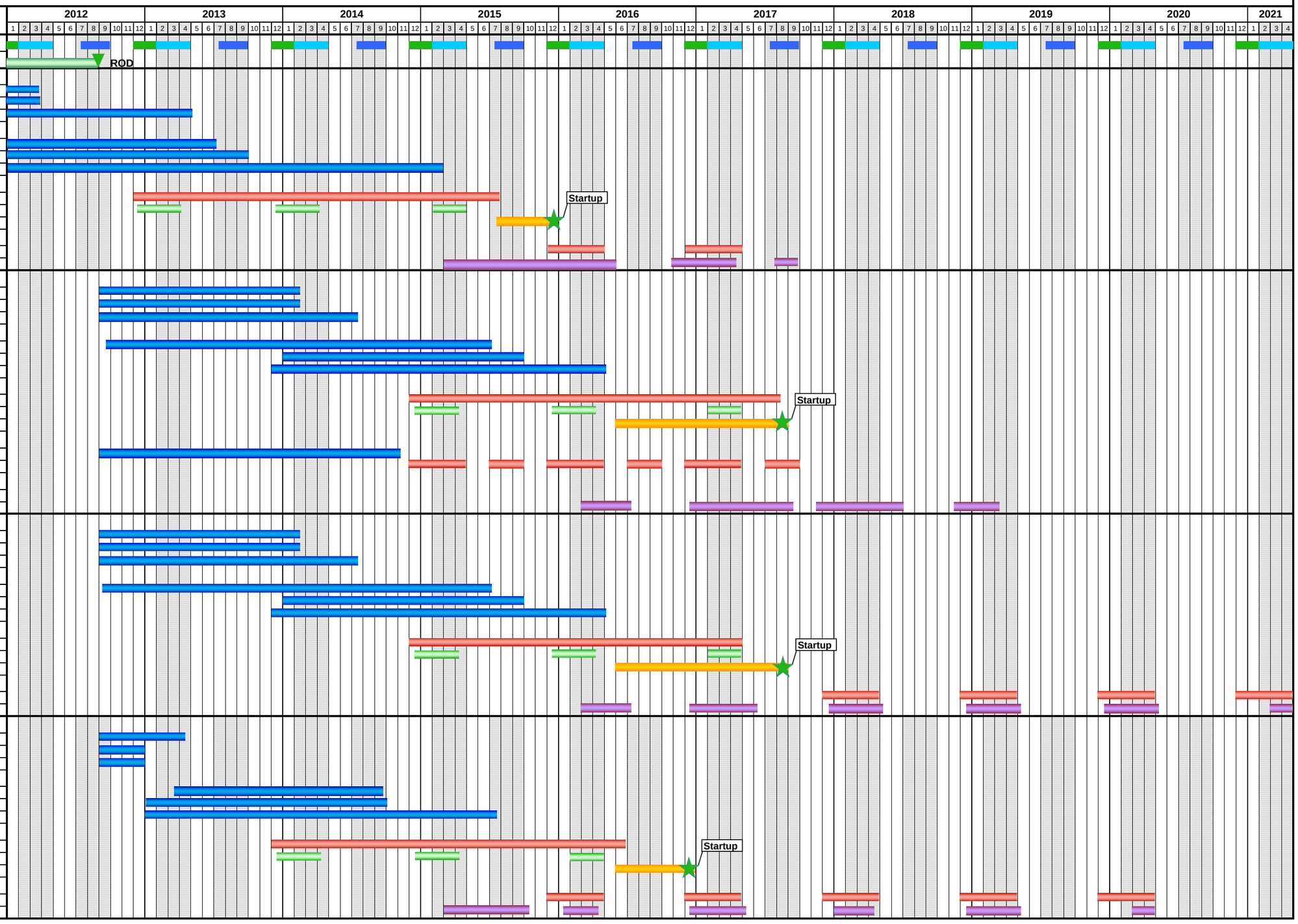


Figure 2 PDEIS Alternative B Project Execution Schedule

PROJECT SCOPE - Alternative B
TUNDRA ICE ROAD BARGING
EIS/NEPA Process & Major Permits
Engineering- Civil, Pipeline, Facilities
Procurement & Fabrication
Civil & Infrastructure
Pipelines
Facilities
Construction Season 1
Ice Road & Maintenance
Install Camps
Infield Gravel Installation
Bridge Installation
Marine Facilities- Service Pier
Non-Process Building
Airstrip Installation
Export Pipeline VSM's & Supports
Construction Season 2
Ice Road & Maintenance
Infield Gravel Installation
Bridge Installation
Marine Facilities- Onshore Abutment
Non-Process Building
Export Pipeline Installation
Construction Season 3
Ice Road & Maintenance
Infield VSM & Pipeline Installation
Foundation Piles, Utilidors, Piperacks, Flare & Piping
Facilities Transportation Sealift
Facilities Installation
Facilities Startup & Commissioning
Drilling
Ice Road & Maintenance
Mobilize Rig & Supplies Via Ice Road
Drill Disposal Well
Complete PTU 15 & 16
Drill Surface Hole East Pad
Drill West Pad Well & Comlpete
Drill East Pad Well to TD
Drill Surface Hole 5th Well
Drill 5th Well & Complete
Complete East Pad Well
Demobilize Drill Rig

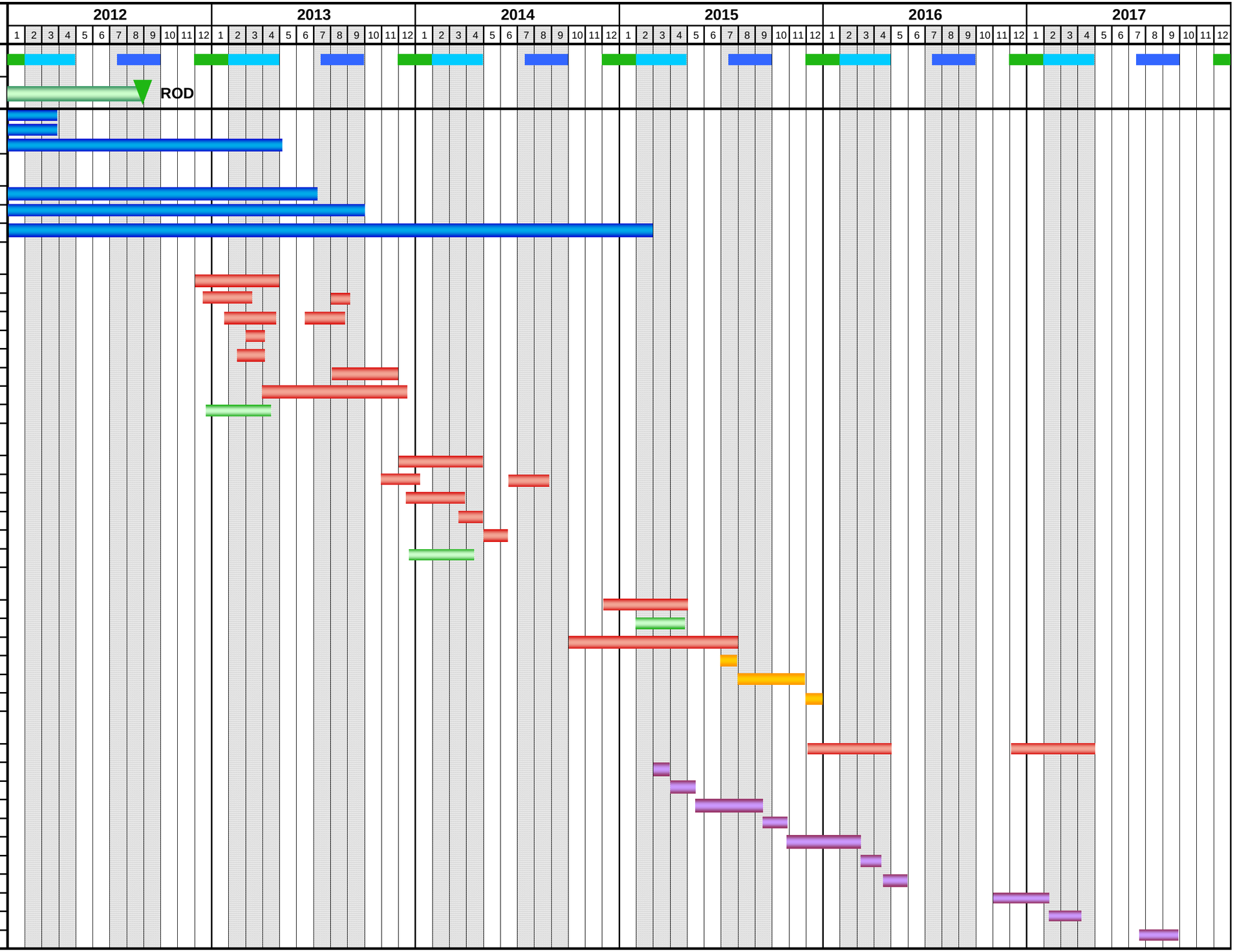


Figure 3 PDEIS Alternative C Project Execution Schedule
Point Thomson Project Final EIS - Appendix X

PROJECT SCOPE - Alternative C
TUNDRA ICE ROAD BARGING
EIS/NEPA Process & Major Permits
Engineering- Civil, Pipeline, Facilities
Procurement & Fabrication
Civil & Infrastructure
Pipelines
Facilities
Construction Season 1
Ice Road & Maintenance
Install Camps 200 Beds
Infield Gravel Installation- CPF, Road to CWP, Road to Water
Install Temporary Fuel Tanks & Fill 1.5 Million Gallons
Transport & Set Main Fuel Tanks 6 Million Gallon Capacity
Install Main Fuel Tanks
Bridge Installation
Export Pipeline VSM's & Supports
Export Pipeline Major River Crossings
Construction Season 2
Ice Road & Maintenance
Install Camps 400 Beds
Infield Gravel Installation- Road to Airstrip, Airstrip, CWP
Export Pipeline Installation
Airstrip Installation
Facilities Transportation Sealift to Prudhoe Bay
Facilities Staging in Prudhoe Bay
Construction Season 3
Ice Road & Maintenance
Infield Gravel Installation- West & East Pads & Roads
Bridge Installation
Infield VSM & Pipeline Installation
Facilities Transportation Ice Road
Facilities Installation
Facilities Startup & Commissioning
50 Mile All Season Road
Civil & Bridge Engineering
Civil & Bridge Procurement
Gravel & Bridge Installation
Gravel & Bridge Installation
Gravel & Bridge Installation
Drilling
Mobilize Rig & Supplies Via Ice Road
Drill Disposal Well
Complete PTU 15 & 16
Drill Surface Hole East Pad
Drill Surface Hole West Pad
Drill West Pad Well to TD & Case
Drill East Pad Well & Complete
Complete West Pad Well
Drill Surface Hole 5th Well
Drill 5th Well & Complete
Demobilize Drill Rig

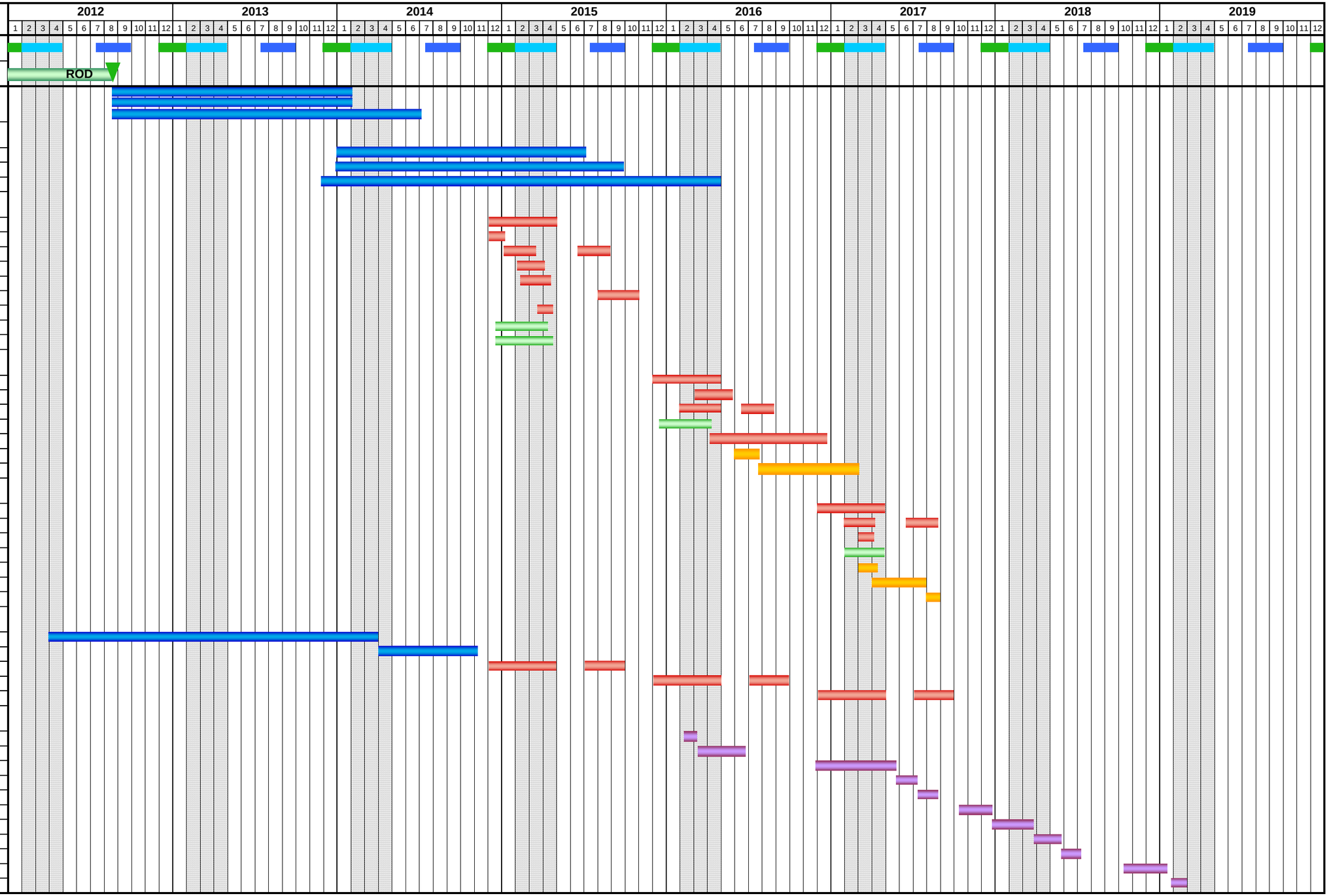


Figure 4 PDEIS Alternative D Project Execution Schedule

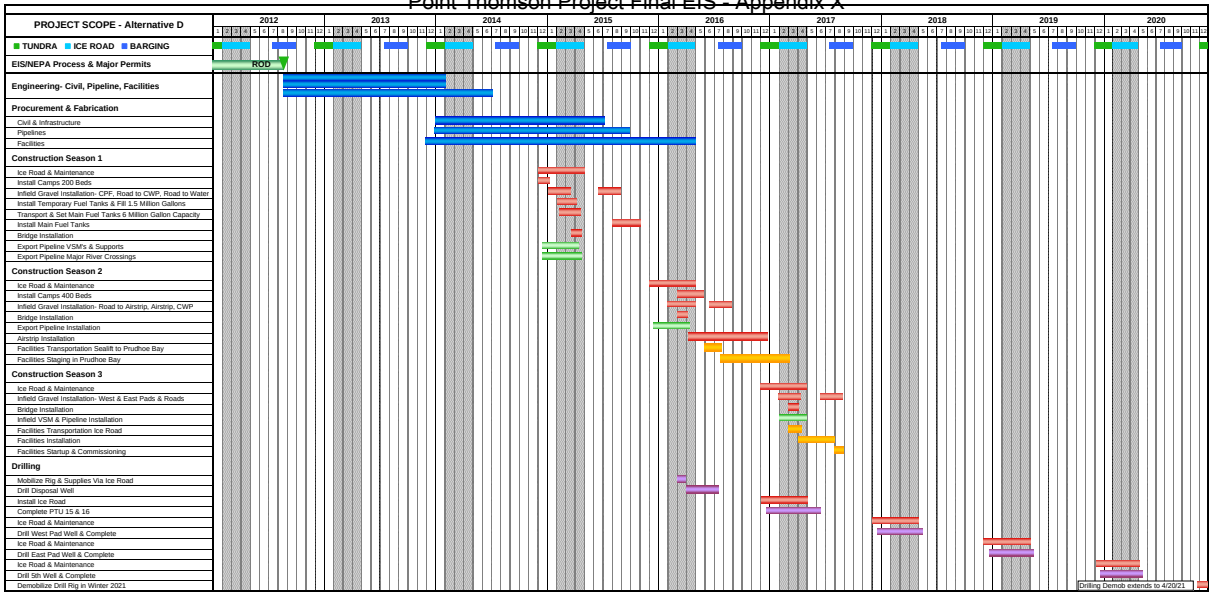
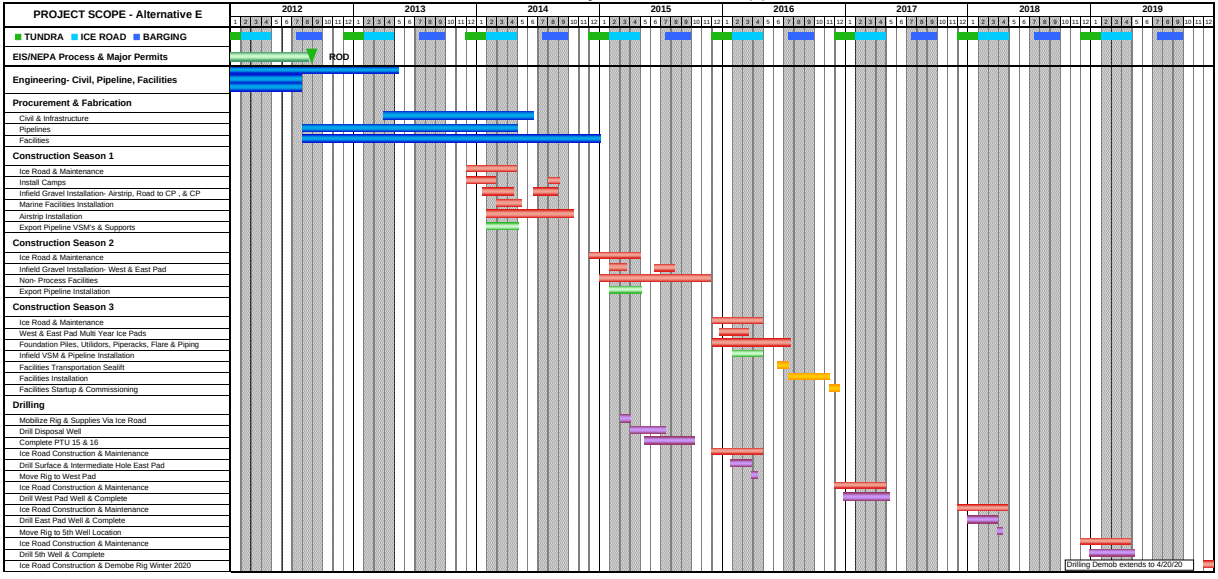


Figure 5 PDEIS Alternative E Project Execution Schedule

Point Thomson Project Final EIS - Appendix X



May 13, 2011

Figure 6 – Alternative C & D Ice Road Strategy Maps

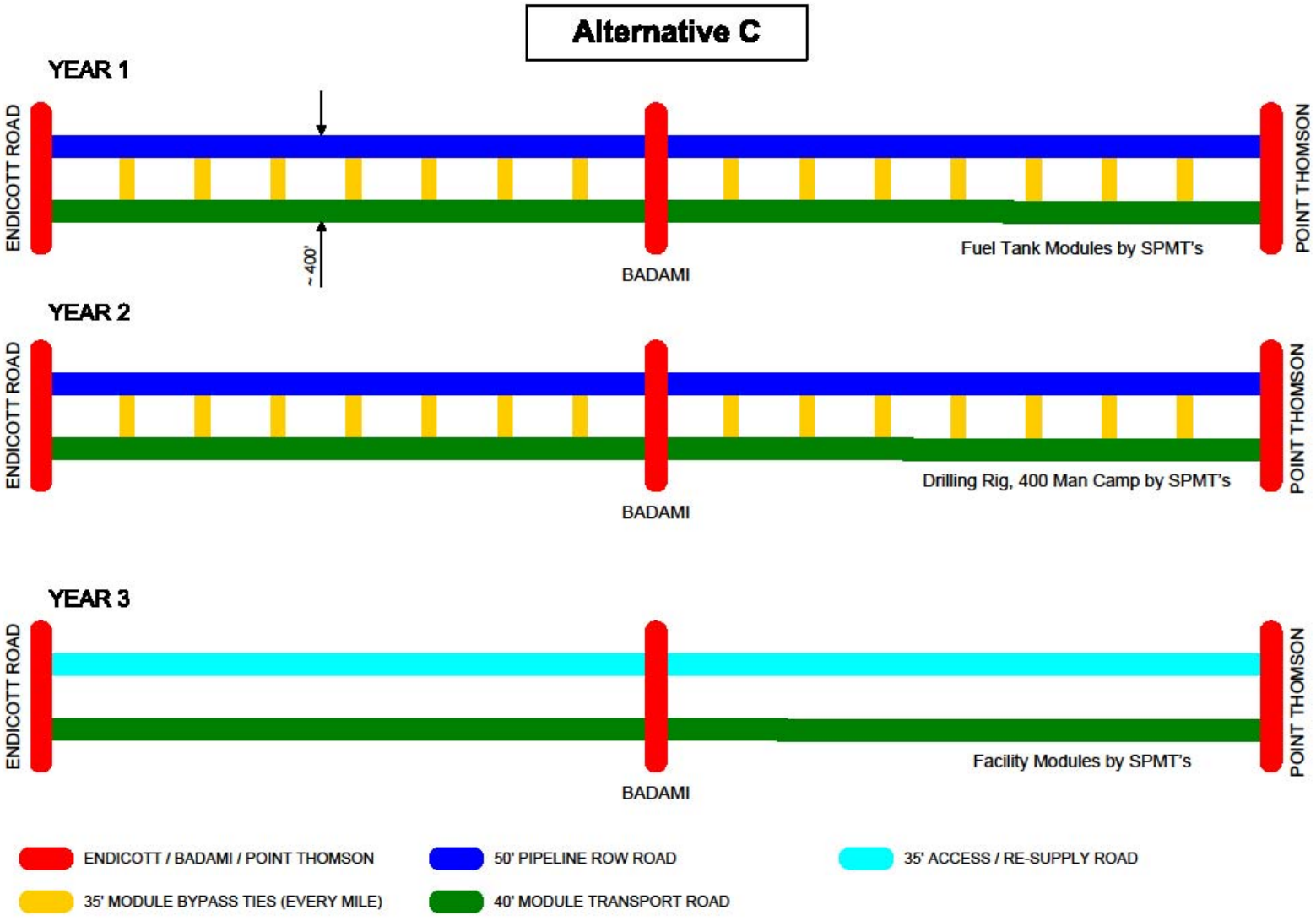


Figure 6 – Alternative C & D Ice Road Strategy Maps

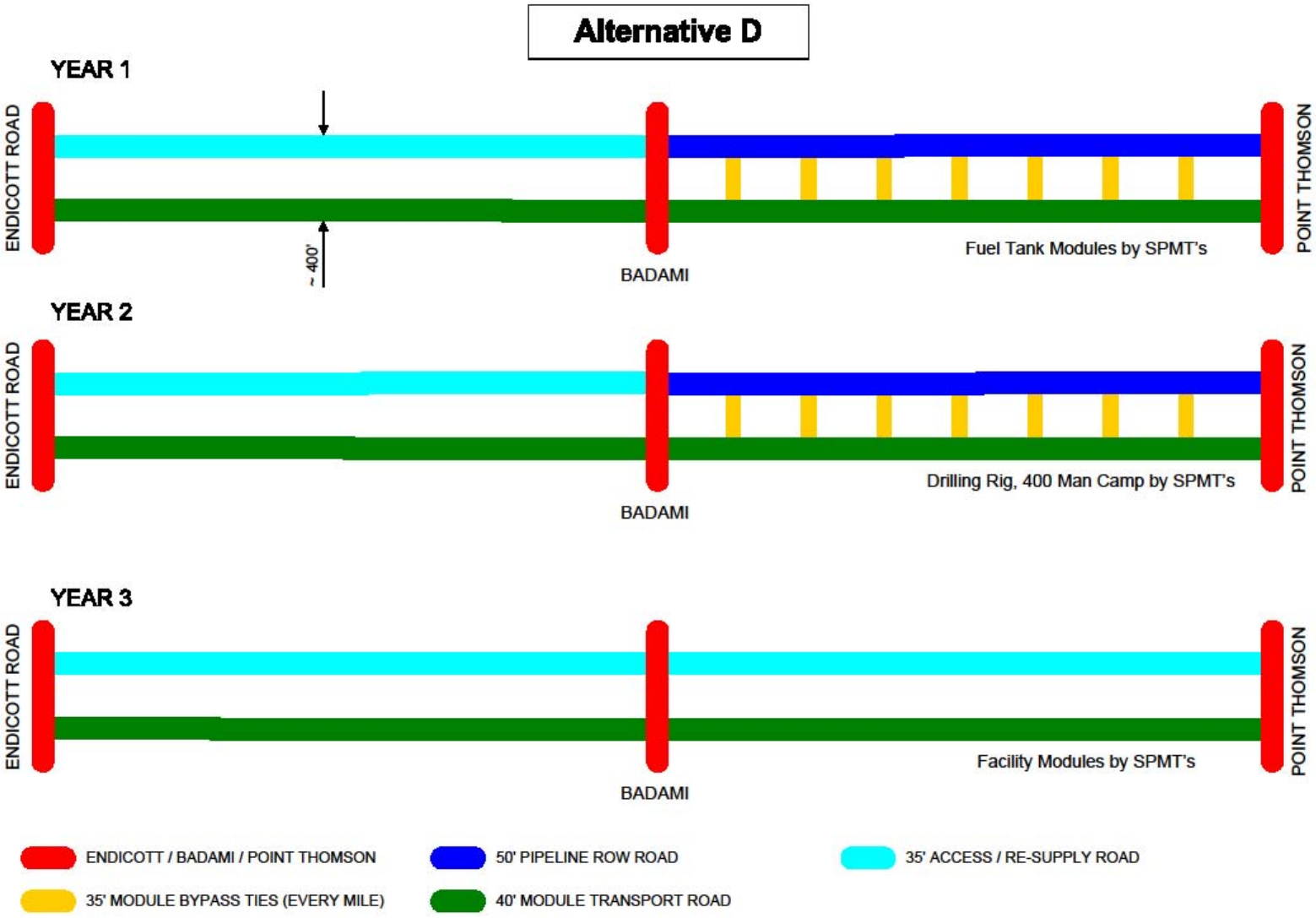
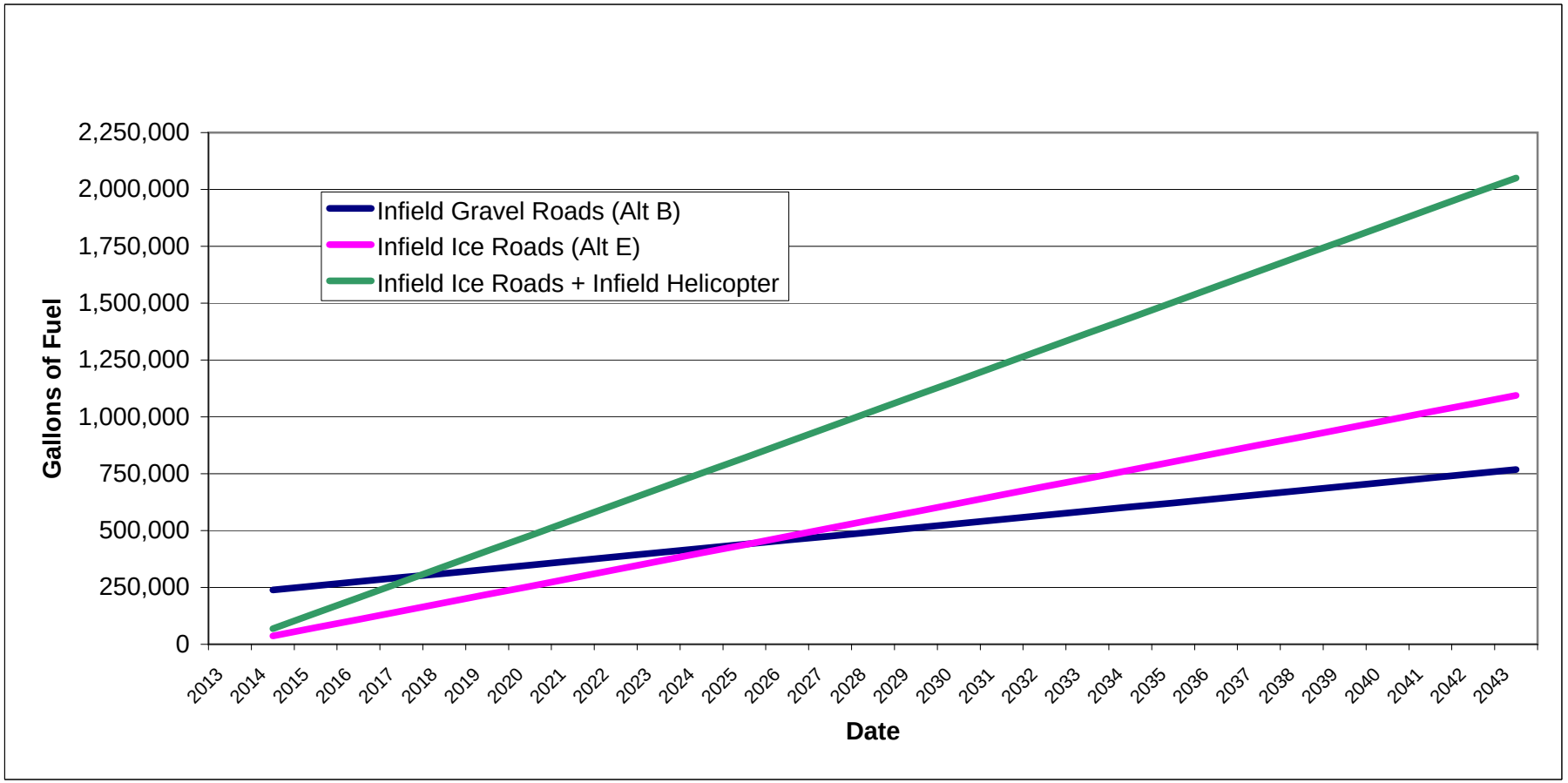


Figure 7: Comparison of Infield Transportation Fuel Usage: Construction, Maintenance, and Operations Alternative E's Infield Ice Roads vs. Alternative B's Infield Gravel Roads



Alt B

West Pad Road Construction= 48,430 Gallons
East Pad Road Construction= 29,310 Gallons
Gravel Mining for West & East Pad Roads= 37,690 Gallons
West Bridge Construction= 77,760 Gallons
Summer Gravel Farming= 45,430 Gallons
Annual Winter Gravel Road Maintenance & Traffic= 15,840 Gallons
Annual Summer Gravel Road Maintenance & Traffic= 3,600 Gallons

Alt E

Anual Ice Road Construction= 22,340 Gallons
Annual Ice Road Maintenance & Traffic= 14,100 Gallons
Annual Infield Helicopter Usage= 31,870 Gallons

Appendix A – Scope of Alternatives Used for the Practicability Matrix

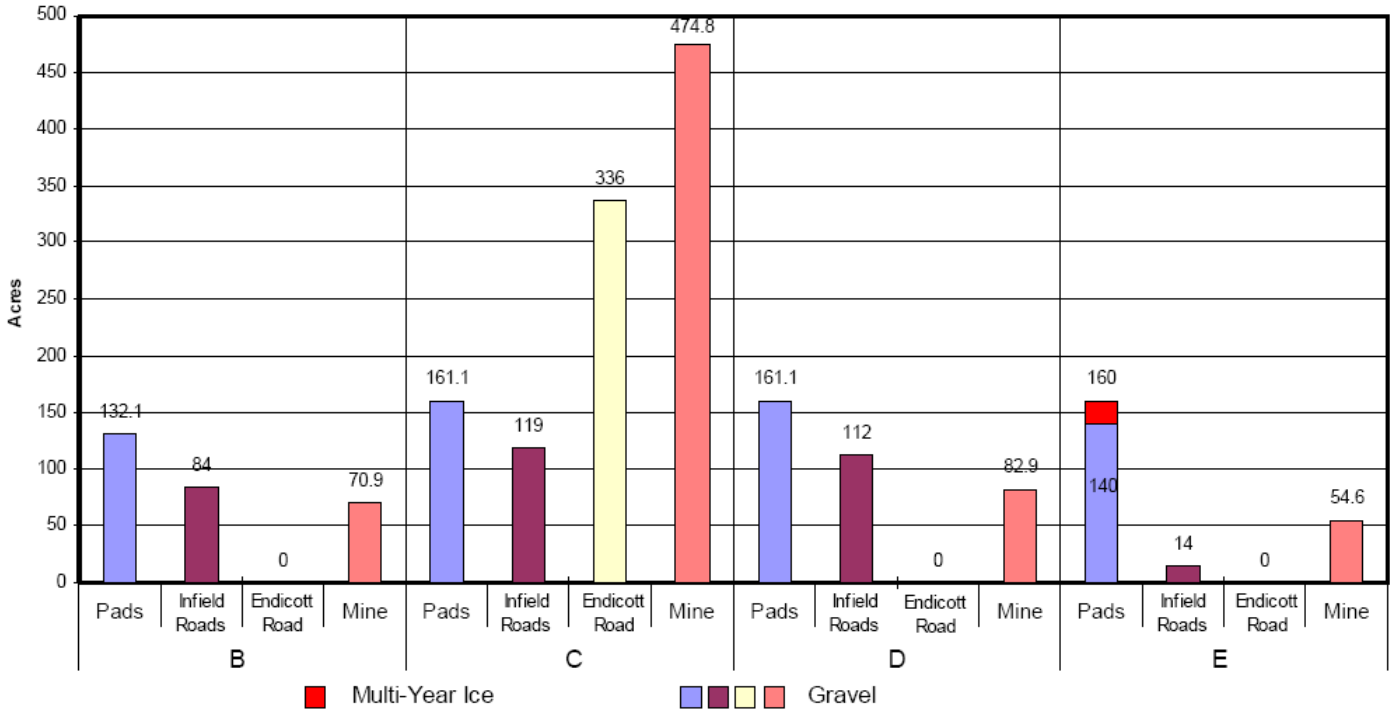
	PDEIS	April 25 Update to Alternative Descriptions	ExxonMobil Exceptions Related to Practicability
Alternative C			
Main Pads	New 36-acre Central Processing Pad - 2 miles inland New 12-acre Central Well Pad near coast New 19-acre East Pad ~ 1/2-mile inland New 19-acre West Pad ~ 1/2-mile inland	Originally-suggested Central Processing Pad and gravel mine transposed Emergency boat launch ramp from Central Well Pad to proposed launch location	49.5-acre Central Processing Pad - at least 1 mile from mine site 28.8-acre Central Well Pad near coast
Air Transport	Helicopter, fixed-wing aircraft (5,600-foot airstrip) 5,600-foot ice airstrip	Eliminated ice air infrastructure Airstrip power line buried in road or elevated on export pipeline	No ice air strip infrastructure assumed Assumed buried power line
Module Transport	42-mile heavy-duty tundra ice road for 1 year only 48-mile optional heavy-duty sea ice road for 1 year only	No change	No change
Gravel Roads	New 44-mile all-season gravel road to Endicott Spur Road New 17 miles of in-field gravel roads	No change	Would require detailed feasibility and risk assessment Additional 42-mile, 35-foot light duty ice road each year of module transport
Infield Pipeline	11 miles of 8-inch heat traced gathering pipelines 2 miles of 10-inch high pressure gas reinjection pipeline	8-inch gathering line only (East & Central Well to Processing Pad) 8-inch gathering, 10-inch reinjection lines (Central Well to Processing Pad) 8-inch gathering and 12-inch export line (Central Processing to West Pad)	Also addressed: 2-mile, 10-inch production line to between Central Well Pad and process pad 2-mile, 12-inch high pressure gast re-injection line
Export Pipeline	New 51-mile, 12-inch export pipeline; tie-in at Endicott	Export pipeline ties in at Endicott; generator at Endicott	No change; river crossings assumed to be on bridges
Water Supply	New insulated & heat traced pipeline on timber sleepers	No water line; water will be trucked for all project phases Water source for construction being identified & roads evaluated	No change for water trucking C-1 mine site assumed as primary water source
Alternative D			
Main Pads	New 36-acre Central Processing Pad - 2 miles inland New 12-acre Central Well Pad near coast New 19-acre East Pad ~ 1/2-mile inland New 19-acre West Pad ~ 1/2-mile inland	Gravel mine located in Applicant's proposed location Emergency boat launch ramp from Central Well Pad to proposed launch location	49.5-acre Central Processing Pad - at least 1 mile from mine site 28.8-acre Central Well Pad near coast
Air Transport	Helicopter, fixed-wing aircraft (5,600-foot airstrip) 5,600-foot ice airstrip	Tundra ice airstrip only for construction Airstrip power provided by power line elevated on export pipeline	No ice air strip assumed Assumed power line is buried
Module Transport	42-mile, heavy-duty tundra ice road for 1 year only 48-mile, optional heavy-duty sea ice road for 1 year only	No change	Would require detailed feasibility and risk assessment Additional 42-mile, 35-foot light duty ice road each year of module transport
Gravel Roads	New 17 miles of in-field gravel roads	No change	No change
Infield Pipeline	11 miles of 8-inch heat traced gathering pipelines 2 miles of 10-inch high pressure gas reinjection pipeline	8-inch gathering line only (East & Central Well to Processing Pad) 8-inch gathering, 10-inch reinjection lines (Central Well to Processing Pad) 8-inch gathering and 12-inch export line (Central Processing to West Pad)	Also addressed: 2-mile 10" production line between Central Well Pad and process pad 2-mile 12" high pressure gast re-injection line
Export Pipeline	New 22-mile, 12-inch export pipeline; tie-in at Badami	No change	No change
Water Supply	New insulated & heat traced pipeline on timber sleepers	Option of pipeline burial in gravel road C-1 mine site as primary water source	No water line assumed No change to C-1 mine site
Alternative E			
Main Pads	New enlarged 73-acre Central Pad near coast New 12-acre gravel East Pad, with 10-acre ice expansion New 12-acre gravel West Pad, with 10-acre ice expansion	Three gravel pads, slightly larger to accommodate drilling equipment & stagging Sealift bulkhead, service pier, associated mooring dolphins, and emergency boat launch ramp from Central Pad Gravel mine located in Applicant's proposed location	Would require detailed feasibility and risk assessment New 15-acre gravel East Pad, with 10-acre ice expansion New 15-acre gravel West Pad, with 10-acre ice expansion
Air Transport	Helicopter, fixed wing aircraft (3,700-foot airstrip) 5,600-foot ice airstrip	Gravel airstrip and helipad; power line on waterline Vertical Support Members (VSMs) Sea ice airstrip only for construction	Helipad at each East and West Pad, with appropriate safety spacing. No sea ice airstrip
Module Transport	Same as Alternative B	No change	No change
Gravel Roads	New 2 miles of gravel roads between airstrip and Central Pad	In-field roads to gravel mine and airstrip	No change
Infield Pipeline	10 miles of 8-inch heat traced gathering pipelines	Infield gathering lines on VSMs designed to accommodate both current and potential future gather lines	VSMs designed for Initial Production System (IPS) only
Export Pipeline	New 22-mile, 12-inch export pipeline; tie-in at Badami	No change	No change
Water Supply	New insulated & heat traced pipeline on timber sleepers	Water pipeline elevated on VSMs C-1 mine site as primary water source	No water line assumed; water trucked for all project phases No change to C-1 mine site
Alternative B			
Air Transport		Gravel airstrip and helipad; no ice air infrastructure	Clarification: The helipad is not a helipad per se, in that it does not have a separate set of approaches and associated equipment. It is a helicopter parking area. Helicopters will use the approaches to the airstrip and then hover over to the helicopter parking area.
Pipelines		Infield gathering lines on supports (VSMs) designed for 8-inch gathering line only (East to Central Pad) or 8-inch gathering and 12-inch export line (Central to West Pad)	Note: There will be VSMs supporting two 8-inch gathering lines and a 12-inch export line from Central Pad to East Pad Junction

	Logistics and Execution	Environmental and Safety	Technology
Alternatives C, D, and E	• Significant additional constraints to already limited logistics: - Significant impacts to schedule and cost. • Delayed construction start due to major re-engineering work. • Extended drilling duration. • Delayed start of production.	• Increased water consumption for construction and operations ice roads. • Limitations to emergency response and implications for safety. • Increased disturbance to wildlife, birds, polar bears, subsistence, and recreation due to increased helicopter/fixed-wing air traffic and extended drilling duration. • Increased potential for disturbance to polar bears and dens due to increased ice road construction, truck traffic, and extended drilling progam. • Increased air emissions, noise and visual impacts due to increased helicopter/fixed-wing air traffic and extended drilling duration.	• Due to lack of industry experience for certain aspects of each alternative, feasibility studies would be required before practicability can be determined.
Alternative C	• Re-engineering of modules. • Sole reliance on ice road and aircraft access during construction and early phases of drilling: - Requires triple handling of modules. - Creates significant logistical and technical limitations for transporting modules, equipment and supplies (especially fuel).	• Increased potential for disturbance to polar bears and dens due to increased ice road and longer infield roads. • Increased hydrological impacts with alignment of infield roads. • Increased number of bridges, stream crossings, major river crossings, and hydrological impacts for Endicott gravel road. • Increased potential for impacts to fish streams due to Endicott gravel road. • Increased disturbance to wildlife and birds due to increased infield roads, gravel pads, and mine sites. • Potential impacts to Central Arctic Herd caribou calving, and to birds due to Endicott gravel road. • Access and competition for subsistence resources due to Endicott gravel road. • Increased water consumption, and potential impacts on polar bear dens due to ice road contruction and use. • Potential for increased disturbance to wildlife, birds, and polar bears due to drilling program extended over additional year • Substantial increases in helicopter/fixed wing air traffic during construction and drilling phases of the Project: - Disturbance to polar bears, other wildlife and birds. - Potential for subsistence disruption. - Increases in noise and visual impacts. - Potential for impacts to recreation activity. • Increased noise impacts from extended construction season and extended drilling program • Substantial increases in noise and dust due to in road traffic . • Sealift barge traffic moved to West Dock barge traffic, potentially requires additional dredging. • Substantial increase in labor force and required support for concurrent projects.	• SPMTs have never been used to transport modules 50 miles on ice road (North Slope): - Ice road not ready until March. - Slow speeds (3 mph). - Tundra route would have multiple major river crossings. - Complex and sensitive control systems in Arctic weather. - Significant increase in Project risk. • Non-optimal access to the primarily offshore reservoir and reduced flexibility for drilling targets due to location move of East and West Pads.
Alternative D	• Re-engineering of modules. • Sole reliance on ice road and aircraft access throughout all phases of the Project: - Requires triple handling of modules. - Creates significant logistical and technical limitations for transporting modules, equipment and supplies (especially fuel). - Imposes significant constraints on operations.	• Increased gravel fill for pads and longer infield roads. • Increased dust shadow from longer infield roads. • Increased hydrological impacts with alignment of infield roads. • Increased water consumption, and potential impacts on polar bear dens due to bi-annual ice road contruction and increased truck traffic. • Potential for increased disturbance to wildlife, birds, and polar bears due to drilling program extended over three years. • Significant increase in air traffic during all phases of the Project: - Disturbance to polar bears, other wildlife and birds. - Potential for subsistence disruption. - Increases in noise and visual impacts. - Potential for impacts to recreation activity. • Increased air emissions due to increased helicopter/fixed wing air traffic, bi-annual ice road construction and truck traffic, and extended drilling duration over three years. • Sealift barge traffic moved to West Dock barge traffic, potentially requires additional dredging.	• SPMTs have never been used to transport modules 50 miles on ice road: - Ice road not ready until March. - Slow speeds (3 mph). - Tundra route would have multiple major river crossings. - Complex and sensitive control systems. - Significant increase in Project risk. • Non-optimal access to the primarily offshore reservoir and reduced flexibility for drilling targets due to location move of East and West Pads.
Alternative E	• Significant icrease in fixed-wing flights due to smaller airstrip. • Extensive helicopter support due to lack of infield gravel roads.	• Increased water consumption for operation's annual infield ice roads. • Potential for substantial subsistence disturbance for the life of the Project due to heavy dependence on helicopter transportation between coastal pads (Central, East, and West) • Increased potential disturbance to polar bear dens due to annual operations, ice road contruction and increased truck traffic, and extended drilling duration over three years. • Significant increase in air traffic during all phases of the Project: - Potential disturbance to polar bears, other wildlife and birds. - Potential for subsistence disruption. - Increase in noise and visual impacts. - Potential impacts to recreation activity. • Increased air emissions due to increased helicopter/fixed-wing air traffic, annual infield ice road construction and truck traffic, and extended drilling duration over three years. • Limitations to emergency response: - Medical emergencies. - Major spill response.	• Limited industry experience with multi-season ice pads on the North Slope: - Used on two projects for *short-term* exploration purposes only. - Yukon Gold: used only to extend exploratory drilling season; included 6 inches of ice with insulation board on top. • No experience for construction, maintenance and operation of a thick (nominal 5 feet – for a common work surface elevation) ice pad that would have to be in service for over 5 years.

Key:
mph - mile per hour
SPMTs - Self Propelled Module Transporters

Appendix C - Example Practicability Bar Charts

Wetlands Fill



Alternative B

Mines 57.2-acre Mine Site, 13.7-acre Stockpile
Pads & Airstrip 1,573K CY, 132.1 Acres
Infield Roads 12 Miles, 627K CY= 84 Acres

Alternative C

Mines **Infield Roads/Pads:** 66.8-acre Mine Site, 17.2-acre Stockpile.
Endicott Road: 9 Mine Sites= 360 Acres, 9 ea 50K CY Stockpiles= 30.8 Acres
Pads & Airstrip 1,644 CY, 161 Acres
Infield Roads 17 Miles, 915K CY= 119 Acres
Endicott Road 2,375K CY Gravel Road= 336 Acres

Alternative D

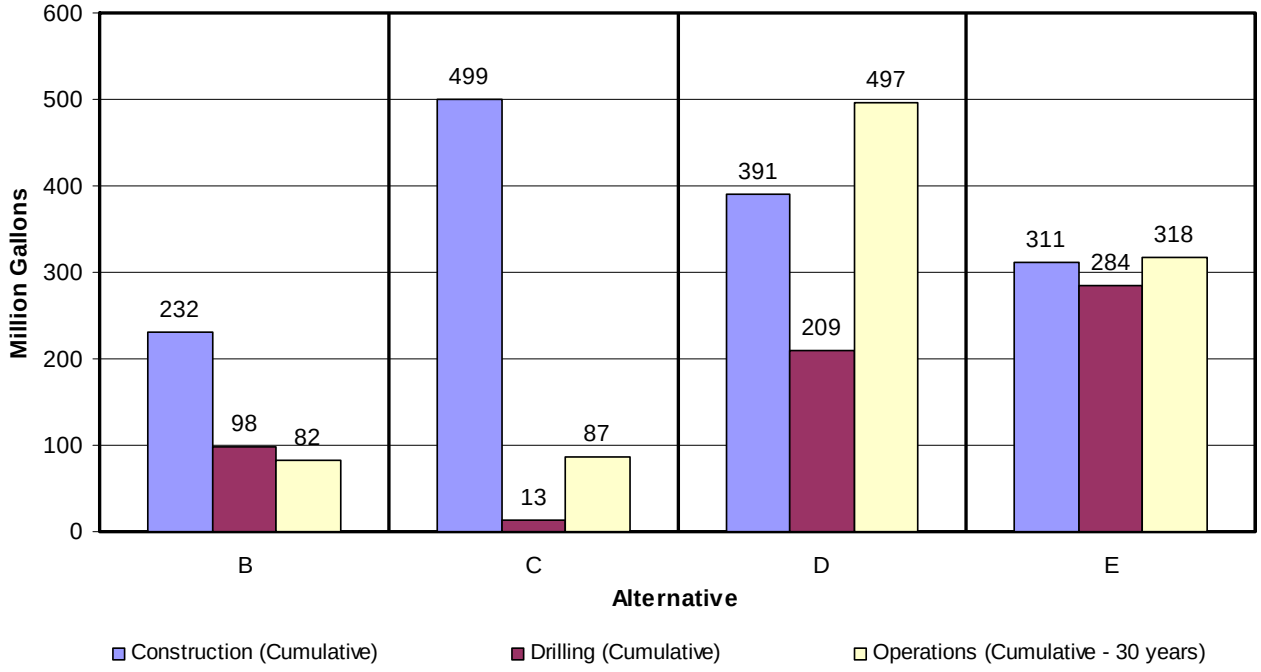
Mines 65.7-acre Mine Site, 17.2-acre Stockpile
Pads & Airstrip 1,658K CY, 161 Acres
Infield Roads 16 Miles, 862K CY= 112 Acres

Alternative E

Mines 43.2-acre Mine Site, 11.4-acre Stockpile
Pads & Airstrip 1,592K CY, 140 Acres
Infield Roads 2 Miles, 108K CY= 14 Acres

Appendix C - Example Practicability Bar Charts

Water Consumption



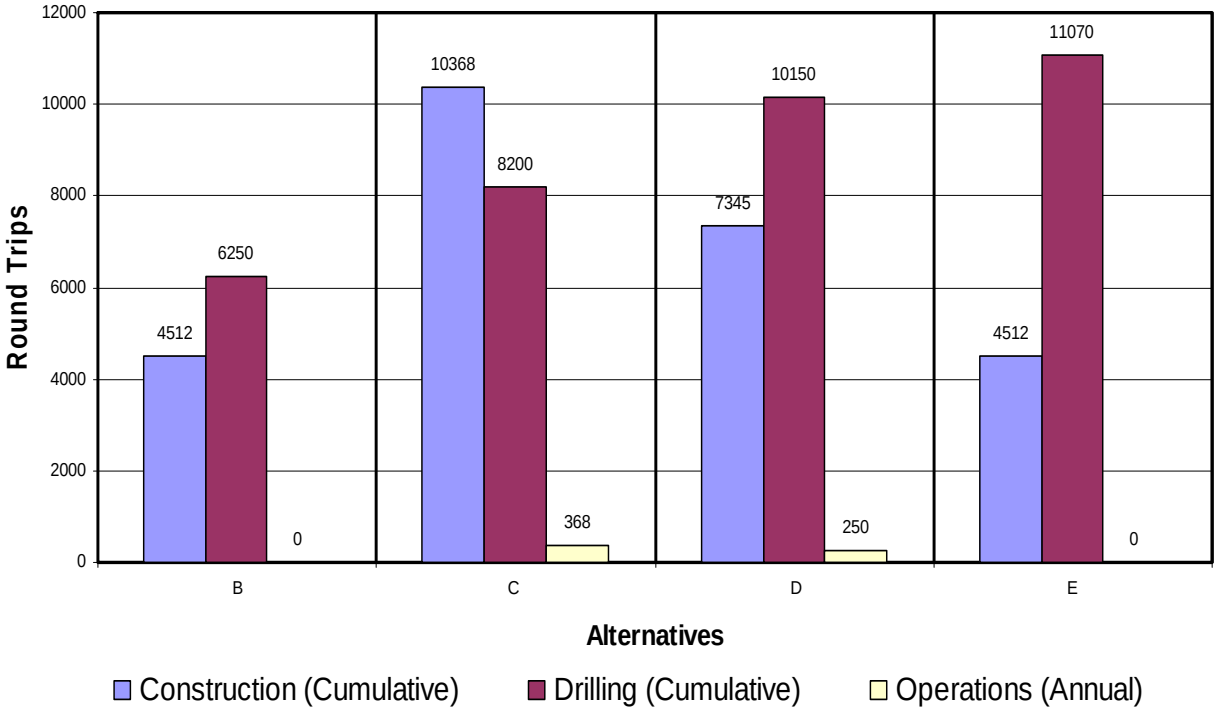
Construction:
The most significant drivers between each Alternative are the differences in ice road and maintenance requirements to execute each alternative. Alternative C & D require two ice roads for each year of construction, as well as additional construction workforce. Alternative E is mostly driven by infield ice road construction and multi-year ice pad construction on the East and West Pads.

Drilling:
Similar to construction, drilling water consumption is primarily driven by ice road and pad differences. The secondary driver is the schedule extensions and required water to support people and equipment consumption for an extended period of time. Alternative C does not have any drilling associated ice roads; therefore, the difference is a result of the extended drilling schedule. Alternative D will require an ice road for each of the 2 years drilling extends beyond the Alternative B drilling schedule. Alternative E will require an ice road to Endicott each of the 2.5 years of schedule extension, as well as infield ice roads for each year of schedule extension.

Operations:
Operational water consumption differences and also driven primarily by differences in ice road requirements. Alternative C does not require any ice roads due to the use of the gravel road to Endicott, but it will require additional operations staffing to manage the gravel road. Alternative D is assumed to require an ice road every other year to Endicott for operations resupply due to the lack of barge resupply access. Alternative E water consumption is a result of the annual infield ice road consumption.

Appendix C - Example Practicability Bar Charts

Logistics – Land Transport

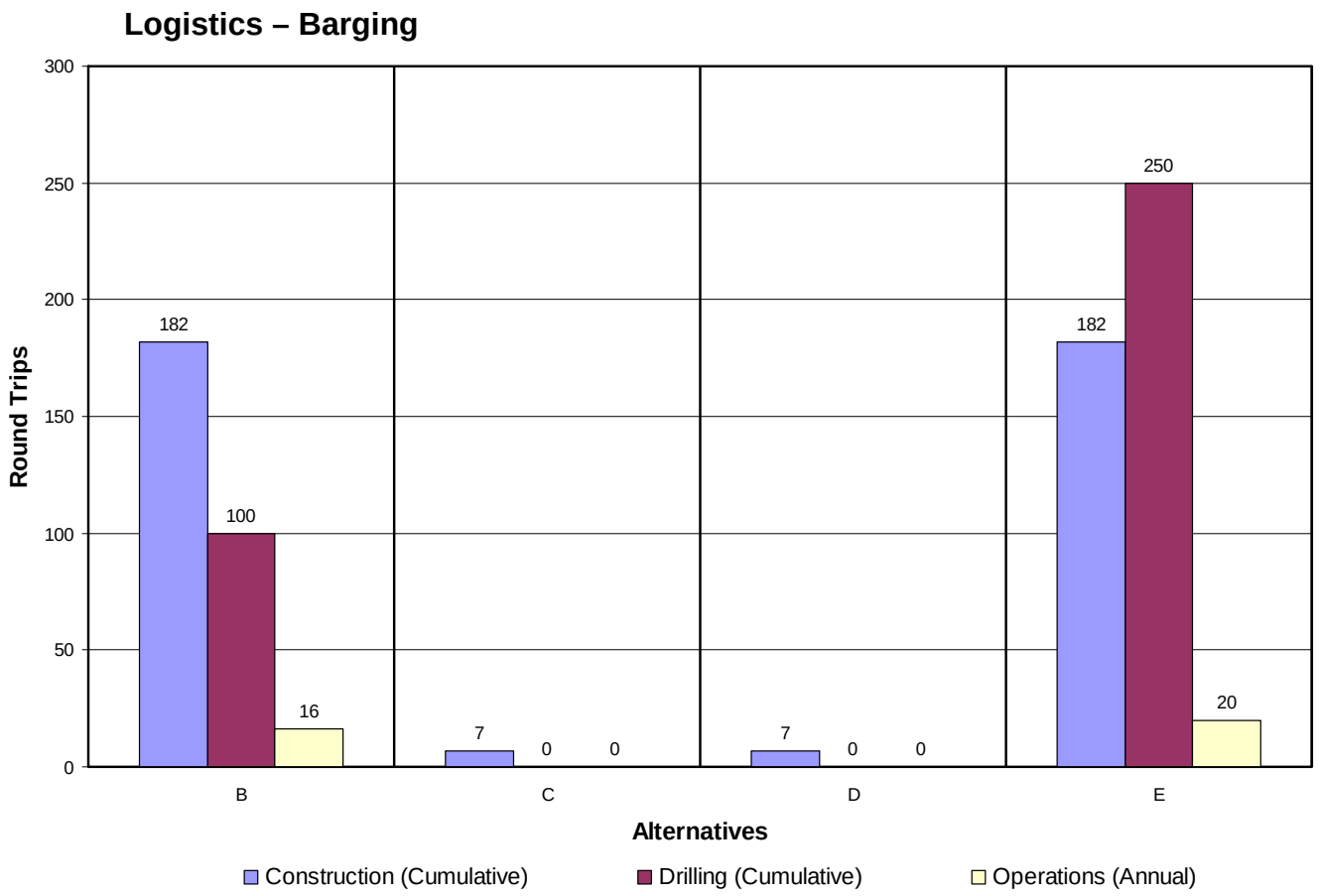


Construction:
The overall drivers affecting the volumes of trucking via road and onward via ice roads to and from Point Thomson are the scenarios of Alternatives C and D eliminate the coastal barging. This drives the cargo back onto trucks in the limited 3-month season of ice road transport. Alternative C also has a larger civil scope in the building of the all season gravel road from Endicott to Point Thomson. This scope requires more land transport to support this construction effort. Approximately 10 or more truck loads per potential coastal barge movement are forced back to ice road transit as individual loads. Alternative C and D will require ice road traffic of 19 smaller modules of up to 1,300 tons per module in place of the previous four production modules that would have shipped via larger sealift barges directly to Point Thomson.

Drilling:
The overall drivers affecting the volumes of trucking via road and onward via ice roads to and from Point Thomson are the scenarios of Alternatives C and D eliminate the coastal barging. This drives the cargo back onto trucks in the limited 3-month season of ice road transport. The lack of infield gravel roads in Alternative E requires extended years of drilling with multiple mobilizations of equipment and materials from a 3-year program to 5.5 years. There is also more trucking to offset limited airfield in Alternative E.

Operations:
The overall drivers affecting the volumes of trucking via road and onward via ice roads to and from Point Thomson are the scenarios of Alternatives C and D that eliminate the coastal barging. This drives the cargo back onto trucks in the limited 3-month season of ice road transport. There is also more trucking to offset limited airfield in Alternative E.

Appendix C - Example Practicability Bar Charts



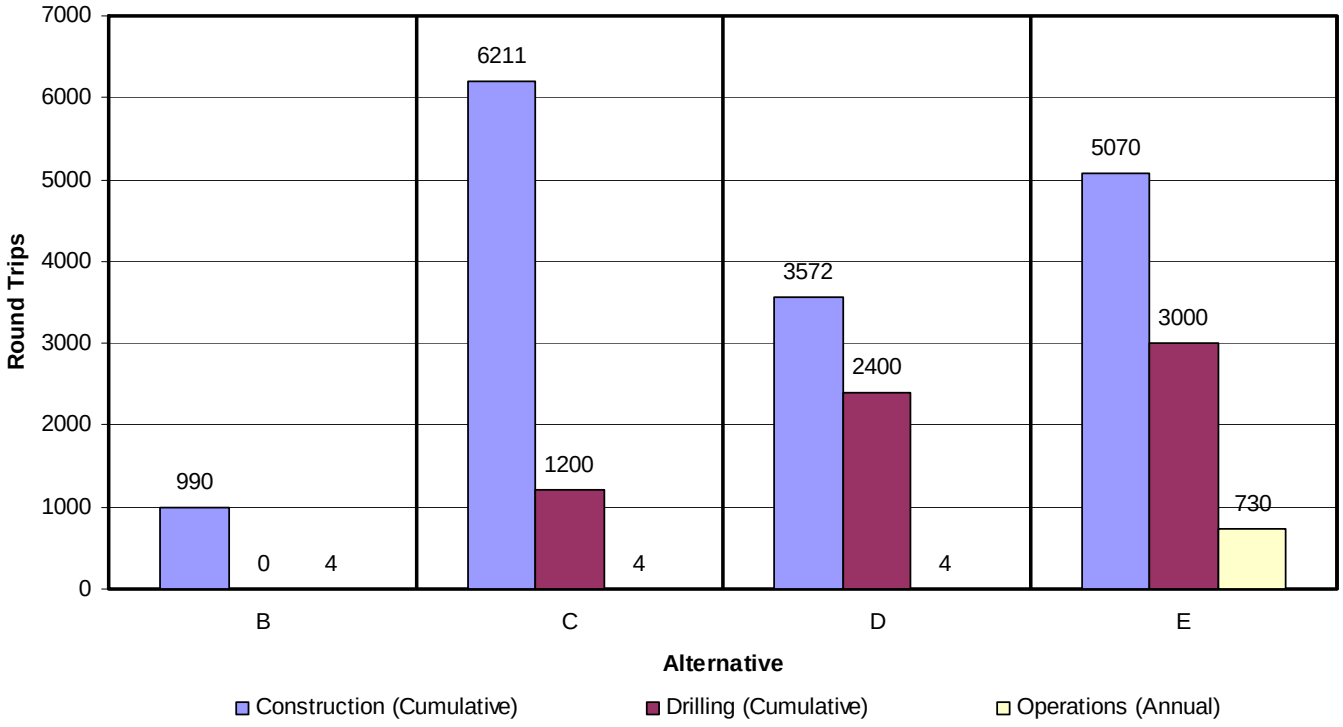
Construction:
The elimination of barging in Alternatives C and D push the potential coastal barge traffic to ice road transport. The Sealift barges will offload “Truckable” size modules of up to 1,300 tons at Prudhoe Bay, where they must be stored and preserved on gravel pads (as yet to be determined) until the winter ice road seasons. These 19 (+ -) modules will transit via Self Propelled Module Transporters (SPMTs) on heavy haul ice roads and require diversions of the other truck traffic to bypass ice roads.

Drilling:
The elimination of barging in Alternatives C and D pushes the potential coastal barge traffic to ice road transport. The lack of infield gravel roads limiting drilling activities during any year requires a longer drilling program, with the associated barge resupply and mobilizations in Alternative E. The abbreviated airstrip limits air freight resupply and forces these volumes to barge and truck shipment.

Operations:
The elimination of barging in Alternatives C and D pushes the potential coastal barge traffic to ice road transport. This will require more frequent ice road building for resupply for these alternatives. It will also require more barging in Alternative E due to a shorter airfield runway and resulting use of smaller capacity cargo aircraft.

Appendix C - Example Practicability Bar Charts

Logistics – Helicopters

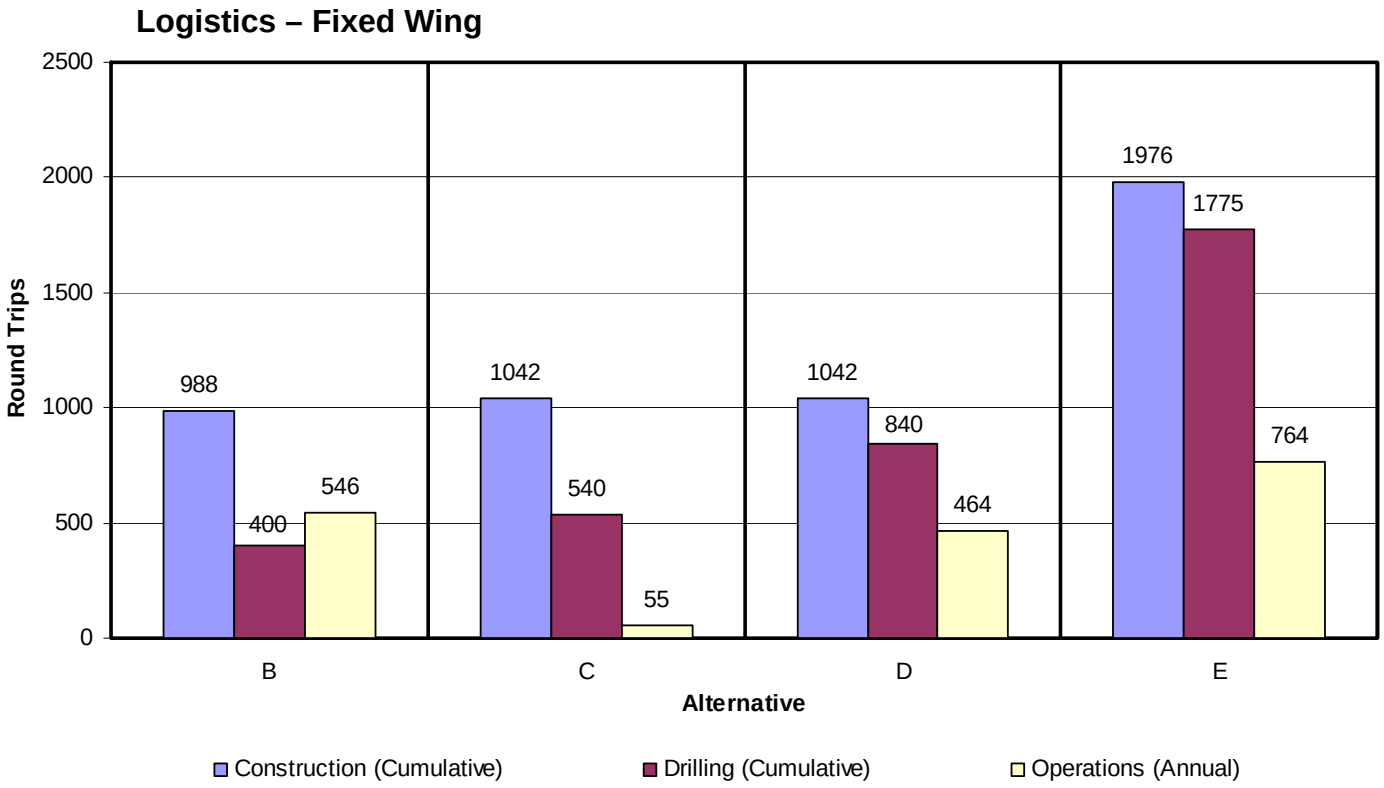


Construction:
The all season gravel road in Alternative C will require extended helicopter support for workforce rotation. The completion of the permanent airstrip at Point Thomson also increases the need for longer helicopter support that would have been converted to fixed wing a year earlier in both Alternatives C and D. Alternative E forces more flights via helicopter for 9 months of the year to access the East and West Pads until the infield ice roads are established. A full-time helicopter base would be established with base, hangers, fuel, and crews to support the daily round trips to the satellite pads.

Drilling:
Drilling will require the support of helicopters in place of fixed-wing aircraft for part of the multiple mobilizations of work force and crew. Alternative E forces more flights via helicopter for 9 months of the year to access the East and West Pads until the infield ice roads are established. A full-time helicopter base would be established with base, hangers, fuel, and crews to support the daily round trips to the satellite pads.

Operations:
Operations will require the support of helicopters. Alternative E forces more flights via helicopter for 9 months of the year to access the East and West Pads until the infield ice roads are established. A full-time helicopter base would be established with base, hangers, fuel, and crews to support the daily round trips to the satellite pads.

Appendix C - Example Practicability Bar Charts



Construction:
The significant increases in fixed wing traffic are a result in the shorter 3,700-foot airstrip of Alternative E. This will require the use of 15 to 17 passenger aircraft for people and limit cargo aircraft to Twin Otters / Casa type with only a 5,000-pound capacity. The 6,500-foot airstrip allows 30-passenger aircraft and regular cargo aircraft of 24,000-pounds (DC -6), or heavy aircraft with a 45,000-pound capacity (C130 type). This will effectively double required air flights.

Drilling:
The significant increases in fixed-wing air traffic are a result in the shorter 3,700-foot airstrip of Alternative E. This will require the use of 15 to 17 passenger aircraft for people and limit cargo aircraft to Twin Otters / Casa type with only a 5,000-pound capacity. The 6,500-foot airstrip allows 30-passenger aircraft and regular cargo aircraft of 24,000 pounds (DC -6), or heavy aircraft with a 45,000-pound capacity (C130 type). This will effectively double required air flights.

Operations:
The significant increases in fixed-wing air traffic are a result in the shorter 3,700-foot airstrip of Alternative E. This will require the use of 15 to 17 passenger aircraft for people and limit cargo aircraft to Twin Otters / Casa type with only a 5,000-pound capacity. The 6,500-foot airstrip allows 30-passenger aircraft and regular cargo aircraft of 24,000 pounds (DC -6), or heavy aircraft with a 45,000-pound capacity (C130 type). This will effectively double required air flights.

Appendix D – Technical Brief Module Transport Using SPMT's

To move modules over long ice roads involves an increased chance of failures and higher potential impacts to the environment. The risks stem from equipment durability, ice road condition, weather impacts (especially wind and temperature), and fuel and hydraulic fluid management. Failures due to load instability and mechanical breakdowns in a remote area can result in damage to the environment.

Modules weighing over 105 tons are generally not capable of being moved over the Alaska highway system. Roads and bridges cannot sustain the larger loads. Modules up to 5,400 tons have been sea-lifted to the West Dock at Prudhoe Bay and then transported via self propelled module transporters (SPMT's) to their final destination over gravel roads. Within the Prudhoe Bay and Kuparuk Units, gravel roads are especially designed for heavy transports. These roads are wider, flatter (limited inclines), contain more gradual turns, and have stronger bridges and culverts.

Modules have been moved beyond the road system using temporary ice roads for the Alpine field. Ice roads do not have the same load-bearing capacity as gravel roads. Technical studies for the Alpine Project determined that 1,300 tons would be the maximum safe transport weight.

The SPMT systems were not designed for long distance or sustained low temperature hauls. The SPMT's consist of individual units that are tied together in sets to form different configurations to match the size and weight of the module to be carried. One or more of the individual units contains the power systems. These units provide pressurized hydraulic fluid as the motive power to all the other units in the set.

Each tire under the SPMT set can be hydraulically raised or lowered to compensate for irregularities in the road surface and to ensure the immense weight remains evenly distributed. This is done with an automatic leveling system. An overload in any area of the SPMT could result in either the road surface failing or damage to the SPMT and in turn the module. There is even a risk the entire load could list or fall over.

Each tire can be individually turned to control the direction of movement of the load. This is also accomplished with the use of computer controls. Some tires also have a power unit to turn the wheel and provide movement to the load.

This sophisticated and complex system is sensitive to cold temperatures. Therefore, the entire SPMT set must be continuously heated. This reduces the risk of sensors, computers, or hydraulic systems failing. Heat is provided by enclosing the entire trailer with temporary siding and blowing heated air from portable heaters that follow the SPMT's as they move down the road.

Appendix E - Guide to Reading the Practicability Matrix Tables 1A & 1B

DETAILS FOR DEVELOPMENT OF THE SUMMARY TABLE

The Practicability and Environmental Impact Summary Table shows general comparisons between the Applicant's proposed Alternative and the three PDEIS Alternatives. In compiling Summary Tables 1A and 1B, the Point Thomson Project subject matter experts were asked to provide input to the various sections outlined in the table. This input utilized the expert's best professional judgment and relied on the experience and knowledge gained from the 3 years of engineering and planning, as well as the Point Thomson drilling program.

Focus areas include differences in the overall project scope, logistic impacts, such as changes in barge, air, and land traffic, and variations in water consumption and schedule durations. While the tables do not comprehensively identify all of the differences between the Alternatives, the tables do attempt to capture and quantify those differences for which the project scope variations may have a significant environmental or practicability impact.

The Summary Tables rely on the extensive engineering design and execution planning effort ongoing for Alternative B. Using these values as the basis for the Summary Tables, the change in the values for Alternatives C, D, and E were predicted based on project scope differences from Alternative B. The estimated "delta" values shown for Alternatives C, D, and E are factored from the values shown for Alternative B. The estimated "totals" were then totaled from the "delta's" and the Alternative B values.

READING/INTERPRETING THE SUMMARY TABLE

For accuracy and soundness of data, the tables originated as factored changes from the engineered Alternative B. This generated the DELTA Table 1A illustrating an increase or decrease in requirements for the execution of Alternatives C, D, and E as compared to Alternative B. This includes:

- In DELTA Table 1A, each alternative must be evaluated with respect to Alternative B.
- DELTA Table 1A was then summarized across the alternatives into the TOTALS Table 1B showing the cumulative total for each alternative category.
- In TOTALS Table 1B, each alternative can be evaluated separate from one another or without comparison to Alternative B.
- It is important to note that, due to their high level of complexity and simultaneous activities, the schedule comparisons are illustrated as totals in each table.

Table Columns:

Looking across the table, it is divided into six main columns:

1 Column one lists topics/parameters to be compared across Alternatives. These are components of the project scope that are thought to have an environmental impact, or play a significant role in construction, drilling, and operations activities.

2-5 Columns two through five list numeric values associated with a specific impact parameter for Alternative B, C, D, or E, as identified.

Appendix E - Guide to Reading the Practicability Matrix Tables 1A & 1B

6 Column six notes general assumptions made when determining the numeric values listed for the given parameter.

Table Rows:

Looking down the table, the rows are divided into three main categories:

1 The first category focuses on specific design aspects, such as the amount of gravel required, length of roads or pipelines, the required module design, etc.

2 The second category focuses on logistics parameters for movement and support of both people and materials. In the logistics section, each parameter is sub-categorized to further show specific requirements for construction (CONST.), drilling (DRILL.), and operations (OPS.). Values for construction and drilling are inclusive, or cumulative (CUM.), and indicate predicted requirements for the entire duration of construction and drilling. Operations values are shown as annual values (ANNUAL), and indicate predicted requirements on a per year basis.

For the Deltas Table 1A, comparisons between Alternatives are based on these sub-divisions. For example, “DELTA” values for the *construction* sub-category are based off of Alternative B “Planned” *construction* values, and similar for the drilling and operations categories. In both the project design and logistic sections, “DELTA” numbers in parentheses indicate a decrease in the value from Alternative B, and “DELTA” numbers without parentheses indicate an increase in the value from Alternative B.

3 The third category identifies total schedule durations for each Alternative. It should be noted that, across a single Alternative, the years are not additive, because some activities will occur simultaneously. For example, the predicted project schedule for Alternative B does not equal 9 years, which would be the sum Infrastructure, Pipeline, Initial Production System (IPS) Facilities, and Drilling. Therefore, it is important to reference the attached project schedules when determining any cumulative schedule impact for any Alternative.

Point Thomson Project Alternatives Cost Analysis

May 5, 2011

PTP EIS Alternatives Practicability Workshop

(Updated May 11, 2011)

Table of Contents

ESTIMATE BASIS

- Overview
- Comparison from Base Costs to Discounted Present Values
- Present Value "DELTAS" Compared to Alternative B
- Project Construction
- Drilling Program
- Operations (OPEX)

COST DRIVERS

- Overview
- Project Construction
  - → *Facilities*
  - → *Civil / Infrastructure*
  - → *Export Pipeline*
  - → *Gathering Lines*
  - → *Field Wide Support Services (FWSS)*
  - → *Engineering*
  - → *Owners Costs*
- Drilling Program
  - → *Drilling Operations*
  - → *Drilling Support*
- Operations

Estimate Basis – Overview

- The Point Thomson Project (PTP) is comprised of three main components: Project Construction, Drilling Program, and Operations. The cost analysis, execution basis and explanations are outlined according to these main project components and related subgroups

- For each Alternative, these main components have been reviewed, analyzed, and developed by the project team, then merged, scheduled, and examined in total, accounting for simultaneous operations, shared resources and logistical needs, and overall project requirements

- Involved 3 month effort by PTP cost engineers and supported by Project Team personnel from construction, logistics, drilling and operations

- The cost model has been developed and analyzed on a consistent basis with ExxonMobil's proposed Alternative B cost estimating methodology

- Allows for dependable and consistent relative cost comparisons of the alternatives compared with Alternative B

Estimate Basis – Overview Continued

- The Cost Analysis for Alternatives C, D, and E are depicted as "DELTAS" (increases/decreases) compared to the proposed Alternative B

- The cost "Delta" approach was used rather than total costs because ExxonMobil's internal PTP costs and models are proprietary

  - → *Estimates were created in 2011 dollars then escalated to their Nominal values, then discounted to reflect Present Values*
  - → *The first table illustrates the change in costs from their current cost basis, through escalation, and Present Value discounting*
  - → *The second table depicts the estimated DELTAS in terms of their Present Value (Discounted) Costs*

- Cost estimates are all in gross dollars (in millions unless otherwise noted) and are nominal: escalated based on the composite index (weighted average) of the yearly cost indexes of the U.S. Army Corps of Engineers Civil Works Construction Cost Index System (EM 1110-2-1304; updated as of September 2010)

- The results also have been discounted to Present Value terms consistent with the OMB Nominal Discount Rates found in Circular No. A-94 (Revised December 2010)

Estimate Basis – Overview Continued

Cost analysis results for Alternatives C, D, and E compared to Alternative B are listed below in order of severity of impact:

→*Alternative C has a significant overall cost impact and is the most extreme of all the Alternatives*

→*Alternative D has a significant overall cost impact but less severe than Alternative C and greater than Alternative E*

→*Alternative E has a significant overall cost impact but less severe than Alternatives C and D*

- Alternatives C, D, and E are not Practicable and do not meet the Project Purpose and Need in terms of Cost and Schedule

→*The PTP (Alternative B) is a cost challenged project*

→ *Any significant increase in costs adversely impacts the PTP purpose and need of securing a cost effective investment for shareholders*

Comparison from Base Costs to Discounted Present Value

Cost estimates/analysis comparisons were shared in 5/5 meeting discussion. Updated cost comparisons to be provided separately at later date to be agreed with Corps and Cooperating Agencies.

**Definitions in Backup Slide*

Present Value (PV) "Deltas" Compared to Alternative B

Cost estimates/analysis comparisons were shared in 5/5 meeting discussion. Updated cost comparisons to be provided separately at later date to be agreed with Corps and Cooperating Agencies.

Estimate Basis – Project Construction

- Project Construction consists of engineering, procurement, project management, fabrication, logistics and construction activities – everything except the Drilling Program, and prior to Operations, which takes place after the facilities startup and commissioning.

- The Project Construction Estimate for the proposed project plan, Alternative B, has been segregated into the following subgroups, based on the project's Work Breakdown Structure (WBS):
  - → *Facilities*
  - → *Civil / Infrastructure*
  - → *Export Pipeline*
  - → *Gathering Lines*
  - → *Field Wide Support Services*
  - → *Engineering & Owners Costs*

Estimate Basis – Construction Project

- Cost estimates for these groups have been analyzed and categorized by their execution elements, for example:
  - *Production facilities & modules*
  - *Reinjection lines*
  - *Flow-lines*
  - *Diesel Tank Capacity*
  - *Gravel roads & pads*
  - *Airstrips*
  - *Piles*
  - *Foundations*
  - *Bridges*
  - *Culverts*
  - *Marine facilities*
  - *Pipeline specifications*
  - *Metering/pigging skids and modules*
  - *Hydro-tests*
  - *VSMs*
  - *Engineering & Project Team activities*
  - *Et cetera…*
- The correlating resource requirements for the above execution elements have been extracted from the Alternative B estimate, by unit of measure, and delineated accordingly, for example:
  - *Quantities*
  - *Tons*
  - *Miles*
  - *Linear feet*
  - *Square feet*
  - *Gallons*
  - *Cubic Yards*
  - *Haul distances*
  - *Logistical needs (aviation, trucking, barging, tundra travel, etc.)*
  - *Camps & Site Services*
  - *Telecommunications*
  - *Warehousing*
  - *Other Support Services*
  - *Manhours*
  - *Durations*
  - *Costs*
  - *Et cetera…*

Estimate Basis – Construction Project

- Cost benchmarks generated from the resulting matrices of execution elements and associated resource requirements were used to create the majority of the Alternatives Construction Project cost estimates. These were based on the respective execution elements, requirements, implementation strategies, schedules, etc.

- Certain execution elements of Alternatives C, D, or E are not in the Alternative B estimate. For these elements, stand-alone screening-level estimates were generated by subject matter experts, project engineers, and contractors

- These cost benchmarks and estimates were applied to each Alternative, taking into account schedule durations, seasonality, simultaneous operations with the drilling program, and infrastructure and logistical provisions (gravel roads, barging availability, etc.)

Estimate Basis – Drilling Program (Drilling Operations)

- Drilling Operations is comprised of all labor, equipment, material, subcontracts, etc. for the Drilling team including the Rig, tanks, fuel, etc. specific to the Direct drilling operations

- Drilling Operations spend/usage rates have been calculated by the Drilling team based on historical actual costs, current known costs, and estimated resource requirements

- The spend/usage rates were applied to the respective Alternatives, for both Drilling Operational and Standby durations, taking into account seasonal restrictions, available infrastructure, logistics, total measured depth, drilling time, directional complexity, etc.

Estimate Basis – Drilling Program (Drilling Support)

- Drilling Support (similar to the support functions provided to Project Construction by Field Wide Support Services) is comprised of all labor, equipment, material, subcontracts, etc. for the drilling support team that oversees all drilling-specific infrastructure construction and maintenance, for example:
  - *Aviation*
  - *Trucking*
  - *Tundra travel*
  - *Barging*
  - *Fuel Delivery*
  - *Engineering Support*
  - *Camps & Site Services*
  - *Ice Roads & Pads*
  - *Other Support Services*
  - *Et Cetera…*
- Drilling Support estimates have been created by the Drilling Support team based on historical actual costs, current known costs, and estimated resource requirements
- The benchmarks and estimates were applied to the respective Alternatives, taking into account schedule durations, seasonality, operational efficiencies with Project Construction, and infrastructure and logistical provisions (gravel roads, barging availability, etc.)

Estimate Basis – Operations

- The ExxonMobil Operations team will assume control of the PTP after startup and commissioning. For Alternatives C, D, and E they have provided cost estimate DELTAS (increases/decreases) compared to the proposed Alternative B

- The respective Operations cost DELTAS compared to Alternative B are for an operational life of 30 years beyond each Alternative's startup date

- Infrastructure and logistical provisions (e.g. gravel road to Endicott road, barging availability, lack of infield roads, etc.) outlined in each Alternative are key factors driving Operations costs (e.g. air cargo and fixed wing crew transport, helicopters, barging, trucking, ice roads)

- Additionally, annual maintenance requirements and productivity reductions, due to infrastructure restrictions, are important considerations

Cost Drivers – Overview

- The following tables summarize the main cost drivers for the Alternative C, D, and E cost DELTAS (increases/decreases) compared to the proposed Alternative B. They are outlined by the three project components (Project Construction, Drilling Program, and Operations)

  → *For the various cost driver items, categories or activities listed in the attached tables, a qualitative cost impact relative to Alternative B is assigned using a + (increase), - (decrease) or = (no change) as note in the Symbol Key below*

Symbol Key *(relative to Alternative B)*
+ *Increases*
- *Reductions*
= *No Change*

Cost Drivers– Project Construction (Facilities)

ALT - C	ALT - D	ALT - E

Project Construction

Facilities		
+ Separation of process modules	+ Separation of process modules	+ Logistical/execution uncertainties
+ Increased overall module tons	+ Increased overall module tons	+ Escalation (extended schedule)
+ Reduced Design Efficiencies	+ Reduced Design Efficiencies	
+ Increased Fabrication/Installation	+ Increased Fabrication/Installation	
+ SPMT ice road transport	+ SPMT ice road transport	
+ Upgrade to Prudhoe Bay West Dock facilities	+ Upgrade to Prudhoe Bay West Dock facilities	
+ Increased commissioning, startup, CM rqm'ts	+ Increased commissioning, startup, CM rqm'ts	
+ Production Line extension	+ Production Line extension	
+ Pigging module rqm'ts	+ Pigging module rqm'ts	
+ Increases Fuel tank capacity rqm'ts	+ Increases Fuel tank capacity rqm'ts	
+ Logistical/transportation/execution uncertainties	+ Logistical/transportation/execution uncertainties	
+ Escalation (extended schedule)	+ Escalation (extended schedule)	

Symbol Key *(relative to Alternative B)*	
+	*Increases*
-	*Reductions*
=	*No Change*

Cost Drivers – Project Construction (Civil, EPL, GL)

ALT - C	ALT - D	ALT - E
Project Construction		
Civil / Infrastructure		
+ Gravel access road to Endicott (increased gravel qty's, bridges, culverts, mhrs, fuel, etc.) + Increased infield gravel qty's (separation of process pad, etc.) + Increased piles for facilities + Logistical/execution uncertainties + Escalation (extended schedule) - Remove module offloading bulkhead/service dock at PT	+ Increased infield gravel qty's (separation of process pad, etc.) + Increased piles for facilities + Logistical/execution uncertainties + Escalation (extended schedule) - Remove module offloading bulkhead/service dock at PT	+ Logistical/execution uncertainties + Escalation (extended schedule) = pile qty's consistent w/ Alt B = module offloading bulkhead/service dock at PT consistent w/ Alt B - Reduced gravel qty's (no infield roads, etc.)
Export Pipeline		
+ Endicott Pipeline (increased VSMs, ice access roads, river crossings, fiber optic cable, Elec room at Endicott, etc.) + Logistical/execution uncertainties + Escalation (extended schedule)	+ Logistical/execution uncertainties + Escalation (extended schedule)	+ Logistical/execution uncertainties + Escalation (extended schedule)
Gathering Lines		
+ No shared VSMs, ice access road, for West Gathering Line + Logistical/execution uncertainties + Escalation (extended schedule)	+ Logistical/execution uncertainties + Escalation (extended schedule)	+ Logistical/execution uncertainties + Escalation (extended schedule)

Cost Drivers – Project Construction (FWSS, Engr, Owners)

ALT - C	ALT - D	ALT - E
Project Construction		
Field Wide Support Services (FWSS)		
+ Tundra Ice access roads + Fuel + Field Equip, Misc Craft Labor, Scaffolding + Aviation + Trucking + Tundra Travel + Marshalling Yards + Safety & Health Services + Medical & Emergency Services + Firefighting Professional Services + Misc Support Services + Temp Camps & Bldgs + Camp & Site Services + Construction Mgt + Logistical/execution uncertainties + Escalation (extended schedule) - No Coastal Barging	+ Fuel + Field Equip, Misc Craft Labor, Scaffolding + Aviation + Trucking + Tundra Travel + Marshalling Yards + Safety & Health Services + Medical & Emergency Services + Firefighting Professional Services + Misc Support Services + Temp Camps & Bldgs + Camp & Site Services + Construction Mgt + Logistical/execution uncertainties + Escalation (extended schedule) - No Coastal Barging	+ Aviation + Coastal Barging + Trucking + Tundra Travel + Logistical/execution uncertainties + Escalation (extended schedule) - Fuel - Safety & Health Services* - Medical & Emergency Services* - Firefighting Professional Services - Misc Support Services - Temp Camps & Bldgs - Camp & Site Services - Construction Mgt **This is for the IPS only; considerations for the Safety & Emergency Response during Operations are detailed in the Practicability write-up*
Engineering & Owners Costs		
+ Project re-engineering, extended schedule, and carrying costs + Engr/Permitting/schedule uncertainties + Escalation (extended schedule)	+ Project re-engineering, extended schedule, and carrying costs + Engr/Permitting/schedule uncertainties + Escalation (extended schedule)	+ Project re-engineering, extended schedule, and carrying costs + Engr/Permitting/schedule uncertainties + Escalation (extended schedule)

Cost Drivers – Drilling Program

ALT - C	ALT - D	ALT - E
Drilling Program		
Drilling Ops		
+ add'l year of Drilling + seasonal/barging restrictions + increased measured depth & drilling time (due to move inland) + Fuel + equipment (rig, tanks, etc.) + Logistical/execution uncertainties + Escalation (extended schedule)	+ add'l 2 years of Drilling + seasonal/barging restrictions + increased measured depth & drilling time (due to move inland) + Fuel + equipment (rig, tanks, etc.) + Logistical/execution uncertainties + Escalation (extended schedule)	+ add'l 2.5 years of Drilling + seasonal restrictions + logistical restrictions (due to absence of infield roads) + Fuel + equipment (rig, tanks, etc.) + Logistical/execution uncertainties + Escalation (extended schedule)
Drilling Support		
+ add'l year of Drilling + aviation + tundra travel + trucking + Logistical/execution uncertainties + Escalation (extended schedule) - no coastal barging - reduced ice road & camp rqm'ts (gravel access road latter part of program)	+ add'l 2 years of Drilling + ice road rqm'ts + aviation + tundra travel + trucking + Logistical/execution uncertainties + Escalation (extended schedule) - no coastal barging	+ add'l 2.5 years of Drilling + ice road rqm'ts + multi-year ice pads + aviation + tundra travel + trucking + Logistical/execution uncertainties + Escalation (extended schedule)

Cost Drivers – Operations

ALT - C	ALT - D	ALT - E

Operations (OPEX)

Operations		
+ annual maintenance for Endicott gravel road + Trucking (re-supply & personnel transfer) - reduced Cargo & personnel aviation rqm'ts	+ increased Cargo aviation rqmt's (no barging) + increased ice road rqmt's (no barging)	+ increased helicopters & fixed wing aviation rqmt's + increased tundra travel rqmt's + increased barging rqmt's + estimated well downtime (restricted access due to no infield roads)

Backup

Definitions

- **Constant Dollars**
  - *Implies the purchasing power of the dollar remains unchanged over the analysis period. The equivalent of 'what a dollar buys today will be the same in the future'*

- **Nominal (Escalated)**
  - *"Current Dollars"*
  - *Measures costs and benefits for future purchasing power of the dollar. Accounts for future assumed inflation rates. Current or Nominal dollars represent the purchasing power in the year spent. Future costs stated in current dollars are the actual amounts expected to be paid, including amounts caused by future price changes (inflation)*

- **PV (Discounted)**
  - *"Present Value"*
  - *The present value on a given date (2011 for this analysis) of a future payment, or series of future payments, discounted to reflect the time value of money and other factors such as investment risk. Present Value calculations are widely used in business and economics to provide a means to compare cash flows at different times on a consistent "like to like" basis*