ATTACHMENT I
Point Thomson Project-Project Description

Point Thomson Project Description
Export Pipeline Update
June 24, 2010

Since the Point Thomson Project Description was published in October 2009, the Front End Engineering and Design (FEED) process has progressed and resulted in a higher level of Project detail, with a better understanding of how the different elements fit together. The table below summarizes the notable changes associated with the export pipeline since the Project Description was published. With the exception of the changes outlined in this table and included in the export pipeline right-of-way application, the October 2009 Project Description should be used as the reference document.

Project Change	Description of Change	Project Description Section
Export Pipeline Operating Pressure	The Maximum Allowable Operating Pressure of the Export Pipeline system was decreased from 2060 psig to 2035 psig to conform to design temperature corrections.	6.0
Export Pipeline Badami Tie-in Facilities Electrical Power Supply	Electrical power will be supplied to the Project's Badami facilities through a power cable from the Central Pad. A fiber optic cable may also be installed between the two locations to provide a data transmission link to serve as a back up to microwave communication. Both will be supported on the Export Pipeline's VSMs.	6.0
Export Pipeline Badami Pig Receiving Facilities	The Export Pipeline Badami pig receiving facility will be installed on a new gravel pad approximately 110' x 120' and connected to the existing Badami pad via a short 200' – 300' road. A second small gravel pad (40' x 40' with a cased pipeline crossing) was added approximately 450' south of the Badami Main Pad to facilitate rig crossings associated with Badami's ongoing development. The new pads are shown in Exhibit A of the ROW application.	6.0
Temporary Camps	Additional details regarding Temporary Camps are being determined. Construction camp capacity needed for the export pipeline will range from approximately 80 to 140 beds to match work loads. The construction camp for installation of the export pipeline will be staged on the Badami pad or on an adjacent single-season ice pad (location to be determined). Camps during the second season of export pipeline construction may be co-located with facilities construction camps at Point Thomson.	7.1.2
Telecommunications Facilities	Additional details regarding specific telecommunications facilities are being developed, including the possible addition of a new communication tower at Badami, assuming that the availability of the Badamai Tower is not certain, and that its current structure is not suitable for additional communications facilities.	7.3.6
Construction Timeline and Workforce Requirements	The workforce requirements are being adjusted based on an updated construction timeline and more complete Project details. The construction workforce for installation of the export pipeline will range from approximately 140 to 210, with construction of the pipeline taking place over two winter seasons (January 2012 – April 2012 and January 2013 – April 2013).	11.0

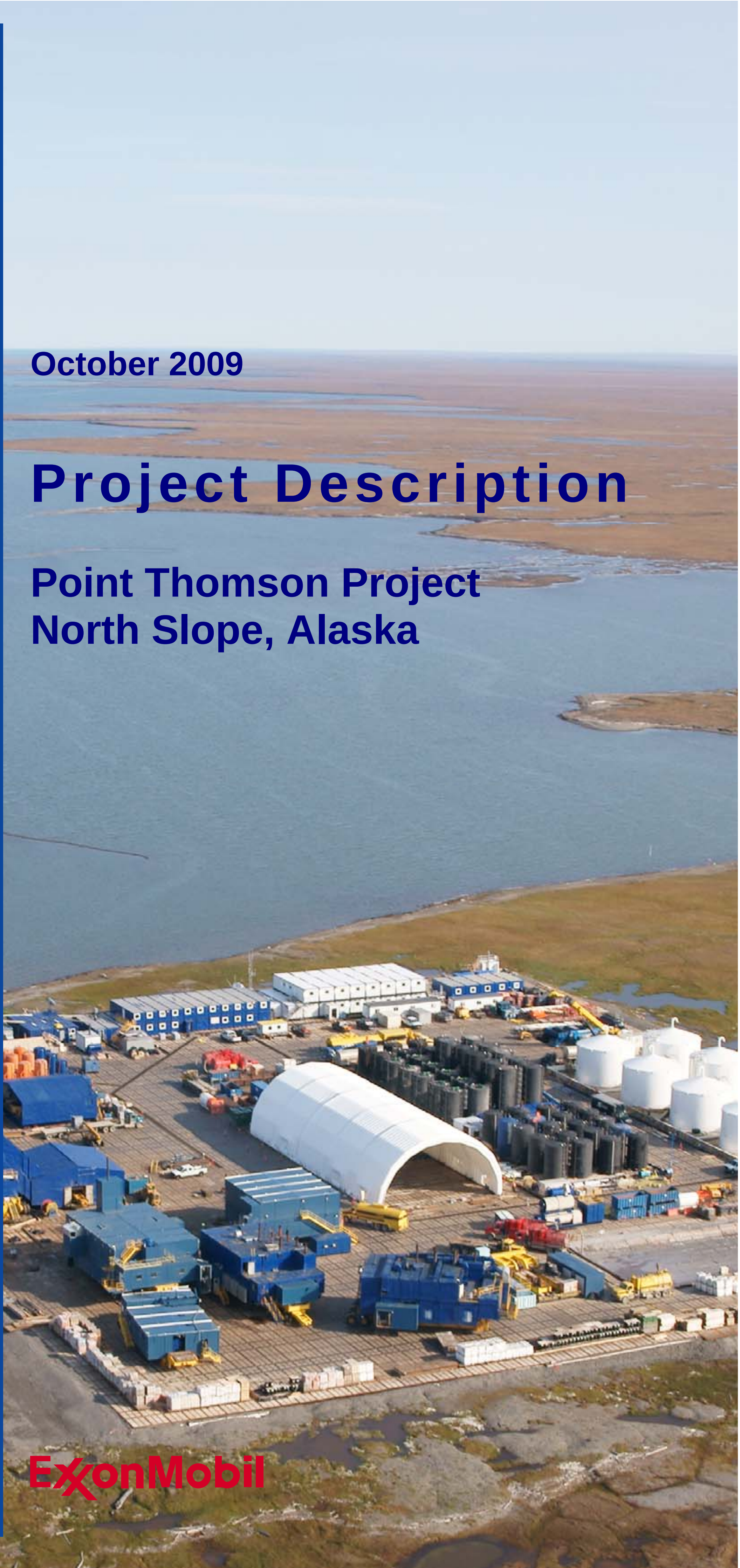




October 2009

Project Description

Point Thomson Project
North Slope, Alaska



ExxonMobil

POINT THOMSON PROJECT
DEPARTMENT OF THE ARMY
APPLICATION FOR PERMIT

PROJECT DESCRIPTION

October 2009

Exxon Mobil Corporation
3301 C Street, Suite 400
Anchorage, AK 99503

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APPENDIX

LIST OF FIGURES

(Note: Figures are located at the end of their corresponding sections.)

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

^{o}F	Degrees Fahrenheit
ACMP	Alaska Coastal Management Program
ACS	Alaska Clean Seas
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
APDES	Alaska Pollutant Discharge Elimination System
BMP	Best Management Practice
bpd	barrels per day
CCR	Central Control Room
CO_2	Carbon Dioxide
CPF	Central Processing Facility
ExxonMobil	Exxon Mobil Corporation
FAA	Federal Aviation Administration
FEED	Front End Engineering Design
HMI	Human/Machine Interface
HP	High-Pressure
kW	kilowatt
LP	Low-Pressure
MHW	Mean High Water
MLLW	Mean Lower Low Water
mmscfd	million standard cubic feet per day
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NSB	North Slope Borough
PBX	Private Branch Exchange
O&M	Operations and Maintenance
ODPCP	Oil Discharge Prevention and Contingency Plan
OIMS	Operations Integrity Management System
PCS	Process Control System
Project	Point Thomson Project
psig	pounds per square inch gauge
RF	Radio Frequency
ROW	Right-of-Way
SOP	Standard Operating Procedures
SPMT	Self Propelled Module Transporter
SSH&E	Safety, Security, Health, and the Environment
TAPS	Trans Alaska Pipeline System
UPS	Uninterruptible Power Supply
USACE	U.S. Army Corps of Engineers
VSM	vertical support member
WHRU	Waste Heat Recovery Unit

1.0 INTRODUCTION

Exxon Mobil Corporation (ExxonMobil) is proposing to produce gas and hydrocarbon liquids (condensate and oil) from the Thomson Sand reservoir and delineate other hydrocarbon resources in the Point Thomson area on the North Slope of Alaska. Produced fluids will be processed on site, with condensate and oil being transported by pipeline to existing common carrier pipelines that supply the Trans Alaska Pipeline System (TAPS).

The Project Description details the major design, construction, and operational features of the Point Thomson Project (Project). It has been prepared to support the application for Department of the Army Section 404/10 permit that will be submitted in draft form[1] to the U.S. Army Corps of Engineers (USACE) and to support federal, State of Alaska, and North Slope Borough (NSB) permit applications, processes, and permits issuance; and the National Environmental Policy Act (NEPA) process. The Project Description provides agencies, other interested parties, and the public with the information necessary to understand the Project. A *Point Thomson Project Environmental Report* will be submitted to regulatory agencies, other interested parties, and the public in mid-November 2009 to support permitting and the NEPA process. The Environmental Report will detail alternatives considered by ExxonMobil in the development plan and the environmental and safety mitigation measures incorporated into the Project's design.

A draft Project Description was provided to the USACE – Alaska District, other federal and state agencies, the NSB, and local parties in July 2009 to solicit comments and input as part of the pre-application process. That document contained a summary of the development plan that reflected engineering and environmental evaluations that had been conducted through conceptual engineering. Concurrent with the pre-application process in the summer of 2009, ExxonMobil continued Front End Engineering Design (FEED) work that included a number of optimization studies. The results of the optimization studies are reflected in this Project Description. Comments and input received during the pre-application process have been evaluated by ExxonMobil and are reflected in this Project Description. FEED and detailed engineering work will progress concurrent with the early phases of the NEPA review.

Major components of the Project have been designed and incorporated into the Project to accommodate both proposed and potential future hydrocarbon evaluation and development (oil rim, Brookian oil resources, and gas sales). These Project components include three production pads, process facilities, an infield road system, an export pipeline, infield gathering lines, and an airstrip. Additional detailed information on the Project's components will be available at the conclusion of FEED and during subsequent engineering. Projected dimensions and quantifications in this Project Description will be refined through this process; however, no fundamental changes are expected. These engineering steps should occur during the NEPA and permitting processes, ensuring timely opportunity for agency, stakeholder, and public review.

1.1 ORGANIZATION OF DOCUMENT

The purpose and need for the Project is presented in Section 1.2. ExxonMobil's objectives for safety, security, health, and the environment (SSH&E) are summarized in Section 1.3 and detailed in Section 2.0. The Project is summarized in Section 1.4 and described in more detail in

[1] A final Section 404/10 will be submitted to the USACE in 2010 on a date to be agreed with the USACE.

Sections 3 through 14. Figures are included at the end of each Section. **Appendix A** provides a mining and rehabilitation plan for the Point Thomson Project gravel mine site, as required for the Alaska Department of Natural Resources (ADNR) Material Sales Contract and the Department of the Army (Section 404/10) permit application.

1.2 PURPOSE AND NEED OF PROJECT

The Project will initiate development of the Thomson Sand reservoir and initiate commercial hydrocarbon production by the end of 2014. The Project will deliver condensate and oil to TAPS Pump Station No. 1 at Prudhoe Bay for shipment to market. Initial average production of condensate is expected to be approximately 10,000 barrels per day (bpd). The Project will evaluate other potential hydrocarbon resources in the Point Thomson area – such as the Brookian stratigraphic horizon and the design will include the capability to produce up to 10,000 bpd of oil.

Drilling of two production wells is underway from the existing Central Pad. ADNR has authorized the current drilling program as in the public interest. The current drilling program has been found to be consistent with applicable standards of the Alaska Coastal Management Program (ACMP) and necessary permits and authorizations have been received.

ExxonMobil has committed to the production of condensate and, if viable, oil from the Thomson Sand. The State has accepted this commitment and authorized production by the end of 2014. The Project will achieve this purpose.

Production of condensate and oil resources at Point Thomson serves other public purposes and needs. Development of this resource will help the United States meet domestic energy demand and reduce dependence on foreign sources of oil. Production at Point Thomson will help offset declining production from Alaska's North Slope reservoirs, and will help to maintain the efficiency of TAPS.

The Project will provide economic benefits to the State, NSB, and local communities through the creation of new jobs and tax revenues. The Project will provide an important source of employment for Alaska businesses, workers, and local residents. This will include both temporary jobs during drilling, engineering, procurement, and construction, and long-term jobs supporting permanent operations. The Project will be a source of new revenue for the State of Alaska and the NSB, helping to offset declining revenue from existing hydrocarbon production and facilities.

ExxonMobil believes the Project represents the best plan for field development considering geological, resource, commercial, and legal uncertainties. The Project's design and flexibility accommodates foreseeable options for production by 2014 and beyond.

The Project features a three-pad configuration, the optimum development design for resource recovery, delineation, and conservation, and encompasses the smallest footprint necessary for these purposes. The configuration of the Project is designed to delineate and produce reservoir resources by utilizing long reach directional drilling techniques from onshore pads.

Development of the Point Thomson field's resources beyond 2014 is dependent upon many factors that cannot be determined at present. The Project will provide a flexible footprint for the future.

Point Thomson is the largest discovered, undeveloped natural gas field in Alaska. No pipeline exists to bring Alaska North Slope natural gas to market, and there is substantial uncertainty about whether or when such a pipeline may be constructed. Nevertheless, should such a pipeline be built, natural gas from Point Thomson would be an important energy source for the United States and Alaska. Gas production and delivery into a pipeline is not part of the proposed Project but is addressed in the cumulative effects analysis in the *Point Thomson Project Environmental Report*.

1.3 SAFETY, SECURITY, HEALTH, AND ENVIRONMENTAL OBJECTIVES

Effectively protecting the environment and achieving superior SSH&E performance requires full regulatory compliance and a workplace free from accidents and incidents. The Project will be designed, constructed, and operated in accordance with applicable federal, state, and NSB laws and regulations.

The safety goal for all ExxonMobil employees and contractors working on the Project is "**Nobody Gets Hurt.**"

It is ExxonMobil's policy to conduct our business in a manner that is compatible with the balanced environmental and economic needs of the communities in which we operate. We look for opportunities to reduce our environmental footprint in the design phase of every new project, and we are committed to continuous efforts to improve environmental performance throughout our operations worldwide.

We have communicated our commitment in detail across all business lines and at all levels. ExxonMobil senior management has reinforced these expectations to all business lines through a corporate initiative called **Protect Tomorrow. Today.**

Through this directive it is our goal to achieve superior environmental performance and be recognized as an industry leader who operates responsibly everywhere we do business, and who, in doing so, will **Protect Tomorrow. Today.** Further, it is our vision that the Point Thomson Project will be viewed as the "Standard for Arctic Environmental Excellence."

ExxonMobil's SSH&E Plans are further described in Section 2.0 and related training is discussed in Section 11.2.

1.4 PROJECT SUMMARY

The Point Thomson field is located along the coast of the Beaufort Sea, on the eastern North Slope of Alaska, approximately 22 miles east of the Badami Development and west of the Staines River boundary of the Arctic National Wildlife Refuge (**Figures 1-1** through **1-3**). The Thomson Sand is a high-pressure gas reservoir with a thin oil rim that underlies state lands onshore and state waters offshore. Other hydrocarbon accumulations exist in the Project area and these will be evaluated by the Project to the extent practical.

Drilling and production facilities will be consolidated into three onshore gravel pads connected via gathering lines and roads. Offshore portions of the reservoir will be developed using long reach directional drilling techniques. Consolidating the facilities and using onshore pads reduces the overall environmental footprint and impacts of the Project.

ExxonMobil, working interest owner and operator, is proposing to produce gas from the reservoir recover liquid condensate from natural gas and re-inject the residual gas back into the reservoir; thus, conserving it for future use. This gas cycling process is further described in Section 5.2.

A minimum of five wells will be drilled from three pads: a Central Pad, and East and West Pads located to access the eastern and western extent of the reservoir. Necessary authorizations to drill an injector well and a producer well pair at the Central Pad have been received, and drilling is ongoing.

Wells drilled from the East and West Pads will be designed to penetrate and evaluate the oil rim to determine if production from the oil rim is viable. If the oil rim is determined to be viable, gathering lines will connect the East and West Pads to the Central Pad, and will deliver the produced hydrocarbon stream to the Central Processing Facility (CPF). The Brookian formation will also be evaluated when present.

At the CPF, the three-phase stream (gas, water, and hydrocarbon liquids) from the wells will be separated, and liquid condensate will be recovered. Condensate is the hydrocarbon liquid that condenses from the produced natural gas as pressure and temperature fall below original reservoir conditions during production and surface handling at processing facilities. The separated condensate will be dehydrated and stabilized at the CPF to meet oil pipeline specifications.

The CPF is designed to process approximately 200 million standard cubic feet per day (mmscfd) of natural gas to recover approximately 10,000 bpd of condensate. The facility design includes the capability to produce up to 10,000 bpd of oil, if production from the oil rim is viable.

After separation at the CPF, the produced gas will be conserved by being compressed and re-injected into the reservoir. Produced natural gas will be used as the primary fuel source for the facility, with diesel fuel used for back-up and in case of an emergency. Produced water will be injected into a Class 1 disposal well.

The hydrocarbon liquids (condensate and oil) will be shipped through an approximately 22-mile long, elevated export (sales) pipeline that will be constructed from Point Thomson to Badami. This new pipeline will tie into the existing Badami common carrier pipeline, which connects with the existing common carrier oil sales pipeline system to TAPS Pump Station No. 1.

The Central Pad will also include the infrastructure to support remote operations and drilling including: temporary construction and permanent camps; offices, warehouses, and shops; electric power generating and distribution facilities; diesel fuel, water, and chemical storage; treatment systems for drinking water and wastewater; a grind and inject module; waste management facilities; and communications facilities.

A gravel airstrip will be constructed for all-season transportation and emergency evacuations. To facilitate offloading of sealift modules, a bulkhead and dolphins will be installed, and minor dredging will be conducted. An in-field gravel road will be constructed, but a gravel road between Point Thomson and other Alaska North Slope infrastructure is not planned. Winter ice roads will be used for construction and other activities and in support of operations, as needed. A gravel mine will be developed to support construction. The mined pit will be converted to a water reservoir to provide a freshwater source for operations.

SECTION 1 FIGURES

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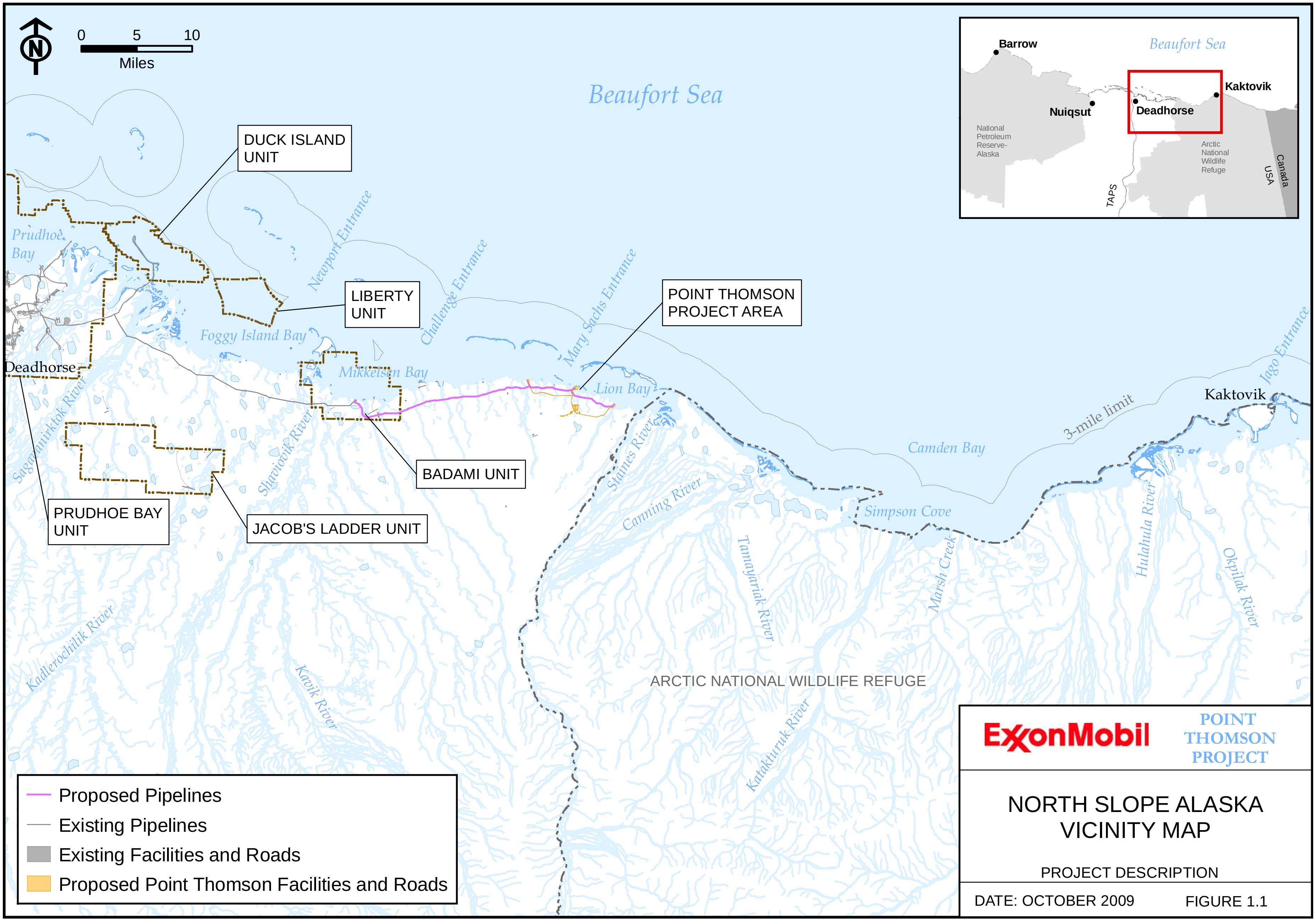

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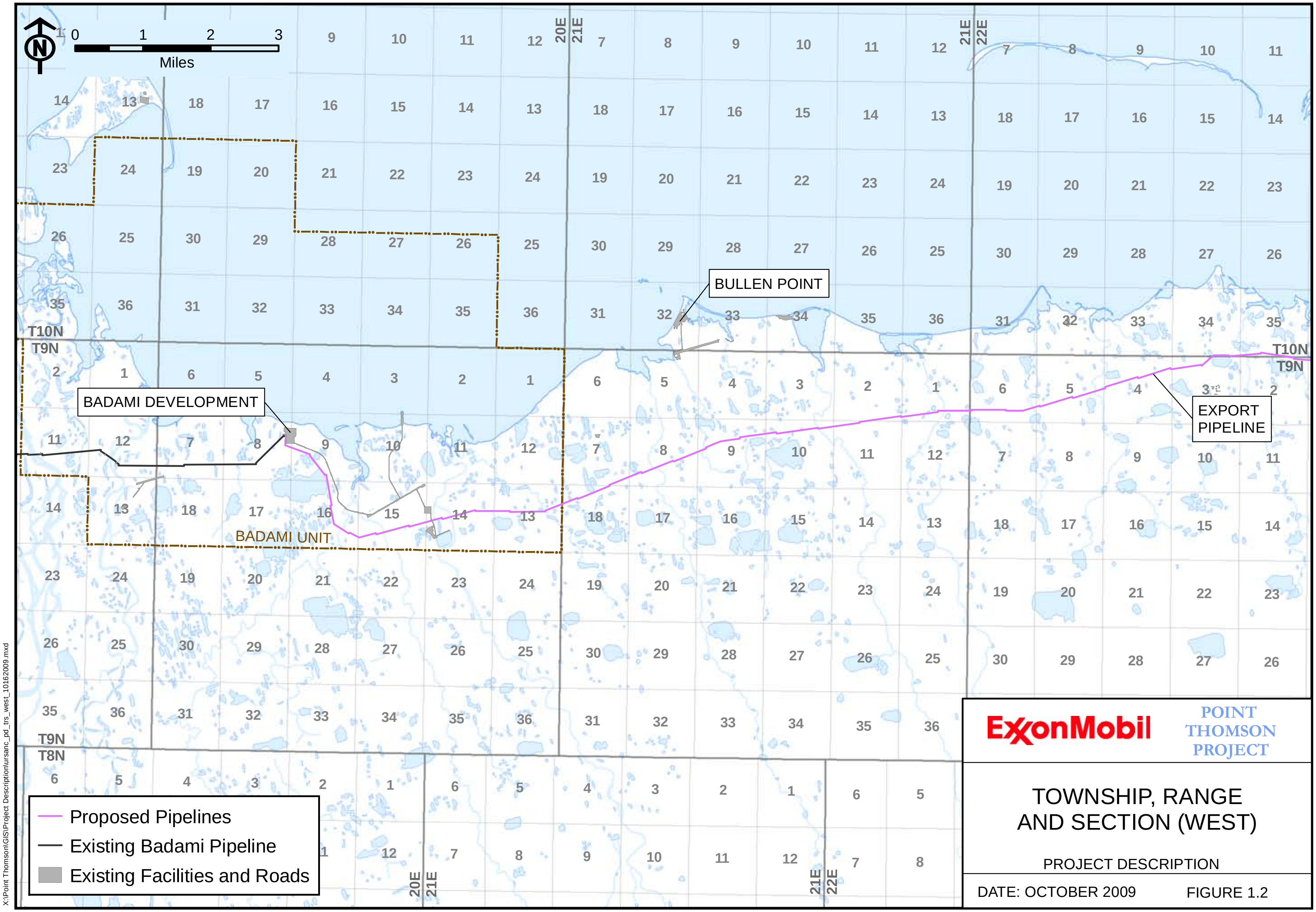
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Proposed Pipelines
Existing Badami Pipeline
Existing Facilities and Roads
ExxonMobil
POINT THOMSON PROJECT
TOWNSHIP, RANGE AND SECTION (WEST)
PROJECT DESCRIPTION
DATE: OCTOBER 2009
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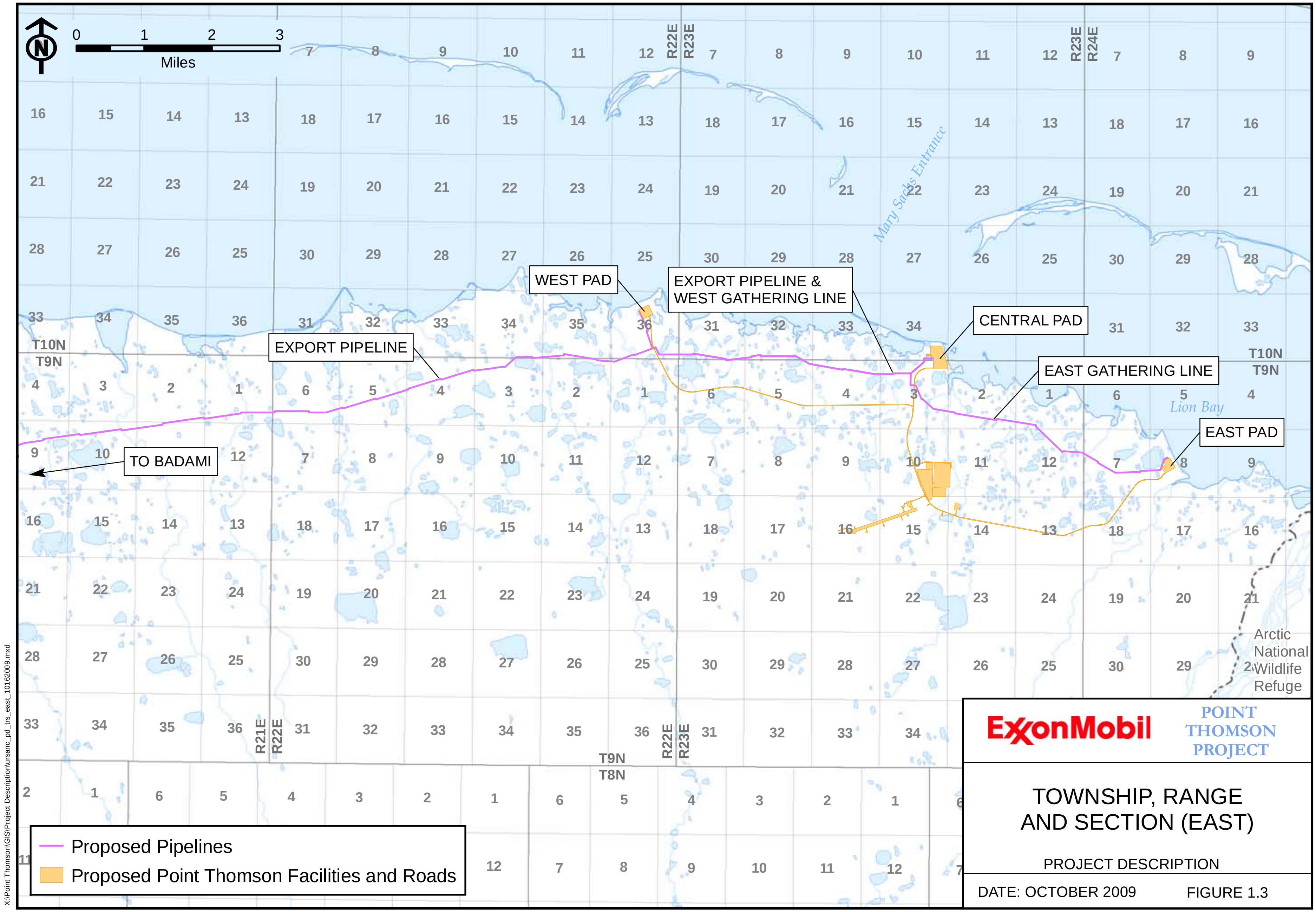
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Proposed Point Thomson Facilities and Roads
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PROJECT
TOWNSHIP, RANGE
AND SECTION (EAST)
PROJECT DESCRIPTION
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2.0 SAFETY, SECURITY, HEALTH, AND ENVIRONMENT PROGRAM AND REGULATORY REQUIREMENTS

ExxonMobil will conduct Project activities and operations in compliance with all applicable federal, state, and local laws and regulations and in a manner compatible with the environmental, socio-economic, and cultural concerns of the local communities. Local traditional and contemporary knowledge will be sought and incorporated into the Project design, construction, and operation (where/as appropriate or feasible).

SSH&E requirements will be specified in overall and site-specific SSH&E plans covering design, construction, and operations. Established standard ExxonMobil systems will be adapted for the Project to provide a systematic approach to the management, monitoring, and influencing of SSH&E concerns. These systems, including constructability and process safety reviews, will apply to all phases of the Project – from drilling and design through decommissioning. These systems will be communicated to contractors to ensure understanding of and compliance with ExxonMobil's philosophy and expectations.

ExxonMobil's Operations Integrity Management System (OIMS) is the overall management system that the Project will employ to deliver superior SSH&E performance and full regulatory compliance. The key elements of OIMS are:

- **Management Leadership, Commitment, and Accountability**: Specific roles and accountabilities.
- **Risk Assessment and Management**: Ongoing risk management.
- **Facilities Design and Construction**: Standards and practices.
- **Information and Documentation**: Drawings and other required documentation.
- **Personnel and Training**: Skill development and maintenance, safety, and health management.
- **Operations and Maintenance**: Procedures and programs including regulatory compliance.
- **Management of Change**: Permanent and temporary changes.
- **Third-Party Services**: Contractor management.
- **Incident Investigation and Analysis**: Root cause identification and global sharing.
- **Community Awareness and Emergency Preparedness**: Response planning and drills and community notifications.
- **Operations Integrity Assessment and Improvement**: Ongoing assessment and findings resolution, as well as continuous improvement.

2.1 SSH&E PLANS

Overall Project and site-specific SSH&E plans will be developed and implemented to ensure that development and operation activities are carried out with maximum SSH&E protection and performance. ExxonMobil's global management systems and practices, along with existing practices developed by Alaska North Slope operators, will be used to develop plans specific for the Project. References that will be used to support SSH&E issues associated with working in the Arctic include the *North Slope Operations Alaska Safety Handbook* and the *North Slope Environmental Field Handbook*.

ExxonMobil's SSH&E plans for Project design, construction, and operations, as well as corporate OIMS standards for delivering outstanding performance, are summarized below.

2.1.1 Design Phase

SSH&E requirements will be incorporated into the design phase of the Project by implementing the following design-related requirements, reviews, assessments, and plans:

- **Hazard and Operability (HAZOP) for Process Hazard Analysis**: This activity identifies inadequacies with respect to process safety and operability of process flow sequences and ensures that they are addressed in subsequent project design phases.
- **Facility Site Reviews**: The Project's conceptual layout and the detailed design layout will be subject to facility site reviews. These reviews will ensure that the location, layout, and orientation of process and utility modules, the control room, camp, wells, and the drilling rig reduce hazards from gas release(s), fire(s), and explosion(s). These will address conditions unique to the area such as Arctic weather, activity of subsistence hunters and the presence of wildlife, such as polar bears.
- **Design Readiness Review**. These reviews will be conducted by engineering functions to assist project teams in assessing that adequate progress and plans are in place to proceed to the next design execution phase.
- **Independent Project Review (IPR)**: Independent project reviews (peer reviews) will be conducted by experienced professionals not associated with the Project. These will be done at specific steps in the Project development process to ensure the readiness of the Project to proceed to the next phase (Design → Construction → Operation).
- **Constructability Reviews**: These reviews incorporate construction knowledge into the Project's design. Construction-related hazards found during these reviews will be addressed in subsequent design phases, allowing for engineered solutions to be employed to ensure safety.
- **Human Factors:** This activity is intended to improve safety and operating effectiveness through the review of the engineering design and construction plan for the facility and equipment, work environment, and anticipated physical activities.

2.1.2 Construction Phase

Established safe construction practices, together with a strong quality control/quality assurance program, will be used to ensure the health and safety of project personnel and the public, and the protection of the environment during the construction and commissioning of the facility and the export pipeline.

Construction techniques, plans, and personnel training will be implemented prior to and during construction to maximize health and safety protection and reduce environmental impacts. These are addressed through the Arctic Pass training program which is discussed in Section 11.2.

2.1.3 Operations Phase

All necessary systems (e.g., procedures and documentation) for the Project to be started up and operated in a safe, efficient, and environmentally sound manner will be developed and implemented. ExxonMobil Production Company's proven global best practices for new operations, which is referred to as "Build the Production Organization", will guide this effort. Operations personnel will be properly trained to perform their project-specific duties. ExxonMobil's *Production Reference Manual for New Operations* establishes operations system requirements to be in place prior to start-up.

Implementation of these requirements will ensure that all necessary systems are in place and that the new operating organization benefits from "best practices" derived from both local and global operating experience; these requirements for management processes, operating procedures, and documentation for new organizations are established by worldwide ExxonMobil standardized best practices and operating experience; these incorporate ExxonMobil management systems modified for specific local requirements. Line management is accountable for ensuring that all necessary procedures and documents are implemented before start-up commences.

2.2 SECURITY

Although Point Thomson is located in a sparsely populated area and will not be connected to other Alaska North Slope operations by gravel road, appropriate security measures will nevertheless be implemented. Security plans include controlling direct site access, controlling access to ice roads, controlling air access to the helipad and landing strip, and coordinating with local and state police agencies regarding any unusual security concerns or events. As with other Alaska North Slope industrial facilities, public access will be managed to ensure public and facility safety and security. Security mechanisms and protocols will be in place to discourage or prevent vandalism or other intentional acts to the facility and its infrastructure.

Residents and area hunters will be able to transit and conduct traditional subsistence activities in the Project area. ExxonMobil understands the frequent and customary use of this area by residents for hunting, fishing, recreation, and travel. Residents of Nuiqsut and Kaktovik will be consulted to determine appropriate guidelines to allow hunting in the vicinity of the pipeline and other production facilities, as well as access to the camp itself.

During drilling and construction activities, the workforce at Point Thomson will be much larger and traffic will be substantially higher than during the operations phase. Temporary (seasonal) ice roads will link Point Thomson to the Prudhoe Bay infrastructure during drilling, construction and, perhaps, occasionally during operations, depending on logistics needs. Use of the ice road by residents of the area is permitted; however, it will be necessary for all travelers to register at the Point Thomson security check point when ice road access is available. Security plans for drilling, construction, and operating phases will be developed as part of the Project Execution Plan; this will include consulting with local residents in its development.

2.3 ENVIRONMENTAL GOALS

The Project will comply with ExxonMobil's environment policy, which is to conduct business in a manner that is compatible with the balanced environmental and economic needs of the communities in which ExxonMobil operates. ExxonMobil is committed to continuous efforts to improve environmental performance. ExxonMobil's environmental objectives are best summarized through its "**Protect Tomorrow Today."** environmental excellence initiative. Effective implementation of **Protect Tomorrow. Today.** will enable achieving ExxonMobil's Point Thomson vision, which is to "**Be the Standard for Arctic Environmental Excellence."**

Environmental considerations and issues will arise throughout the permitting process, the NEPA compliance process, and Project implementation. These will be addressed by working closely with stakeholders to address concerns regarding potential environmental impacts. Specific Project environmental considerations, issues, and mitigation measures are described in the *Point Thomson Project Environmental Report,* which addresses the following:

- Subsistence use and other local community issues
- Archaeological sites and other culturally important sites and resources
- Caribou herd migration, insect relief, and calving
- Grizzly bears and other terrestrial mammals
- Birds (including threatened and endangered species)
- Polar bears, whales, and other marine mammals (including threatened and endangered species)
- Fish and fish habitat
- Air quality
- Noise
- Visual impacts
- Climatic conditions
- Water quality and quantity
- Wetlands
- Spill prevention and response planning
- Mining and placement of gravel fill
- Waste management
- Shoreline protection
- Tourism and recreation use in nearby areas

These and other environmental issues have been considered during conceptual engineering and engineering optimization. This has assisted in refining mitigation measures that reflect more detailed design information and are based on a current understanding of agency and public concerns.

2.4 REGULATORY REQUIREMENTS

Federal, state, and NSB approvals will be required for construction and operation of the Project. A Department of the Army Section 404/10 Permit is required for wetland dredge or fill and placement of structures (i.e., mooring dolphins) in navigable waters. The State of Alaska is the landowner and lessor, and has a key role in authorizing Project land use and resource development, including approval of a Plan of Development and Operations and issuance of a Right-of-Way (ROW) Lease for construction and operation of the export pipeline. An ACMP consistency review is required to ensure conformance with policies and standards of the ACMP. The Project is located within the NSB, and is therefore subject to NSB approvals under the provisions of its Title 19 Land Management Regulations.

Major permits, authorizations, and regulatory reviews required for construction and operation of the Project are listed in **Table 2.1**. This list is not comprehensive, but represents the broad range of regulatory authorizations needed for Project development. Permit applications will address information needs identified during the pre-application and NEPA processes.

Table 2.1 Key Regulatory Actions

Regulatory Action	Regulatory Agency	Project Activity
Federal		
NEPA Review/Environmental Impact Statement	USACE; Lead NEPA Agency	Review of environmental impacts of entire Project, including construction, and operations
Department of the Army Section 404/10 Permit	USACE	Placement of fill onto wetlands and structures in navigable waters
NPDES/APDES General Permit	EPA/ADEC	Wastewater and Stormwater discharges
LOAs for Incidental Take of marine mammals (polar bear and walrus)	USFWS, Marine Mammal Section	Annual LOAs for construction and operations
Section 7 Endangered Species Act Consultation	USFWS	Consultation for spectacled eider, Steller's eider, and polar bears
Essential Fish Habitat Determination	NMFS	Essential Fish Habitat
Section 7 Endangered Species Act Consultation	NMFS	Consultation for bowhead whales, for operations and construction
Spill Prevention, Control, and Countermeasure Plan	EPA	For construction, drilling, and operations
Facility Response Plans	EPA, USDOT	For construction, drilling, and operations
State		
Plan of Development and Operation	ADNR, Division of Oil and Gas	For project development
Alaska Coastal Management Program Review	ADNR, Division of Coastal and Ocean Management	Coastal zone consistency analysis for federal and state permits
Air Quality Control (PSD) for Construction	ADEC	Before construction can commence
Title V Air Permit for Operations	ADEC	Operations air emissions
Drilling waste storage and solid waste disposal facility	ADEC	Waste management
Pipeline Right-of-Way Lease	ADNR, State Pipeline Coordinators Office (SPCO)	Pipeline construction, operations, and termination on state land
Oil Discharge Prevention and Contingency Plan	ADEC	Drilling and operations
Land Use Permit	ADNR, DMLW	Miscellaneous land use (e.g., ice roads)
Temporary Water Use Permit	ADNR, DMLW	Water use for ice roads, drilling, domestic, and construction activities
Material Sales Contract	ADNR, DMLW	Gravel mining
Title 16 Fish Habitat Permit	Alaska Department of Fish and Game	Mine site development, ice road water withdrawal, and stream crossings
Cultural Resources Management Plan	ADNR, State Historic Preservation Officer	Clearance prior to commencing construction

Table 2.1 (cont.) Key Regulatory Actions

Regulatory Action	Regulatory Agency	Project Activity
Local		
Master Plan, Re-zoning and Development Permits	North Slope Borough	For construction and operations within the North Slope Borough

KEY:
ADEC – Alaska Department of Environmental Conservation
ADNR – Alaska Department of Natural Resources
APDES – Alaska Pollutant Discharge Elimination System
DMLW – Division of Mining, Land, and Water (ADNR)
EPA – Environmental Protection Agency
LOA – Letter of Authorization
NEPA – National Environmental Policy Act
NMFS – National Marine Fisheries Service
NPDES – National Pollutant Discharge Elimination System
PSD – Prevention of Significant Deterioration
USACE – U.S. Army Corps of Engineers
USDOT – U.S. Department of Transportation
USFWS – U.S. Fish and Wildlife Service

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3.0 RESERVOIR DEVELOPMENT

The Point Thomson Field is a major hydrocarbon accumulation. The primary reservoir is the Thomson Sand, a large, high-pressure gas-condensate reservoir with a thin oil rim. A total of 19 exploration wells have been drilled in and around the field, and numerous seismic surveys have been undertaken to further delineate resources (**Figure 3.1**). A total of 14 wells have penetrated the Thomson Sand interval.

The Point Thomson Project includes drilling wells, as described in Section 4. The drilling program and its associated activities will provide reservoir quality and performance information for field development and potential facility expansion planning. Where practicable, hydrocarbon resources, including the Thomson Sand oil rim, the Pre-Mississippian section, and the Brookian, will be further delineated and evaluated by the Project.

3.1 GENERAL RESERVOIR DESCRIPTION

The Lower Cretaceous Thomson Sand is a clastic reservoir. The primary depositional processes are inferred to be sediment gravity flows. The Thomson Sand thickness varies widely across the field, ranging to a maximum penetrated thickness of 350 feet. The Hue/HRZ Shale overlies the Thomson Sand and forms a top seal for the hydrocarbon accumulation. The Pre-Mississippian section directly underlies and is in pressure communication with the Thomson Sand. The shallower Brookian sandstones are located above the Thomson Sand. A generalized cross section of the Point Thomson Field is shown on **Figure 3.2**.

The lithologies encountered in the Thomson Sand reservoir range from conglomerates to sandstones to siltstones. Primary controls on reservoir quality include depositional fabric, compaction, and calcite cementation. The hydrocarbon trapping mechanism for the Thomson Sand is a combination of structural closure with a component of stratigraphic trapping.

The carbon dioxide (CO_2) concentration in the natural gas is approximately 4.5 percent. Hydrogen sulfide (H_2S) is absent or present in trace amounts. The hydrocarbon liquids yield is expected to be approximately 50 to 60 barrels of condensate per million standard cubic feet of produced natural gas. A thin, heavy oil rim is located beneath the condensate reservoir, with an oil-water transition zone extending throughout the oil rim.

3.2 PRODUCTION

Wells will be drilled from three onshore pads. As shown on Figure 3.1, the majority of the reservoir lies offshore. Due to the aerial extent of the reservoir and the inability to reach all the bottom hole targets from a single drilling location, three drilling pads are planned. The three drilling locations provide the ability to delineate and evaluate the Point Thomson hydrocarbon resources while providing flexibility for future production. The Central, East, and West Pads have been located to optimize reaching and producing oil and gas using long reach directional drilling techniques from onshore locations. Several factors support using these onshore drilling locations, including using portions of existing pads to reduce the need for additional wetland fill, and avoiding potential adverse environmental impacts associated with offshore drilling structures.

A producer and an injector well pair are being drilled on the Central Pad. At least one delineation/development well will be drilled from both the East and West Pads. A fifth well will be drilled from one of the three pads, depending on results from the previous wells drilled.

The producer well at the Central Pad will be equipped with large bore (nominally 7-inch) tubing to enable high withdrawal rates. Full wellstream production will be processed at a nominal rate of 200 mmscfd, from which the condensate will be separated and stabilized. Once the condensate is removed, the separated gas will be compressed and injected into the Thomson Sand through the injection well at the Central Pad. The condensate production profile is currently anticipated to be relatively level for about 10 years, before declining modestly during the remainder of field production.

Delineation/development wells will be designed to penetrate the oil rim. This zone will be evaluated, sampled, and tested, as appropriate. If production from the oil rim is viable, the well(s) will be tied into the CPF. Producing these wells would allow additional dynamic reservoir performance data to be collected across the eastern or western portions of the field and they could be used for subsequent development activity (**Figure 3.3**).

SECTION 3 FIGURES

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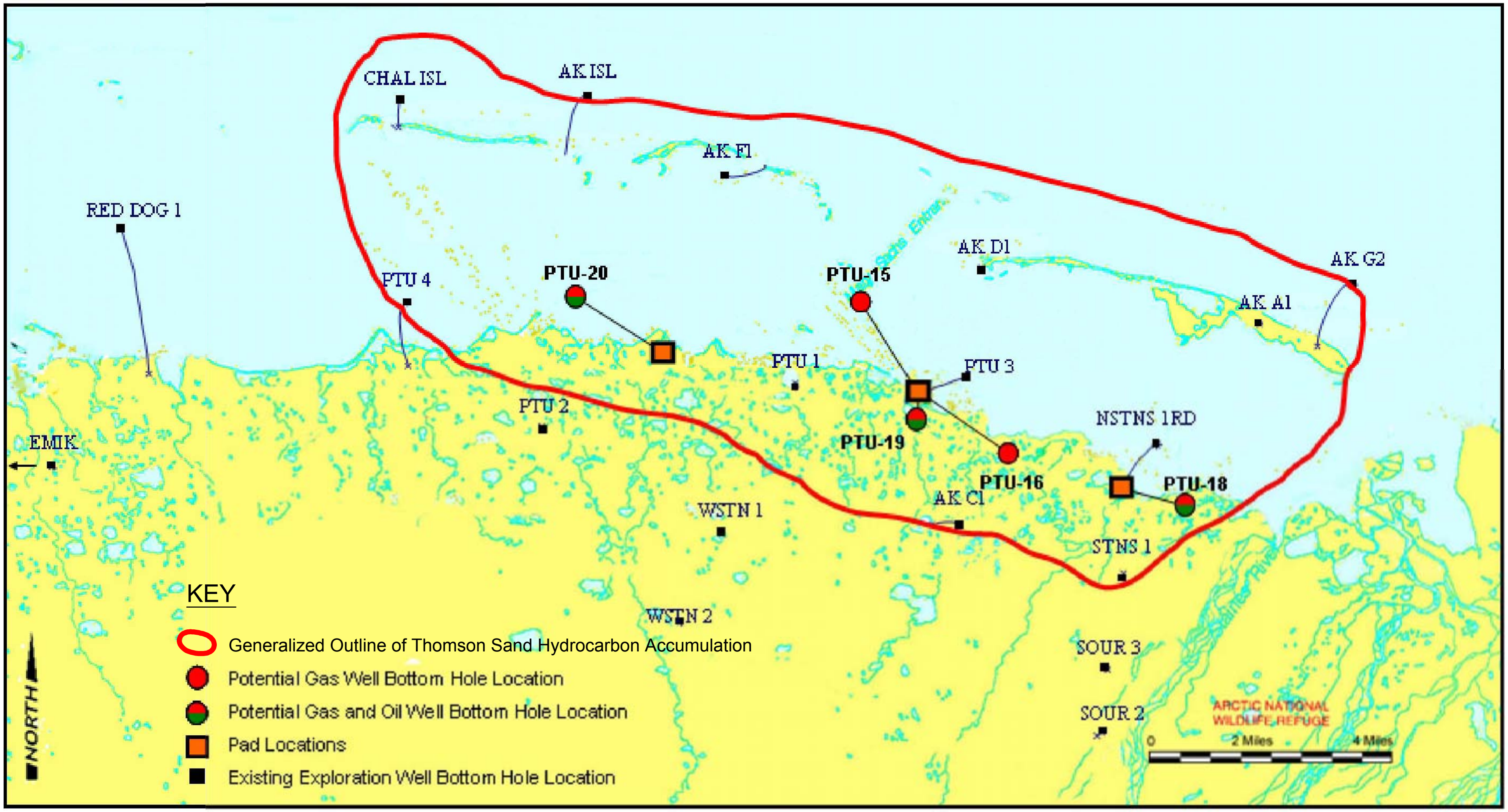

ExxonMobil | POINT THOMSON PROJECT

WELLS AND THOMSON SAND GENERALIZED HYDROCARBON ACCUMULATION

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 3.1

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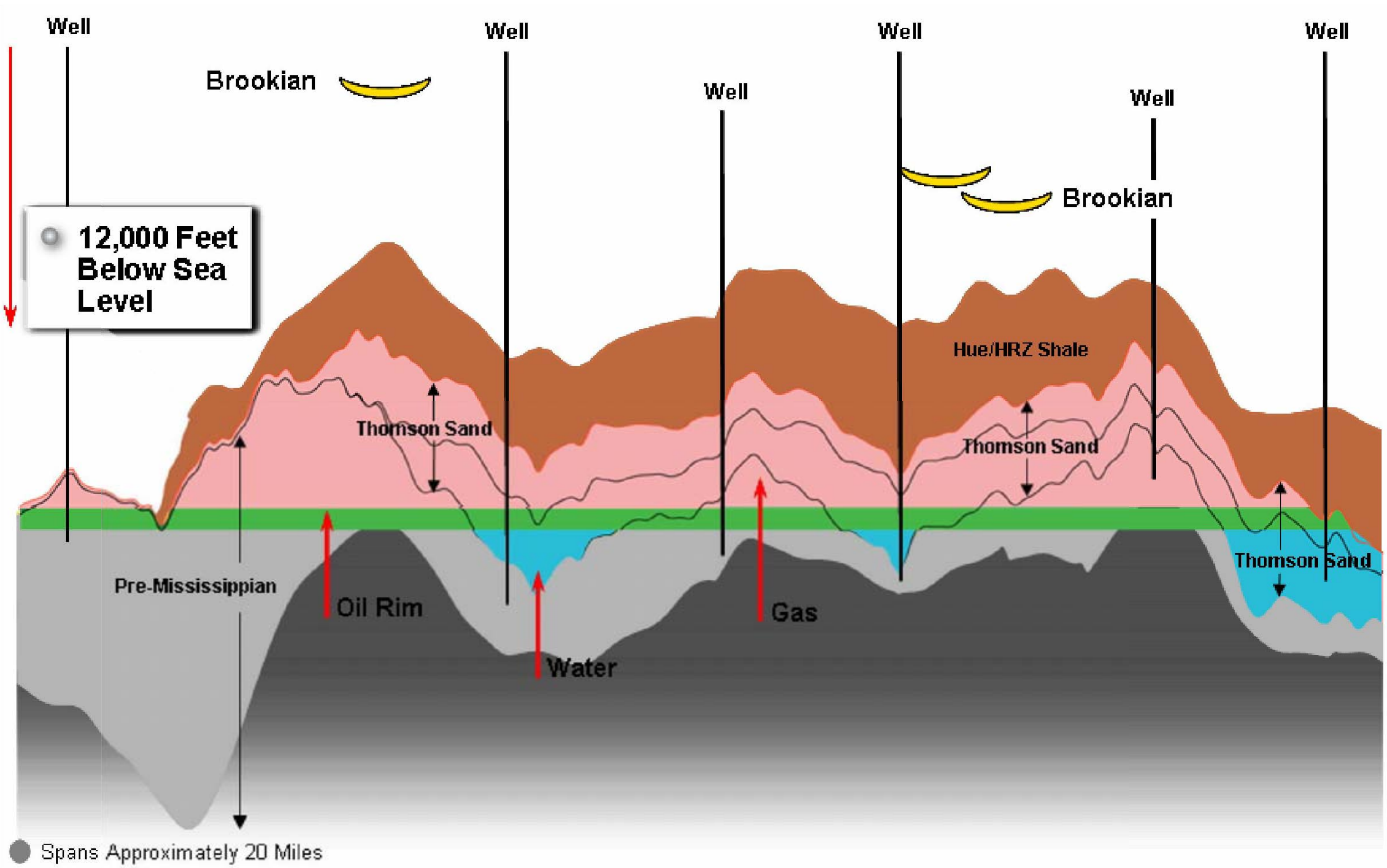

ExxonMobil | POINT THOMSON PROJECT

GENERALIZED CROSS SECTION OF POINT THOMSON FIELD

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 3.2

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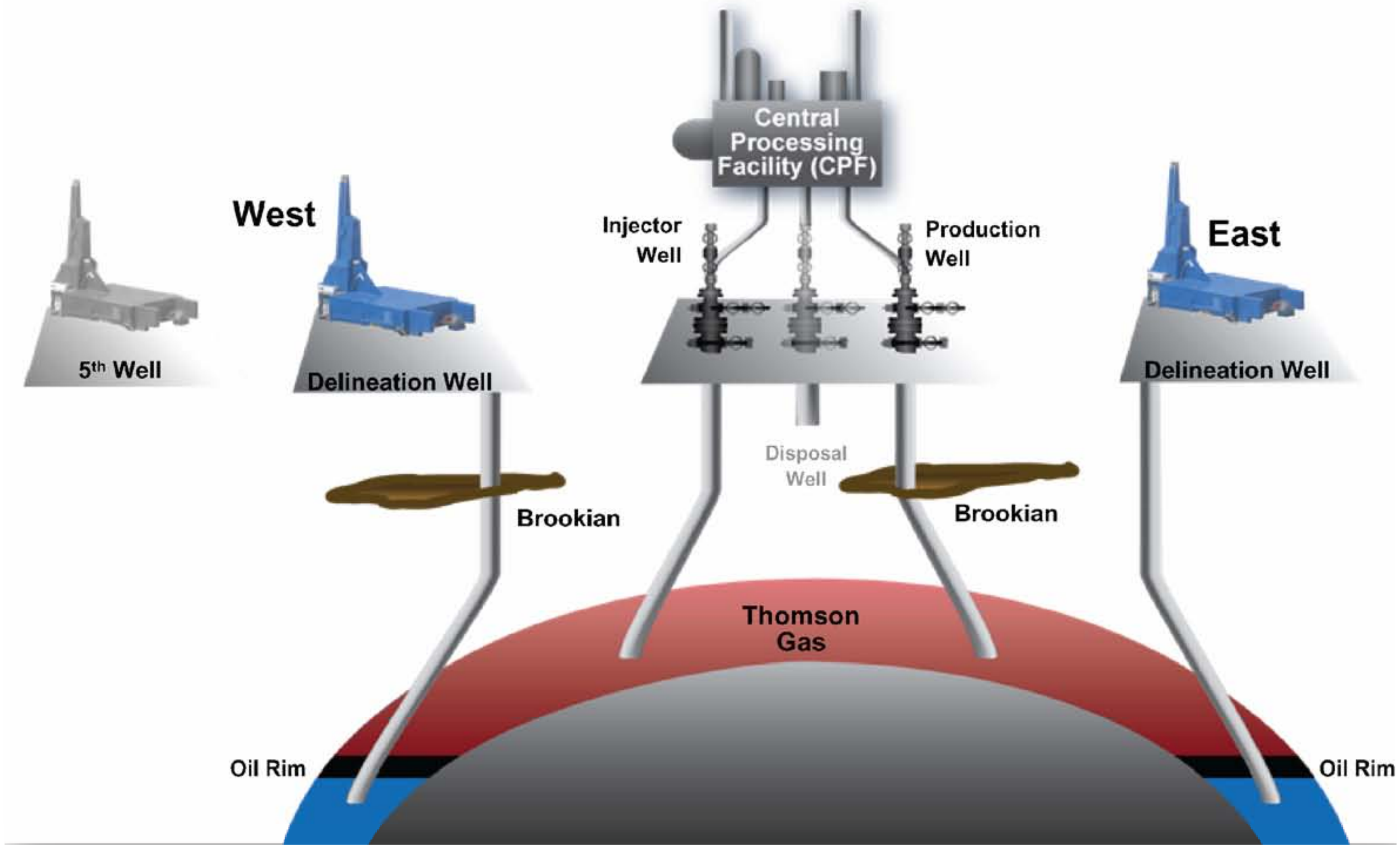

ExxonMobil POINT THOMSON PROJECT

DEVELOPMENT AND DELINEATION PLAN

PROJECT DESCRIPTION

DATE: October 2009 FIGURE 3.3

X:\GIS\mxd\Project Description\101209 Version\ursanc_pd_development_and_delineation_plan.mxd

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4.0 DRILLING

The Project includes a drilling program that includes the producer and injector wells and obtaining reservoir quality and performance information for field development planning. The producer and injector wells, PTU-15 and PTU-16, are being drilled from an existing gravel pad at the Central Pad location. The PTU-15 surface hole section was drilled in May 2009 and the PTU-16 surface hole section was drilled in July/August 2009. The disposal well will be permitted and drilled from the Central Pad in 2010 to support drilling and facilities operations.

The Project will provide the facilities to produce these wells and gravel pad foundations for future drilling activities. The results of each current well will be used to optimize the design and placement of subsequent wells.

4.1 DRILLING PROGRAM

A remote Arctic environment presents unique operational issues that need to be taken into consideration during the design of a drilling rig and its support systems. The Nabors Alaska 27-E Drilling Rig is being used to drill and complete the Point Thomson Project's wells. The rig was specifically chosen for the Project and has undergone significant upgrades to meet the challenging Point Thomson drilling requirements. It was mobilized from Deadhorse to the Central Pad in April 2009.

The Project's wells will be designed using current, best-in-class drilling and completion technology, which is required to meet reservoir objectives. Directional wells will be drilled to the Thomson Sand reservoir from onshore pad locations to reduce environmental impacts. The Point Thomson Project wells present technical challenges related to surface permafrost management, a tight margin high pressure target gas zone, sand control completions, and long reach directional drilling.

Previous studies, as well as additional ongoing studies undertaken by the Project, will be used to optimize drilling and completion design/installation strategies. Each well will have a specific design to meet the specific reservoir target. Prior to the rig move to each well slot, an insulated conductor pipe will be pre-set.

The Thomson Sand reservoir is at a much higher pressure, and its wells will flow at high rates as compared to other Alaska North Slope reservoirs (e.g., Prudhoe Bay). Because of this, the surface location well spacing is planned to be somewhat larger than normal for Alaska North Slope developments. Forty-foot well spacing is the minimum recommended to ensure safe access and operational flexibility. Key issues considered include:

- High pressure wells with high flow rates require larger well heads / production trees and well houses than typical lower pressure wells on the Alaska North Slope (10,000 to 15,000 pounds per square inch gauge [psig] versus 5,000 psig).
- Sufficient working space is required to bring heavy tools and equipment up/down the auxiliary ramp to the Nabors 27-E drill floor without interfering with the adjacent wellheads and flow lines.

Well spacing and the number of wells to be drilled, has a small impact on the overall pad dimensions and footprint. The drilling rig, support infrastructure, and equipment required to drill a single well occupy the majority of the space on the East and West Pad. If the well spacing were reduced, from 40 feet to 20 feet, for example, the overall size of the pads would not be reduced appreciably; the same principles would apply to the Central Pad. Additionally, gas fields such as Point Thomson typically require far fewer wells than do oil fields.

4.2 GENERAL DRILLING MANAGEMENT SYSTEMS

For safe, efficient, and cost-effective life cycle drilling and completion operations, the ExxonMobil OIMS and other drilling management systems will be used for drilling rig and pad design to:

- Protect the safety and health of personnel and ensure the safe operation of the drilling facilities.
- Reduce environmental impacts.
- Comply with all applicable federal, state, and local laws, rules, regulations, and guidelines; Project-specific design codes; and Project-specific technical specifications.

4.3 DRILLING RIG AND EQUIPMENT

The Nabors Alaska 27-E Drilling Rig was selected for the Project because it could most efficiently be upgraded to meet the Point Thomson drilling requirements (e.g., high pressure reservoir with long reach directional wells). This included upgrades to the following rig components:

- New well control equipment
- Derrick and substructure refurbished and certified
- New mud and solids control system
- Additional mud pump module
- Additional power module

5.0 PRODUCTION FACILITIES

This section describes the Project's facilities directly associated with hydrocarbon production. Other information about the facilities and their associated infrastructure is described in Section 7, with facility operations and maintenance (O&M) discussed in Section 9.

5.1 OVERVIEW

Wells will be drilled from the Central Pad and the East and West Pads. Gathering lines will connect the East and West Pads to the CPF, if oil rim is viable. All three-phase production will be delivered to the CPF for separation and processing. The hydrocarbon liquids will be stabilized to meet export (sales) pipeline specifications. Natural gas will be compressed and re-injected at the Central Pad. Produced water will be injected into the disposal well.

The CPF is designed to process approximately 200 mmscfd of natural gas to recover approximately 10,000 bpd of condensate. The Project's facility design includes the capability to process up to 10,000 bpd of oil, if oil rim production is viable.

Figure 5.1 provides a map showing the location of the well pads, CPF, and the related pipelines and infrastructure (roads, airstrip, gravel mine, etc.).

5.2 PRODUCTION PROCESS/HIGH PRESSURE GAS CYCLING

The Project includes a high pressure gas cycling operation (the first such operation on the Alaska North Slope). While high pressure gas injection has been accomplished and gas cycling has been used in the industry to extract hydrocarbon liquids (condensate) from condensate reservoirs, the Point Thomson Project will be the highest pressure gas cycling operation worldwide, to date.

Gas cycling involves producing gas and liquids to a facility where the hydrocarbon liquids (condensate) are separated from the natural gas. The liquids are further processed to meet export pipeline specifications for water content and vapor pressure. The remaining gas is compressed and delivered back to the reservoir via an injection well. In this manner, the producing wells and the injection well provide the means to "cycle" the reservoir and extract the hydrocarbon liquids (condensate), as shown on **Figure 5.2**.

The gas cycling operation at Point Thomson involves much higher pressures than those found in oil production locations elsewhere in Alaska. The flowing wellhead pressure is estimated to be over 6,500 psig, which is far greater than the oil production wells on the Alaska North Slope.

To enable an efficient separation and capture of hydrocarbon liquids, the produced fluid pressure is reduced to around 2,700 psig and delivered to the CPF. The inlet separator system separates the liquids from the gas. For the cycling operation, this gas must then be compressed to a sufficient pressure to be injected back into the reservoir. At Point Thomson, this requires wellhead injection pressures of about 10,000 psig.

The high pressure gas cycling operation described above requires specialized high pressure equipment not typically used in an oil production facility. The combination of high pressures and the CO_2 content in the produced fluids requires special metallurgy. A high pressure gas cycling operation also influences the layout of the facilities. Modules that receive and compress the high pressure gas must be properly spaced from other facilities, especially the operations camp and other inhabited buildings, for safety reasons.

5.3 CENTRAL PAD FACILITIES

The approximately 49-acre Central Pad is the largest of the gravel pads and is the location of production and injection wells and the CPF, which includes: the main process and utility modules; associated support and infrastructure facilities; high and low pressure flares and auxiliary equipment; the camp; diesel and methanol storage tanks; a cold storage area with associated pipe racks, cable racks, and storage equipment; and the disposal well. The general pad layout, shown on **Figure 5.3**, is preliminary and will be refined as the Project's design and engineering progresses. The layout reflects the requirements for safety, construction, operations, environmental compliance and performance, spill prevention and response, and fire protection. The Central Pad incorporates the entire existing PTU-3 exploration pad site to reduce the need for a new gravel pad area. The existing pad area is being used for permitted drilling activities. Additional detail on the Central Pad's infrastructure and civil works (dimensions, fill requirements, etc.) is provided in Section 7.

Sizing and layout of the Central Pad is driven by:

- Footprint required for the process facilities, construction and operation camps, and associated utilities and infrastructure.
- Required safety spacing between hazardous areas (drilling and process) and personnel occupied areas (camp, maintenance buildings, and shops).
- Remoteness of the operation and lack of access by permanent roads requiring more dedicated onsite storage (warehouses, maintenance shops, spill response equipment, etc.).
- Large footprint of the drilling rig and the required drilling support equipment, including drilling fluids, diesel fuel, tubulars, consumables, and tools.
- Need to move the rig (required turning radius) and all drilling support equipment to and from the Central, East, and West Pads.
- Spacing for up to eight wells, with the required 40-foot spacing between the wells (as described in Section 4.0) and need for the drilling rig to access future drill slots without pad extensions.
- Need for adequate construction lay down areas during the construction phase.

Detailed safety studies will confirm the safety spacing depicted on the preliminary plot plan (Figure 5.3).

5.3.1 Wells

The surface locations for the wells to be drilled from the Central Pad will be located on the north side of the pad, aligned in a row from east to west, and spaced at least 40 feet apart. A producer well (PTU-16), gas injector well (PTU-15), and a Class I disposal well will be located on the Central Pad, which will have sufficient area to accommodate up to eight wells.

5.3.2 Central Processing Facility

The CPF will separate gas, hydrocarbon liquids, and formation water produced by the producer wells. **Figure 5.4** is an overall process flow diagram showing the CPF process.

The three-phase production from the wells is delivered to the Separation Module of the CPF, where condensate is extracted and stabilized prior to shipment through the export pipeline.

The separated natural gas is delivered to the Injection Compressor Module, where it will be compressed to approximately 10,000 psig and injected via the injection well. Some of the natural gas will be used on-site as fuel for the facility.

Produced water from the third-stage separator and the condensate dehydrator will be routed to the disposal well. Sufficient residence time and surge volumes will be provided in the separator to meet system requirements.

5.3.3 Emergency Flares

An emergency flare system will be used to safely burn natural gas that occasionally needs to be released when pipelines and facilities are depressurized for maintenance, during a process upset, or in an emergency situation. High-pressure (HP) and low-pressure (LP) system flare stacks will be located just west of the main Central Pad. Gas and air will mix at the flare tips located at the top of the stacks to achieve smokeless combustion. The flare stack height will aid in dispersion of the combustion products and will reduce ground-level heat radiation.

The location of the flare stacks was selected considering a number of criteria, including:

- To be as close to the plant site as practical to reduce the length and resulting pressure drop of the flare lines.
- To be downwind of the plant (based on the prevailing wind direction).
- To be situated so that the microwave path between Point Thomson and Badami is not obstructed during flaring.

Stacks on the west side of Central Pad should reduce potential environmental impacts associated with their visibility from the Arctic National Wildlife Refuge and their contribution to visual impacts and bird strikes during their fall westward migration period.

The HP flare stack will not exceed a height of 150 feet above ground surface and the LP flare will not exceed a height of 75 feet above ground surface. The actual height will be determined as the Project's design proceeds. A discussion on flaring operations is included in Section 9.1.3.

5.4 EAST AND WEST PAD FACILITIES

The East Pad and West Pad will contain production wells and associated facilities. The well pads have been located to reach off-shore bottom-hole targets in the Thomson Sand reservoir from shore-based locations, while limiting the number of pads. The East and West Pads will each be located approximately 4 miles from the Central Pad. The East Pad has been located to make use of an existing gravel pad at North Staines River State No.1.

Figures 5.5 and **5.6** show plan views for the East Pad and West Pad, respectively. The East and West Pad facilities will be similar, with some variations in the pad configurations due to site-specific conditions. The East and West Pads will be approximately 18 acres each. The pad sizes and dimensions are necessary to meet requirements for drilling and construction with due consideration of safety, spill prevention, and spill response. The East Pad will be the facility nearest to the Arctic National Wildlife Refuge. Design will pay particular attention to reducing light emissions emanating from the facility toward the Refuge. Additional detail on the pad's infrastructure and civil works (dimensions, fill requirements, etc.) is provided in Section 7.

Limiting the facilities at the East and West Pads will follow the same general philosophy as for the Central Pad. During the drilling phase, much of the pad area will be occupied by facilities and services to support drilling, including diesel fuel storage, temporary camps and utilities. The East and West Pads will accommodate drilling operations and will include area for necessary production facilities. The resulting pad area will accommodate up to eight wells on each pad. Well slots will be aligned in a row and spaced at least 40 feet apart. Production facilities on the remote pads will include control facilities, an electrical transformer, a methanol tank and injection system, and a launcher for gathering-line maintenance and deployment of inspection tools. Production from each producer well will be measured using individual in-line meters.

The East and West Pad flow lines will be designed for the full well head shut-in pressure. Overpressure relief protection (flare/vent) will not be required at these pads, and permanent flares will not be installed at the East and West Pads. Temporary flaring may be necessary during drilling, completion, and the testing of wells.

5.5 PRODUCTION GATHERING LINES

Hydrocarbons that are produced from the wells located on the East and West Pads will be delivered to the CPF via production gathering lines. To prevent corrosion, the gathering lines will likely be constructed of Corrosion Resistant Alloy (CRA), although alternate materials will be considered as the Project's final design progresses. The 8-inch nominal diameter gathering lines are sized to handle production from a single production well. Line lengths are approximately 5 miles for both the East and West Pad gathering lines. The gathering lines will be configured to allow launching and receiving of pigs for in-line inspection of the line pipe and maintenance pigging. The lines will be placed on vertical support members (VSMs) sized to maintain a minimum 7-foot height between the bottom of the pipe (including any cables or wind vibration dampeners, if required, and the tundra surface. "Z" type offsets will be included to allow for thermal expansion. Gathering line VSMs will be designed and sized to support an additional 18-inch gathering line in the future for subsequent field development activity.

The well flow rate and inlet pressure to the gathering lines will be controlled so that the normal delivery pressure at the CPF will be approximately 2,700 psig. Normal flowing temperatures in the gathering lines will be over 180 degrees Fahrenheit (°F), with normal temperature drops of 10°F or less. Because the estimated hydrate point of the produced gas at flowing pressure is approximately 80°F, the gathering lines will be insulated to delay cooling of the fluids when the flow is stopped or restricted. This will prevent hydrate formation in the gathering lines and allow time for necessary actions to be employed, if needed. Methanol will be used during start-up and at other times to provide hydrate formation inhibition of the gathering lines.

Integrity monitoring of the gathering lines will include inspection of the line pipe through the use of in-line inspection tools and periodic surveillance of the gathering lines and their associated

ROWs. Visual inspection of gathering lines will typically be performed on a weekly basis via aerial surveillance (fly over) or by ground-based observations. Pressure monitoring and visual observations are planned as the primary means of leak detection for the gathering lines.

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SECTION 5 FIGURES

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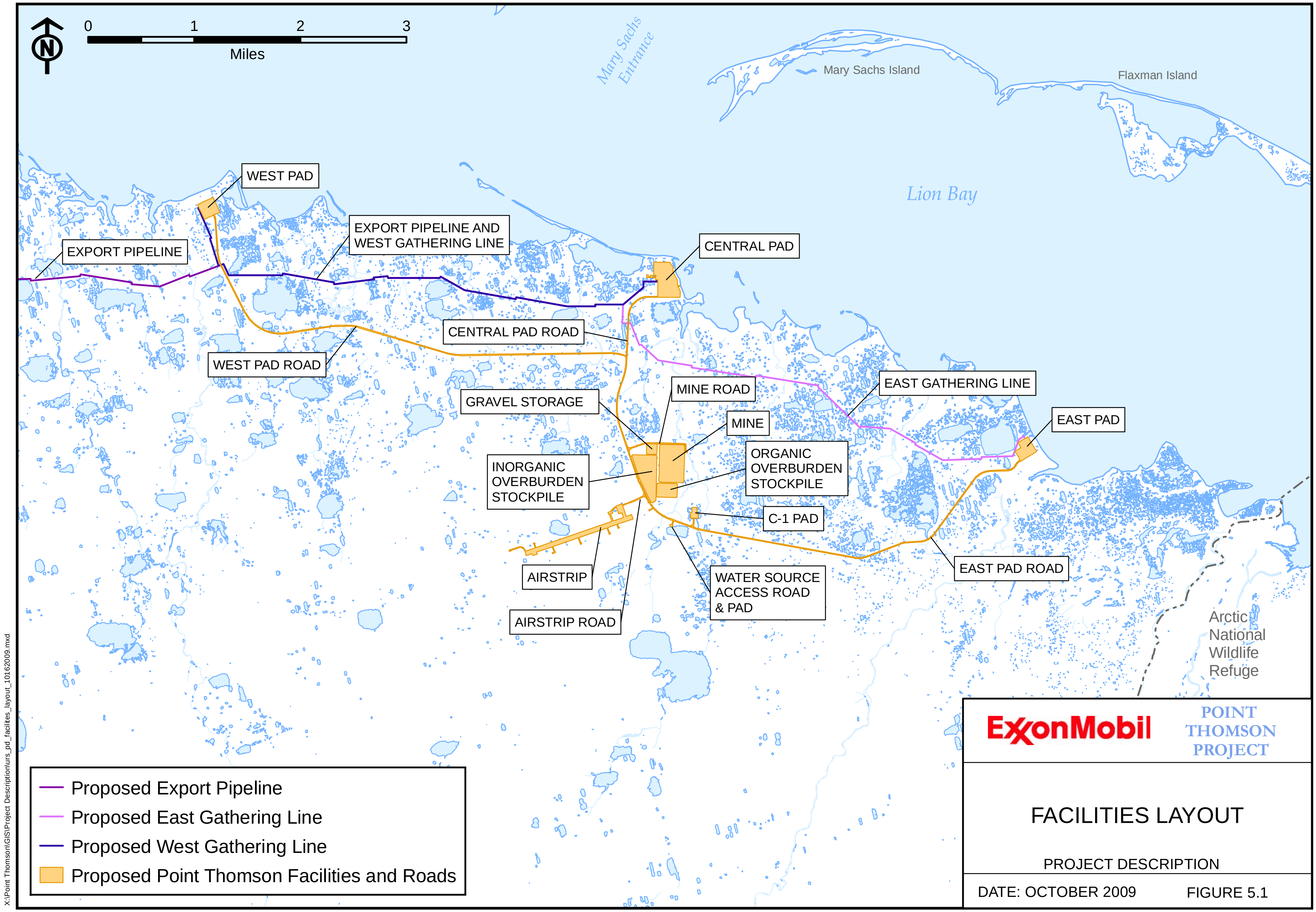
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Miles
N
Mary Sachs Entrance
Mary Sachs Island
Flaxman Island
Lion Bay
WEST PAD
EXPORT PIPELINE AND
WEST GATHERING LINE
EXPORT PIPELINE
CENTRAL PAD
CENTRAL PAD ROAD
WEST PAD ROAD
MINE ROAD
EAST GATHERING LINE
GRAVEL STORAGE
MINE
EAST PAD
ORGANIC
OVERBURDEN
STOCKPILE
INORGANIC
OVERBURDEN
STOCKPILE
C-1 PAD
AIRSTRIP
EAST PAD ROAD
WATER SOURCE
ACCESS ROAD
& PAD
AIRSTRIP ROAD
Arctic
National
Wildlife
Refuge
Proposed Export Pipeline
Proposed East Gathering Line
Proposed West Gathering Line
Proposed Point Thomson Facilities and Roads
ExxonMobil
POINT
THOMSON
PROJECT
FACILITIES LAYOUT
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 5.1
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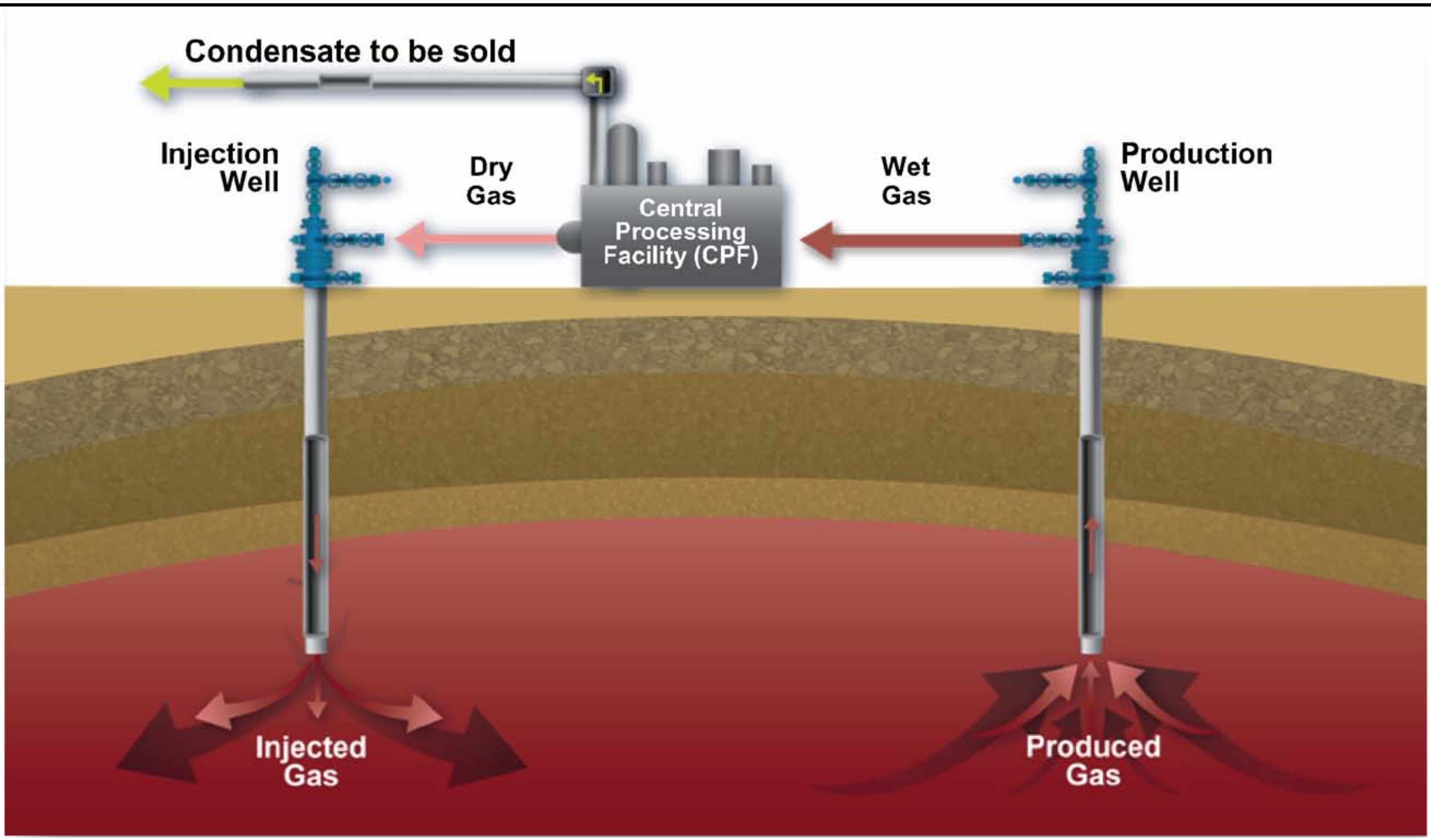

ExxonMobil
POINT THOMSON PROJECT

CONDENSATE PRODUCTION BY GAS CYCLING

PROJECT DESCRIPTION

DATE: October 2009 FIGURE 5.2

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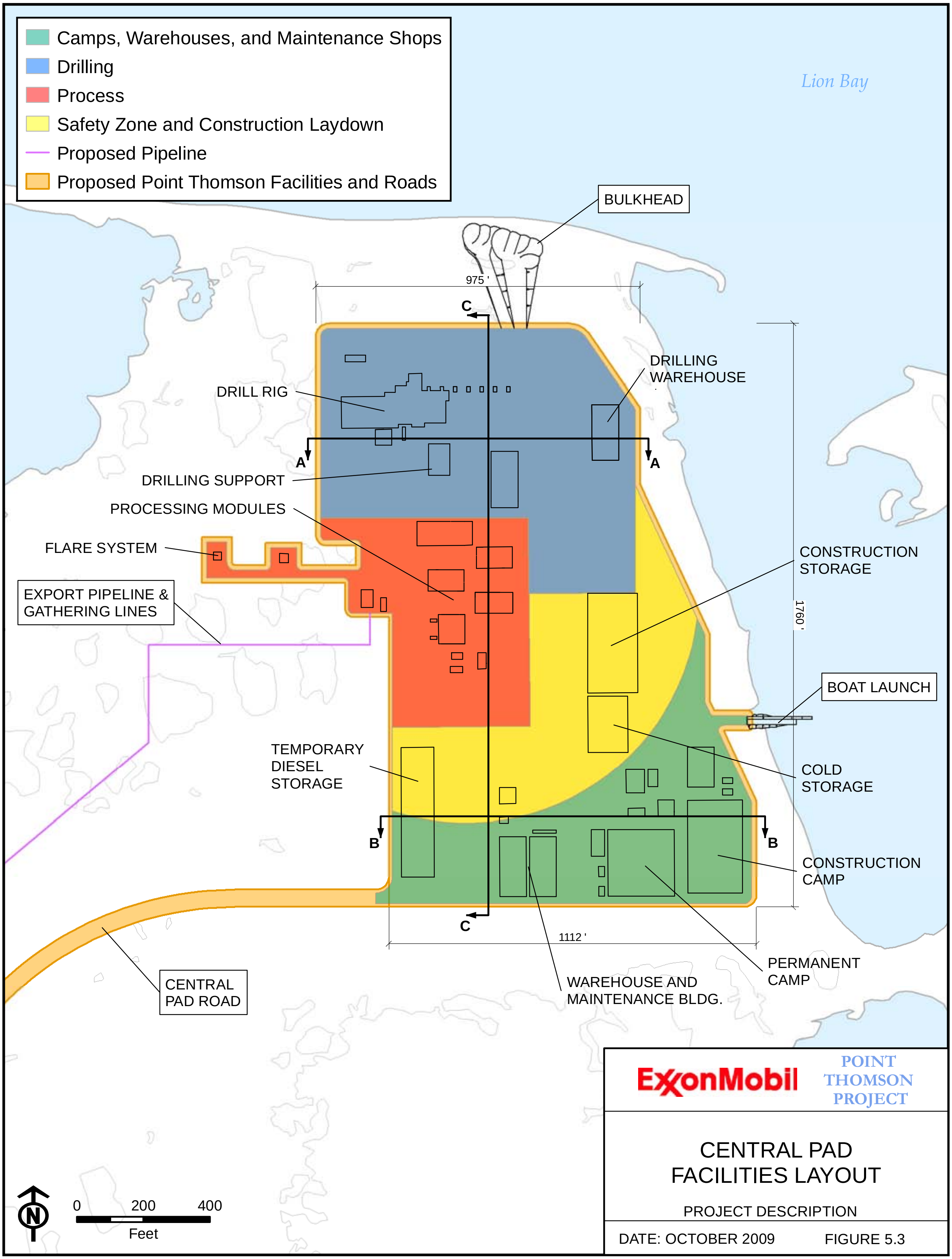

ExxonMobil POINT THOMSON PROJECT

CENTRAL PAD FACILITIES LAYOUT

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 5.3

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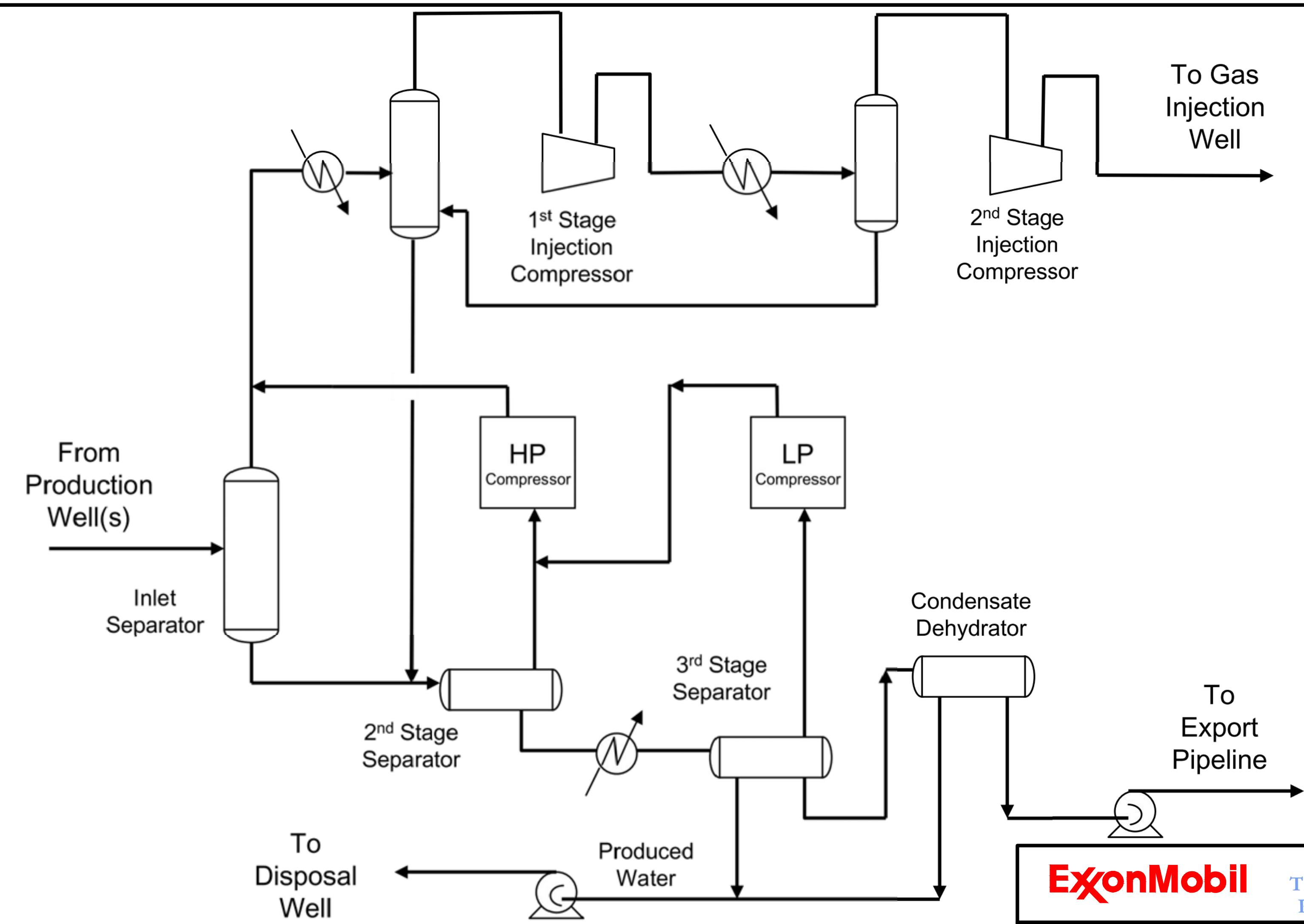

ExxonMobil POINT THOMSON PROJECT

OVERALL PROCESS
FLOW DIAGRAM

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 5.4

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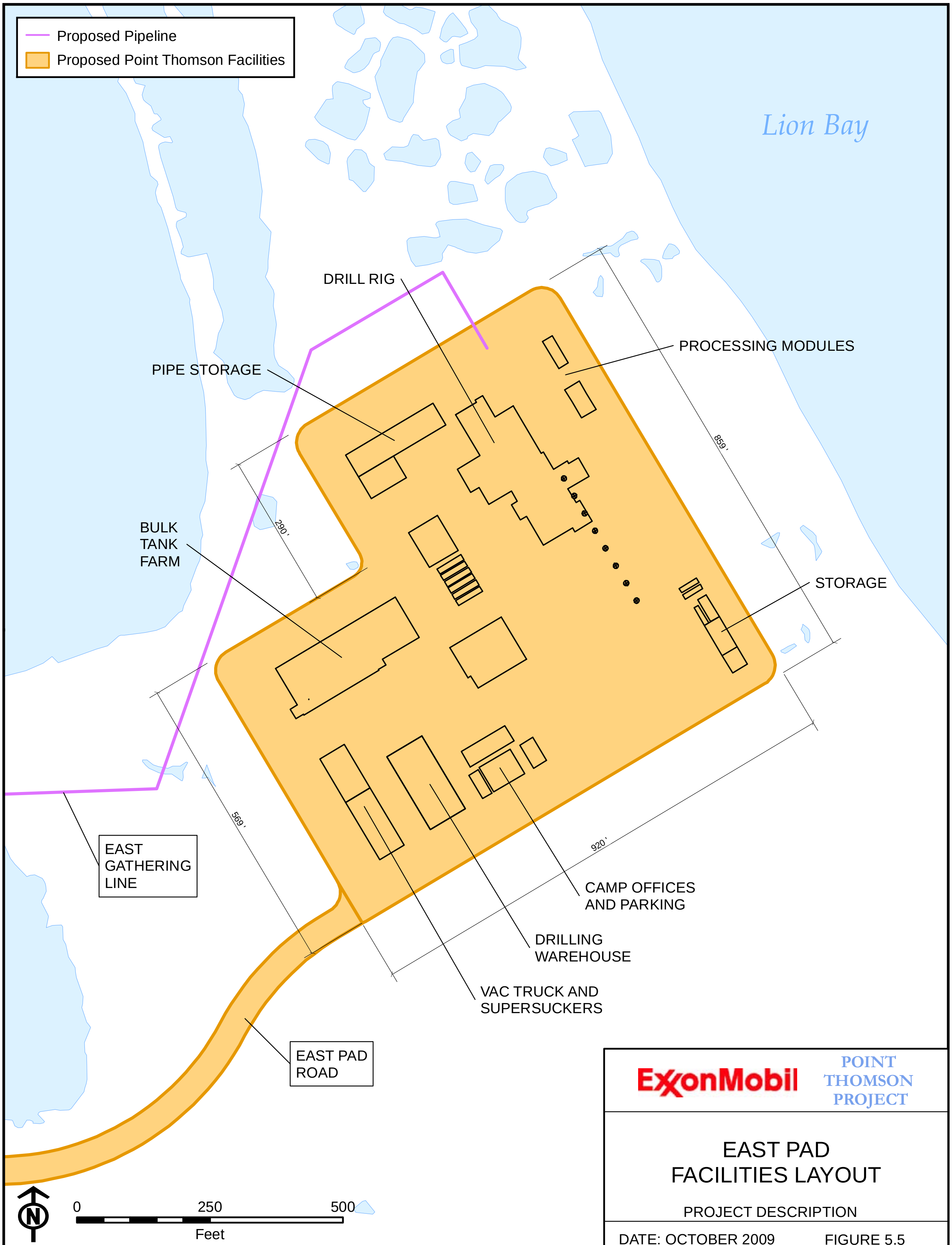

EAST PAD
FACILITIES LAYOUT

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 5.5

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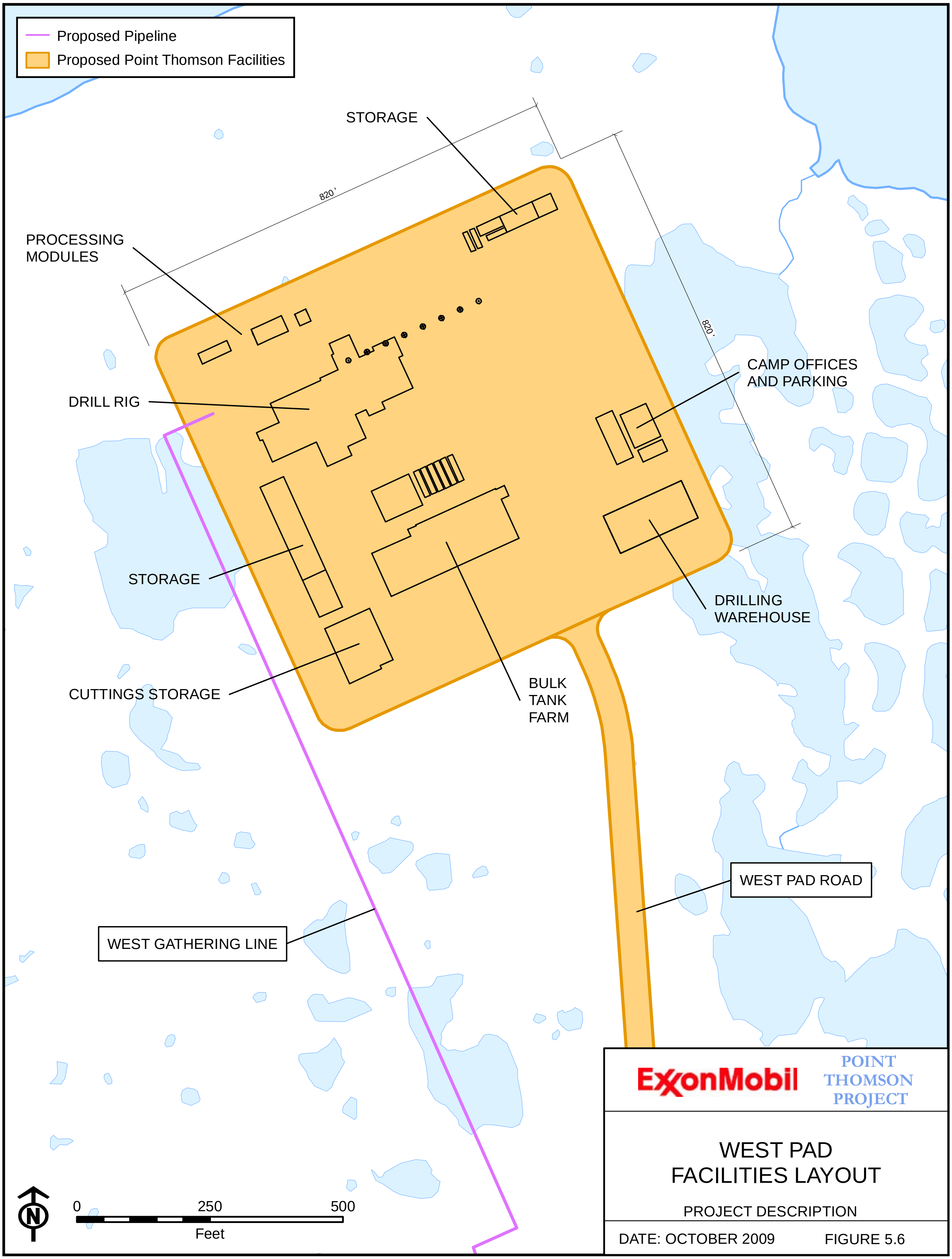
Proposed Pipeline
Proposed Point Thomson Facilities
STORAGE
820'
PROCESSING MODULES
DRILL RIG
820'
CAMP OFFICES AND PARKING
STORAGE
DRILLING WAREHOUSE
CUTTINGS STORAGE
BULK TANK FARM
WEST PAD ROAD
WEST GATHERING LINE
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500
Feet
N
ExxonMobil
POINT THOMSON PROJECT
WEST PAD FACILITIES LAYOUT
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 5.6
X:\GIS\mxd\Project Description\ursanc_pd_west_pad_layout_10162009.mxd

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6.0 EXPORT PIPELINE SYSTEM

The export (sales) pipeline will be designed, built, and operated according to U.S. Department of Transportation (DOT) requirements, ExxonMobil specifications and procedures, and Alaska North Slope industry best practices. The export pipeline will operate as a common carrier system. Production from the Project is estimated to be 10,000 bpd, with additional volumes possible. The export pipeline has been sized to accommodate potential expanded field development which could result in hydrocarbons liquids production in excess of 70,000 bpd.

The pipeline will have a maximum allowable operating pressure (MAOP) of approximately 2,060 psig. The pipeline will be made of carbon steel with a nominal 12-inch diameter and will transport sales grade hydrocarbon liquids from the Central Pad to Badami, approximately 22 miles. The pipeline will be insulated to reduce heat loss and provide improved flow behavior. Point Thomson Project liquid hydrocarbons will be transported from Badami through existing common carrier pipelines. The 12-inch Badami pipeline extends 25 miles to a tie-in with the Endicott pipeline, which extends 10 miles before connecting to TAPS Pump Station No. 1.

The Point Thomson export pipeline will be supported on VSMs and will include “Z” type offsets to allow for thermal effects. The VSMs will be designed and installed to provide a separation of at least 7 feet between the bottom of pipe (including associated power/ telecommunication cables or vibration arrestors) and the tundra surface. The VSM design will be finalized during the pipeline detail design. The need for wind vibration arrestors will be assessed during detail design (**Figures 6.1** through **6.3**).

Pipeline facilities at the Central Pad and at Badami will include pig launchers/receivers, isolation valves, metering equipment, leak detection equipment, data acquisition equipment, and control/safety systems. A combined power/fiber optic cable is being considered to power the export pipeline facilities at Badami and to provide a telecommunications/data transmission link between Badami and the Central Pad. A summary of the key features of the export pipeline is presented in **Table 6.1.**

Table 6.1 Features of the Export Pipeline

FEATURE	DESCRIPTION
Transported Substance	Liquid hydrocarbons
Maximum Allowable Operating Pressure	2,060 pounds per square inch gauge
Pipeline Outside Diameter	12.750 inches
Minimum Pipeline Wall Thickness	**Mainline:** 0.406-inch **Station piping and valve and trap sites:** 0.375-inch
External Coating	**Above Ground Mainline:** Fusion bonded epoxy and polyurethane foam insulation with galvanized metal outer jacket **Buried Road Crossings:** Fusion bonded epoxy and polyurethane foam insulation with galvanized metal outer jacket
In-line Inspection Capability	Yes
Pipeline Design Throughput	Nominally 70,000 barrels per day
Pipeline Construction Mode(s)	**Mainline:** Vertical support members (VSMs), minimum 7-foot clearance between bottom of pipe and tundra surface **Buried Road Crossings:** In casings through road bed gravel **Creek and Water Crossings**: VSMs
Design Code/Regulation	49 Code of Federal Regulations, Part 195
Minimum Operational Life	30 years

6.1 ROUTE SELECTION AND ROUTE

The pipeline route has been optimized to:

- Limit the length of the line
- Avoid lakes
- Target pipeline stream crossings that are relatively narrow
- Share VSMs with the gathering line between the Central Pad and the West Pad

The route, as shown on **Figures 6.4** through **6.8**, starts at the Central Pad and ends at a connection to the existing Badami sales oil pipeline. After departing just south of the West Pad, the pipeline route is generally located more than a mile inland from the coastline. The pipeline ROW will cross lands owned by the State of Alaska.

All stream and water body crossings from the Point Thomson CPF to the Badami tie-in will be constructed above-grade using VSMs. No below-grade river or stream crossings are necessary, because the streams traversed by the pipeline are relatively small. At road crossings, the pipeline will be installed in casings through the road bed gravel using standard design practices for the Alaska North Slope.

The export pipeline route traverses local hunting grounds and, therefore, its design must consider the potential for accidental bullet strikes. The design will consider rifle calibers and ammunition typically utilized in the area for caribou hunting, and may incorporate additional wall thickness if required to prevent penetration from bullets fired from the coastline.

6.2 CORROSION MANAGEMENT

External corrosion of the pipeline will be controlled by the application of fusion-bonded epoxy to the line pipe prior to the application of polyurethane foam insulation.

Internal corrosion will be controlled by the injection of corrosion inhibitors, and maintenance pigging to remove sediments and any other deposits. In addition, the wall thickness will include a corrosion allowance of 0.125 inches.

6.3 PIPELINE INTEGRITY MONITORING

Pipeline integrity monitoring will provide assurance that the pipeline system is being appropriately maintained and operated. Integrity monitoring typically includes:

- Periodic inspection of the line pipe condition through the use of in-line inspection tools
- Monitoring the condition of corrosion coupons
- Analysis of production samples to monitor corrosion inhibitor concentrations and to check for corrosion by-products
- Periodic visual inspection of the pipeline and ROW. Visual inspection will typically be performed on a weekly basis via aerial surveillance (fly over) or by ground-based observations

In addition, the pipeline design will include a computational leak detection system in accordance with federal and state requirements. The system will perform real-time monitoring for pipeline leakage, and will rely on operating data such as liquid hydrocarbon flow rate and pressure. This operating data will be continually updated via the supervisory control and data acquisition system. Specific hardware and software options for the leak detection system will be evaluated and selected during project detail design.

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SECTION 6 FIGURES

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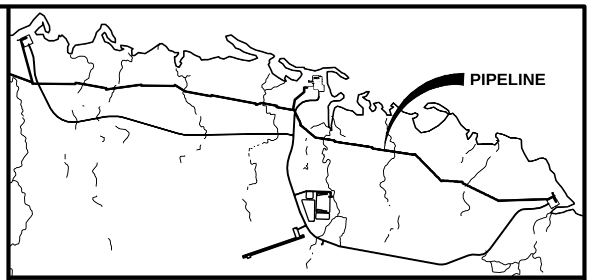
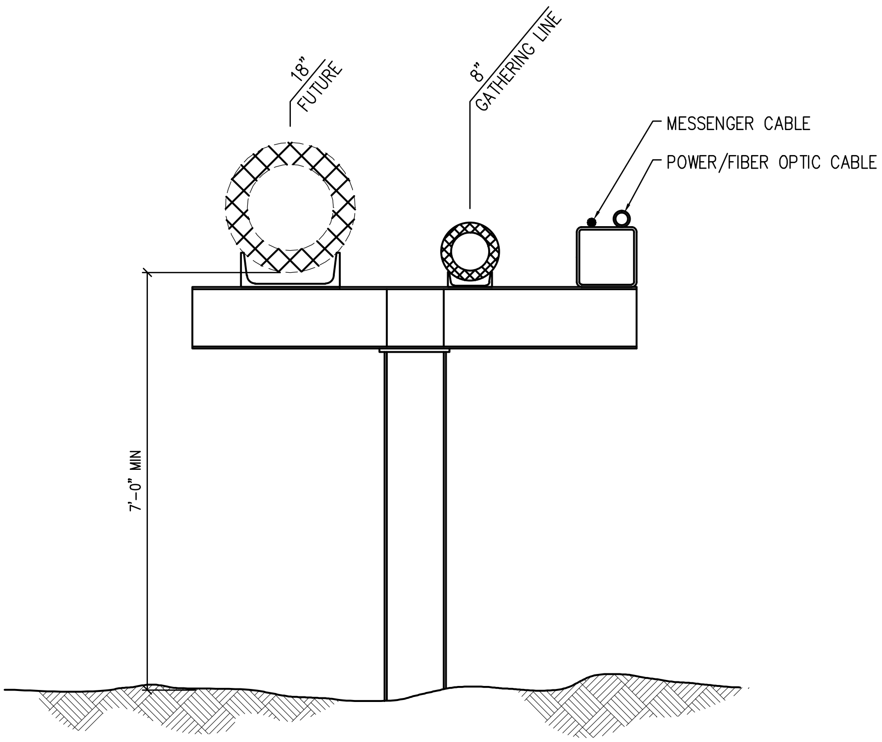


KEY MAP



TYPICAL PIPELINE SECTION - EAST PAD TO CENTRAL PAD

ExxonMobil

POINT THOMSON PROJECT

PROPOSED PIPELINE SECTION
EAST PAD TO CENTRAL PAD

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 6.1

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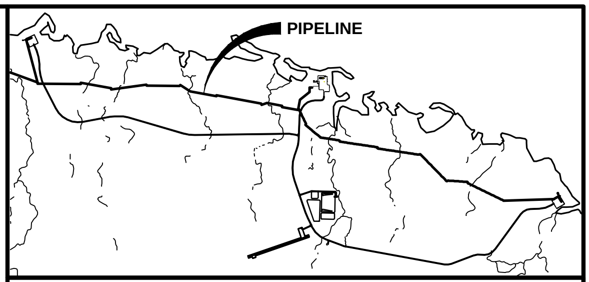
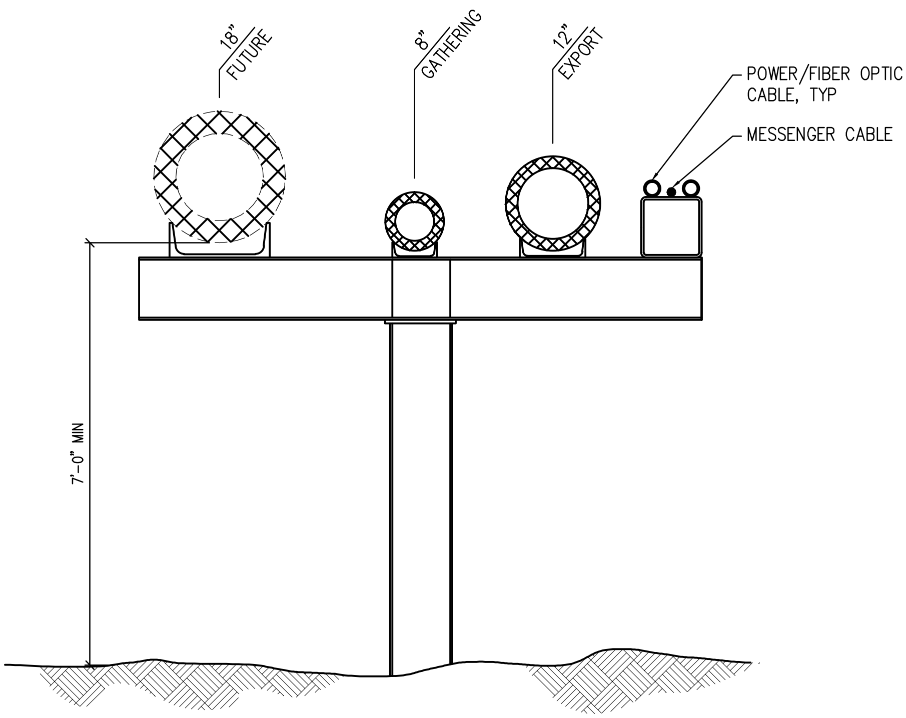


KEY MAP



TYPICAL PIPELINE SECTION - CENTRAL PAD TO WEST PAD

ExxonMobil

POINT THOMSON PROJECT

PROPOSED PIPELINE SECTION
CENTRAL PAD TO WEST PAD

PROJECT DESCRIPTION

DATE: OCTOBER 2009

FIGURE 6.2

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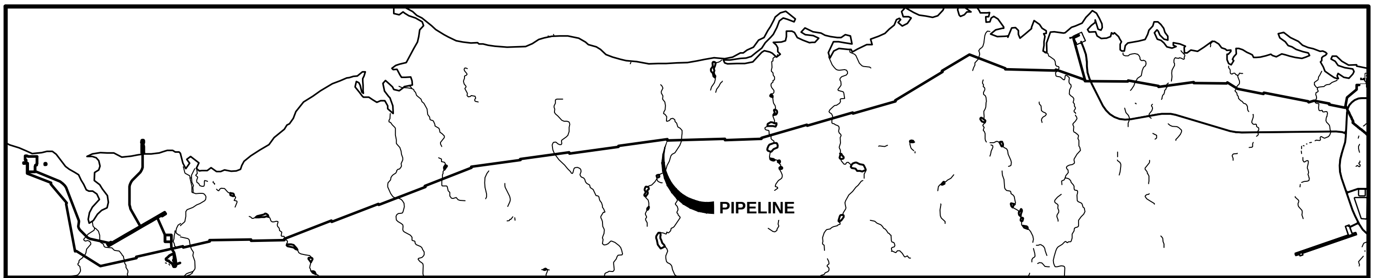
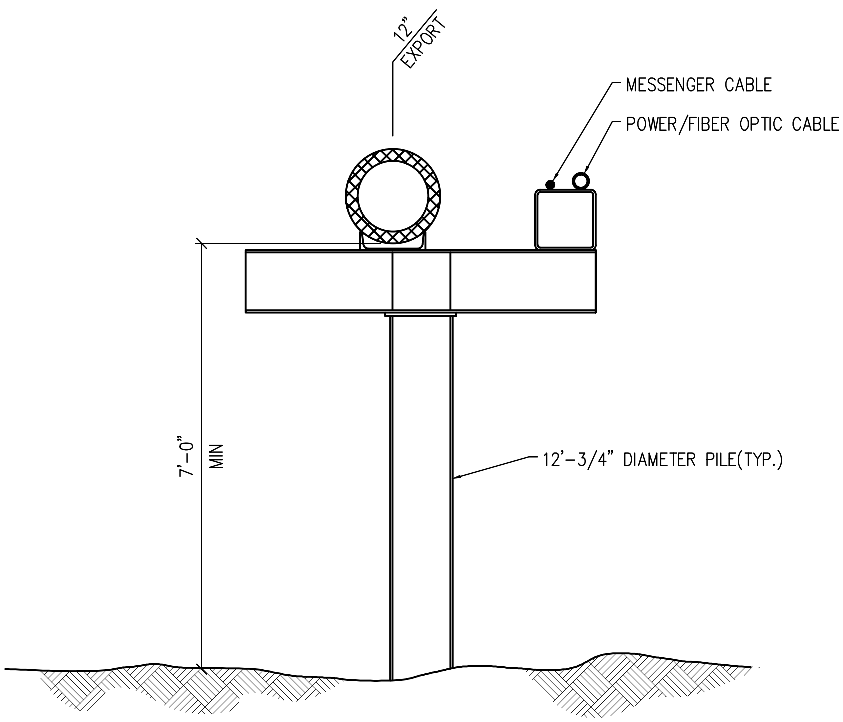


KEY MAP



TYPICAL EXPORT PIPELINE SECTION - WEST PAD TO BADAMI

ExxonMobil

POINT THOMSON PROJECT

PROPOSED PIPELINE SECTION
WEST PAD TO BADAMI

PROJECT DESCRIPTION

DATE: OCTOBER 2009

FIGURE 6.3

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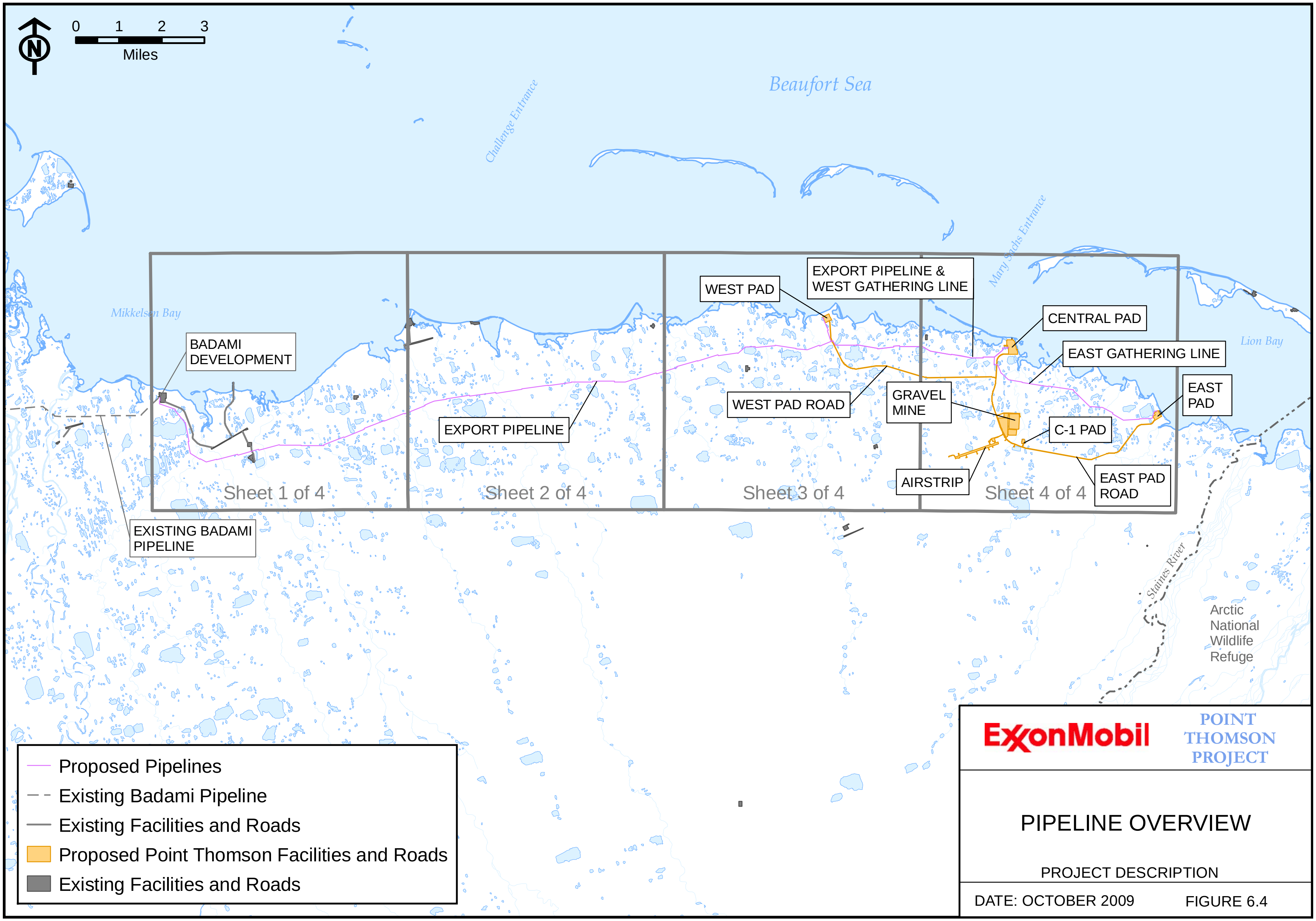

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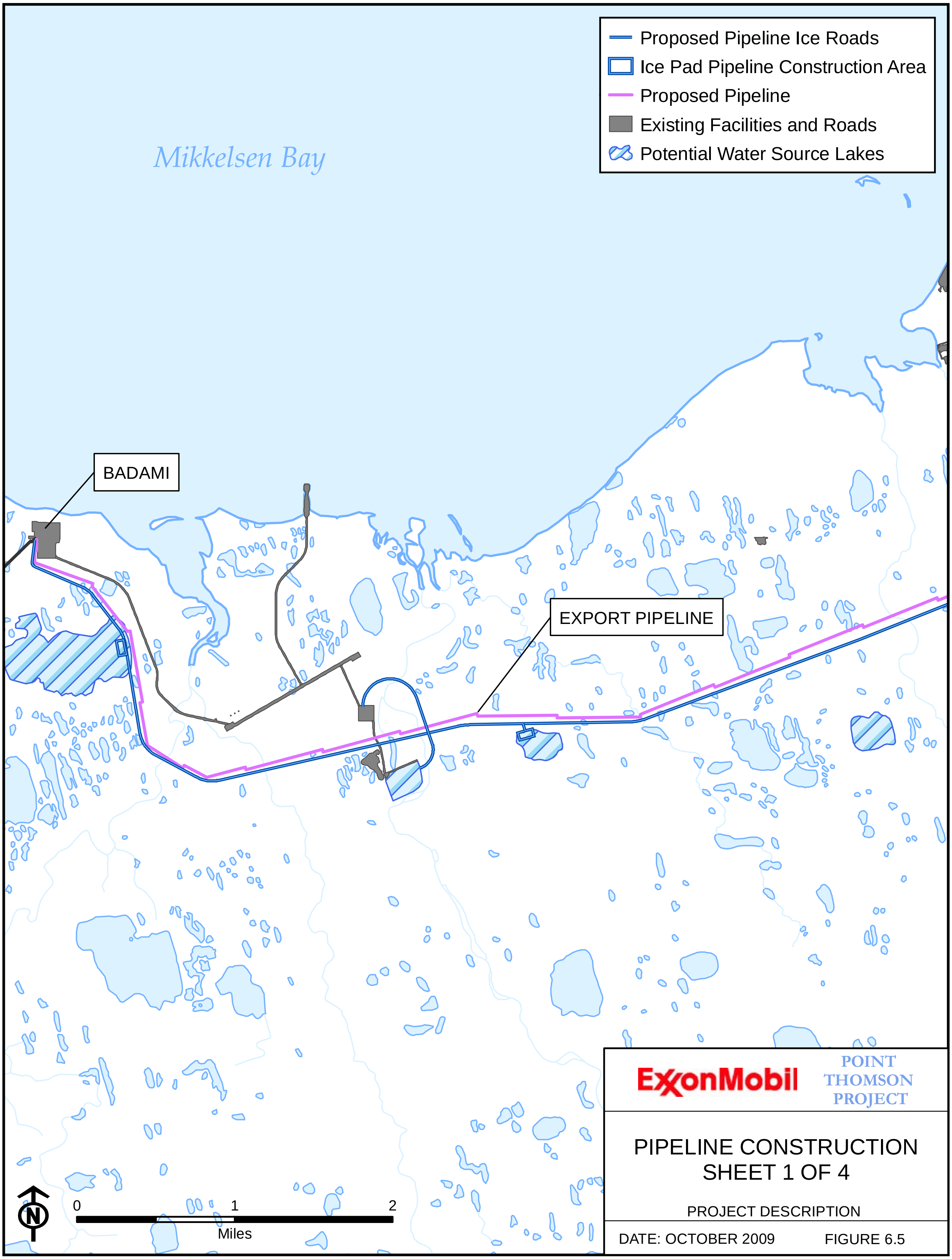

ExxonMobil | POINT THOMSON PROJECT

PIPELINE CONSTRUCTION
SHEET 1 OF 4

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 6.5

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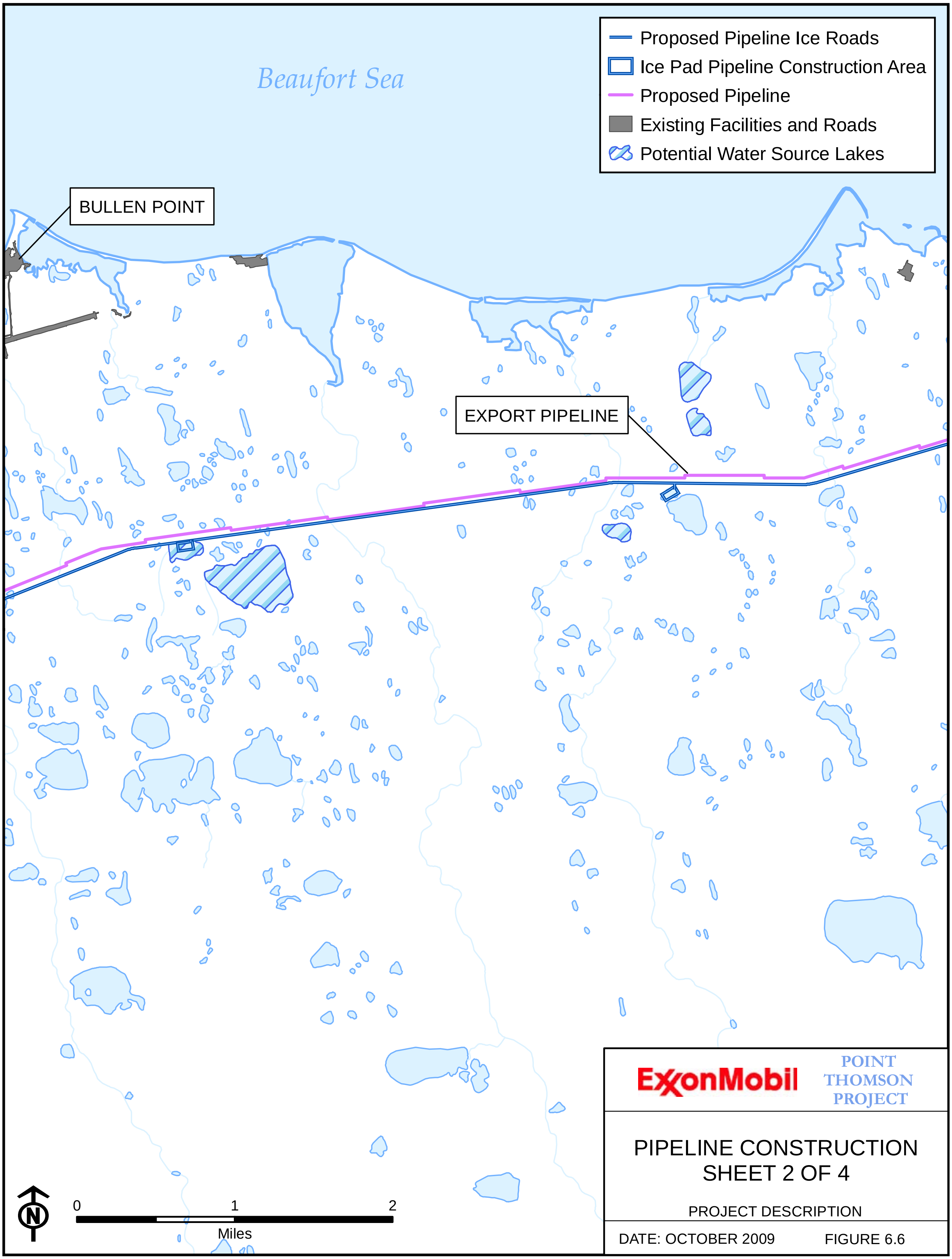

ExxonMobil POINT THOMSON PROJECT

PIPELINE CONSTRUCTION
SHEET 2 OF 4

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 6.6

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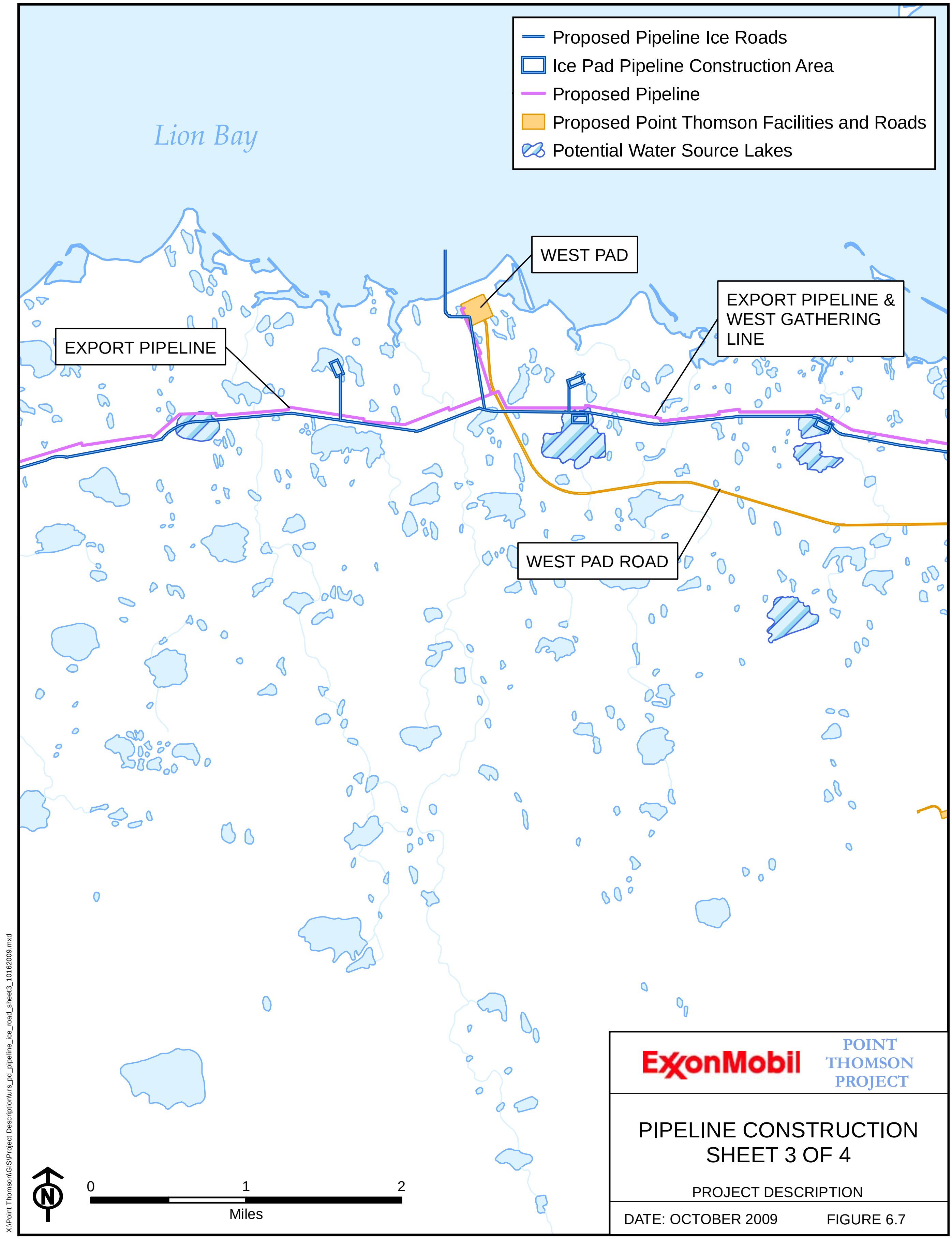

ExxonMobil POINT THOMSON PROJECT

PIPELINE CONSTRUCTION SHEET 3 OF 4

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 6.7

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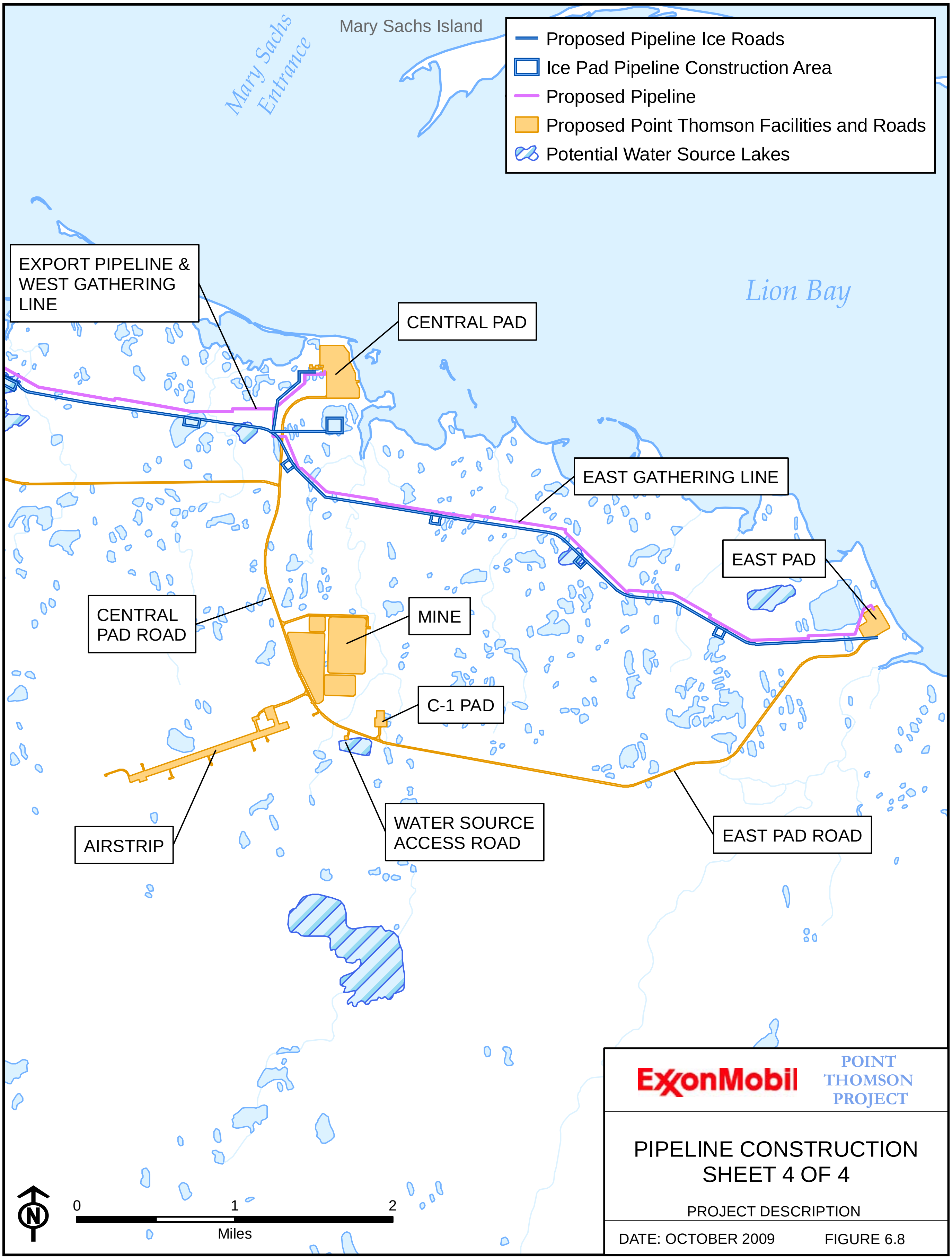
Mary Sachs Island
Mary Sachs Entrance
Proposed Pipeline Ice Roads
Ice Pad Pipeline Construction Area
Proposed Pipeline
Proposed Point Thomson Facilities and Roads
Potential Water Source Lakes
Lion Bay
EXPORT PIPELINE & WEST GATHERING LINE
CENTRAL PAD
EAST GATHERING LINE
EAST PAD
CENTRAL PAD ROAD
MINE
C-1 PAD
AIRSTRIP
WATER SOURCE ACCESS ROAD
EAST PAD ROAD
N
0
1
2
Miles
X:\Point Thomson\GIS\Project Description\urs_pd_pipeline_ice_road_sheet4_10162009.mxd
ExxonMobil
POINT THOMSON PROJECT
PIPELINE CONSTRUCTION SHEET 4 OF 4
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 6.8

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7.0 INFRASTRUCTURE AND CIVIL WORKS

This section describes the temporary and long-term infrastructure to support the Project and the civil works for major project components (gravel placement, bridges, barge offloading, etc.). During the design of these facilities including the siting, layout, and construction of gravel works, the main considerations were:

- Point Thomson is remote from existing infrastructure (60 miles east of Prudhoe Bay and 22 miles east of Badami) with no connecting road. Point Thomson has been designed as a self-supporting facility with all the necessary infrastructure for oil field operation (e.g., warehouses, camps, storage, on-site mobile equipment).
- The hydrocarbon reservoir lies mainly offshore. To avoid offshore development and potential adverse impacts on the marine environment, onshore drilling pads close to the shore have been selected.
- Three former exploration sites (PTU #3, North Staines River State No.1, and Alaska State C-1) in the Point Thomson area are being used to reduce tundra wetland impacts.
- Opportunities to reduce the number (or size) of stream crossings along the in-field road system without increasing road length.
- The need to assure safe setbacks of personnel quarters (camp, offices, control rooms, etc.) from process facilities to mitigate hazards.
- Requirement for multiple transportation methods (air, marine, and ice road) due to the lack of a gravel road to the existing oil field infrastructure on the Alaska North Slope.
- Offloading sealift modules without installing a solid fill causeway or dock.

7.1 TEMPORARY INFRASTRUCTURE

7.1.1 Ice Roads and Pads

Sea ice roads or onshore ice roads will be constructed during the winter construction seasons to connect the Project locations to the existing gravel road system at Endicott, approximately 50 miles to the west. Ice roads may be constructed on an as-needed basis when the facilities are in operation. Sea ice roads may be up to approximately 100 feet wide for large equipment access and safety and will follow the shoreline along a general routing shown on **Figure 7.1**. Ice road size and location will vary depending on seasonal ice conditions and wildlife, as well as the size and weight of the loads that need to be transported. Spur ice roads will be constructed to connect the sea ice road to onshore freshwater sources. Bypasses will be constructed, if required, to avoid polar bear dens. Specific routes for the spur ice roads will be determined as Project planning and engineering progress. Water requirements for ice roads are described in Section 7.3.2.

Onshore ice roads will be required each winter construction season, and on an as-needed basis when the facilities are in operation. To support infrastructure construction, one ice road, approximately 2.5 miles long will extend south from the general location of the Central Pad (**Figure 7.2**). This ice road will be nominally 50 feet wide and 6 inches thick, and will be used to access water for ice road construction and other activities, such as bridge construction along the gravel access road to the water source and East Pad. A second ice road will extend west from this ice road for approximately 3 miles to support construction of three bridges along the gravel access road to West Pad.

Ice roads will be required along the pipeline ROW to provide a work surface for travel and construction of the export pipeline and the gathering lines. **Figure 7.3** shows the proposed route of pipeline construction ice roads from the East Pad to the Central Pad (approximately 4 miles), the Central Pad to West Pad (approximately 4 miles), and the West Pad to Badami (approximately 18 miles). The route is also shown in greater detail in Figures 6.5 through 6.8. The ice road for pipeline construction will nominally be about 100 feet wide and 6 inches thick, although it may be widened in some areas for materials storage, pullouts, or to provide access to other Project-related activities and to ensure safe vehicle traffic.

Ice pads will be primarily required to support construction works. These will include approximately 2 to 3 acre ice storage/staging pads along the ice roads for bridge and pipeline construction, ice pad extensions required to support construction activities on the Central Pad, and approximately 66 acres of ice pad adjacent to the gravel mine for the temporary storage of overburden removed from the mine.

7.1.2 Temporary Camps

Temporary construction camps will be brought to the Point Thomson area, to support civil works and other early infrastructure-related activities. Estimates are that the camp capacity needed in the first half of 2012 is around 200 individuals. Subsequent construction and drilling activities at Point Thomson, until year end 2014, will require increased camp capacity; with an estimate peak workforce on-site of approximately 380. All camps and related camp support activities (i.e., waste management) will comply with all applicable codes and regulatory requirements. Pipeline construction activities will need camps (location to be determined) along the pipeline construction ROW. These camps may be retained for future drilling and construction activities.

The operations camp may be installed earlier so it can be used during the construction period before it will be needed for operations, reducing temporary camp facilities.

7.2 CIVIL WORKS

The Project includes gravel roads, pads, and other structures to support wells, process and utility facilities, a camp, and staging/storage during operations. The pads will protect the underlying permafrost and will be surface graded to control stormwater runoff and allow for effective spill recovery. Other civil works include an emergency response boat launch, barge offloading bulkheads, and airstrip. These facilities are described below, with associated dimensions and fill requirements summarized in **Table 7.1**.

Field surveys will be performed to finalize the design of the gravel structures. Size and gravel requirements will be more precisely determined during the detail design phase, but are not expected to be greater than described below.

7.2.1 Gravel Roads

All-season gravel roads will connect Project pads, airstrip, gravel mine, and freshwater supply source(s) to the Central Pad (**Figures 7.4** through **7.10**).

Table 7.1 Summary of Civil Works

Structures	Dimensions[1] (feet) (length x width x minimum height)	Approximate Volume (cubic yards)	Affected Acreage
Drill Pad Roads[2]	11.4 miles x 32 x 5	726,400	88.8
Access Roads[3]	4,963 x 24 x 5	51,900	7.0
Central Pad	1,730 x 1082 x 6	673,200[4]	48.9[4]
Emergency Response Boat Launch – above MHW	Included in Central Pad	Included in Central Pad	Included in Central Pad
Emergency Response Boat Launch – below MHW	150 x 16 x 0.6	84	0.1
Emergency Response Boat Launch: Gangway Pilings	N/A	N/A	<0.1
Barge Offloading Bulkheads: Access Approach and High and Low Bulkheads[5]	See Figures 7-23 and 7-24	17,800	1.2
Barge Offloading Bulkheads: Mooring Dolphins[6]	N/A	N/A	<0.1
Barge Offloading Bulkheads: Dredging and Screeding	150 x 400	Up to 1,500	1.4
Barge Offloading Bulkheads: Dredging Spoils	1,015 x 20 x 2	1,500	0.9
East Pad	900 x 730 x 6	207,500[7]	17.7[8]
West Pad	800 x 800 x 6	280,000	18.2
C-1 Pad	230 x 520 x 6	13,000[9]	4.4[9]
Water Source Access Pad	120 x 100 x 6	4,600	0.6
Airstrip[10]	5,600 x 200 x 5	474,700	44.1
Gravel Storage Pad[11]	530 x 530 x as required	200,000	10.7
Gravel Mine Site	1,880 x 1,250 x 48	3,379,100[12]	59.3
VSMs	N/A	N/A	<0.1

KEY

1 Crown and height dimensions detail area at top of fill and height of fill. Side slopes are used to calculate affected acreage.
2 Includes the gravel quantities for roads to the Central Pad, East Pad, West Pad, Gravel Mine, and Stream Diversion Roads.
3 Includes the gravel quantities for Access Roads to the Airstrip, Navaid Pad, C-1 Pad, and Water Source Pad.
4 Total numbers for fill and affected acreage are presented here. Existing gravel fill at Central Pad encompass 12.4 acres, the newly placed 673,200 cubic yards of gravel fill will encompass 31.9 new acres for a total of 48.5 acres filled above MHW.
5 Fill for access approach and bulkheads is above MHW.
6 Mooring Dolphins will be placed below MHW.
7 Total numbers for fill and affected acreage are presented here. Existing gravel fill at East Pad encompass 3.5 acres, the newly placed 207,500 cubic yards of gravel fill will encompass 15.2 new acres for a total of 17.7 acres filled.
8 Dredging Spoils will be placed above MHW.
9 Total numbers for fill and affected acreage are presented here. Existing gravel fill at Alaska State C-1 Exploration Well Pad encompass 4.4 acres, the newly placed 13,000 cubic yards of gravel fill will encompass no new acres.
10 Airstrip estimated footprint includes helipad and navigational aid (Navaid) pads.
11 Gravel stockpile dimensions are for base of the stockpile; height and side slopes as required.
12 Includes gravel, inorganic overburden, and organic overburden.

MHW – mean high water
N/A – not applicable

7.2.1.1 Infield Access Roads

The footprint dimensions and gravel quantities for the Project's infield access roads are based on side slopes of shoulders at a slope of 2H:1V (two horizontal feet for every vertical foot). The minimum depth of fill is 5 feet. Table 7.1 summarizes the dimensions and fill requirements for the gravel roads, and **Figure 7.11** depicts typical gravel road cross-sections. This information will be confirmed as engineering and Project execution plans are finalized.

7.2.1.2 Bridges and Culverts

The in-field gravel roads will cross nine creeks and small tundra streams, with culverts or bridges being installed at these crossings. The design selected will depend on the width of the stream being crossed, the presence of fish, and discharge flow parameters at the site of each crossing. Based on studies completed in July 2009, bridges are planned at four of the crossings identified as being fish-bearing streams.

Crossing locations and designations for bridges or culverts are shown on Figures 7.5 through 7.10. Typical culvert pipe and bridge configurations that will be used for stream crossings are depicted on **Figures 7.12** through **7.15**. A specific design will be selected for each water body crossing as additional data are gathered and evaluated.

7.2.2 Central Pad

The Central Pad will be used for drilling, process facilities, and other infrastructure. The drilling will include the gas injection and producer wells, and the Class I disposal well. Features of this pad include:

- Accommodates up to eight wells with surface well locations spaced 40 feet apart.
- Incorporates gravel fill from an existing exploration pad, thereby reducing the pad's new footprint.

The approximately 49-acre Central Pad will accommodate production facilities and required supporting infrastructure including:

- The CPF process and utility modules
- High and low pressure flares
- Auxiliary equipment
- A grind and inject module
- Operations camp and camp utility modules
- A warehouse
- A communications tower and an associated building
- Storage tanks
- A cold storage area
- Associated pipe racks, cable racks, and storage equipment and staging/storage areas

Dimensions and fill requirements for the Central Pad are shown in Table 7.1. Central Pad footprint and slope protection required for the Central Pad are shown on **Figures 7.16** and **7.17**, respectively**.** Given the current pad configuration and layout, it is expected that slope protection will be needed on three sides of the pad. Slope protection would consist of gravel-filled geotextile bags, armor rock, or jute matting as appropriate for each location, as shown on **Figure 7.18**. Typical pad sections are shown on **Figure 7.19**.

7.2.3 Emergency Response Boat Launch

A boat launch to support access by emergency response vessels will be located along the east side of the Central Pad, extending to about the shoreline. The ramp will extend approximately 150 feet into the inlet down to approximately 3.5 feet below the Mean Lower Low Water (MLLW) level. The boat launch will consist of a gravel ramp with concrete planks as a running surface, and a gangway running alongside (**Figures 7.20** through **7.22**). The gangway will be supported by timber sleepers where it adjoins the pad, and a pile cap as it extends into the lagoon with Flexi Floats attached to the piles. Dimensions and fill requirements of the emergency response boat launch are shown in Table 7.1.

7.2.4 Barge Offloading

A comprehensive evaluation of alternatives for transporting large modules was undertaken and the findings are summarized in the *Point Thomson Project Environmental Report.* Sealift by ocean-going barges direct to the Point Thomson location was selected as the option with the lowest expected environmental impact and provides the best means to meet the Project's construction schedule.

Point Thomson is remote and not connected by gravel road to the existing Prudhoe Bay infrastructure. As a result, the construction of the Point Thomson facilities is limited by the transportation modes available to move heavy loads, such as process modules, to the site. Ice roads and barging are the main means for the transport of such heavy loads. Environmental conditions (weather, sea ice movement) and wildlife considerations (e.g., denning polar bears) can affect the availability of the ice roads, particularly sea ice roads. Freeze up and break up timing affects the availability of onshore ice roads. Additionally, double handling is required to transport heavy modules to Point Thomson where ice roads are involved – e.g., sealift to Prudhoe Bay, transfer to a staging site, and then ice road transport to Point Thomson. Risks from double handling and ice road transportation limitations can be reduced by direct shipment of large modules to the Point Thomson site.

Current drilling activity at Point Thomson is supported by over-the-beach barge access during the open water season. This type of direct beach access is limited to smaller, shallow-draft coastal barges. The Project will require the use of oceangoing barges for sealift of large pre-fabricated facility modules. The oceangoing barges are considerably larger, with deeper hulls (approximately 400 feet long by 105 feet wide by 25 feet deep) and can carry heavy loads with a relatively shallow draft during transport and delivery to the site.

A bulkhead and five offshore mooring dolphins (pilings driven into the sea floor) are necessary for landing and securing the ocean barges, which require several feet of draft and cannot directly access the beach. The bulkhead (referred to as the high bulkhead) will be located above the Mean High Water (MHW) line on the beach. Mooring dolphins are needed to ensure an accurate alignment of the barges for offloading operations and will be left in place for future use.

To better accommodate landing and offloading of the smaller coastal barges, an adjacent lower bulkhead (low bulkhead) will also be constructed above the MHW line on the beach, with an associated gravel ramp constructed to the Central Pad (**Figures 7.23** through **7.25)**. More details about construction of the barge offloading components are provided in Section 8.2.4.

It is anticipated that the large ocean barges will be in place at the Point Thomson site for approximately 14 days, providing adequate time to dock and offload cargo. Once offloaded, the barges will leave the site. This method of barge access will be utilized for up to three construction seasons (2012 through 2014).

To safely ground the large ocean barges sufficiently close to the bulkhead, the seafloor will require some dredging and screeding (leveling), at least before the first shipping season. Dredging/screeding will generally be limited to the area needed for landing the first barge, with up to 1,500 cubic yards of excess material potentially needing to be removed to ensure the required seabed profile. Removed seafloor material will likely be placed along designated shoreline locations. Specific disposal locations will vary and will be evaluated depending on site-specific conditions and amount of dredging required.

Removed seabed material could be distributed along the beachfront in a swath 20 foot wide by 1,015 feet long and 2 feet deep (assuming the maximum 1,500 cubic yards). Based on onsite observations and the dredge area being located primarily within the beach active zone, the majority of the dredged material is expected to be silty sandy gravels. An updated dredge material description will be provided when geotechnical sampling is completed in 2010.

7.2.5 East and West Pads

The East and West Pads will allow drilling the delineation/development wells that will target the oil rim. Each pad will protect the underlying tundra and permafrost.

The East Pad will be approximately 18 acres in size. In addition to accommodating drilling operations (up to eight wells), the pad will include an area for required production and metering facilities that accommodate full wellstream production to the CPF – as well as the necessary supporting infrastructure. The East Pad will use area of an existing exploration pad (North Staines River State No.1), and this allows for the required setbacks (e.g., reduce the effects of coastal erosion and ice encroachment on the drill site) and gathering line routing. Dimensions and fill requirements for the East Pad are shown in Table 7.1. The East Pad footprint is shown on **Figure 7.26**, with typical pad sections shown on **Figure 7.27**. The exact shape, dimensions, and layout of the pad will be further refined as the final design phase proceeds, but the size of the pad is not expected to change appreciably.

The West Pad will be approximately 18 acres in size. In addition to accommodating drilling operations (up to eight wells), the pad will include an area for production and metering facilities that accommodate full wellstream production to the CPF – as well as the necessary supporting infrastructure. The West Pad will be located on an undeveloped site near the shoreline that allows for the required setbacks and an appropriate pipeline approach configuration. Dimensions and fill requirements of the West Pad are shown in Table 7.1. The West Pad footprint is shown on **Figure 7.28**, with typical pad sections shown on **Figure 7.29**.

7.2.6 Water Source Pad

An access pad of approximately 0.4 acres will be constructed next to the existing Point Thomson area water source (C-1 mine site), as shown on **Figures 7.30** and **7.31**. This pad will be used to support year-round water withdrawal from that source (e.g., truck turnaround, pumping equipment, etc.) before the new water supply reservoir is available; therefore, it will serve as a backup water supply. Dimensions and fill requirements of the Water Source/Staging Pad are shown in Table 7.1.

7.2.7 Equipment and Materials (C-1) Storage Pad

The Alaska State C-1 exploration well site will be used as an equipment and materials storage pad. Use of an existing gravel pad provides a significant amount of valuable storage space with a limited size new gravel footprint. Approximately 13,000 cubic yards of fill will be placed onto the existing pad's footprint. The drilling rig will be moved off the Central Pad during pad construction. The East and West Pads will also need to be constructed and prepared to receive the drilling rig during the same winter construction season. It will be necessary to "season" the gravel over a summer thaw period before the pad can be used to support drilling activities. During the construction period, the rig will be moved to the existing gravel pad at the C-1 exploration site. This may require constructing an ice road to the pad for moving the drilling rig before the gravel access road is constructed. Gravel may be added to the existing pad. A camp may be located on site to maintain the rig (**Figures 7.32** and **7.33**).

7.2.8 Airstrip

A year-round gravel airstrip is essential for the transport and safety of personnel, supplies, and emergency response. Air service to support drilling and initial construction activities will be provided by helicopter and a seasonal ice airstrip during the winter until the gravel airstrip is useable. The gravel airstrip will provide the only year-round fixed-wing access to the Point Thomson area. The location of the year-round airstrip is south of the Central Pad, approximately 3 miles from the coast. Factors considered in siting the airstrip include:

- Proximity to the Central Pad and its camp facilities
- Sufficiently inland from the coast to reduce fog restrictions
- Alignment with prevailing winds
- Favorable topography
- Proximity to the planned gravel source
- Avoidance of creeks or lakes
- Proximity to the planned access roads

The location of the airstrip is shown on the facilities layout (Figure 5.1), with design details provided on **Figures 7.34** and **7.35**.

During operations, aircraft using the airstrip most frequently for crew change-out and supply delivery purposes will be approximately the size of a Beechcraft 1900D or a Twin Otter. However, the runway will be designed and constructed to provide landing and take-off capabilities for a Hercules C-130 cargo plane (no passengers), since such aircraft may be needed for maintenance and servicing of large equipment or potentially for emergency response. The airstrip will include the following features:

- Heliport
- Runway lighting
- Airport control building(s)

- Electrical service via cable buried in the road from the Central Pad power-generating facilities
- Apron for personnel and cargo transfer
- Control and communication links to the Central Pad using fiber-optic cable
- Navigation and communication controls and an instrument approach system that provides 24-hour operations capability

Based on Federal Aviation Administration (FAA) advisory circulars including safety guidelines, the airstrip's dimensions will be approximately 5,600 feet long by 200 feet wide, with an apron, helipad, and ancillary navigation aid pads. As with the gravel roads, the footprint dimensions and gravel quantities are based on side slopes of shoulders at a slope of 2H:1V. The depth of fill will be at least 5 feet. Dimensions and fill requirements of the airstrip are shown in Table 7.1.

The airstrip will maintain navigational aid equipment, weather equipment, and the required lighting to comply with the instrument approach procedures that will be issued by the FAA for the safe operation of the Point Thomson airstrip during adverse weather conditions. The equipment will be located at small pads near the airstrip. The exact dimensions and locations of the pads will be determined as the Project's engineering design progresses. The gravel volumes of these pads are generally accounted for in the overall airstrip gravel requirements shown in Table 7.1.

7.2.9 Gravel Storage Pad

A pad will be constructed next to the gravel mine for storing mined gravel for future maintenance needs. The maintenance gravel storage pad will be adjacent to the proposed mine site and will be accessible by the gravel mine access road. The approximately 200,000 cubic yards of gravel will require a storage pad of approximately 11 acres in size. As gravel is consumed over the years, the vacated pad area will be used for storage and staging of equipment and materials. Dimensions and fill requirements of the Gravel Storage Pad are shown in Table 7.1.

7.2.10 Gravel Sources

The primary gravel source for the Project will be a new gravel mine located approximately 2 miles south of the Central Pad and just north and east of the airstrip. This centrally-located site has been selected to limit both the impact on lakes and the haul distance from the mine to the major gravel fill locations. Geotechnical surveys at the gravel mine site have identified gravel of sufficient quantity and quality for construction and operations purpose and will be verified in 2010.

It is estimated that approximately 2,651,100 cubic yards of gravel and 726,100 cubic yards of overburden will be removed from the approximately 60-acre mine site. Gravel will be stockpiled on a pad adjacent to the pit, as described in Section 7.2.9. The overburden removed from the mine site will be stockpiled temporarily on an ice pad(s) for placement back into the pit when mining is completed (**Figure 7.36**). The plan is to complete gravel mining in one winter season, remove the overburden stockpiled on ice pads, and place it back into the pit prior to breakup. The mine site will subsequently be used as a freshwater reservoir once mining activities are completed (**Figure 7.37**). An inlet structure will be constructed to divert water to an adjacent stream during peak discharges that occur in spring breakup. Additional detail regarding this topic is presented in the Mining and Rehabilitation Plan provided in **Appendix A**.

7.3 INFRASTRUCTURE AND SUPPORT FACILITIES

Project planning has sought to maximize use of the operations camp and infrastructure to support drilling and construction activities.

7.3.1 Operations Camp

The operations camp, located south of the process facilities on the Central Pad, will be designed and built to accommodate approximately 80 people. The operations camp is targeted for installation in 2012, allowing the construction camp to be reduced in size. The Camp facilities will initially be configured to accommodate more than 80 people (up to 140 individuals). The camp will include a kitchen, laundry, recreational facilities, and sleeping quarters. Camp utility modules will include a potable-water treatment system, potable water tanks, a wastewater treatment system, raw water and firewater storage tanks, and firewater pumps. During the operations phase, a camp incinerator will be installed and used for the disposal of certain wastes. Typical freshwater requirement for the operations camp is approximately 75 to 100 gallons per person per day. Effluent from the wastewater treatment system will normally be injected via the Class I disposal well.

Water tanks will be refilled with local surface water collected either by truck or via a water-supply line from the two area gravel-mine sites (i.e., an existing mine site and the new mine site, both located about 2 miles south of the Central Pad).

7.3.2 Water Supply

Freshwater is required for the construction of ice roads and pads, camp operations, and drilling. Preliminary estimates of water requirements for the Project range up to approximately 200 million gallons per year during construction. These estimates will be updated as engineering work is finalized and construction planning is completed.

Freshwater requirements for construction will be supplied from existing, year-round water sources located between Endicott and the Project site. Sources in the vicinity of the Central Pad include permitted lakes and the existing C-1 staging site, as well as possible future permitted sources. Sources in the vicinity of Badami include the permitted Shaviovik Pit, Turkey Lake, and Badami Reservoir, as well as other permitted and possible future permitted sources. Sources in the vicinity of the Endicott causeway landfall include the Duck Island Mine Site and Sag Mine Site C (Vern Lake), as well as other permitted and possible future permitted sources. **Figure 7.38** shows water-source lakes and mine sites currently permitted for ice road construction and other activities (e.g., drilling). **Table 7.2** provides currently permitted withdrawal volumes for these water sources.

Table 7.2 Representative Permitted Volumes for Fresh Water Sources in the Point Thomson Area and to the West

Water Source	Size (acres)	Depth (feet)	Total Volume (MG)	Authorized Volume Water and Ice (MG)	Fish Restriction
Lake 1	33	4.5	16.13	3.23	No
Lake 2	37	3	12.60	2.41	No
Lake 3	15	3.8	6.19	1.24	No
Lake 4 E/W	93	4	40.41	8.08	No
Lake 5	11	3	3.58	.72	No
Lake 6	12	1.7	2.22	.44	No
Lake 7	22	2	4.78	.96	No
Lake 8	13	3	4.24	.85	No
Lake 9	31	3.6	12.12	2.42	No
Lake 10	65	4	28.24	5.64	No
Lake 11	20	4	8.70	1.74	No
Lake 12	23	3	7.49	1.5	No
Lake 13	40	5	21.72	4.34	No
Lake 14	8	3.3	2.87	.57	No
Lake 15	12	3.5	4.56	.91	No
Lake 16	22	4	9.56	1.91	No
Lake 17	173	7.5	140.93	5.64	Yes
Lake18	182	~5	296.52	59.3	No
Lake 19	32	~5	52.14	10.42	No
Lake 20	68	~5	110.79	22.16	No
Lake 21	196	~5	319.33	63.87	No
Lake 22	181	~5	294.9	58.98	No
Lake 23	183	~5	298.15	59.63	No
Lake 24	118	~5	192.25	38.45	No
Lake 25	166	~5	270.46	54.09	No
Unnamed Lake T11N,R17E, SW¼Sec.19 UM	15	~5	24.44	4.89	No
Shaviovik Mine	13	48	203.33	21.36	Yes
C-1 Mine Site	11	35	43.56	9.38	Yes
Duck Island Mine Site	85.2	69	1915.84	1721.46	No
Sag Mine Site C	41	38.2	77	7	Yes
Badami Mine Site	22	40	~92.55	4.83	Yes

Source; ADNR Temporary Water Use Permits (TWUP) A2008-123 through A2008-128. In addition, TWUPs A2008-129 and A2008-130 authorize withdrawal of water/ice from offshore portions of the Sagavanirktok River and the Beaufort Sea for a combined total of 179.53 acre-feet of water and/or ice aggregate equivalent for TWUP A2008-123 through TWUP A2008-130.

Key:
~ – approximately
MG – million gallons

Freshwater for construction will typically be transported by truck, while freshwater for operational use will typically be transported by pipeline. Although the C-1 staging site will provide much of the water required for drilling, freshwater demand during operations will require that a large portion of the water be drawn from the new freshwater reservoir created by filling the new gravel mine. The reservoir will have with up to 23.5 million gallons available for use, assuming the presence of fish.

An intake structure and its associated water line will supply freshwater initially from the existing C-1 site and later from the new reservoir created at the Point Thomson gravel pit. The water pipeline design has not been finalized, but it is expected to be constructed aboveground, along an alignment generally following the access road system from the water source(s) to the Central Pad. The 3- or 4-inch water line will be insulated, resulting in an overall outer diameter of approximately 8 inches (for either the 3-inch or 4-inch waterline). The top of the pipe from grade, as installed on timber supports, will be approximately 16 inches.

7.3.3 Grind and Inject Facilities

Grind and inject facilities will be located on the Central Pad for ensuring authorized wastes are sufficiently processed for injection via the Class I disposal well.

7.3.4 Warehouse, Buildings, and Shops

At the Central Pad, the Project's warehouse facilities will provide a dry and warm storage area, as well as individual maintenance areas for vehicles, electrical, instrumentation, and mechanical support. Storage and staging pads in Deadhorse will also be used to support the Project.

7.3.5 Tanks and Storage Areas

Tank and storage area requirements will be confirmed as the Project's engineering design is finalized, and tank sizes, contents, and locations are better defined. If required, tanks and associated instrumentation will be heat-traced and insulated to avoid freezing. Secondary containment will be provided for certain stored materials, as required by state and federal regulations.

Diesel fuel is required to support construction activities. The Central Pad currently includes a diesel fuel storage area to support drilling activities. This diesel fuel storage area may also be utilized for Project construction activities and supplemented, as required. Some or all of the diesel fuel storage area used for drilling and construction will be converted to use for storage during operation.

Storage required to support operations is considerably less than required during the drilling and construction periods. Ultra low sulfur diesel fuel will be used for vehicles and equipment, as well as to fuel the emergency generators. The current diesel fuel tank farm has a capacity of 1.6 million gallons. This storage may be used to support drilling operations in the future. Diesel fuel will be re-supplied by tanker trucks (winter) and/or barge (summer). The diesel fuel tanks are designed to American Petroleum Institute (API) and comply with other applicable standards and regulatory requirements.

Methanol is required for hydrate formation inhibition and freeze protection of the wells and production and injection lines, as well as to protect the process facilities during startup and shutdown. Methanol and other production-related chemicals (corrosion inhibitor, emulsion breaker, etc.) will be stored onsite. Sufficient water storage will be installed to support fire suppression and firewater systems and to meet raw water and potable water demands.

7.3.6 Telecommunications

A private microwave connection (Point Thomson-Badami-Deadhorse) will provide the local/wide area network for the Point Thomson site, as well as a Private Branch Exchange (PBX) telephone network tie-in point to the public switched telephone network. Fiber optic and multi-pair copper cable runs (backbone) will be used to provide voice, data, Digital Cellular Service (DCS) signals, and basic process control system (PCS) signals between modules/locations at the Central Pad and to/from the East and West Pads. A Very Small Aperture Terminal (VSAT – satellite) system will be installed for backup communications.

A PBX telephone switch will provide local telephone/fax services for personnel at the Central Pad. An ultra-high frequency (UHF) trunked radio system will be used for Operations plant radio communications. Conventional analog repeater systems will be dedicated to supporting emergency response activities (including spill response) at the Central Pad and along the pipeline route. Appropriate radio and navigation systems will be installed in each Alaska Clean Seas (ACS) vessel at the Central Pad to support emergency response activities.

A security system, including card readers and a color closed-circuit television system (CCTV), will be installed to monitor select areas at the Central Pad and at the well pad locations. A Paging and General Alarm (PAGA) system will be installed in the CPF.

An air band very-high frequency (VHF) radio, Non Directional Beacon (NDB), and a meteorological weather system will be installed at the Point Thomson site to support aircraft operations.

A new communication tower with associated equipment will be installed on the Central Pad. The Central Pad tower design is required to provide reliable communications and line of site microwave access to neighboring tower(s). The height is expected to be between 160 and 200 feet, and will be the tallest structure. A new communications tower(s) may also be installed at Badami and/or the ExxonMobil pad in Deadhorse to ensure reliable communications with Point Thomson.

A separate communication building will house all radio frequency (RF) equipment at the Central Pad for RF efficiency. This building will be located to minimize RF cable runs between the tower and the communications building, and the direct impact of ice falling from the tower onto the building. The building will be connected to the main Telecommunications Equipment Room via fiber optic and multi-pair copper cables in order to provide communications continuity.

7.3.7 Electrical Power Facilities

Drilling typically activities will be supplied with electrical power from the drilling rig diesel fuel-powered generators. Temporary diesel fuel-powered electrical generators will provide power for construction infrastructure and life support. Power requirements during construction are estimated to be less than 1,000 kilowatts (kW). Power demand will be evaluated during the next phase of engineering and execution planning. Multiple units may be used to meet these requirements.

The power requirements identified for the Point Thomson Project peak at about 20,000 kW. Four gas-fired turbine generators, each sized at 7,000 kW will meet these requirements and provide for one spare generator, once gas is available. Two of the four generators can also run on diesel, when needed. Additional diesel generators will be available for emergency and black-start purposes. Power feeds to the East Pad, West Pad, airstrip, and mine/water reservoir will be provided using power cables fed from the 13.8-kilovolt, or comparable, switchgear at the CPF module. To provide power for the Badami pipeline connection facilities, a power cable will be attached to the pipeline VSMs from the West Pad to Badami. Power cables going to facilities not along the pipeline route (e.g., airstrip, mine/reservoir) will be buried along the gravel access roads. Transformers will be provided at each location to provide the required voltage. No overhead power lines are expected.

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SECTION 7 FIGURES

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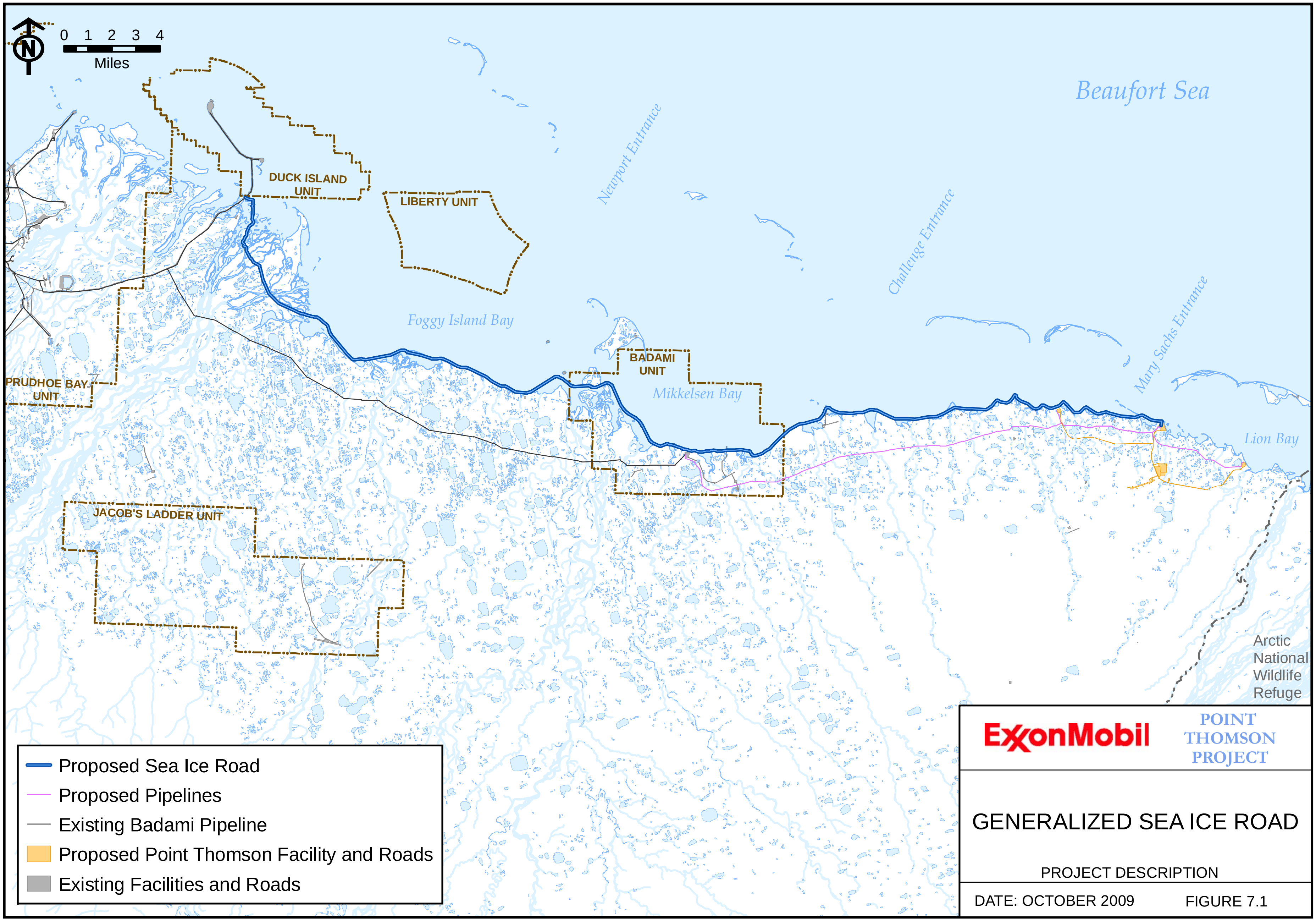
N
0 1 2 3 4
Miles
Beaufort Sea
DUCK ISLAND UNIT
LIBERTY UNIT
Newport Entrance
Challenge Entrance
Mary Sachs Entrance
Foggy Island Bay
BADAMI UNIT
Mikkelsen Bay
Lion Bay
PRUDHOE BAY UNIT
JACOB'S LADDER UNIT
Arctic National Wildlife Refuge
Proposed Sea Ice Road
Proposed Pipelines
Existing Badami Pipeline
Proposed Point Thomson Facility and Roads
Existing Facilities and Roads
ExxonMobil
POINT THOMSON PROJECT
GENERALIZED SEA ICE ROAD
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.1
X:\Point Thomson\GIS\Project Description\ursanc_pd_sea_ice_road_10162009.mxd

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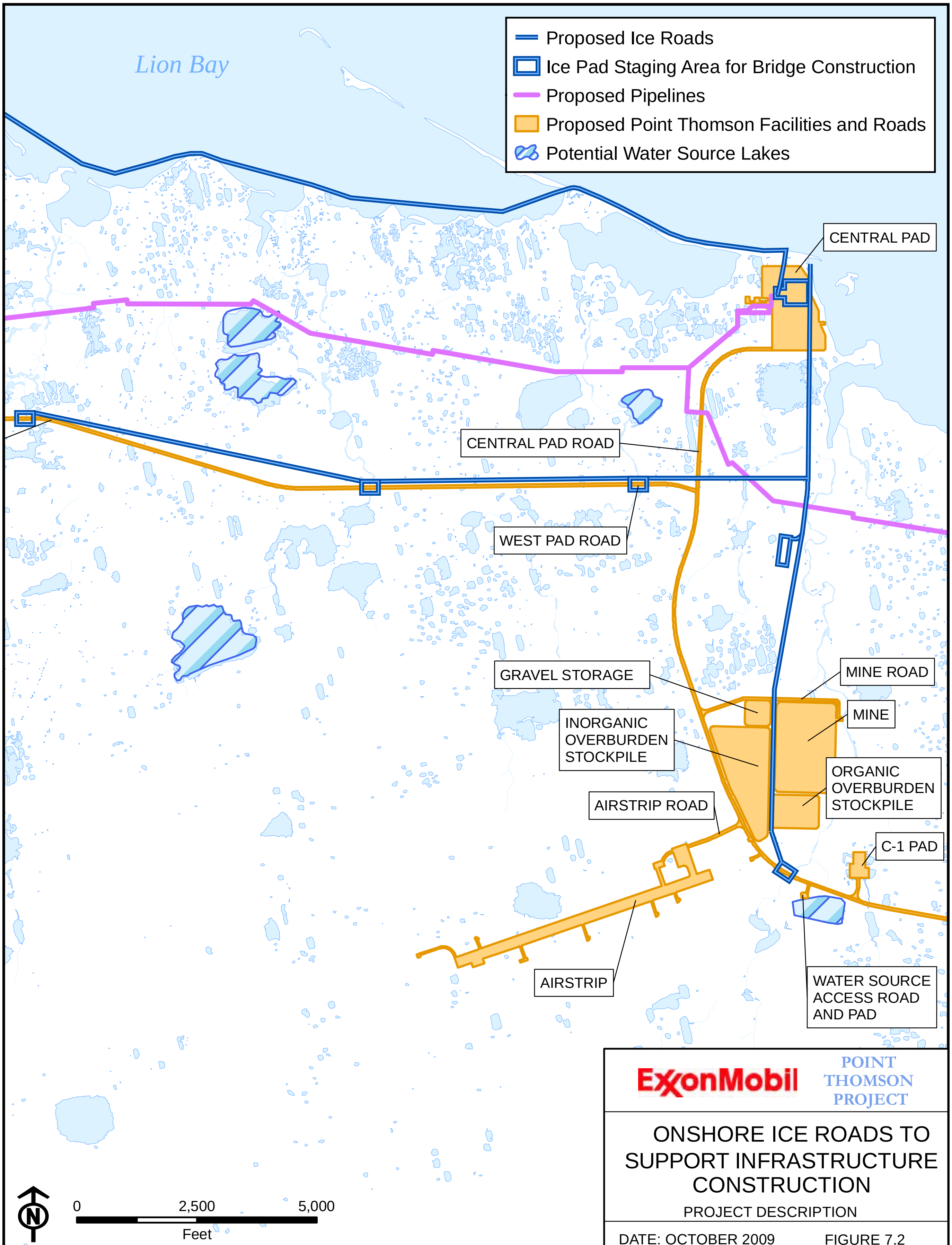

ExxonMobil POINT THOMSON PROJECT

ONSHORE ICE ROADS TO SUPPORT INFRASTRUCTURE CONSTRUCTION

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.2

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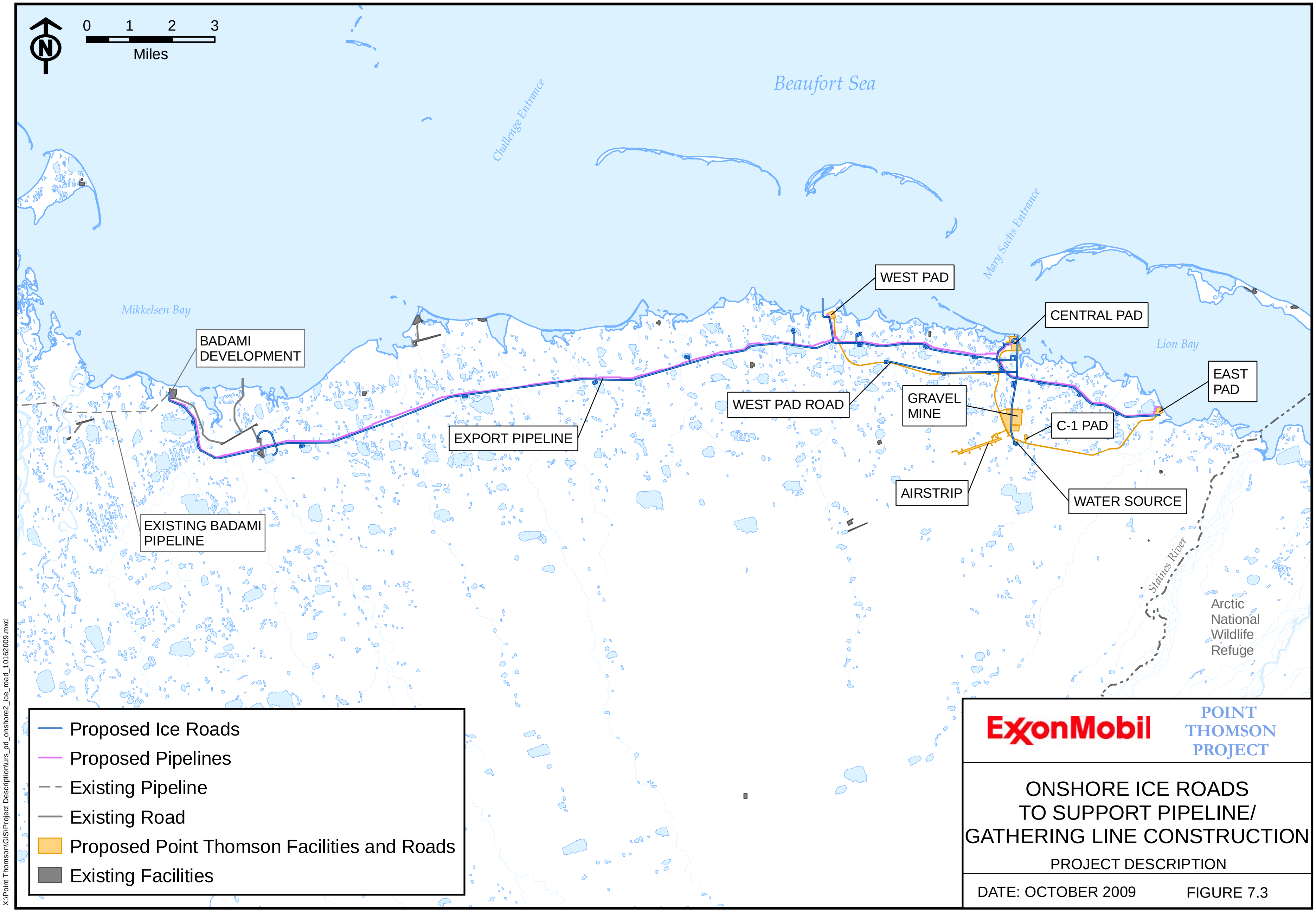
0 1 2 3
Miles
Beaufort Sea
Challenge Entrance
Mary Sachs Entrance
Mikkelsen Bay
Lion Bay
WEST PAD
CENTRAL PAD
EAST PAD
BADAMI DEVELOPMENT
WEST PAD ROAD
GRAVEL MINE
C-1 PAD
EXPORT PIPELINE
AIRSTRIP
WATER SOURCE
EXISTING BADAMI PIPELINE
Staines River
Arctic National Wildlife Refuge
Proposed Ice Roads
Proposed Pipelines
Existing Pipeline
Existing Road
Proposed Point Thomson Facilities and Roads
Existing Facilities
ExxonMobil
POINT THOMSON PROJECT
ONSHORE ICE ROADS TO SUPPORT PIPELINE/ GATHERING LINE CONSTRUCTION
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.3
X:\Point Thomson\GIS\Project Description\urs_pd_onshore2_ice_road_10162009.mxd

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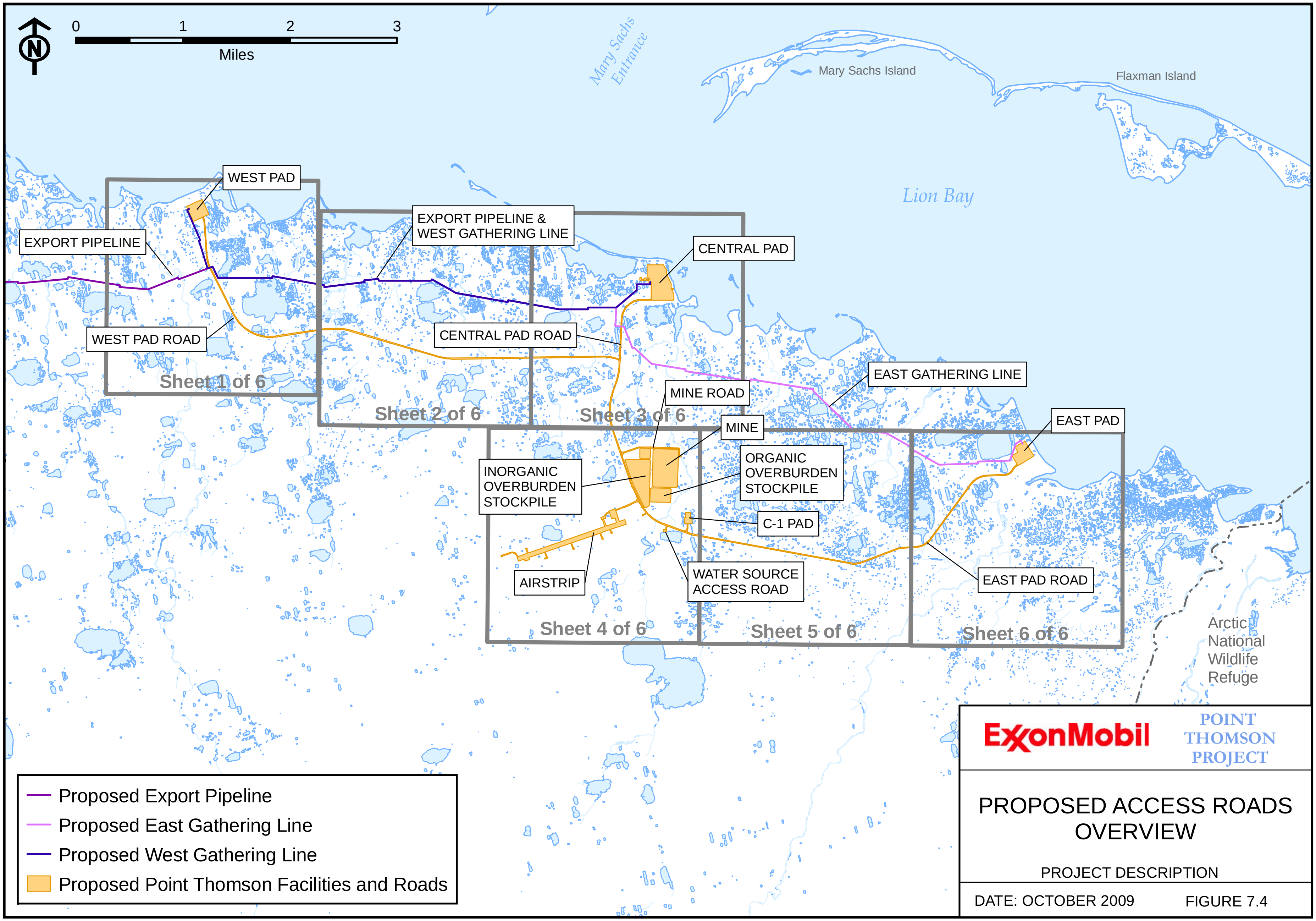

X:\Point Thomson\GIS\Project Description\urs_pd_acess_road_overview_10162009.mxd

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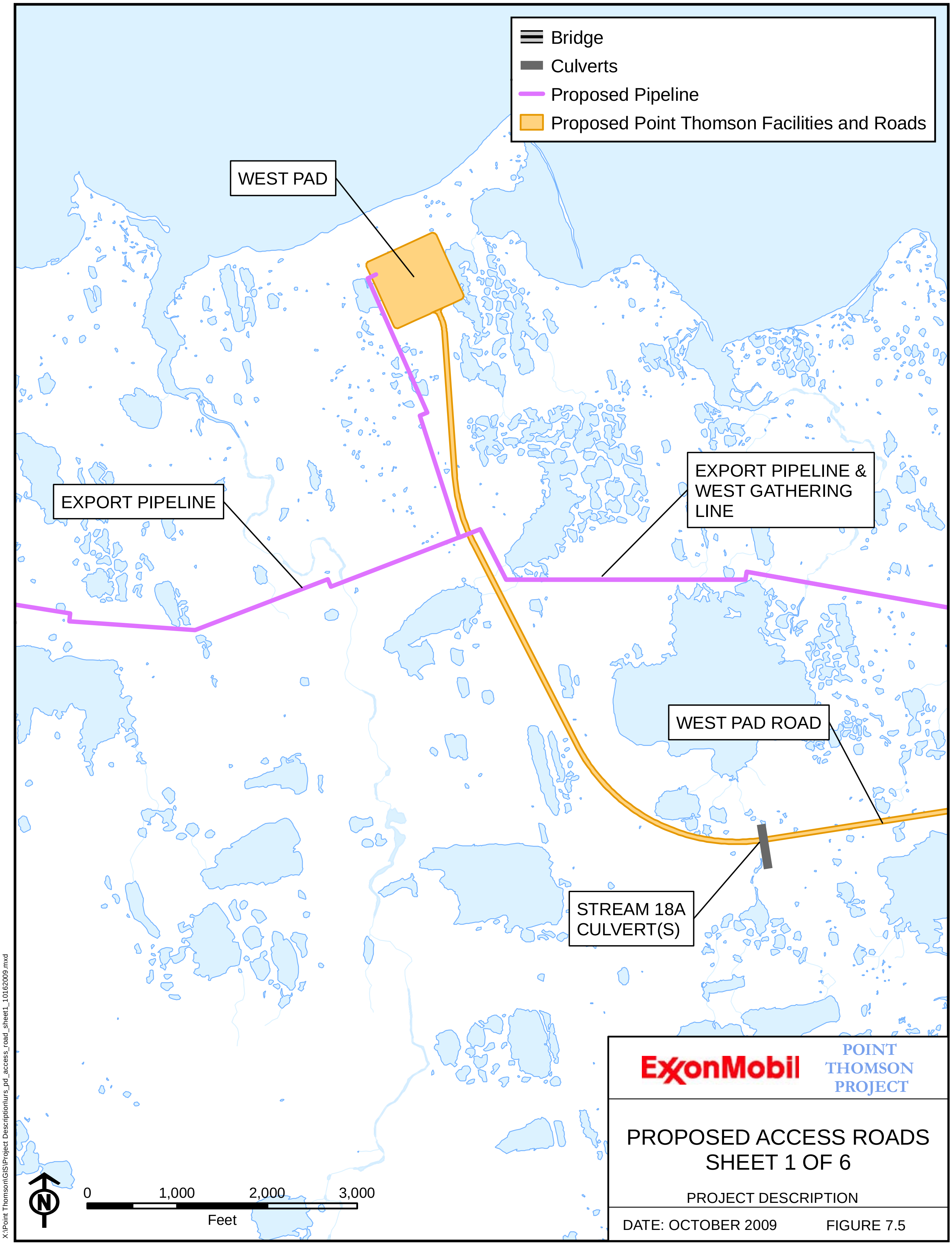
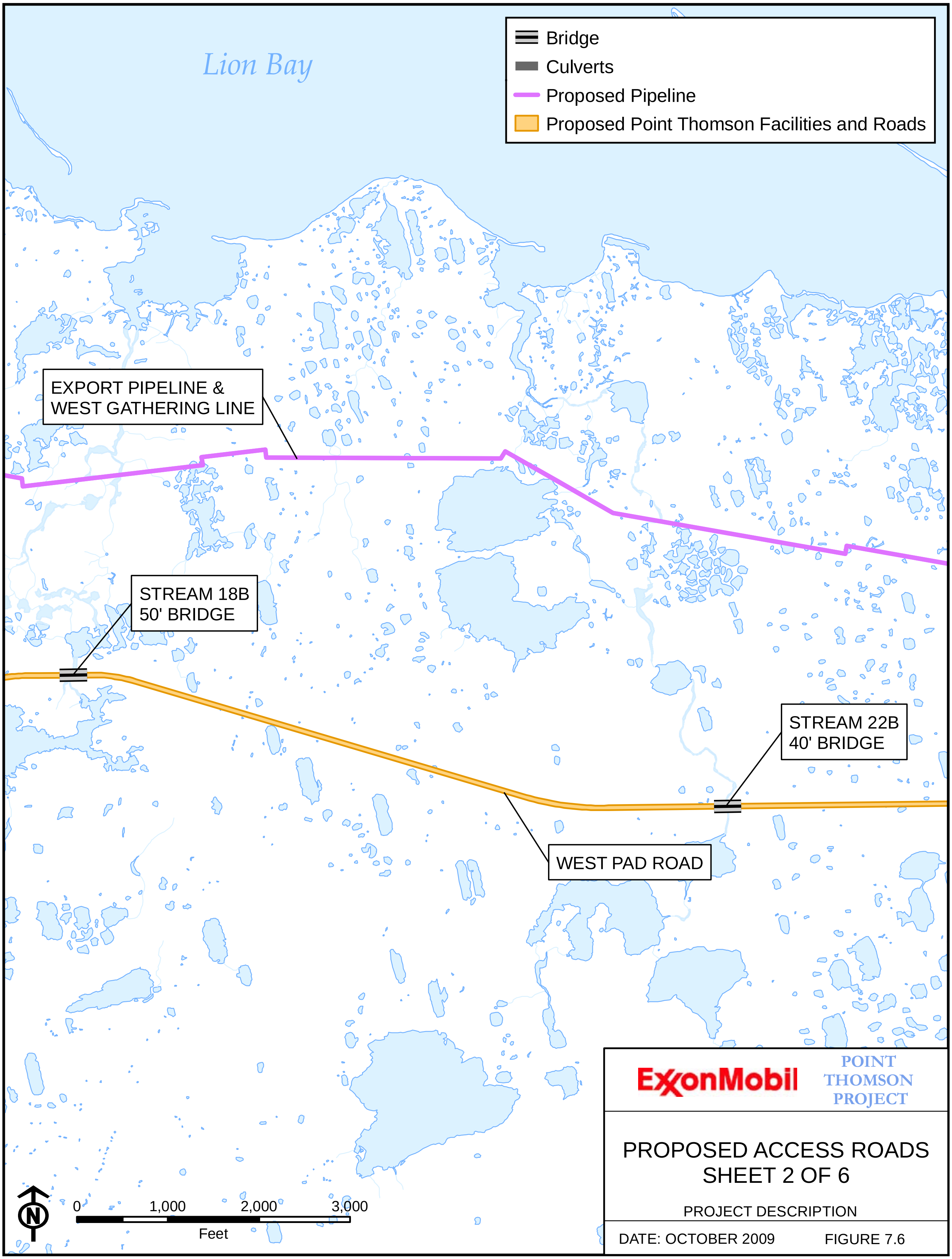

Bridge
Culverts
Proposed Pipeline
Proposed Point Thomson Facilities and Roads
WEST PAD
EXPORT PIPELINE
EXPORT PIPELINE & WEST GATHERING LINE
WEST PAD ROAD
STREAM 18A CULVERT(S)
N
0
1,000
2,000
3,000
Feet
ExxonMobil
POINT THOMSON PROJECT
PROPOSED ACCESS ROADS
SHEET 1 OF 6
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.5
X:\Point Thomson\GIS\Project Description\urs_pd_access_road_sheet1_10162009.mxd



ExxonMobil

POINT THOMSON PROJECT

PROPOSED ACCESS ROADS
SHEET 2 OF 6

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.6

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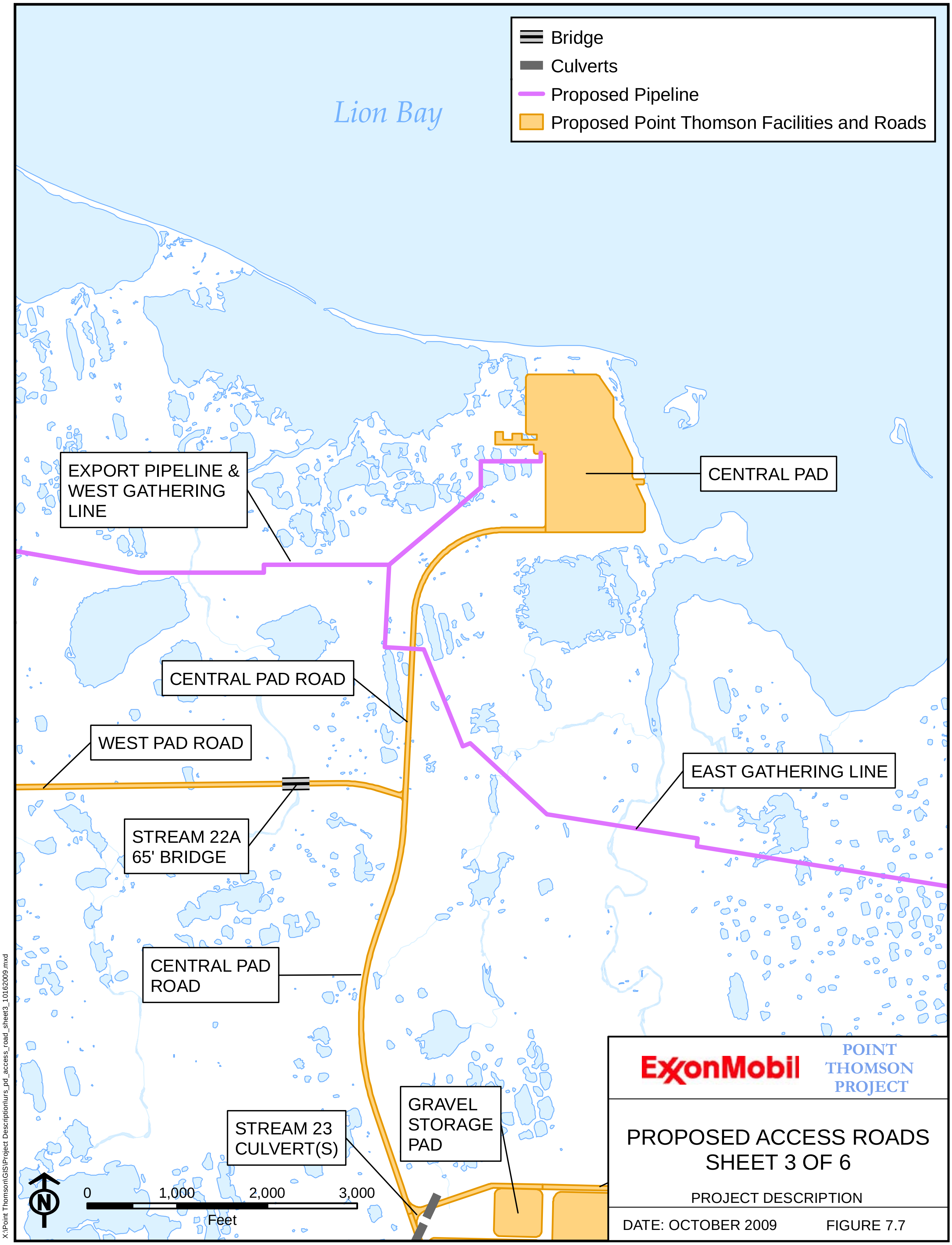
Bridge
Culverts
Proposed Pipeline
Proposed Point Thomson Facilities and Roads
Lion Bay
EXPORT PIPELINE & WEST GATHERING LINE
CENTRAL PAD
CENTRAL PAD ROAD
WEST PAD ROAD
EAST GATHERING LINE
STREAM 22A 65' BRIDGE
CENTRAL PAD ROAD
GRAVEL STORAGE PAD
STREAM 23 CULVERT(S)
0
1,000
2,000
3,000
Feet
N
ExxonMobil
POINT THOMSON PROJECT
PROPOSED ACCESS ROADS SHEET 3 OF 6
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.7
X:\Point Thomson\GIS\Project Description\urs_pd_access_road_sheet3_10162009.mxd

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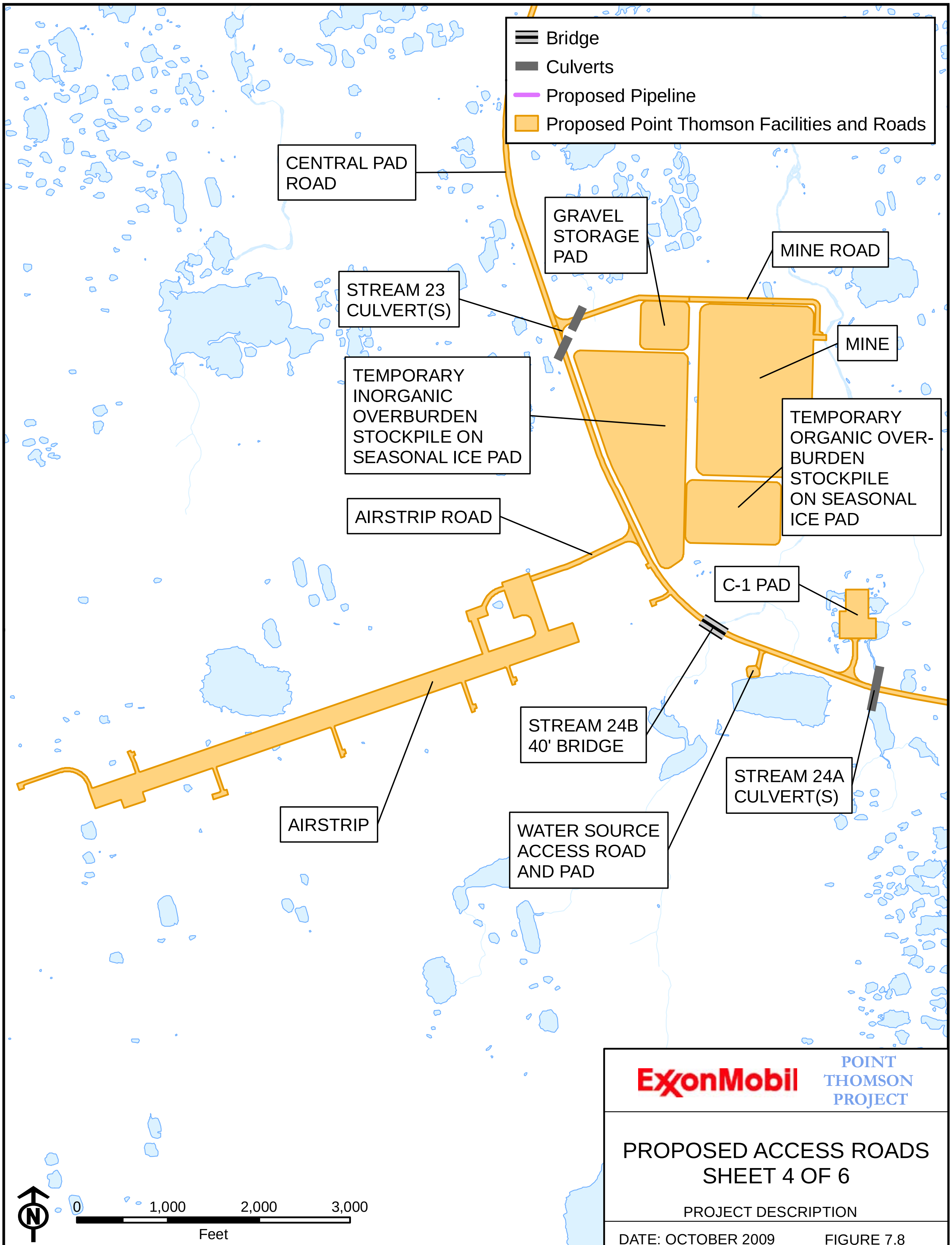

ExxonMobil POINT THOMSON PROJECT

PROPOSED ACCESS ROADS
SHEET 4 OF 6

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.8

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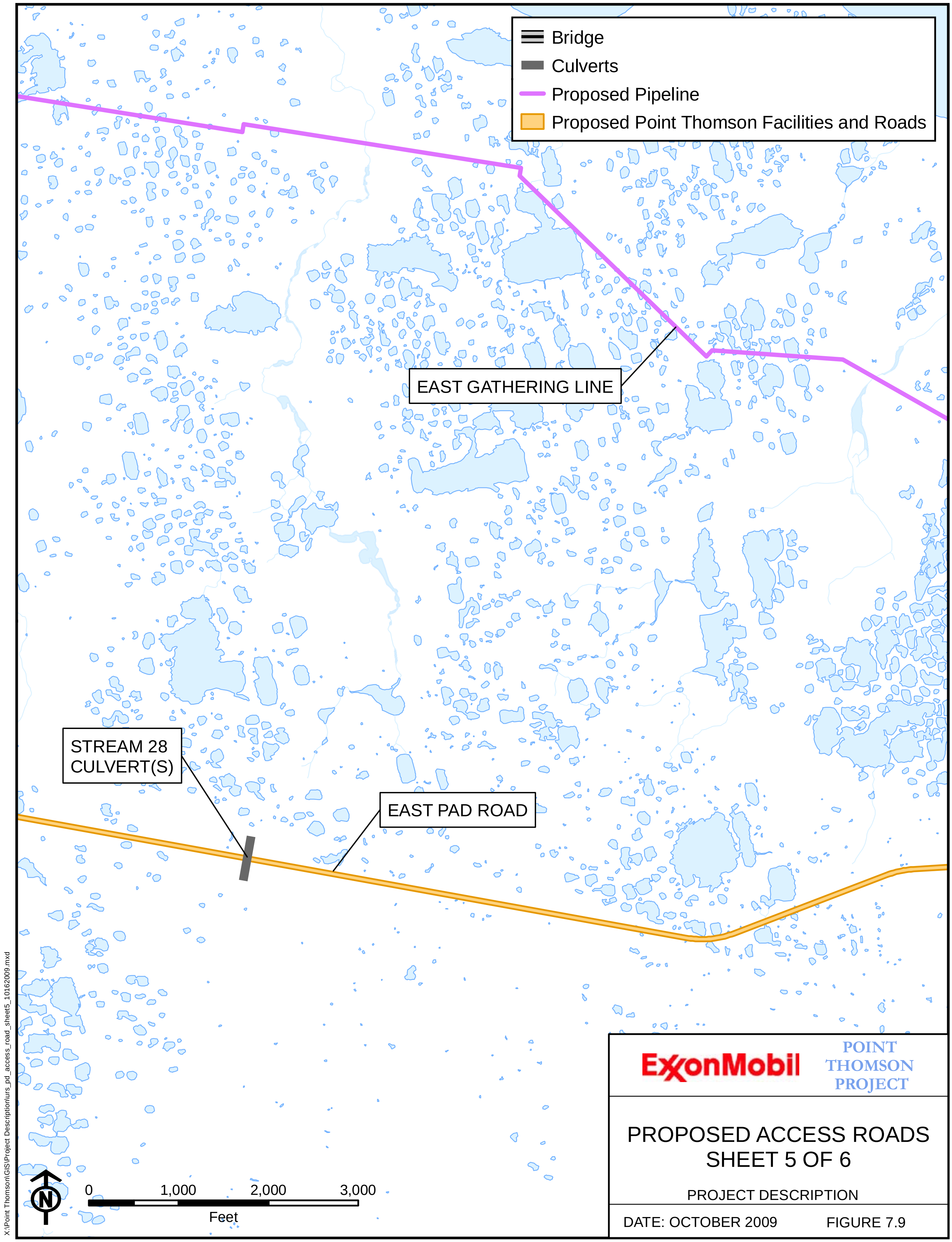
Bridge
Culverts
Proposed Pipeline
Proposed Point Thomson Facilities and Roads
EAST GATHERING LINE
STREAM 28
CULVERT(S)
EAST PAD ROAD
0
1,000
2,000
3,000
Feet
N
X:\Point Thomson\GIS\Project Description\urs_pd_access_road_sheet5_10162009.mxd
ExxonMobil
POINT
THOMSON
PROJECT
PROPOSED ACCESS ROADS
SHEET 5 OF 6
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.9

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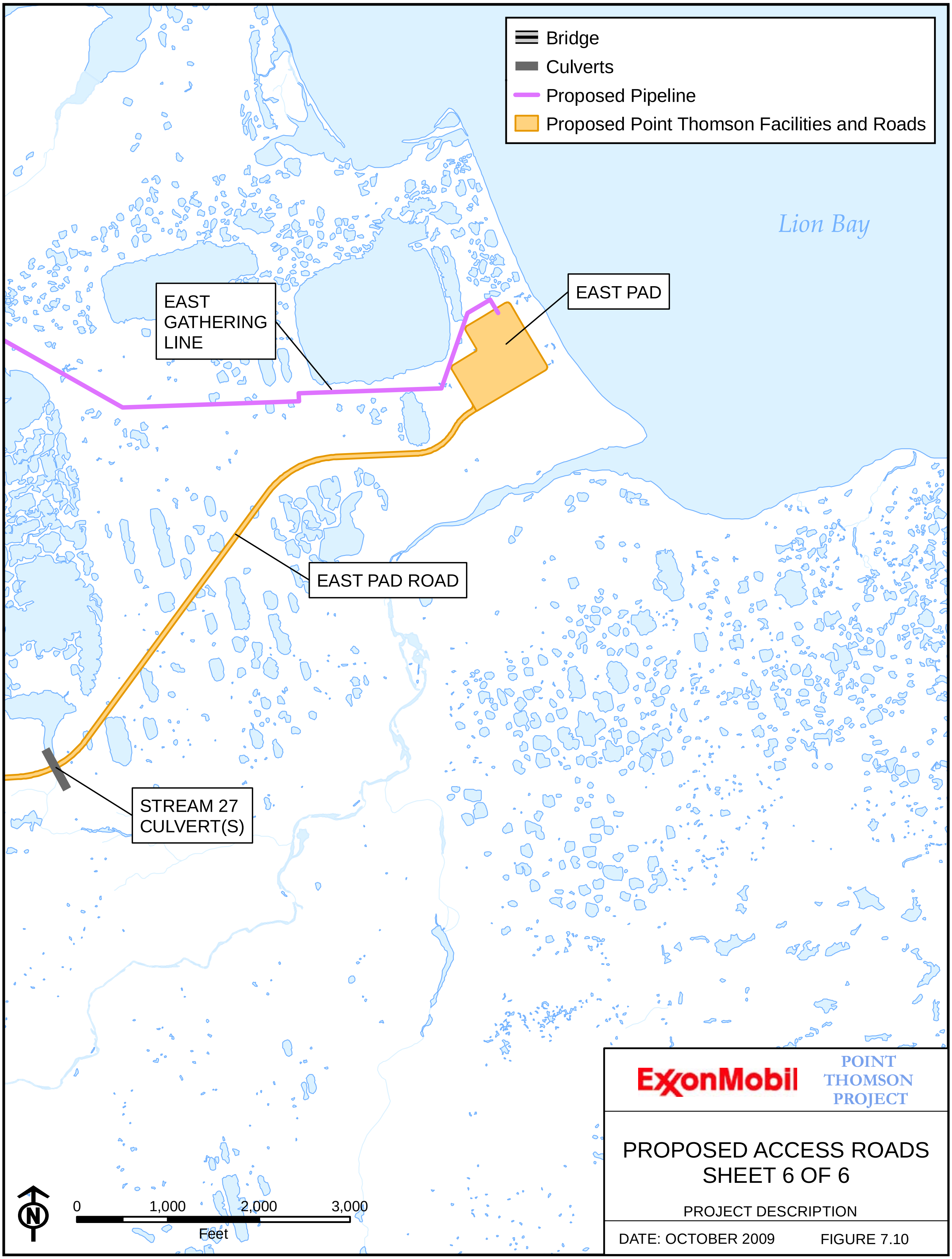
Bridge
Culverts
Proposed Pipeline
Proposed Point Thomson Facilities and Roads
Lion Bay
EAST PAD
EAST GATHERING LINE
EAST PAD ROAD
STREAM 27 CULVERT(S)
0
1,000
2,000
3,000
Feet
N
ExxonMobil
POINT THOMSON PROJECT
PROPOSED ACCESS ROADS
SHEET 6 OF 6
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.10

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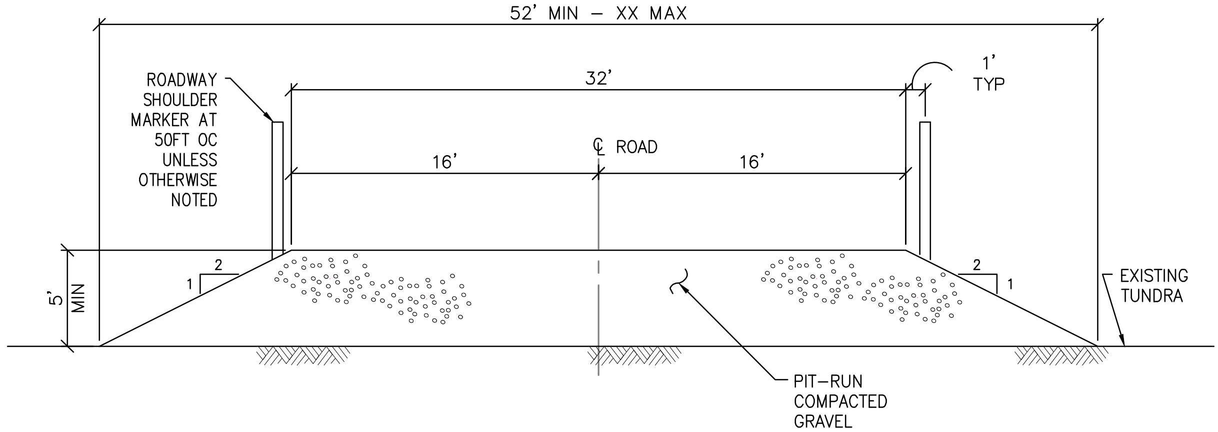
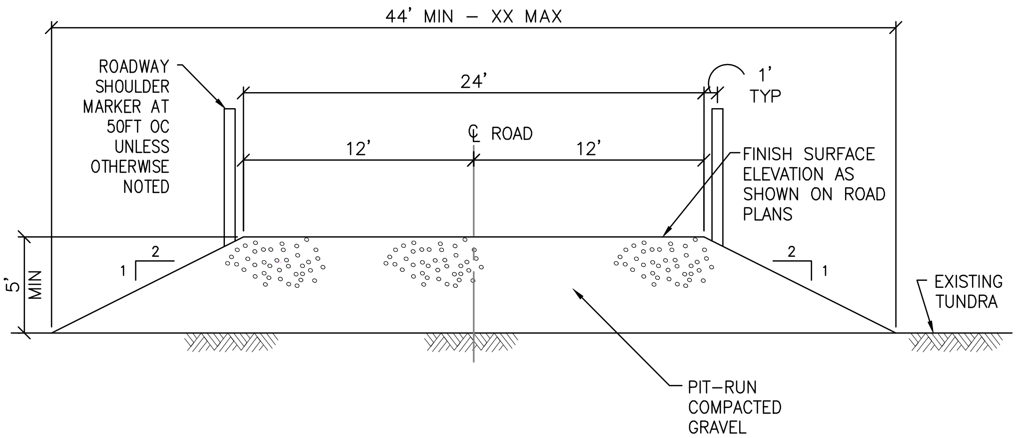


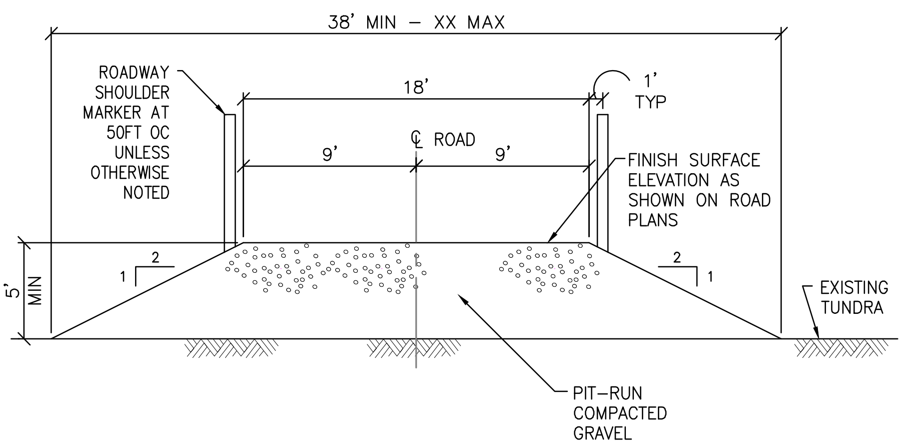
DRILL PAD ACCESS ROAD TYPICAL SECTION

NOT TO SCALE



SECONDARY ACCESS / MAINTENANCE ROAD TYPICAL SECTION

NOT TO SCALE



NAV AID ACCESS ROAD TYPICAL SECTION

NOT TO SCALE

NOTE:
TOE TO TOE DIMENSIONS ARE BASED ON A MINIMUM FILL DEPTH. MAXIMUM TUNDRA FOOTPRINT SECTIONS WILL BE PROVIDED ONCE LIDAR INFORMATION HAS BEEN PROCESSED AND THE DESIGN PROGRESSED TO THE POINT THAT THIS INFORMATION CAN BE DEVELOPED.

ExxonMobil

POINT THOMSON PROJECT

TYPICAL DRILL PAD ACCESS AND SECONDARY/MAINTENANCE ACCESS ROAD SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.11

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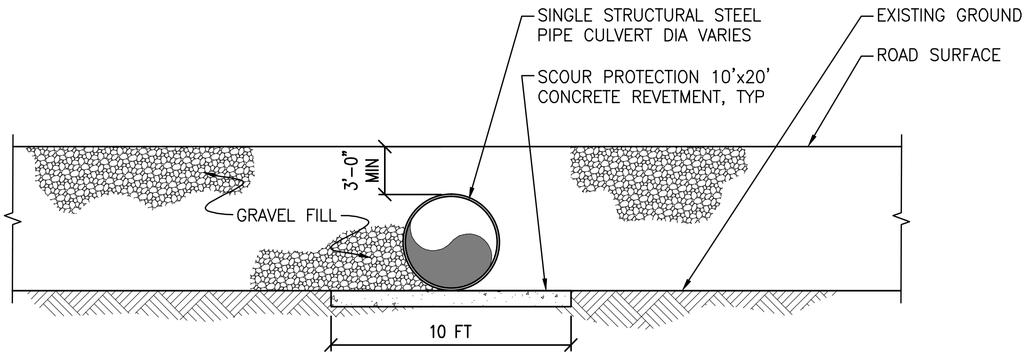
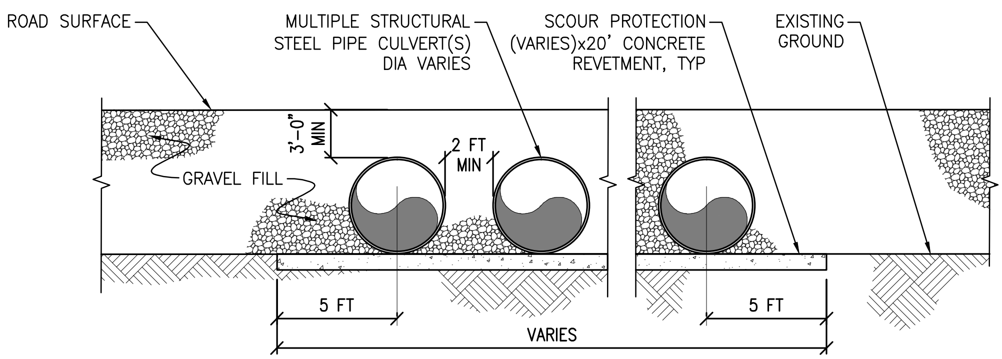
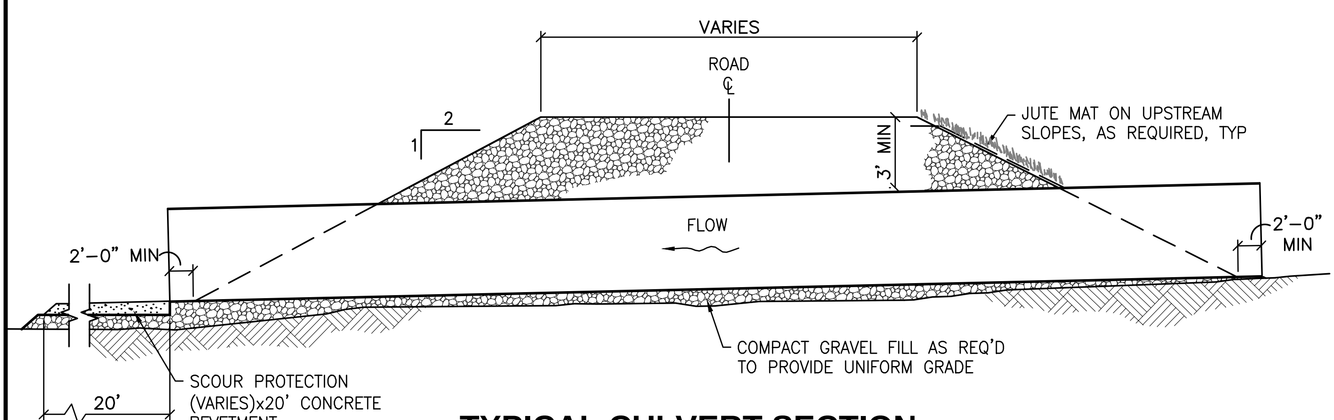


TYPICAL SINGLE CULVERT ELEVATION



TYPICAL MULTIPLE CULVERTS ELEVATION



TYPICAL CULVERT SECTION

ExxonMobil

POINT THOMSON PROJECT

TYPICAL CULVERT
STREAM CROSSING SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.12

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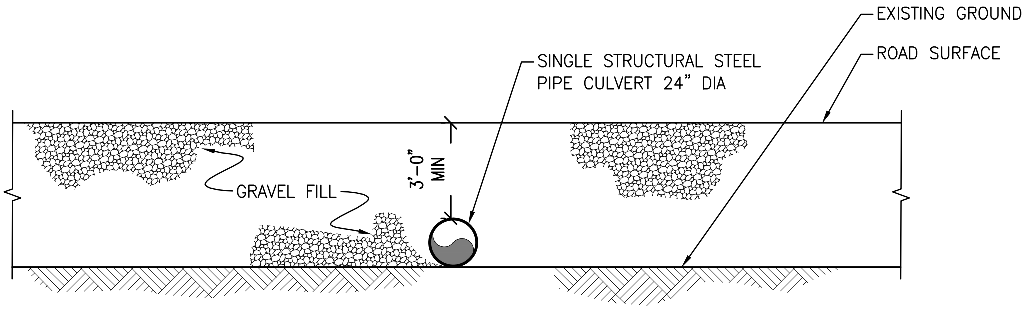
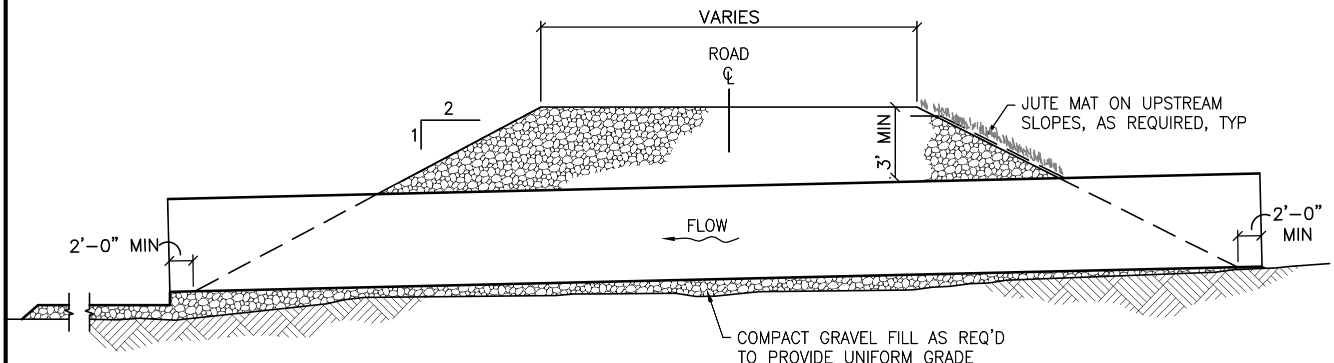


TYPICAL CULVERT ELEVATION



TYPICAL CULVERT SECTION

ExxonMobil | POINT THOMSON PROJECT

TYPICAL CROSS DRAINAGE CULVERT SECTION

PROJECT DESCRIPTION

DATE: OCTOBER 2009 | FIGURE 7.13

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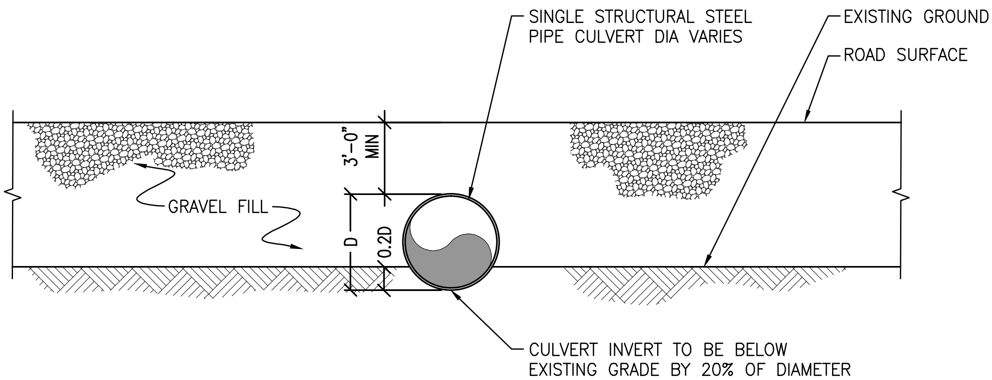
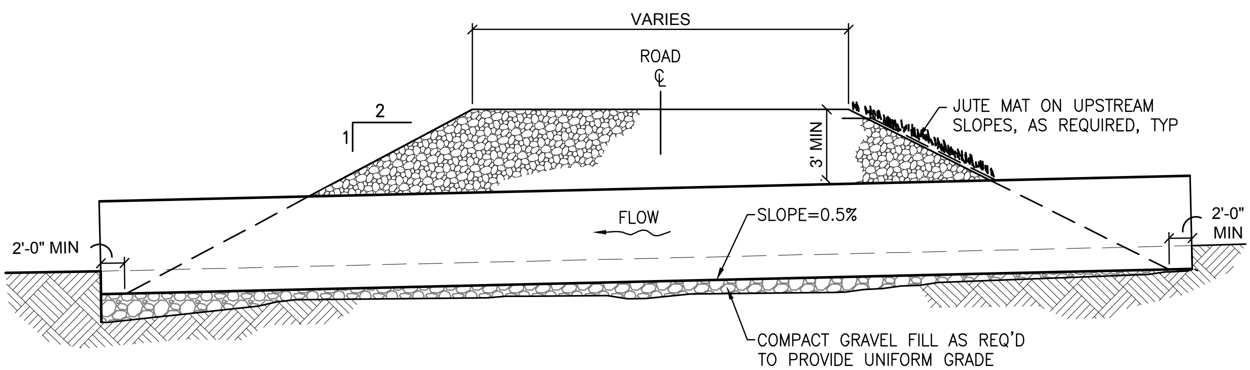


PROPOSED CULVERT ELEVATION



PROPOSED CULVERT SECTION

ExxonMobil POINT THOMSON PROJECT

TYPICAL ANADROMOUS STREAM CULVERT CROSS SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.14

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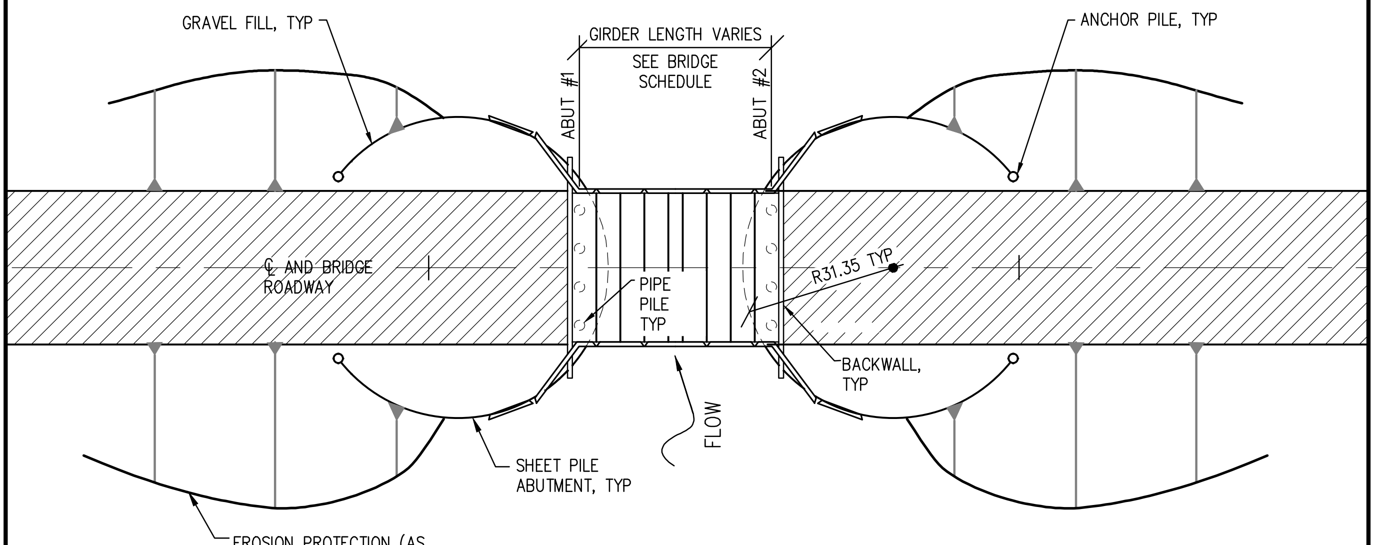
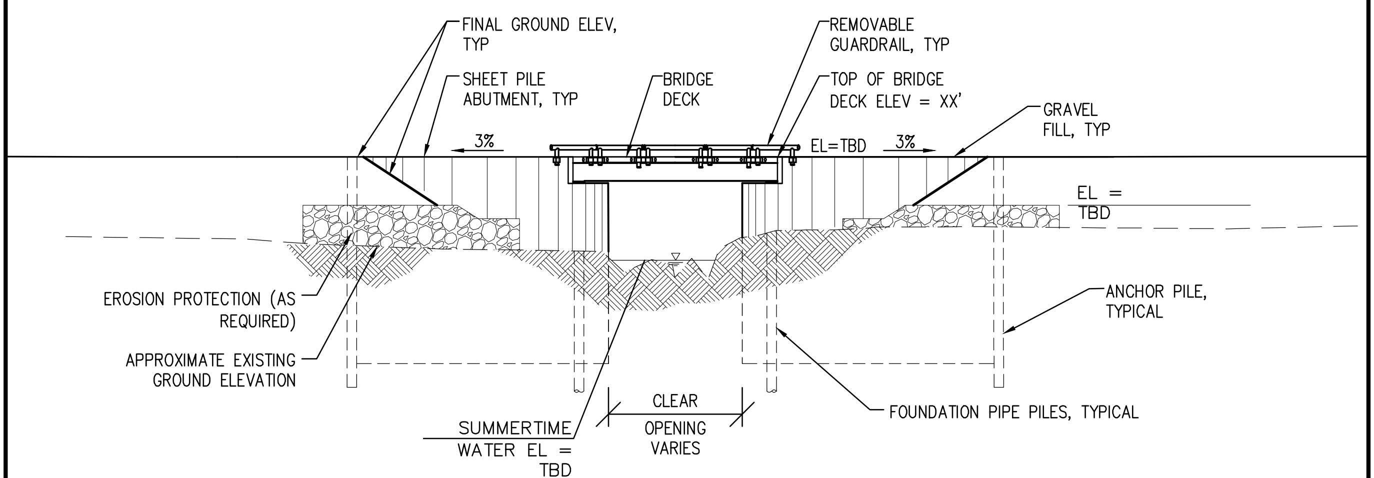


TYPICAL BRIDGE PLAN

NTS



TYPICAL BRIDGE ELEVATION

NTS

POINT THOMSON PROJECT

TYPICAL BRIDGE
PLAN AND ELEVATION

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.15

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Proposed Pipeline
Proposed Point Thomson Facilities and Roads
Lion Bay
BULKHEAD
975 '
1760 '
1112 '
EXPORT PIPELINE & GATHERING LINES
CURRENT POINT THOMSON DRILLING PROGRAM PTU-3 (ON EXISTING EXPLORATION WELL PAD)
EMERGENCY BOAT LAUNCH
CENTRAL PAD ROAD
0 200 400
Feet
N
ExxonMobil
POINT THOMSON PROJECT
CENTRAL PAD PLAN VIEW - FOOTPRINT
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.16
X:\Point Thomson\GIS\Project Description\urs_pd_central_pad_footprint_10162009.mxd

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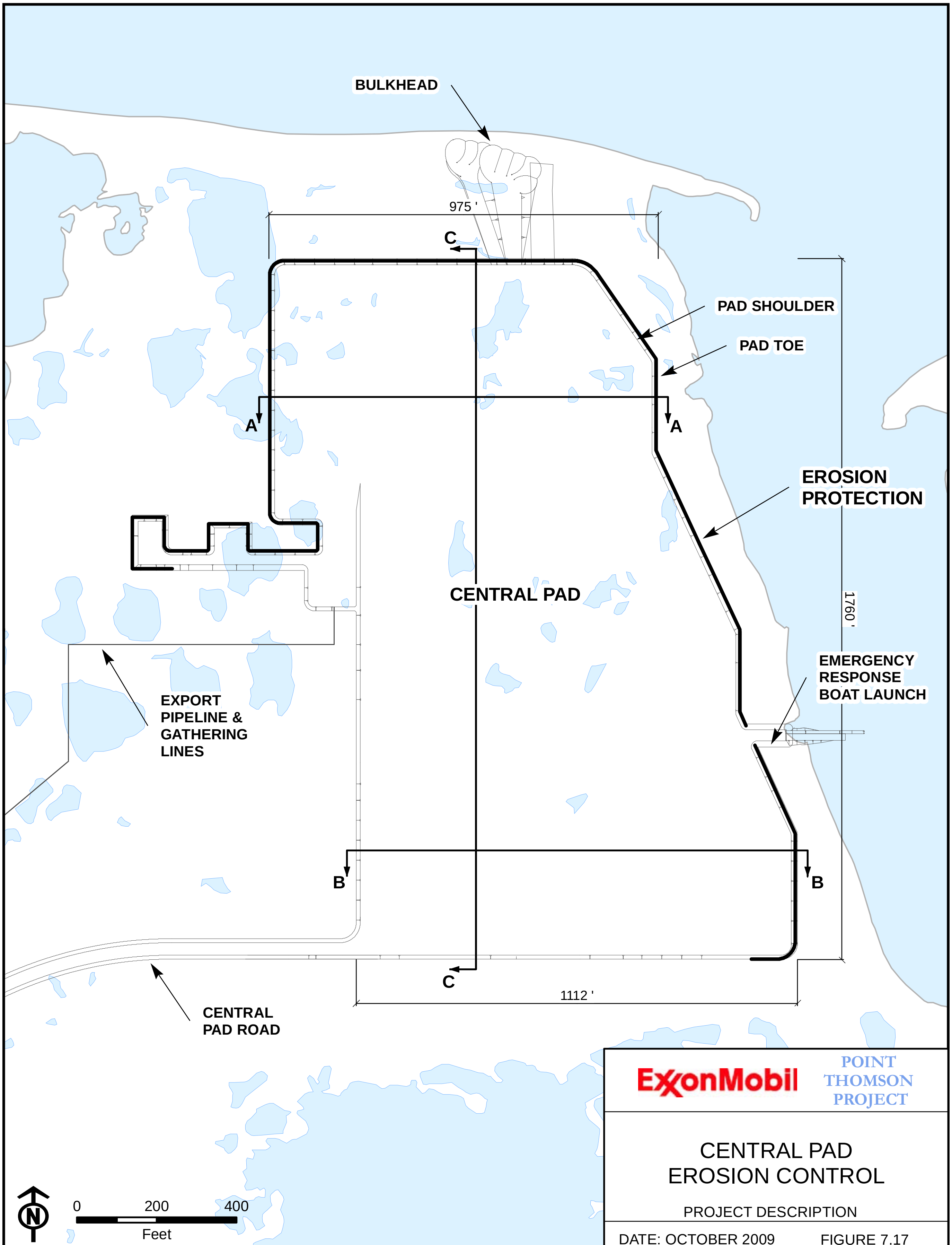

ExxonMobil

POINT THOMSON PROJECT

CENTRAL PAD
EROSION CONTROL

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.17

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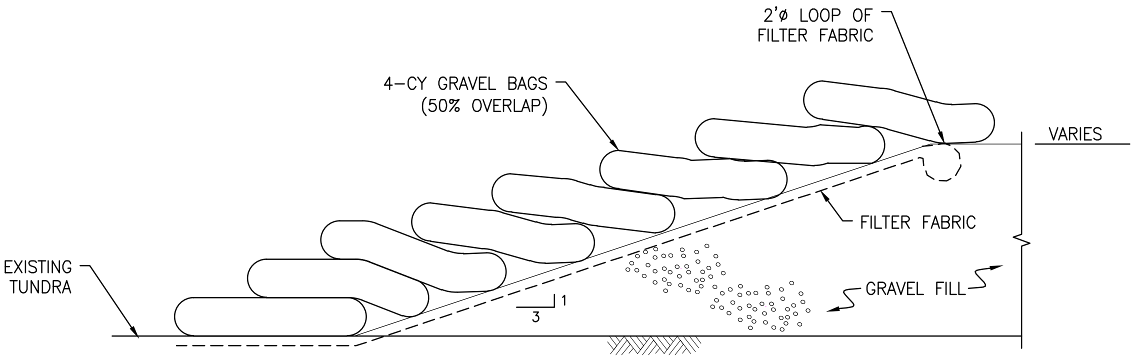

NOTE:
ALTERNATE MEANS OF SHORE PROTECTION MAY BE SUBSTITUTED FOR GEOTEXTILE GRAVEL BAGS BASED ON ADDITIONAL PLANNED STUDIES

GRAVEL BAG ARMOR SECTION

NOT TO SCALE (TYPICAL CENTRAL PAD)

ExxonMobil POINT THOMSON PROJECT

CENTRAL PAD EROSION CONTROL TYPICAL SECTION

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.18

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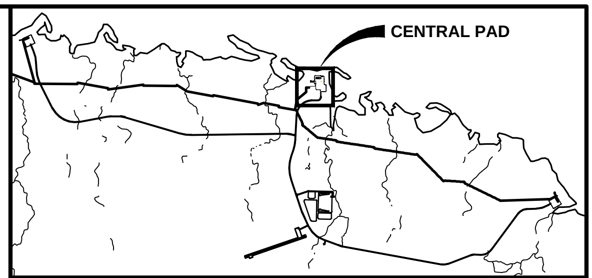
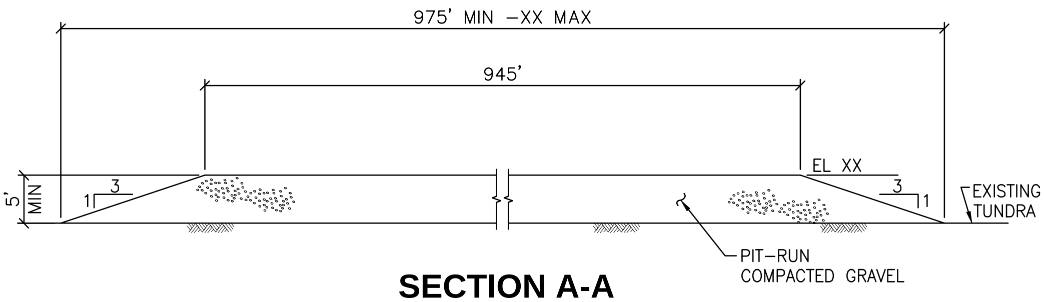
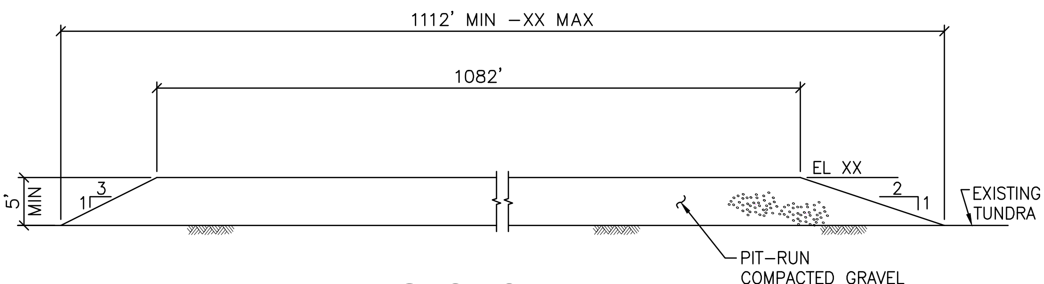


KEY MAP



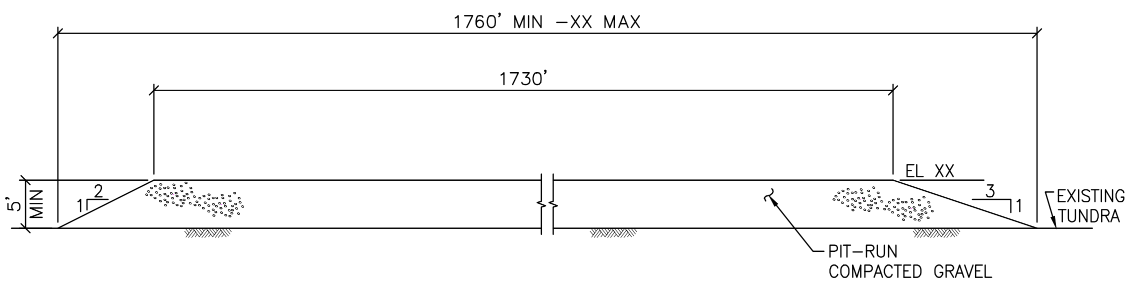
SECTION A-A

NOT TO SCALE



SECTION B-B

NOT TO SCALE



SECTION C-C

NOT TO SCALE

NOTE:
TOE TO TOE DIMENSIONS ARE BASED ON A MINIMUM FILL DEPTH. MAXIMUM TUNDRA FOOTPRINT SECTIONS WILL BE PROVIDED ONCE LIDAR INFORMATION HAS BEEN PROCESSED AND THE DESIGN PROGRESSED TO THE POINT THAT THIS INFORMATION CAN BE DEVELOPED.

ExxonMobil

POINT THOMSON PROJECT

CENTRAL PAD SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009

FIGURE 7.19

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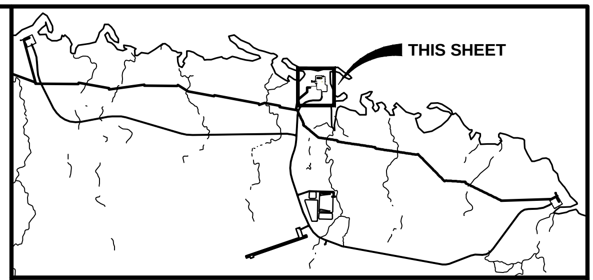

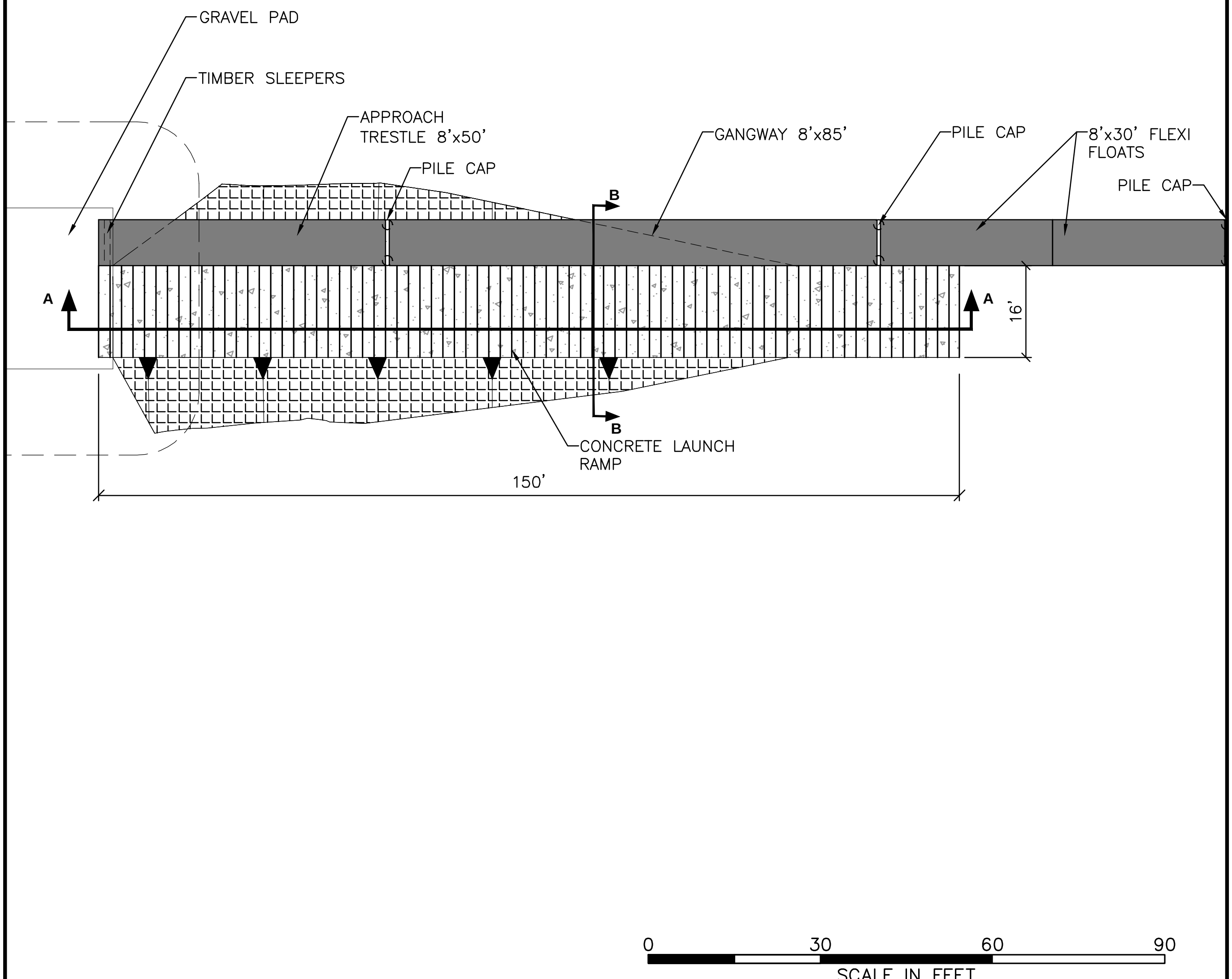

ExxonMobil

POINT THOMSON PROJECT

EMERGENCY RESPONSE BOAT LAUNCH - PLAN VIEW

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.20

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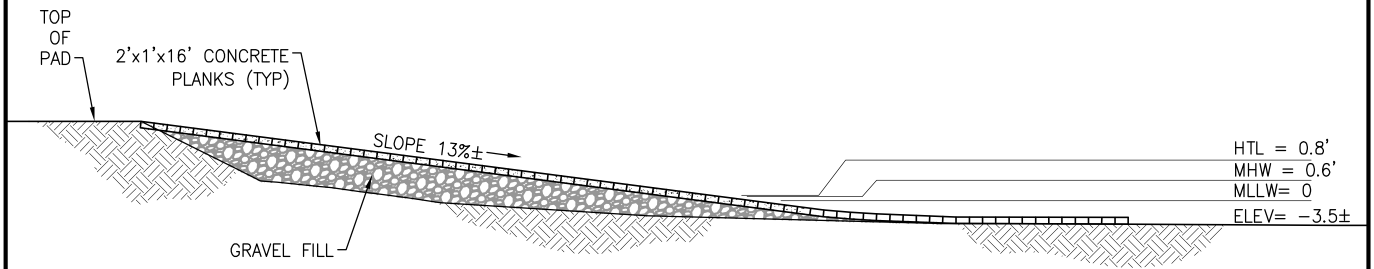
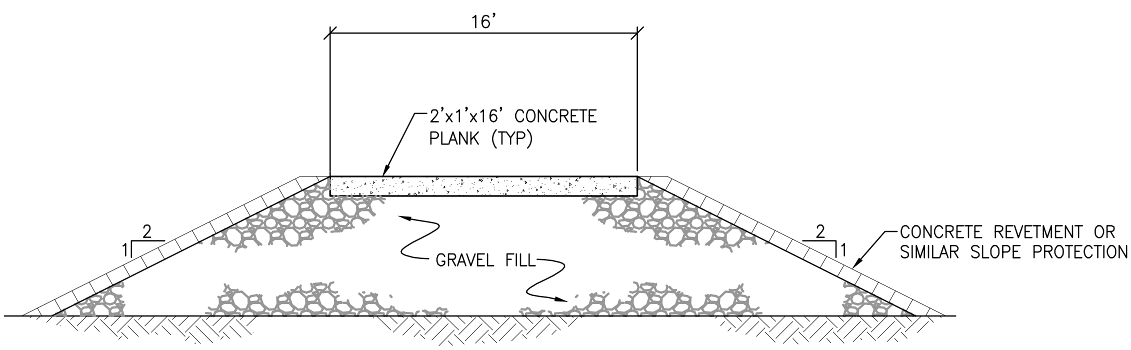


SECTION A-A



SECTION B-B

VERTICAL DATUM = MLLW

ExxonMobil POINT THOMSON PROJECT

EMERGENCY RESPONSE
BOAT LAUNCH SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.21

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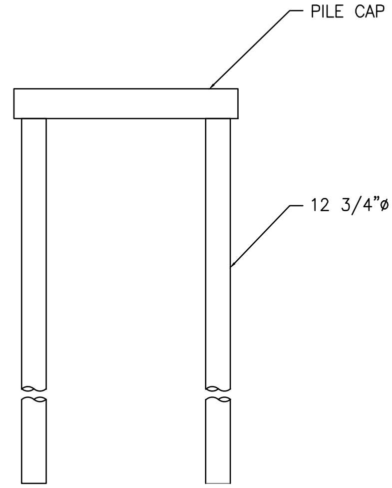
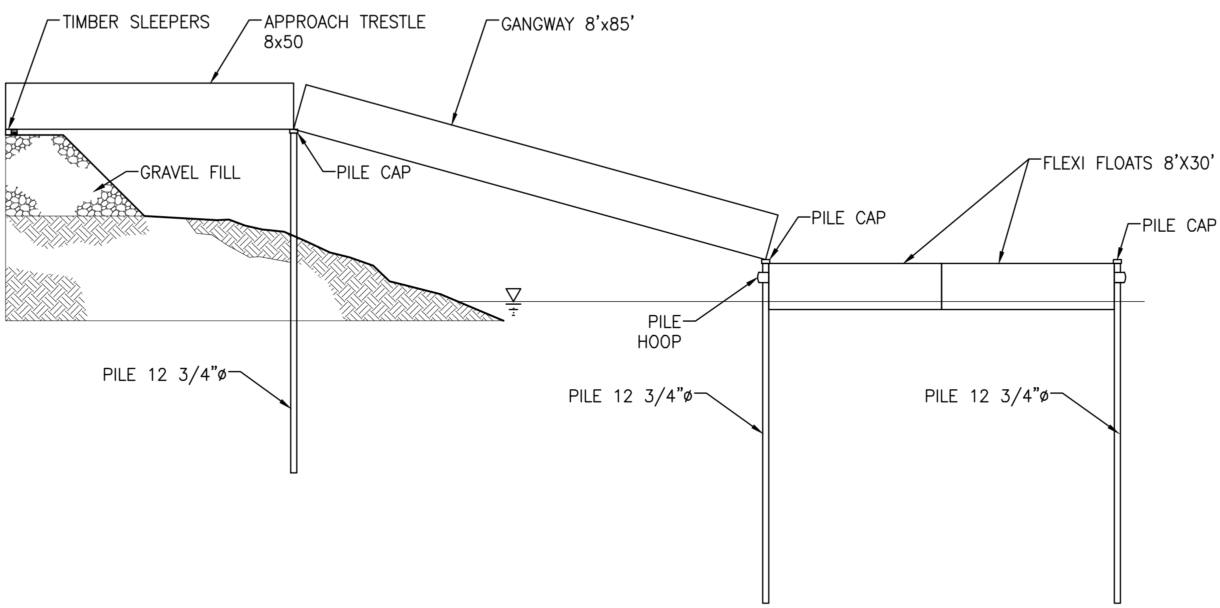


TYPICAL PILECAP



GANGWAY ELEVATION

ExxonMobil

POINT THOMSON PROJECT

EMERGENCY RESPONSE BOAT LAUNCH GANGWAY

PROJECT DESCRIPTION

DATE: OCTOBER 2009

FIGURE 7.22

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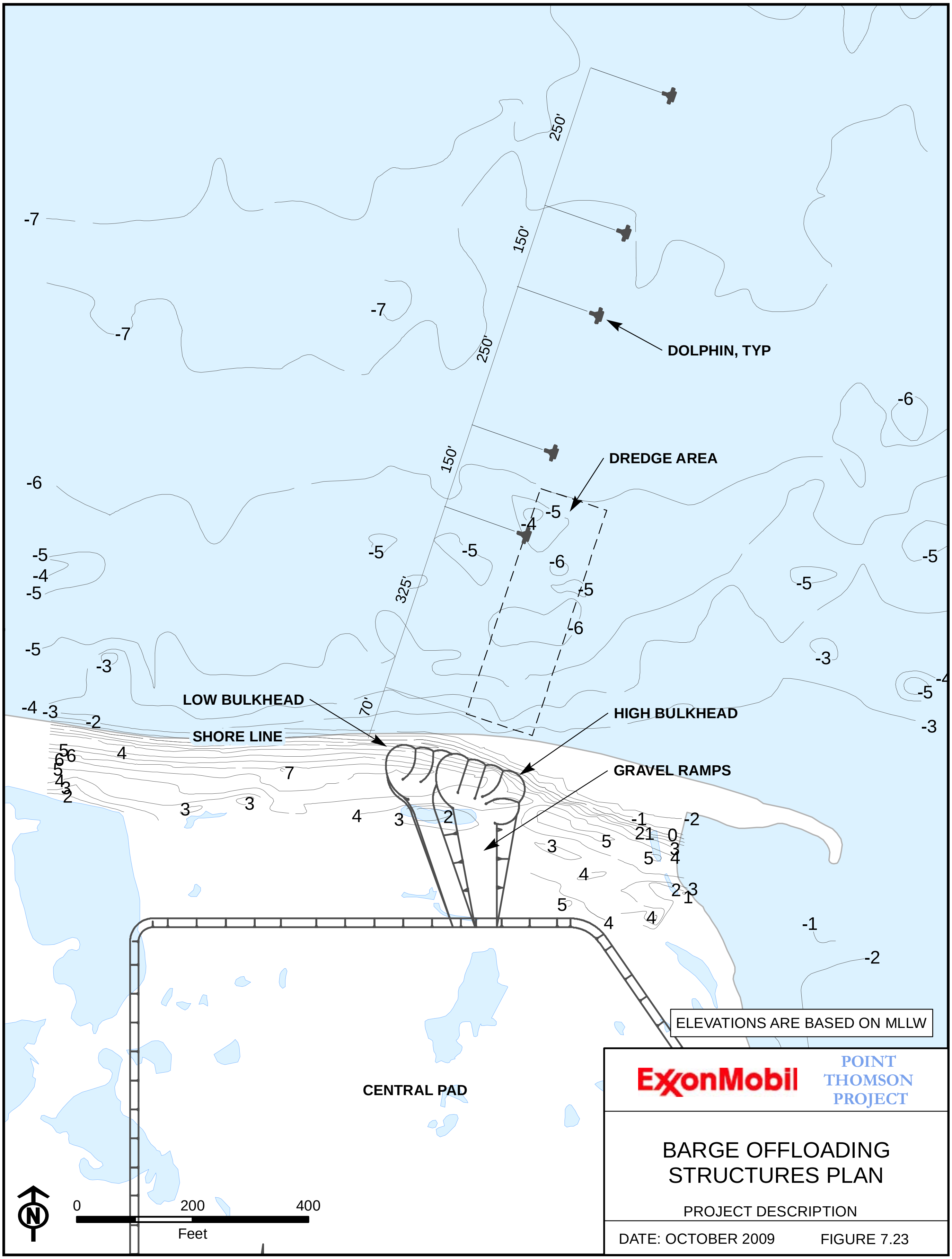

ExxonMobil
POINT THOMSON PROJECT

BARGE OFFLOADING STRUCTURES PLAN

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.23

X:\Point Thomson\GIS\Project Description\urs_pd_offloading_structures_10162009.mxd

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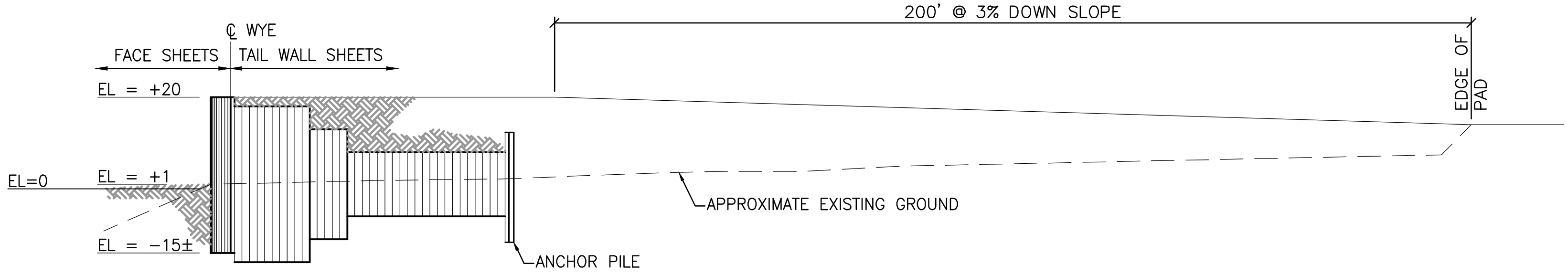
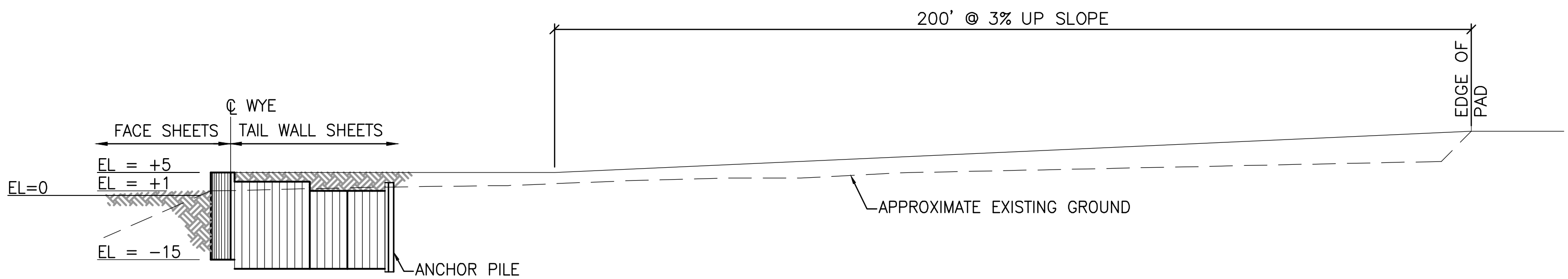


HIGH BULKHEAD SECTION



LOW BULKHEAD SECTION

VERTICAL DATUM = MLLW

ExxonMobil POINT THOMSON PROJECT

BARGE OFFLOADING STRUCTURES SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.24

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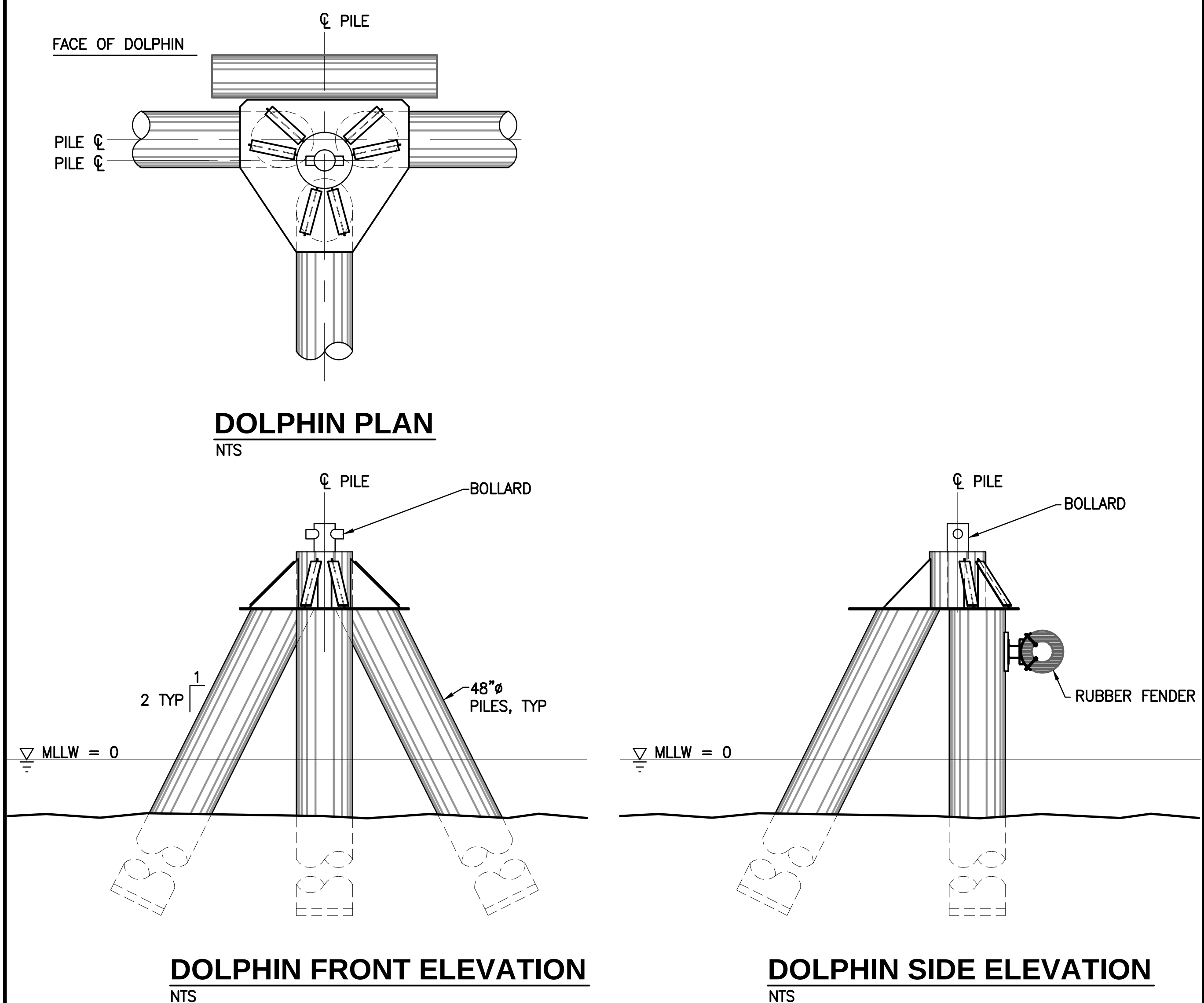

NOTE:
PILE LENGTHS WILL BE DETERMINED
AFTER GEOTECHNICAL INFORMATION
IS OBTAINED 2ND QUARTER 2010

ExxonMobil
POINT THOMSON PROJECT

BREASTING/MOORING DOLPHIN PLAN & ELEVATIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009

FIGURE 7.25

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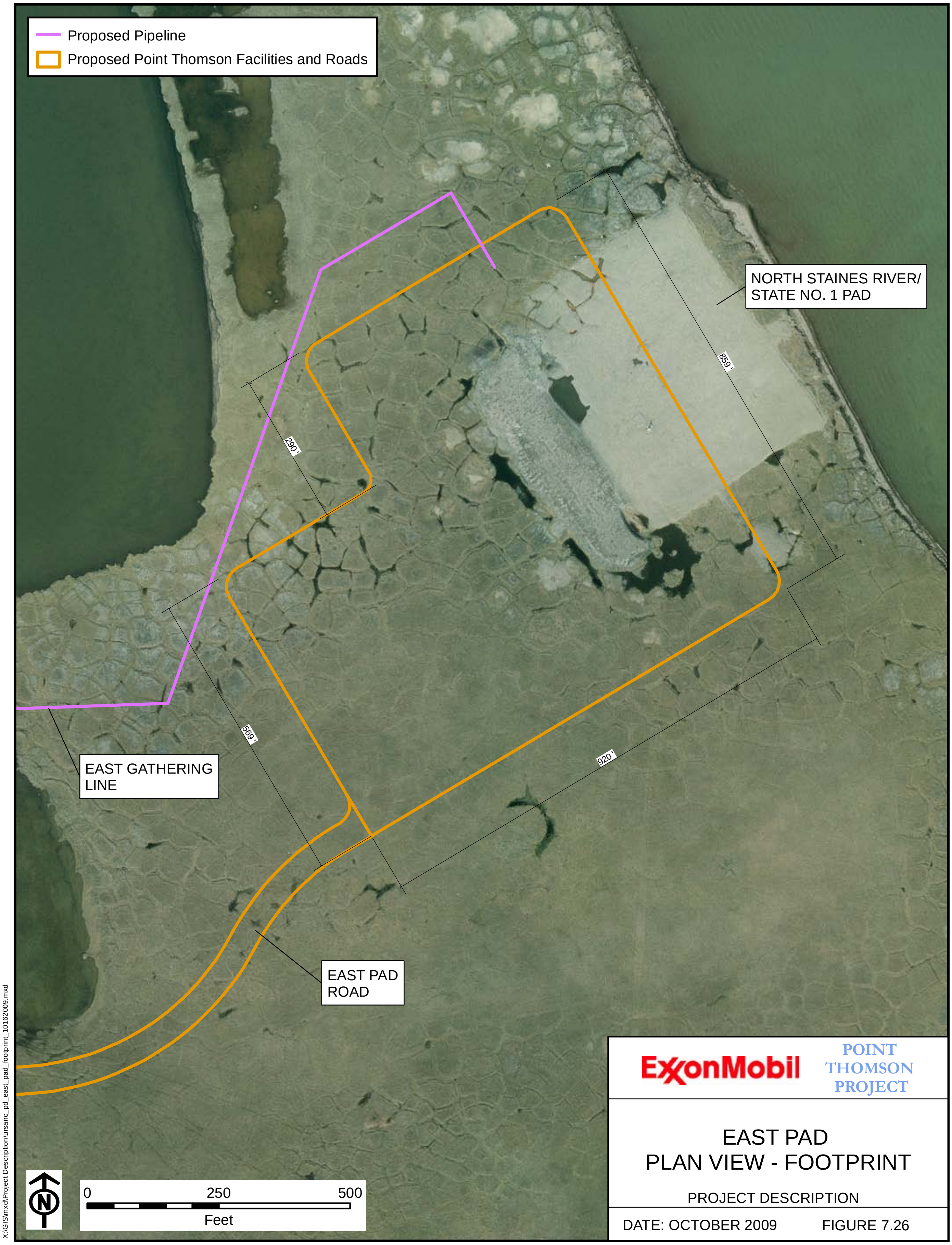
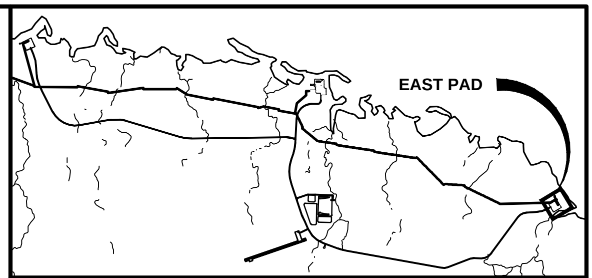
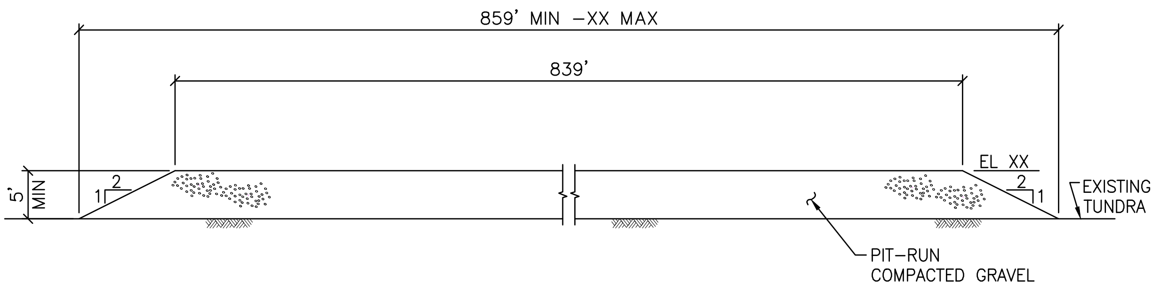

Proposed Pipeline
Proposed Point Thomson Facilities and Roads
NORTH STAINES RIVER/
STATE NO. 1 PAD
859'
290'
569'
920'
EAST GATHERING
LINE
EAST PAD
ROAD
ExxonMobil
POINT
THOMSON
PROJECT
EAST PAD
PLAN VIEW - FOOTPRINT
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.26
0
250
500
Feet
N
X:\GIS\mxd\Project Description\ursanc_pd_east_pad_footprint_10162009.mxd

(This page intentionally left blank.)

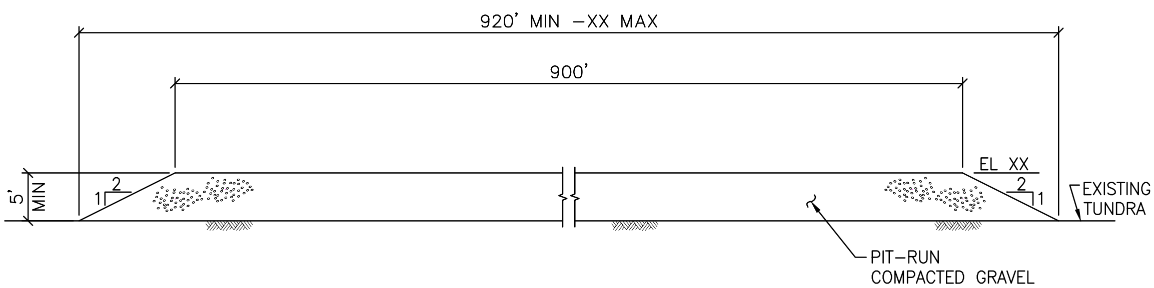


KEY MAP



EAST PAD TRANSVERSE SECTION

NOT TO SCALE



EAST PAD LONGITUDINAL SECTION

NOT TO SCALE

NOTE:
TOE TO TOE DIMENSIONS ARE BASED ON A MINIMUM FILL DEPTH. MAXIMUM TUNDRA FOOTPRINT SECTIONS WILL BE PROVIDED ONCE LIDAR INFORMATION HAS BEEN PROCESSED AND THE DESIGN PROGRESSED TO THE POINT THAT THIS INFORMATION CAN BE DEVELOPED.

ExxonMobil

POINT THOMSON PROJECT

EAST PAD SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.27

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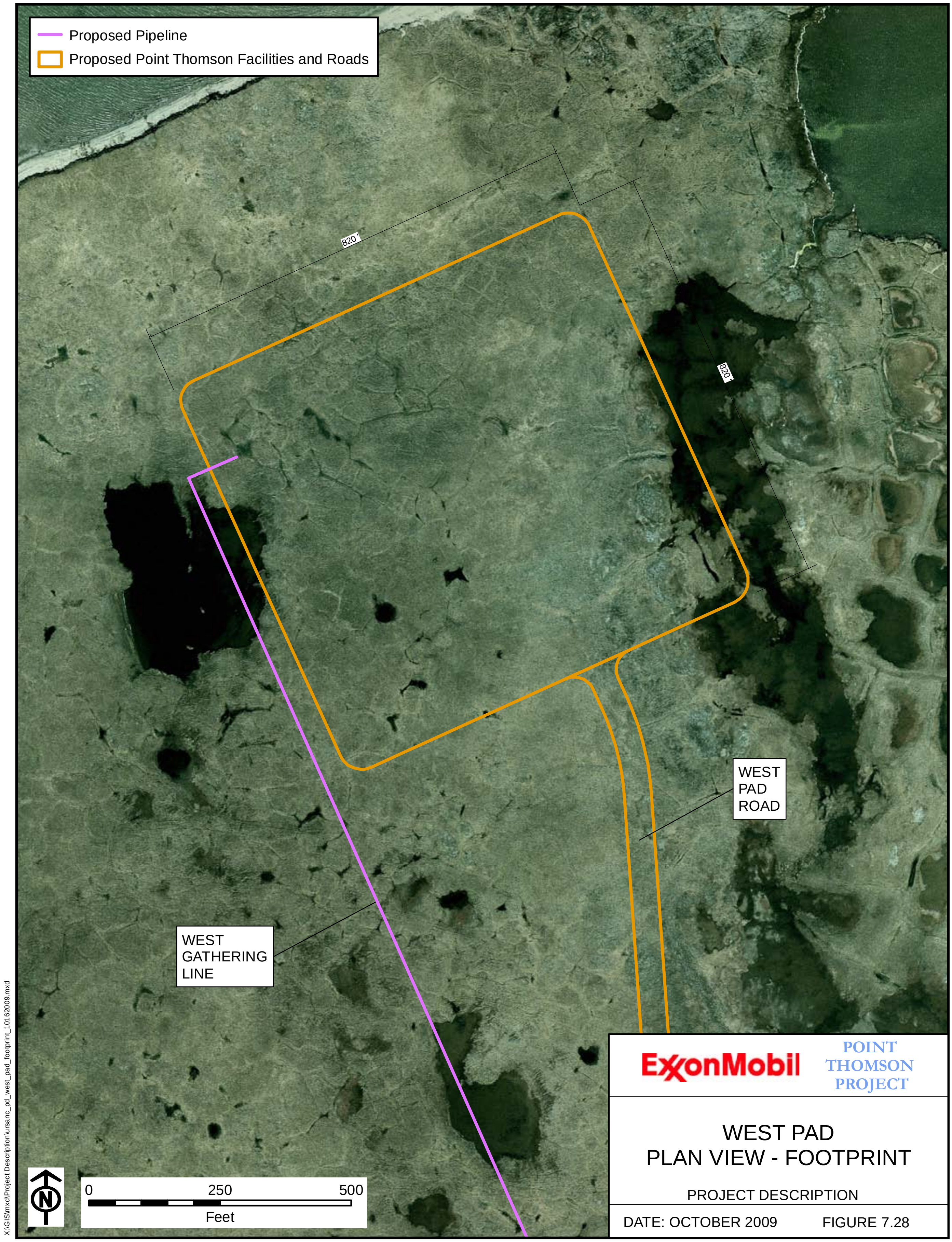
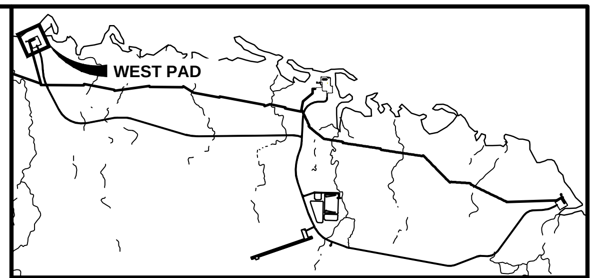
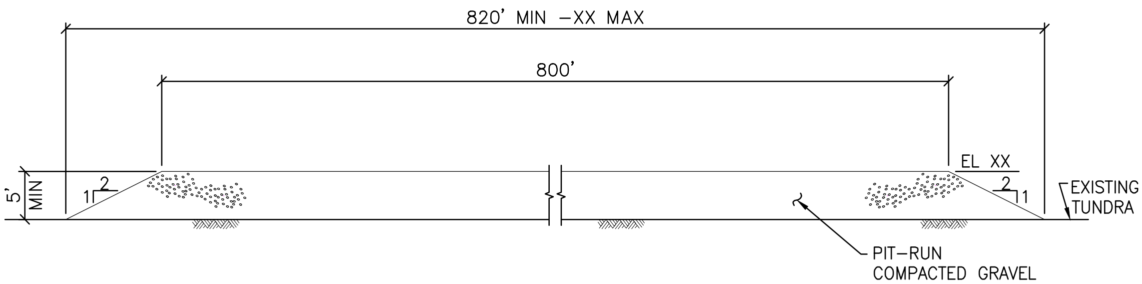

Proposed Pipeline
Proposed Point Thomson Facilities and Roads
820 '
820 '
WEST PAD ROAD
WEST GATHERING LINE
N
0
250
500
Feet
X:\GIS\mxd\Project Description\ursanc_pd_west_pad_footprint_10162009.mxd
ExxonMobil
POINT THOMSON PROJECT
WEST PAD
PLAN VIEW - FOOTPRINT
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.28

(This page intentionally left blank.)

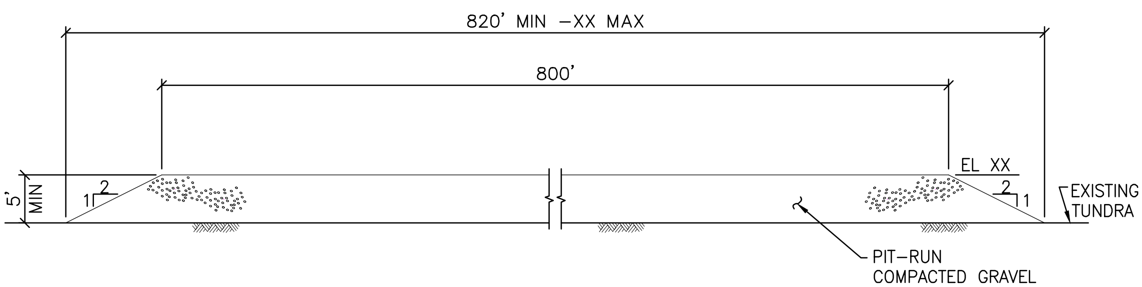


KEY MAP



WEST PAD TRANSVERSE SECTION

NOT TO SCALE



WEST PAD LONGITUDINAL SECTION

NOT TO SCALE

NOTE:
TOE TO TOE DIMENSIONS ARE BASED ON A MINIMUM FILL DEPTH. MAXIMUM TUNDRA FOOTPRINT SECTIONS WILL BE PROVIDED ONCE LIDAR INFORMATION HAS BEEN PROCESSED AND THE DESIGN PROGRESSED TO THE POINT THAT THIS INFORMATION CAN BE DEVELOPED.

POINT THOMSON PROJECT

WEST PAD SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.29

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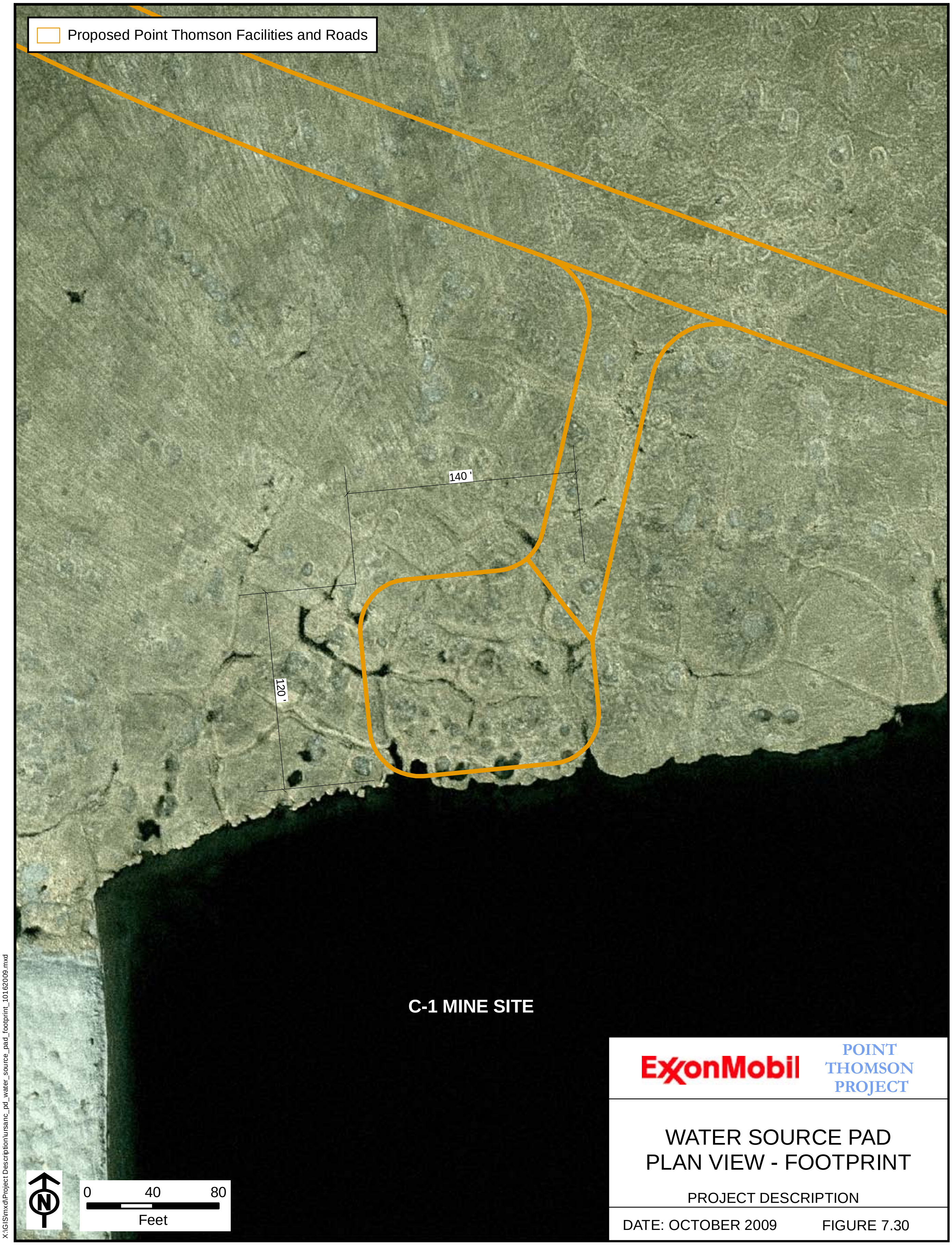

ExxonMobil POINT THOMSON PROJECT

WATER SOURCE PAD
PLAN VIEW - FOOTPRINT

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.30

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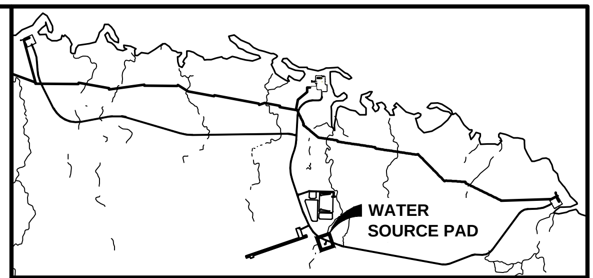
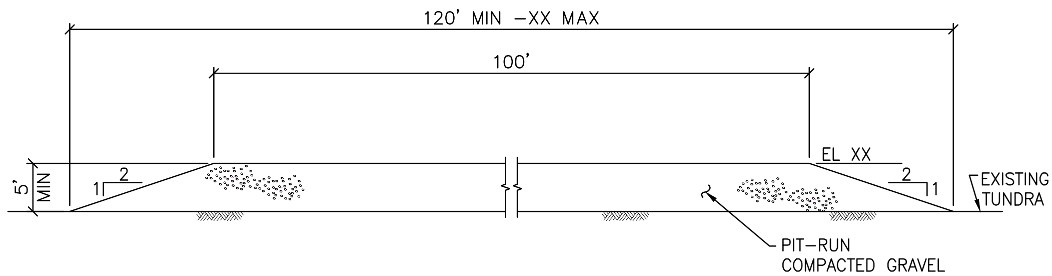
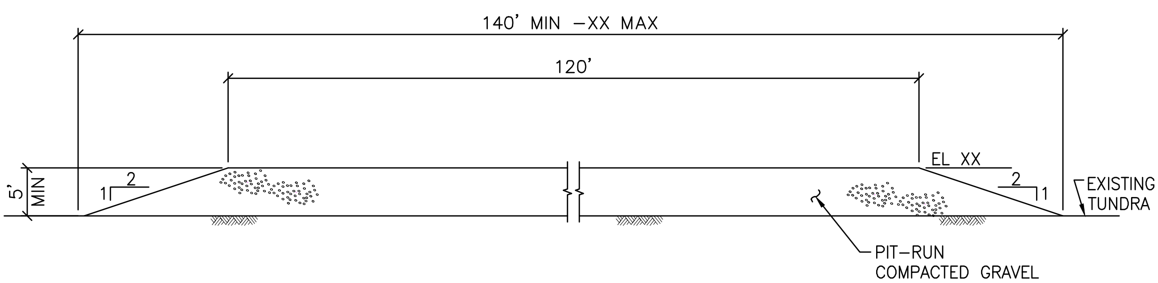


KEY MAP



WATER SOURCE PAD TRANSVERSE SECTION

NOT TO SCALE



WATER SOURCE PAD LONGITUDINAL SECTION

NOT TO SCALE

NOTE:
TOE TO TOE DIMENSIONS ARE BASED ON A MINIMUM FILL DEPTH. MAXIMUM TUNDRA FOOTPRINT SECTIONS WILL BE PROVIDED ONCE LIDAR INFORMATION HAS BEEN PROCESSED AND THE DESIGN PROGRESSED TO THE POINT THAT THIS INFORMATION CAN BE DEVELOPED.

ExxonMobil

POINT THOMSON PROJECT

WATER SOURCE PAD SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009

FIGURE 7.31

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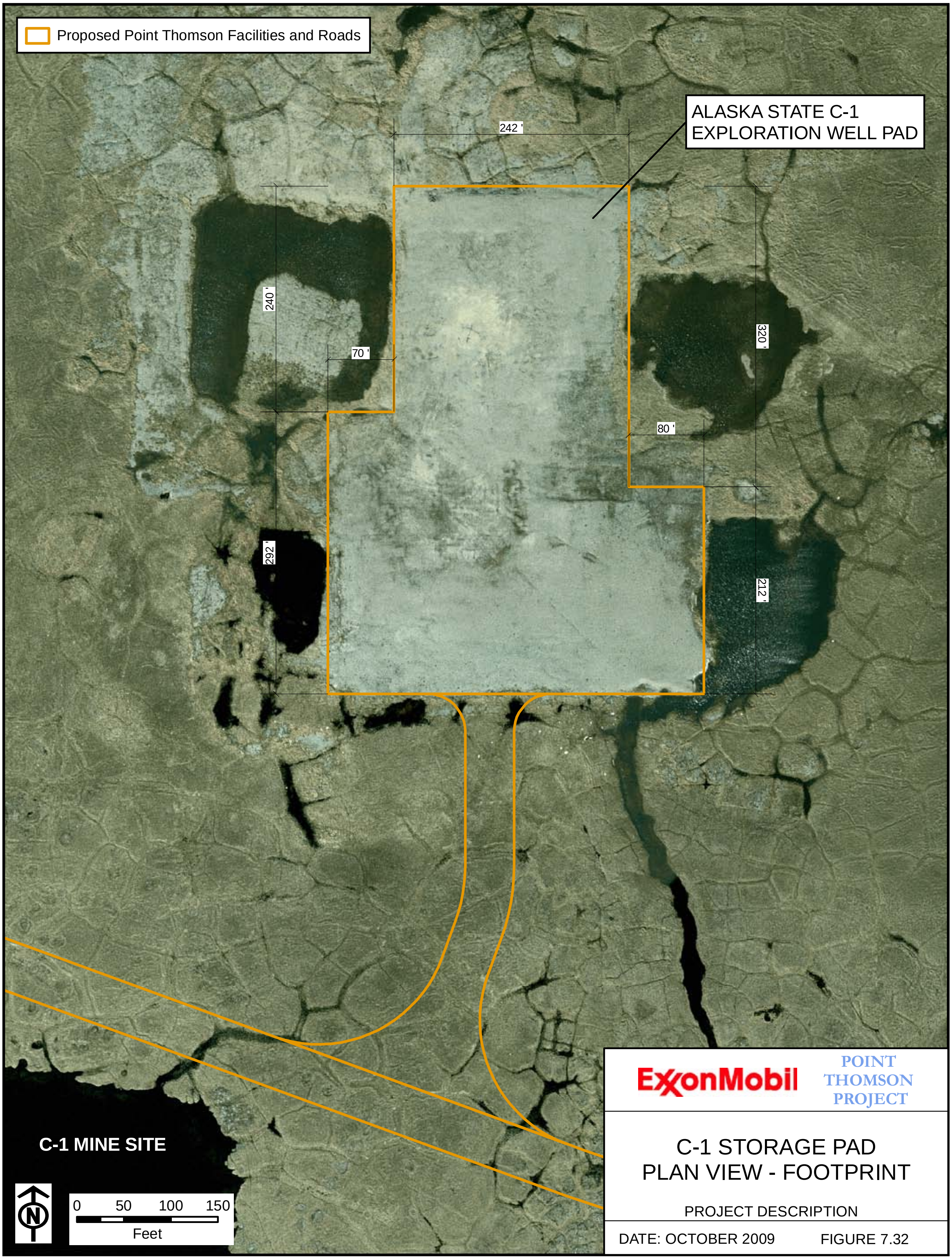
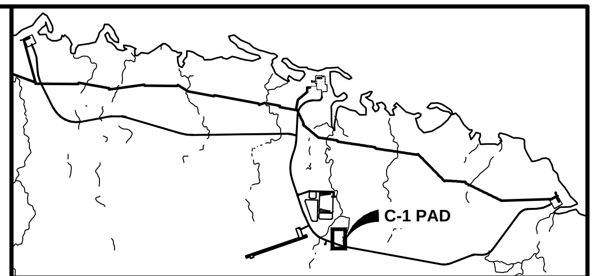
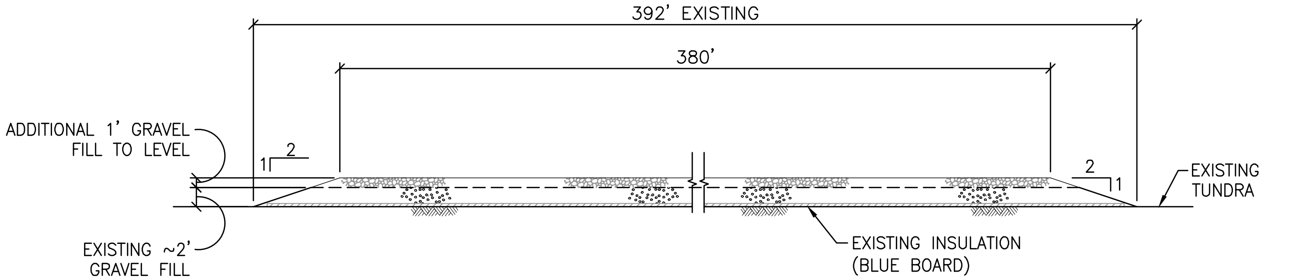

Proposed Point Thomson Facilities and Roads
ALASKA STATE C-1
EXPLORATION WELL PAD
242 '
240 '
70 '
320 '
80 '
292 '
212 '
C-1 MINE SITE
N
0 50 100 150
Feet
ExxonMobil
POINT THOMSON PROJECT
C-1 STORAGE PAD
PLAN VIEW - FOOTPRINT
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.32

(This page intentionally left blank.)

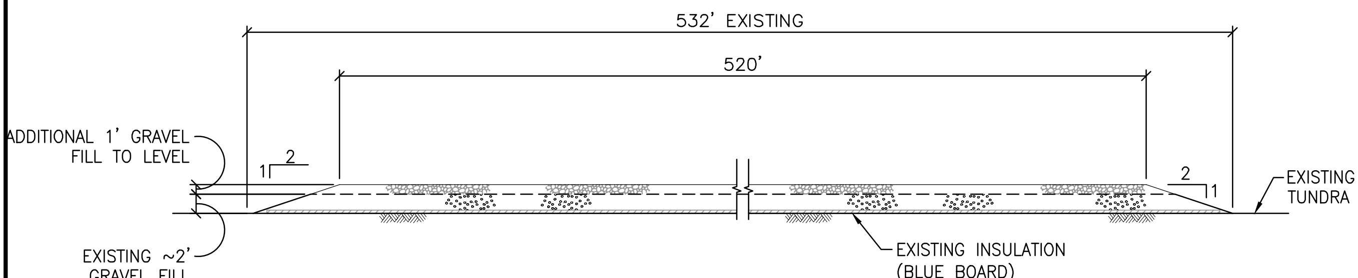


KEY MAP



C-1 PAD TRANSVERSE SECTION

NOT TO SCALE



C-1 PAD LONGITUDINAL SECTION

NOT TO SCALE

ExxonMobil POINT THOMSON PROJECT

C-1 STORAGE PAD SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.33

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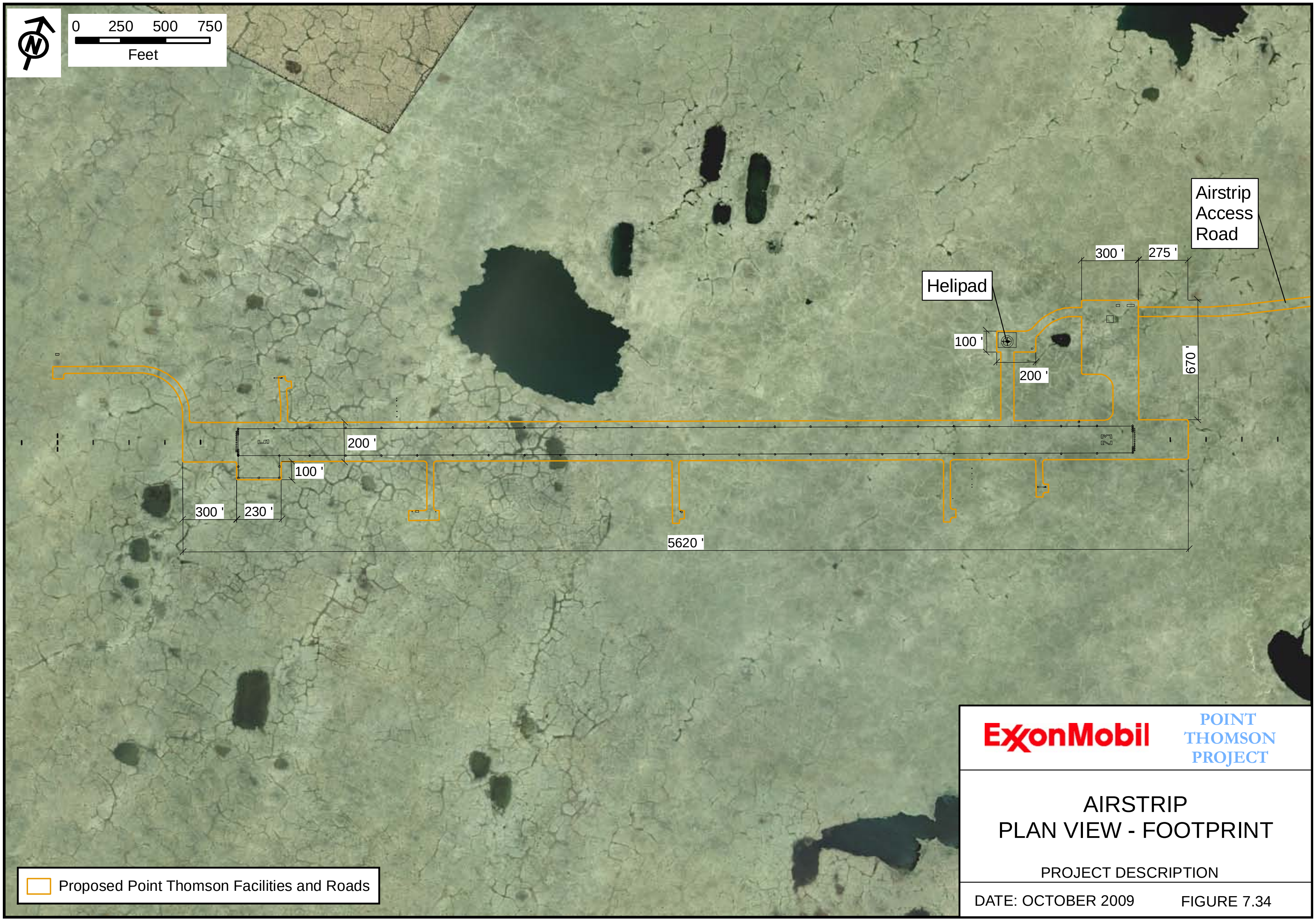
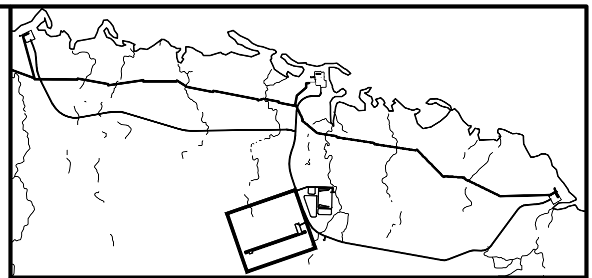
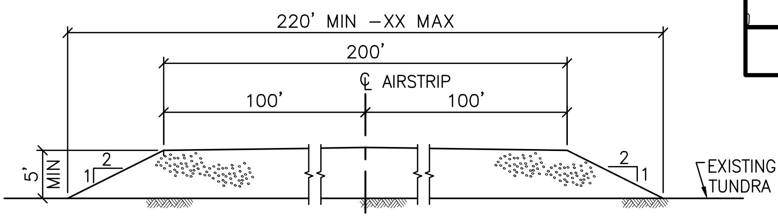

0 250 500 750
Feet
Airstrip Access Road
300 '
275 '
Helipad
100 '
200 '
670 '
200 '
100 '
300 '
230 '
5620 '
Proposed Point Thomson Facilities and Roads
ExxonMobil
POINT THOMSON PROJECT
AIRSTRIP
PLAN VIEW - FOOTPRINT
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.34

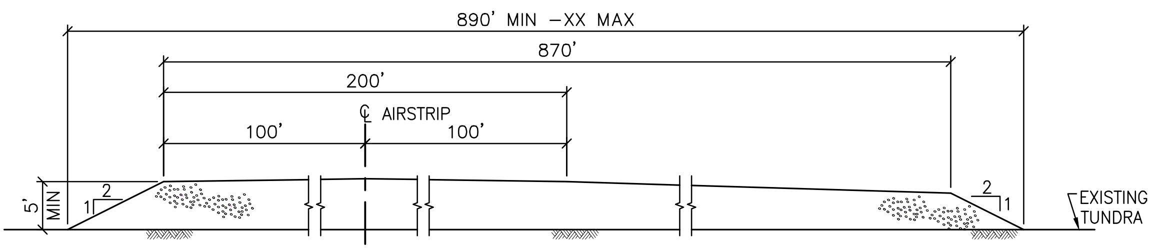


KEY MAP



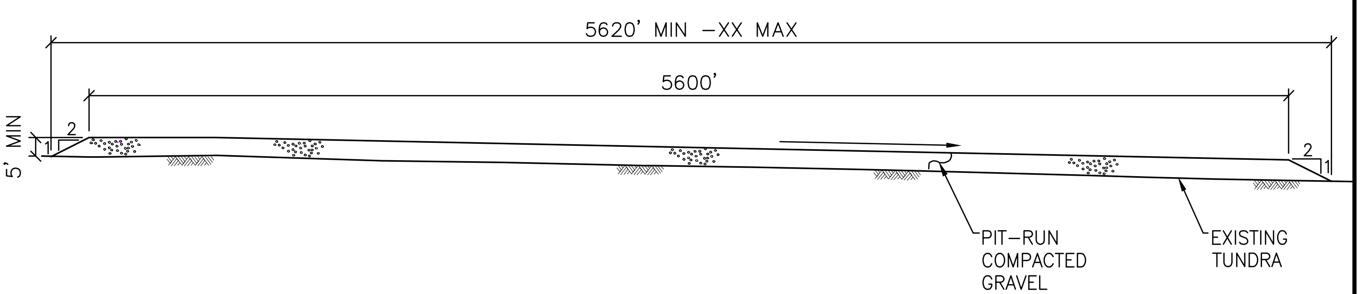
AIRSTRIP SECTION A-A

NOT TO SCALE



AIRSTRIP SECTION B-B

NOT TO SCALE



AIRSTRIP SECTION C-C

SCALE 10V:1H

ExxonMobil

POINT THOMSON PROJECT

AIRSTRIP SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009

FIGURE 7.35

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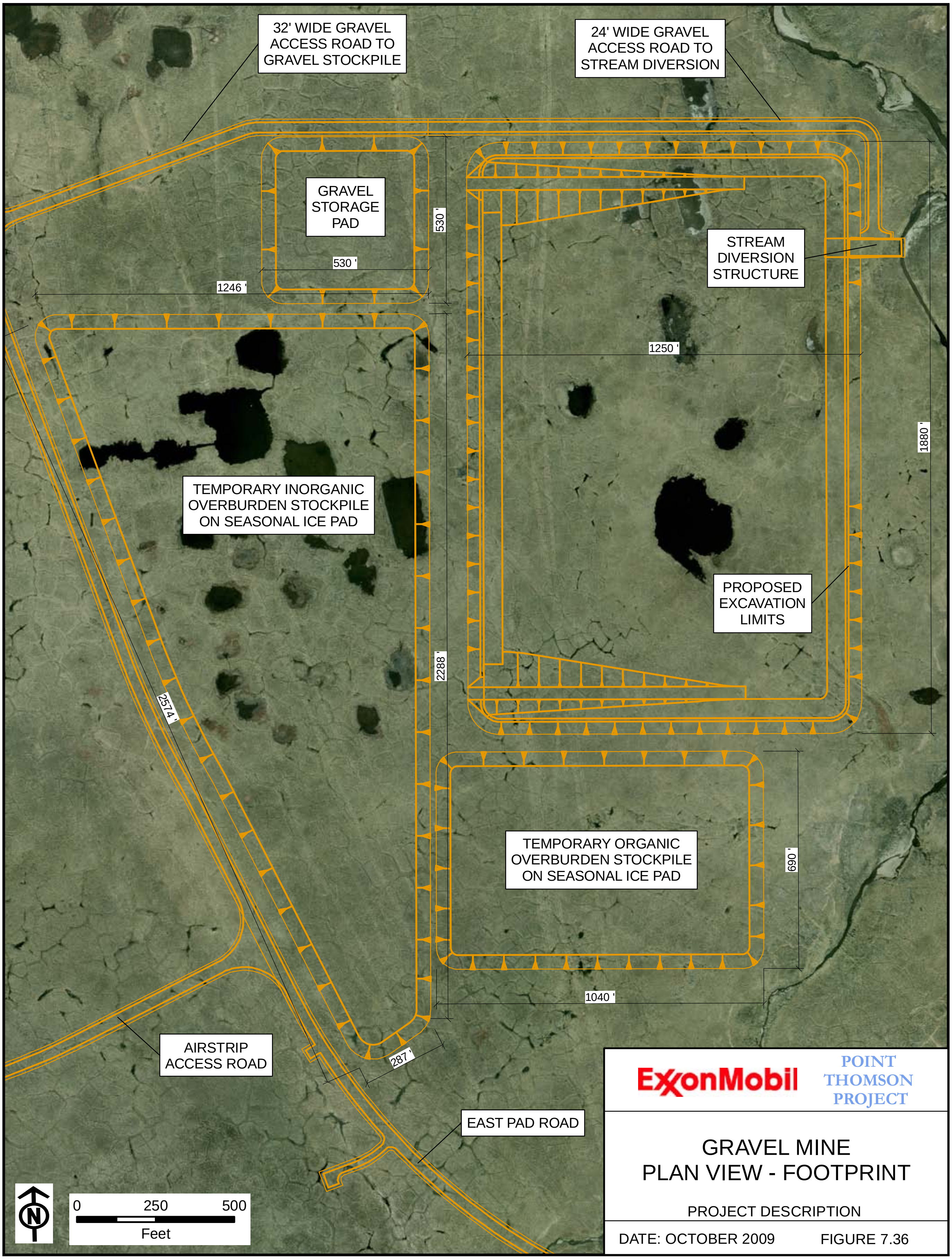

ExxonMobil

POINT THOMSON PROJECT

GRAVEL MINE
PLAN VIEW - FOOTPRINT

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.36

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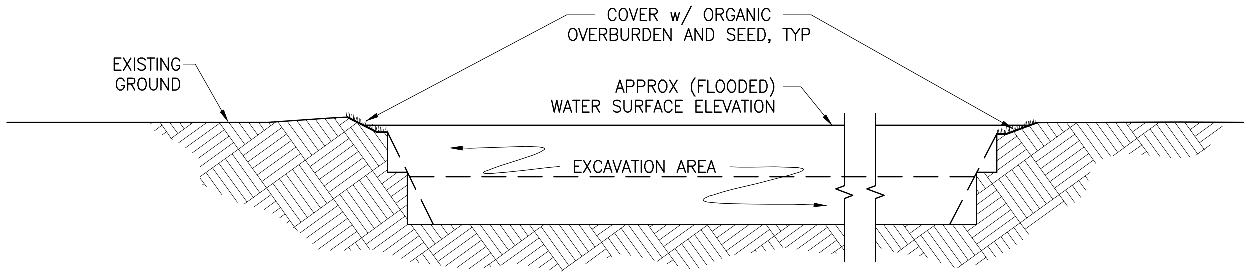
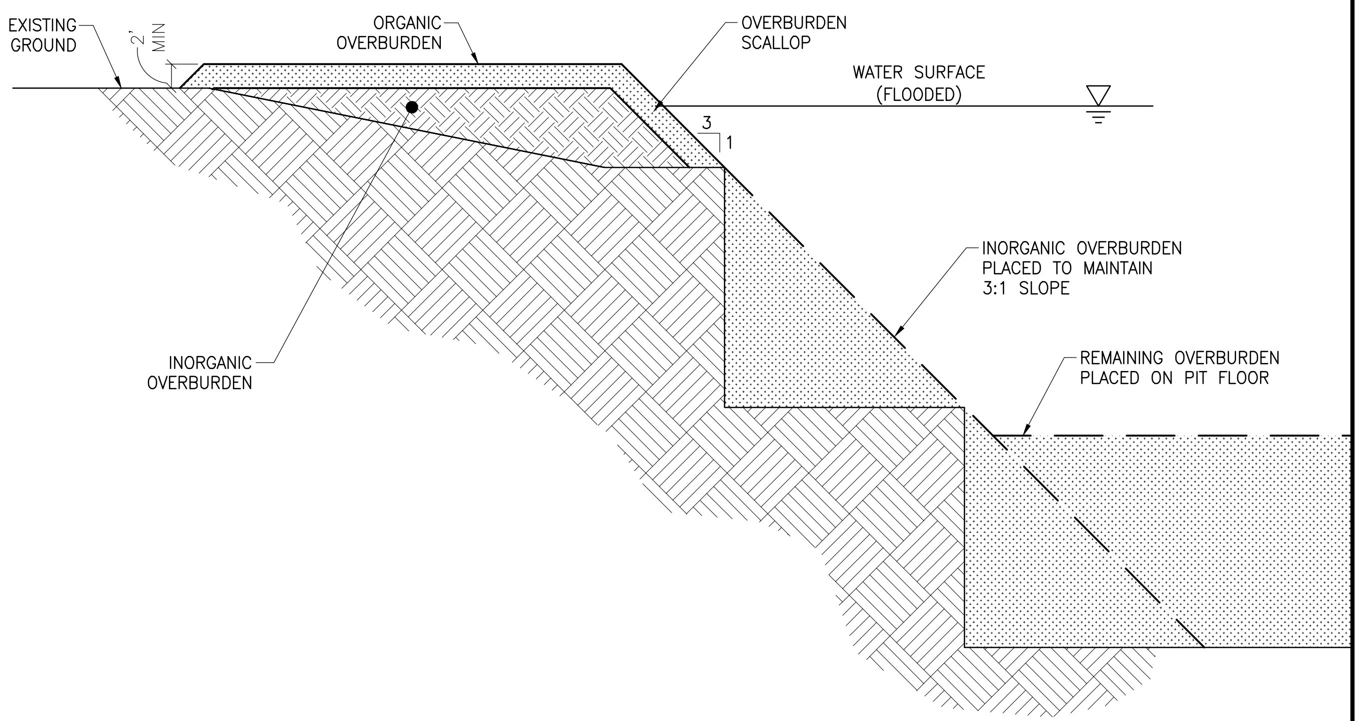


SECTION B-B

SCALE 1H: 2V



OVERBURDEN SCALLOP TYPICAL SECTION

NTS

ExxonMobil

POINT
THOMSON
PROJECT

PROPOSED GRAVEL MINE
REHABILITATION SECTIONS

PROJECT DESCRIPTION

DATE: OCTOBER 2009 FIGURE 7.37

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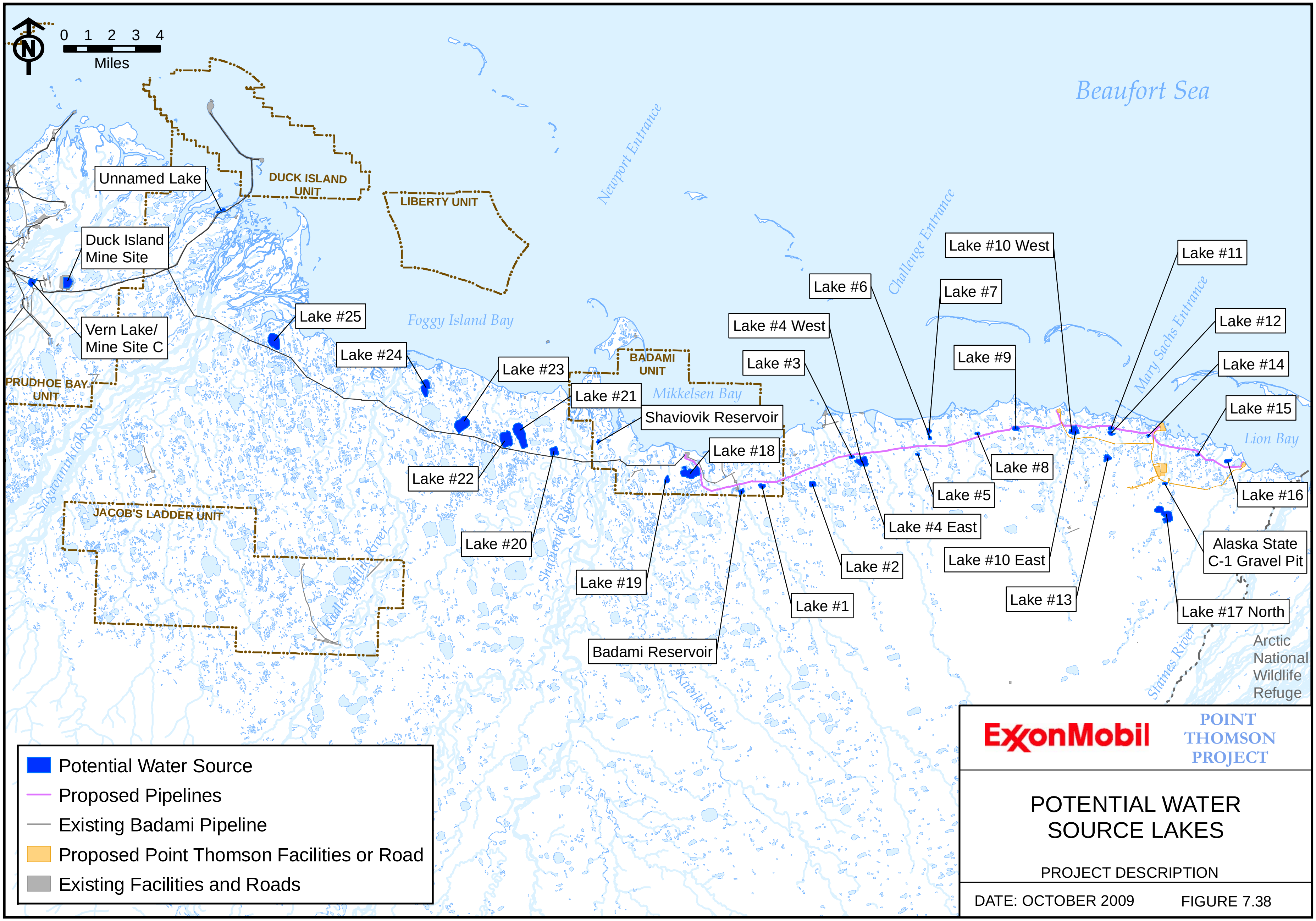
0 1 2 3 4
Miles
N
Beaufort Sea
Unnamed Lake
DUCK ISLAND UNIT
LIBERTY UNIT
Duck Island Mine Site
Vern Lake/ Mine Site C
PRUDHOE BAY UNIT
Lake #25
Lake #24
Foggy Island Bay
Lake #23
Lake #21
BADAMI UNIT
Mikkelsen Bay
Shaviovik Reservoir
Lake #22
Lake #18
Lake #20
Lake #19
Badami Reservoir
JACOB'S LADDER UNIT
Sagavanirktok River
Kadleroshilik River
Shaviovik River
Kavik River
Newport Entrance
Challenge Entrance
Mary Sachs Entrance
Lake #10 West
Lake #11
Lake #6
Lake #7
Lake #12
Lake #4 West
Lake #3
Lake #9
Lake #14
Lake #15
Lion Bay
Lake #8
Lake #5
Lake #16
Lake #4 East
Lake #2
Lake #10 East
Alaska State C-1 Gravel Pit
Lake #1
Lake #13
Lake #17 North
Arctic National Wildlife Refuge
Staines River
Potential Water Source
Proposed Pipelines
Existing Badami Pipeline
Proposed Point Thomson Facilities or Road
Existing Facilities and Roads
ExxonMobil
POINT THOMSON PROJECT
POTENTIAL WATER SOURCE LAKES
PROJECT DESCRIPTION
DATE: OCTOBER 2009
FIGURE 7.38
X:\Point Thomson\GIS\Project Description\ursanc_pd_water_source_lakes_10162009.mxd

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8.0 CONSTRUCTION

This section provides an overview of the Project's construction scope, including civil and infrastructure works, module transportation and offloading, facilities installation, and pipeline construction. Section 14 contains the overall Project schedule.

8.1 TEMPORARY FACILITIES

Temporary and seasonal facilities were described in Section 7. The following discussion focuses on construction methods.

8.1.1 Sea Ice Road Construction

Sea ice road activity can begin as early as November, depending on weather conditions and permitting status. Any part of the road over water will either be grounded to the sea floor or of sufficient thickness to support expected weights of vehicles traversing the route. Sea ice road installation will follow typical Alaska North Slope methods. Sea ice roads will be constructed in shallow waters as close to the adjacent shoreline as practicable, and generally in less than approximately 10 feet (3 meters) of water, in order to avoid marine mammal (e.g., ice seal) habitat.

Sea water for sea ice roads will be withdrawn from locations along the road alignment. Sea water can be obtained by drilling through sea ice and then pumping the sea water across the surface of the ice. If needed, ice chips will be milled from the surface of the sea ice, or as permitted, from the surface of frozen freshwater lakes to provide a solid aggregate in place of liquid water. This technique is used for grounding sea ice and increasing sea ice thickness in order to provide the required load-bearing capacity for vehicle travel.

8.1.2 Onshore Ice Road and Pad Construction

The onshore ice road to support pipeline construction will be approximately 22 miles long and nominally 100 feet wide and 6 inches thick, due to the need to accommodate equipment layout and other traffic. Standard Alaska North Slope onshore ice roads are approximately 35 feet wide and a minimum of 6 inches thick.

Typical Alaska North Slope equipment and construction methods using snow, freshwater, and milled ice chips will be used to construct onshore ice roads and pads. Ice chips provide a solid aggregate and can be used in place of liquid water. Ice chips are placed where required and coated with liquid water, which provides a binder as they freeze in place. Freshwater and milled ice chips will be obtained from permitted sources (See Table 7.2 for currently permitted sources for drilling operations).

8.2 CIVIL WORKS AND INFRASTRUCTURE

Civil works projects were described in Section 7, including dimensions and fill quantities (Table 7.1). The discussion below focuses on construction methods.

8.2.1 Gravel Roads, Pads, and Airstrip Construction

Approximately 12 miles of in-field gravel roadways will be constructed within the Project area. Gravel road installation will occur during winter construction seasons using typical Alaska North Slope equipment and methods.

Bridges will be constructed during the first construction season. Depending on permit requirements, culvert installation is planned to follow road construction during either the winter, with seasoned gravel, or during low flow conditions in late summer. Bridges are planned to cross the four larger drainages along the infield access road system. Bridges will consist of pipe piling supports with sheet piling abutments and precast concrete decks (Figure 7.15). These crossings will be installed during the winter construction seasons using typical Alaska North Slope equipment and methods.

Existing gravel pads will be improved at the Central Pad and East Pad locations and a new gravel pad will be constructed at the West Pad. Other pads include a small water source pad, a gravel mine stockpile pad, and the C-1 storage pad. Gravel pad installation will primarily occur during the winter construction seasons using typical Alaska North Slope equipment and methods.

A gravel airstrip and apron will be constructed within the Project area about 3 miles south of the Central Pad. Gravel runway installation will occur primarily during the winter construction seasons using typical Alaska North Slope equipment and methods.

8.2.2 Summer Gravel Compaction

The gravel at Point Thomson is high in fines (soil particles less than 200 sieve [less than 0.0029 inches in diameter]) and ice content. The winter-placed gravel volume will be approximately 30 percent over the finish grade or quantities (neat line) to account for thawing and compaction. Compaction will be inhibited due to low soil permeability caused by the higher fines content. Additional work will be required to compact the gravel as it thaws and the water drains from it during the summer months. Compaction of gravel structures will be performed with typical construction equipment and methods.

8.2.3 Emergency Response Boat Launch

The Emergency Response Boat Launch consists of a gangway and a 16-foot wide gravel ramp with 2-foot by 1-foot by16-foot concrete planks as a running surface. The current gangway design consists of an 8-foot by 50-foot approach trestle, an 8-foot by 85-foot gangway, and two 8-foot by 30-foot Flexi Floats. The gangway configuration is supported by timber sleepers where it adjoins the pad, and a pile cap as it extends into the inlet. The Flexi Floats are held in position by pile hoops attached to piles. The piles supporting the pile caps and pile hoops are planned to be 12-3/4 inches diameter. The gravel ramp sideslopes will be 2H:1V, and be covered with rip-rap or other appropriate slope protection material. The ramp will extend approximately 150 feet into the inlet down to approximately 3.5 feet below MLLW.

In the winter, ice over the footprint will be cut and removed. Gravel fill will be placed in the excavation and compacted. Pilings will be driven for the approach trestle and the float system, followed by installation of the trestle. The concrete planks will be put in place, and concrete revetment or riprap will be placed on the side slopes of the ramp.

8.2.4 Barge Offloading

Bulkheads for both oceangoing barges (high bulkhead) and coastal barges (low bulkhead) will be constructed to offload modules and supplies during the open water season. More details about the modules are provided in Section 8.4.

The bulkheads consist of sheet pile in an open cell design, with a gravel backfill transition to the Central Pad finish grade. The bulkheads will be located above the MHW line on the beach (+1 foot MLLW line) to accommodate a ramp connecting to a barge grounded just off the shoreline. The deck of the barge at the high bulkhead will be at an elevation of approximately 22 feet, and the transition to the final grade of the Central Pad is approximately 12 feet. The high bulkhead will be completed by the year of the first module barge delivery.

Up to three barges will be temporarily grounded and ballasted at the shoreline each construction season to serve as a bridge to the high bulkhead to allow for offloading. Ocean barges with hull depths in the 25-foot range and lengths of approximately 400 feet will be used to transport sealift large modules and heavy equipment to the Point Thomson site. Mooring dolphins needed to align and stabilize the barges will be constructed in five locations offshore, by driving piles through the ice in winter. Self Propelled Module Transporters (SPMTs) will be used to offload the modules from the barges and transport them to the Central Pad or other locations, as required. The modules will be set directly on their respective foundations. Once modules and other cargo have been offloaded, the grounded barges will be re-floated and demobilized from the area.

To position the ocean barges at the bulkhead, some contouring of the seafloor will likely be required. Directly seaward of the high bulkhead, materials will be removed along the shoreline during the winter. A backhoe will remove a block of ice and some sediment from an area of approximately 140 by 400 feet at the surface and down to the required depth to provide the appropriate seabed profile for the ocean barge hull to have access to the bulkhead. Following this initial preparation, minor dredging and screeding (leveling) of the seafloor may be needed in subsequent construction seasons prior to mooring the barges to maintain barge access to the high bulkhead. Based on current bathymetry, it is expected that seasonal screeding will result in an equal balance of bottom fill and leveling.

Screeding and/or shallow dredging will start at a location approximately 40 feet from the existing shoreline and progress seaward (north) about 400 feet to establish a consistent depth of 5 feet. The current seabed in this area ranges from a depth of 4 to 5 feet. The grade will then taper naturally to the existing seabed elevation of approximately -6 feet at the end of the 400-foot barge. In the summer, this activity will take place from a smaller 200-foot barge with spuds to hold the barge in position. A backhoe with sufficient reach capacity (approximately 25 to 30 feet) will be operated from this barge to remove the required materials. The excavated materials will be placed on another barge and transported via truck to designated shore-based areas for disposal. A ramp along the shore slope will be used to drive the trucks from the barge to the disposal area. In the winter, this activity will take place as described above, but barges will not be used; the backhoe and trucks will be used to remove and transport materials from the frozen sea ice.

It is estimated that dredging/screeding will be limited to the area needed for landing the first barge, with excess material potentially being removed/leveled to ensure the required seabed profile. Removed seafloor material will likely be placed along designated shoreline locations where appropriate.

With the large bulkhead and dolphins in place, a temporary grounded-barge system will be used to offload the sealift barges. Up to three temporarily grounded and ballasted sealift barges will be used to construct a bridge off of the bulkhead for marine offloading operations. Due to the shallow water depth, there is a weight limit for the first barge of approximately 1,500 tons. A second barge will be navigated in position directly behind the first barge and will be ballasted and grounded on the seabed. The second barge will have the capacity to carry 3,000 tons at a water depth of approximately 6.5 feet. A third barge, when needed, will be placed directly behind the second barge and will be ballasted and grounded on the existing seabed. This barge, in deeper water, will have the capacity to accommodate 4,000-tons. The third barge will rotate with additional sealift barges used to transport modules or heavy equipment.

Once the barges are grounded, they will resist any local movement during offloading operations. This temporary grounded-barge offloading method is expected to be used during July or August, as soon as open water allows access of sealift barges to the Point Thomson site. The mooring dolphins will be left in place for future use.

8.3 MINE SITE DEVELOPMENT

A gravel source located approximately 2 miles south of the Central Pad will be developed as discussed in Section 7.2.10, as shown on the Site Plan (Figure 7.36). The initial activity to develop the mine site will be to remove and segregate the organic overburden. Large dozers with ripper shanks will rip the organic overburden and push it into piles for loading and hauling to a dedicated stockpile location. Mineralized overburden (topsoil) underlies the organic overburden and this will also be removed and stockpiled. After the topsoil and overburden have been relocated, drilling and blasting will be used to loosen the frozen, *in situ* gravel. Once gravel extraction is complete, the overburden will be placed back in the mine site, which will be contoured with 3H:1V side slopes and the access left open for water withdrawal. Additional information on the gravel mine site development is provided in Appendix A.

8.4 MODULAR FACILITIES

8.4.1 Point Thomson Modularization Study

A Modularization Study was undertaken to determine the most efficient approach for fabrication, transportation, logistics, and installation of the Project's housing, process, and utility modules and equipment. A facility layout and plot plan was developed to depict the general arrangement of modules and their location at the Project site. Modularization studies were conducted based on this layout. Of the options studied, landing large sealift modules at Point Thomson was selected, with smaller modules being trucked to Prudhoe Bay and then transported to Point Thomson via a winter sea ice road. This option consists of a mix of sealift modules up to 4,000 short tons and smaller, truckable modules with a weight up to 105 short tons each. The 3,500-ton size reflects optimum barge and transport criteria.

8.4.2 Sealift Modules

Sealift modules will be size-constrained to 90 feet wide by 200 feet long and 4,000 tons. These dimensions are compatible with the deck size of ocean-going barges and off-loading methods. Sealift modules will be delivered via ocean barges during the summer open water season and will be offloaded at Point Thomson.

8.4.3 Truckable Modules

Truckable modules will be nominally 20 feet wide by 15 feet high by 80 feet long and will weigh less than 105 tons. Modules will be trucked to the Alaska North Slope on State highways to Deadhorse and then on to Point Thomson via an ice road. Some modules may be staged in Deadhorse awaiting ice road opening.

8.4.4 Hook-up and Commissioning

System completions work will occur to the maximum extent possible at off-site fabrication facilities. Construction crews located at Point Thomson will provide hook-up and commissioning services. Interconnects will begin as each module is set primarily on its pile foundations, with priority for establishing power and heat connection, thereby allowing trades to work efficiently. The goal is to have the fewest possible interconnects left to complete prior to the arrival of modules, as this will reduce the final interconnect time and facilitate an efficient start-up.

8.5 GATHERING LINES AND EXPORT PIPELINE

The gathering lines and export pipeline will be constructed during the winter from tundra ice roads, with small ice pads located along the ice road for materials storage and staging. VSMs will be installed at regular intervals along the pipeline route. The pipe will be joined into longer sections, coated (as necessary), and insulated prior to its arrival at Point Thomson. Pipe sections will be staged along the route and welded together prior to their placement on the VSMs using typical Alaska North Slope construction methods.

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9.0 OPERATIONS AND MAINTENANCE

This section provides descriptions of the O&M requirements for the Project. Discussion is included on anticipated air emissions during operations.

9.1 PROCESS FACILITIES

9.1.1 Gas Injection

The natural gas injection compressors will be housed in a fully enclosed modular building. Regular inspections by operations personnel of the entire injection system will be performed to ensure safe operations and limit downtime. Critical spare parts for the injection system will be warehoused at Point Thomson.

The gas injection system will be connected to the emergency shutdown system of the CPF.

9.1.2 Instrumentation and Controls

Project operations will be controlled from a Central Control Room (CCR). Operating consoles located in the CCR will display process conditions and equipment status, including alarms, trip conditions, and fire/gas detection. Alarms will be relayed to the operator on a real-time basis, providing the operator in the CCR to have complete surveillance capability throughout the plant.

The PCS will be able to monitor and control the entire operation (plant and field). The PCS will have standard local-area-network-based workstations for operator consoles. This will allow the operator and maintenance technicians to check or configure a device from any location on-site. The PCS will continually monitor devices and deliver real-time data regarding their operation. The system provides the following capabilities:

- Surveillance and control of the CPF, the well pads, gathering lines, and export pipeline.
- Monitoring of equipment performance.
- Optimization of maintenance activities.
- Early detection of failures of key pieces of equipment.

Safety instrumented system (SIS) and PCS alarms and shutdowns will be displayed on the human/machine interface (HMI) in the CCR using visual images on the associated graphics display and an audible signal. Alarms that are acknowledged at the HMI and CCR will automatically be acknowledged at all other HMIs in the CCR and in the local equipment room buildings. Priority 1 alarms, including gas leaks, will be displayed on a dedicated alarm panel.

The facility public address and general alarm system will receive signals from the safety systems, manual call stations, and PCS, and will provide unique audible alarms (tones with voice overlay messages) to the audible stations. In addition to control and monitoring from the CCR, certain major pieces of equipment will have their own stand-alone local control and monitoring panels. These panels will provide local control during start-up and shutdown operations, and will assist Operations personnel during equipment start-up and system trouble-shooting. Local panel functions will also be duplicated and accessible from the HMI in the CCR.

9.1.3 Emergency Flaring

Natural gas will be the primary fluid in the Point Thomson Project's gathering system, plant, and gas injection system. The flare system will be used to safely burn these gases, which may occasionally need to be released when pipelines and facilities are depressurized for maintenance or when there is a temporary process upset or an emergency condition. Released hydrocarbons will first flow to flare knock-out drums, where liquids will be separated before the gas is sent to flare. There are two separate flare systems, one for HP gases and one for LP gases.

No routine flaring is planned at the Point Thomson site, other than the minor quantities of purge and pilot gas that are required for safe flare operations. Air emissions from the pilot and purge gas combustion will be included in the emissions inventory for the CPF. The maximum gas flow rate to the HP flare system is expected to be approximately 250 mmscfd. This scenario represents an emergency situation where produced fluids are vented at high rates from the inlet of the CPF due to a facility upset condition or plant shutdown. High-rate relief to the flare is considered to be a very rare occurrence. A more typical flaring scenario would be when an injection compressor drops off-line. The maximum LP flare gas rate is approximately 10 mmscfd and is based on a process upset in the condensate separation train or the unplanned shutdown of the flash-gas compression system.

9.1.4 Air Emissions

Project activities have the potential to produce the following regulated air emissions: nitrogen oxides, carbon monoxide, sulfur dioxide, particulate matter, and volatile organic compounds. The type and amounts of air emissions expected from the Project will differ during the drilling, construction, and operations phases and will be quantified as part of the environmental review and permitting process.

Sources of air emissions during the drilling, construction, and operations phases include:

- Rig generators and rig support equipment such as boilers and heaters (diesel fuel fired).
- Diesel generators located at the CPF to provide power during construction activities and startup until fuel gas is available to supply the CPF's main power generators.
- Gas-turbine driven generators used to power the process facilities, camp, and associated activities.
- Venting and flaring (intermittent source, with the exception of the pilot and purge volumes).
- Mobile sources including vehicles, equipment (e.g., cranes, etc.), marine vessels (in summer), helicopters, and airplanes used to transport equipment, materials, and personnel to and from the Project site.

The main sources of air emissions during drilling will be the rig diesel fuel fired generators. After start-up of the CPF, the gas turbines for power generation will be the main source of operation phase air emissions. Project alternatives evaluated and mitigation measures to reduce air emissions are described in the *Point Thomson Project Environmental Report*. Baseline air quality and meteorological data is being collected at the Point Thomson site, and detailed modeling of potential air emissions will be performed as part of the permit application review and NEPA compliance processes.

9.1.5 Lighting

9.1.5.1 Exterior Lighting

The CPF's lighting will be designed to provide a safe working environment for personnel, satisfy operability requirements, meet applicable codes, and reduce impacts on environment. The use of techniques to limit external light emanating from the facilities (e.g., directional or downcast lighting versus standard overhead lighting) will be incorporated in the Project, to the extent practicable. Other techniques, including motion detection activated lighting, will be further considered for managing the light intensity of the facility.

9.1.5.2 Interior Lighting

Control and electrical rooms will have fluorescent lighting supplied from 120-volt alternating current (AC) uninterruptible power supply (UPS) systems. Process area egress lighting will meet Uniform Building Code (UBC) requirements and will be powered by Underwriters Laboratories (UL)-listed UPS systems.

9.2 PIPELINE MAINTENANCE

The export and gathering pipelines will be accessed by using Rolligons (or similar tundra travel equipment) when tundra travel is allowed, or from ice roads built during the winter to access a specific location. Access can also be achieved by helicopter. Typically, minor repairs will require only hand tools and, possibly, welding equipment. Major repairs may require the use of earth-moving equipment, cranes and lifting equipment, as well as specialized tools and materials. Pipeline repairs will be scheduled in advance, where/when possible, to ensure the equipment, materials, and personnel required to perform the repairs will be available.

Spare parts and replacement materials will be maintained at the Point Thomson warehouse to provide quick response to minor emergencies, and to perform repairs to pipeline-related facilities.

9.3 CIVIL WORKS MAINTENANCE

9.3.1 Roads, Pads, and Airstrip

To ensure the safety and integrity of the airstrip, pads, and roads, routine inspection and maintenance will be required. Road maintenance will be performed, as needed, using equipment such as motor graders, front-end loaders, backhoes, and water tankers for dust control. Care will be taken not to damage the adjacent tundra, particularly during snow removal operations. Snow fences may be installed to reduce snow drifting onto roads, pads, and airstrips.

9.3.2 Culverts

Culverts will be inspected periodically as part of routine operations. Required equipment will be dispatched to remove debris, snow, etc. from culverts. ExxonMobil will pay particular attention during spring breakup to maintain normal hydraulic activity.

9.3.3 Snow Removal and Storage

The Project's facilities will be maintained in accordance with ExxonMobil SSH&E guidelines. During winter months, snow removal activities will be conducted on an ongoing basis. Personnel and equipment, such as front-end loaders and motor graders, will be available to handle snow removal requirements.

To ensure a safe operating facility, a Standard Operating Procedures (SOP) Manual will be developed by the Project before start-up. The SOP Manual will include a section detailing snow removal and handling procedures and these procedures will adhere to the snow removal Best Management Practice (BMP) associated with the applicable Alaska Pollutant Discharge Elimination System (APDES) or National Pollutant Discharge Elimination System (NPDES) permit for storm water. The BMP will address the handling and disposing of snow, which will be visually inspected for contamination before removal. Contaminated snow will be collected and stored in a to be determined specially designated area for proper disposal. Contaminated snow may be allowed to melt, or a snowmelter will be used, and contaminated meltwater will be injected into the Class I disposal well. Uncontaminated snow will be pushed onto surrounding tundra and/or placed on the lagoon sea ice, where it will be allowed to melt. Pad clearing activities will be conducted to avoid gravel and debris entrainment in snow moved off the pad.

While large accumulations of snow are possible during some winters, potential effects of snow storage or disposal are anticipated to be minor. Snow storage and disposal will be undertaken in a manner to avoid the creation of potential hiding places for polar bears.

10.0 LOGISTICS AND ACCESS

The Project will be a remote operating facility, located approximately 60 miles east of Prudhoe Bay and the existing Alaska North Slope road infrastructure. The Badami Development, approximately 22 miles to the west, was developed as a remote facility with no gravel road access. As a result of the Badami and other “remote” developments (e.g., Alpine and NorthStar, and Oooguruk), considerable experience exists in operating and supporting an operation such as Point Thomson without gravel road access to existing infrastructure, although specific details relating to transportation and logistics vary among these facilities.

A gravel airstrip to provide year-round air support is critical to support remote operations. Another important consideration in the Project’s logistics and transportation strategy is the plan to construct process facility modules offsite, which will then be transported to Point Thomson by sealift barge. Additional details on marine, road, and air traffic will be developed as construction and operations plan are finalized. Logistic issues and transportation options for the Project are discussed below.

10.1 LOGISTICS

Year-round access is essential for the Project – both for routine operations and for responding to emergencies. Air transportation will be used year-round for personnel, materials, and emergency support. During the open water season, barges and other vessels will be used to transport equipment and supplies. During winter, seasonal ice roads will be constructed, as needed, to support construction and operations activities. An ice road will be required to support the construction of gravel pads and airstrip, pipeline construction, the delivery of early infrastructure facilities, and the transport of personnel, fuel, modules, equipment, and materials to Point Thomson. Ice roads will also be required in some subsequent years to support additional drilling and field operations. The types of transportation to be utilized by the Project are described in the following sections.

10.2 ACCESS

10.2.1 Road Ground Transportation

Conventional trucks provide the most effective and efficient method of delivering equipment and material to the Point Thomson site that is necessary to construct the required infrastructure and to prepare the pad sites. Ice roads will be constructed, as needed, during the construction and operations phases. An onshore ice road will be required to support pipeline construction. A relatively short network of gravel (all season) in-field roads will be needed to link the various elements of the Project (i.e., the Central Pad, the East and West Pads, the airstrip, the water source, and the gravel mine).

10.2.2 Air Transportation

Air transportation will be used on a year-round basis for personnel and emergency support. Air transportation will also be used to transport equipment, materials, and supplies during periods when there is no ice road or sea access. The airstrip will be sized to handle cargo planes (e.g., Hercules C-130) and will be located approximately 3 miles inland to take advantage of better weather and topography conditions. Use of larger aircraft will reduce the total number of flights required for transport of freight.

Until the gravel airstrip is constructed and commissioned, air traffic will be restricted to helicopters and the seasonal use of an ice airstrip. During this period, fixed-winged aircraft and helicopters will accommodate medical evacuation and emergencies. After the gravel airstrip is commissioned, fixed-wing aircraft will be the normal method of deployment and rotation of personnel, as well as emergency medical evacuation. During the drilling and construction phase of the Project, numerous flights per day, either by helicopter and/or fixed-wing aircraft, will be required to support on-site activities; the number of flights will depend on the activities and the extent of infrastructure in place. Helicopters may also be required for emergency evacuation during pipeline construction.

10.2.3 Marine Transportation

In the summer, barge and boat transport will be used by the Project, as required, between dockheads outside Alaska and at Prudhoe Bay, Endicott, and Point Thomson. Barging will provide a means for the resupply of bulk materials, and for the removal of wastes and excess equipment. Alaska North Slope-based coastal barges will be the primary vessels deployed for this purpose. ExxonMobil will continue to secure a Conflict Avoidance Agreement with the Alaska Eskimo Whaling Commission to coordinate marine traffic patterns and timing with subsistence whaling.

Ocean-going sealift barges will transport large modules directly to Point Thomson. The sealift barge offloading facility will consist of an onshore offloading structure (bulkhead) connected by ramp to a barge temporarily grounded just off the shoreline. The barge and ramp will serve as a temporary bridge off of the bulkhead for marine offloading operations.

11.0 WORKFORCE DEVELOPMENT AND TRAINING

11.1 WORKFORCE

The Project workforce will vary during drilling, construction and production operations. ExxonMobil will prepare and implement an Economic Opportunity Plan for NSB residents and organizations to facilitate local participation in the project. Employment and training initiatives will be detailed in an Economic Opportunity Plan submitted to the NSB. Local training and incentive provisions will be incorporated, as appropriate, into the primary Project construction and operations contracts.

11.1.1 Construction and Drilling

The construction workforce is expected to peak at approximately 380 when ice road construction, pipeline construction, and civil construction works are occurring at the same time in the fourth quarter of 2013. Due to the diverse types of work being conducted at multiple locations, the workforce will be billeted at several sites. Bed space at Prudhoe Bay and other existing facilities may be used, where appropriate. Camps will be located to reduce travel time, as well as to mitigate safety concerns. The Project's workforce projections will be refined as the engineering design and execution planning process progress.

11.1.2 Operations and Maintenance

The Project will require an operations workforce of approximately 80 people. Additional workers will be required during drilling or workover operations and during special work programs (e.g., planned and emergency maintenance operations).

11.2 ENVIRONMENTAL AND SAFETY TRAINING

As discussed in Sections 1.3 and 2, ExxonMobil's safety and health goal for the Project is "**Nobody Gets Hurt**" and ExxonMobil's corporate environmental initiative is to **Protect Tomorrow. Today.** To accomplish these, ExxonMobil has developed a regimented training program to ensure all Team Members receive necessary training prior to arriving at Deadhorse or Point Thomson. This training program is called "Arctic Pass" and it builds on the already strong programs developed by industry for the Alaska North Slope.

The Arctic Pass process addresses the induction and ongoing training program necessary for ensuring that all personnel (regular employee, contractor, customer, and the public) do not undertake visits to our facilities without appropriate safety orientation and training with regard to the location to be visited and/or tasks to be performed. The Arctic Pass training can be received through several sources and media including outside training providers, on-site trainers, contractor trainers, and eventually, some via Computer Based Training.

Arctic Pass requires all workers scheduled to be at Deadhorse or Point Thomson for 14 days or more per year to take the North Slope Training Cooperative Unescorted class as a base for safety and environmental training. This training covers the *Field Environmental Handbook*, *Alaska Safety Handbook*, and *North Slope Visitor's Guide*. These workers will also receive ExxonMobil specific training to include:

- Regulatory Compliance
- Alaska Native Cultural Awareness
- Site Orientation
- Driving Road Rules
- Environmental Awareness
- Waste Management
- Spill Prevention and Reporting
- Polar Bear/Wildlife Awareness

Required safety and health training for all workers will include:

- Job Safety Analysis
- Hearing Conservation
- Blood Borne Pathogens
- Eye Safety
- Hand Safety
- Back Safety
- Behavior Based Safety Processes.

Additional essential training based on each position's specific duties, responsibilities, and location may be required and could include:

- Winter Driving
- Food Safety
- Arctic Water Survival
- First Aid/CPR/AED

Arctic Pass does not cover specialized job-specific high-hazard training like Fall Protection, Confined Space Entry, Energy Isolation, Hazwoper 24-Hour, or the basic requirements of oil field drilling and operations. Specialized training classes for these areas are provided to those specific individuals requiring them and attendance will be tracked separately from the Arctic Pass process.

12.0 ENVIRONMENTAL SAFEGUARDS

As described in Sections 1.3 and 2, ExxonMobil is committed to incorporating environmental protection into the planning, design, and operations of the Project. We will comply with all applicable laws and regulations and will implement ExxonMobil's corporate environmental initiative **Protect Tomorrow. Today.** Key environmental safeguards that have been developed to date by the Project are summarized below, and they are discussed in more detail in the *Point Thomson Project Environmental Report.* In addition, the *Point Thomson Project Environmental Report* also addresses Project design and execution alternatives considered and how environmental protection measures were factored into the proposed Project design.

12.1 WILDLIFE AND HABITAT PROTECTION

12.1.1 Mitigation Measures

A number of design and operational features are planned to protect the environment while managing capital investment, with techniques including:

- Use of shore-based long reach directional drilling to reduce the number of well pads, and avoid offshore drilling or facilities.
- Use of existing sales oil pipelines to transport hydrocarbon liquids from Badami to TAPS.
- No gravel road to Badami or the Prudhoe Bay infrastructure.
- Use of existing Point Thomson area exploration pads and gravel resources where technically and economically feasible.
- Direct offloading of sealift modules from barges at Point Thomson without a solid-fill dock to reduce impacts to near shore area and to avoid enlarging Prudhoe Bay roads and pads for module handling.
- Use of compact heat exchangers for gas injection coolers, reducing the overall profile of the largest module.
- Zero surface discharge policy for drilling wastes, and produced water, via injection into disposal well(s); disposal of other liquid wastes such as camp wastewater into injection well when available.
- Selection of external lighting to address site security and safety requirements, while reducing wildlife interaction and impacts.
- Placement and height reduction of structures such as flare stacks and communication towers to mitigate potential effects on wildlife and visitors' experience in the Arctic National Wildlife Refuge.
- Use of existing and new gravel mines at Point Thomson for freshwater sources.
- Pipeline design compatible with subsistence hunting.
- Timing and/or routing of marine support operations to avoid disturbance to subsistence hunters and whaling crews.

Other mitigation measures are described in the *Point Thomson Project Environmental Report*.

12.1.2 Spill Prevention and Response

An Oil Discharge Prevention and Contingency Plan (ODPCP) will outline site operations and spill prevention and response considerations. This plan will address:

- **Prevention Plan**: Describes regular pollution prevention measures and programs to prevent spills (for example, tank and pipeline leak detection systems, and discharge detection and alarm systems). This plan also covers personnel training, site inspection schedules, and maintenance protocols.
- **Best Available Technology**: Presents analyses of various technologies used and/or available for use at the site for well source control, pipeline source control and leak detection, tank source control and leak detection, tank liquid level determination and overfill protection, and corrosion control and surveys.
- **Response Action Plan**: Describes all actions required by responders to effectively respond to a spill and includes an emergency action checklist and notification procedures, communications plan, deployment strategies, and response scenarios based on Response Planning Standards.
- **Supplemental Information**: Describes the facility and the environment in the immediate vicinity of the facility. This section also includes information on response logistical support and equipment (mechanical and non-mechanical), realistic maximum response operating limitations, and the command system.

ACS will serve as the Project’s primary Oil Spill Removal Organization and primary Response Action Contractor, as approved by the U.S. Coast Guard and the Alaska Department of Environmental Conservation (ADEC), respectively. As they do for other Alaska North Slope oil production operations, ACS technicians will help assemble, store, maintain, and operate the Project’s spill response equipment.

Oil spill response equipment will be stored at the Central Pad. The equipment is expected to include a number of containers holding a variety of boom types, skimmers, portable tanks, pumps, hoses, generators, and wildlife protection equipment. Snow machines and other vehicles for off-road access will be stored on the Central Pad. Equipment may be staged at the East and West Pads to assist with immediate spill responses. Each production pad is expected to support a pair of metal container boxes stocked with containment boom and absorbent boom, among other spill response gear.

To respond to spills into streams and the nearshore marine environment, spill response vessels, such as shallow-draft boats capable of traversing the nearshore waters common in the area, will be maintained at Point Thomson during the summer open-water season. Additional response vessels, such as “Island Class” workboats designed to pull long lengths of oil spill containment boom and operate skimmers will be staged at Point Thomson during the open water season. Small barges for storing and hauling oil recovered from marine oil spills will be staged, as appropriate. Other equipment used in day-to-day operations and not dedicated to oil spill responses will be available to supplement spill-dedicated equipment. A marine ramp has been incorporated into the design of the Central Pad to facilitate oil spill response access by ACS.

ExxonMobil has implemented a spill prevention and reporting system for current drilling and remediation activities at Point Thomson. The prevention and response aspects of this system include the following elements:

- Resources
  - ODPCP
  - Spill Prevention and Control Countermeasure (SPCC) Plan
  - North Slope Environmental Handbook
  - ACS advisor and response

- Guidelines
  - Fluid transfer guidelines
  - Liner use guidelines
  - Secondary containment requirements
  - 360-degree vehicle and construction equipment inspections at shift change
  - Daily tailgate meetings

ExxonMobil monitors and addresses three levels of spills or potential incidents:

1. Reportable spills based on external guidelines and regulatory requirements (ADEC, ADNR, NSB, and National Response Center).
2. Reportable spills based on ExxonMobil internal guidelines (which require addressing spill volumes that are less than those required for external reporting).
3. Near misses where no spill occurred but an unintended or uncontrolled loss of containment could have led to a spill.

In cases where a spill occurred or there were near misses, ExxonMobil conducts a root cause analysis and implements corrective actions based on the root cause analysis.

12.2 DISCHARGES AND EMISSIONS

12.2.1 Discharges

A Class I injection well will be available for the subsurface disposal of fluids from drilling, production, O&M, and domestic wastewater sources. This method is an effective way to avoid surface discharges. Alternate means of disposal, including surface discharge, may be needed, and will be subject to appropriate permit conditions (Section 12.3). A facility will be available at the Central Pad for the temporary storage of drilling wastes in compliance with regulatory requirements. As a planning contingency, ExxonMobil will have an NPDES/APDES permit to discharge allowable wastes.

12.2.2 Air Emissions

The type and amounts of air emissions expected from the Project will differ during the drilling, construction, and operations phases. Air emissions associated with the Project, as described in Section 9.1.4., are being quantified as part of the design and permitting process. Based on optimization studies that have been conducted, ExxonMobil has adopted several process improvements that will result in an overall reduction of facility air emissions. One improvement is the planned installation of Waste Heat Recovery Units (WHRUs) on the Gas Turbine Generators. The WHRUs will eliminate the need for gas-fired heaters, thereby reducing fuel consumption and air emissions. Another improvement is the planned inclusion of an emergency fuel gas system supplied from a connection to the Central Pad gas injection well. Use of this fuel gas supply will reduce the need to use diesel fuel during periods when the operation is shutdown and essential power must continue to be provided to the facilities and camp.

12.2.3 Light Emissions

Facility light emissions will be controlled to reduce the impact on the environment, as described in Section 9.1.5. Efforts will be made to reduce the outside visibility of the facility while incorporating required codes, regulations, safe industry practices, and ExxonMobil design criteria.

12.3 WASTE MANAGEMENT

The Project's waste management plan will address:

- The waste streams and quantities expected to be generated by the Project.
- Disposal options and alternatives for all wastes with an emphasis on on-site disposal where possible and practicable.
- Seasonal availability of transportation options for wastes requiring offsite disposal.
- Changes in types and quantities of wastes during the drilling, construction, and operations phases.
- Methods for handling, transporting, storing, and disposing of wastes that comply with all applicable permits and regulations.

Avoidance of waste generation (where possible), waste minimization, product substitution, beneficial reuse, and recycling will be integral parts of the overall waste management strategy for the Project. The following sections describe the general waste management approach during construction, drilling, and operations phases of the Project. Major regulatory considerations are reviewed and the approach to meet those regulatory requirements is presented.

12.3.1 Approach to Waste Management

A Waste Management Plan developed for drilling will be modified to address the generation, storage, transport, and disposal of anticipated wastes during construction and operations. The Project's waste management strategy consists of avoiding the generation of wastes wherever possible, followed by aggressive waste minimization, and onsite disposal wherever practical. The design considerations associated with implementing this strategy include regulatory compliance, environmental protection, site access, and onsite storage capability.

A variety of facilities are currently available for collection, storage, and disposal of wastes and recycling on site. Wastes associated with the Project that cannot be managed onsite will be managed off site. In these cases, the wastes will be consolidated and stored onsite. Waste and recyclable materials may occasionally be transported to other Alaska North Slope locations for treatment, disposal, recycling, or transfer to other facilities in Alaska or the Lower-48 states. All hazardous waste must be sent to disposal facilities outside Alaska.

Site access varies based on the time of year – hauling waste offsite is generally limited to certain times of the year. During the summer open-water season, access to and from the Project area is available by barges/vessels. During the winter, access will generally occur via an ice road.

Onsite disposal options will be used to the fullest extent practical. Most wastes will be injected into the Class I disposal well, when available. Domestic sewage will be treated in a wastewater treatment plant before disposal down the Class I well. When this option is not available, treated wastewater may be discharged to the tundra under an NPDES/APDES general permit. The disposal well will require detailed operational and record-keeping procedures. A Waste Analysis Plan, which will include information on waste tracking and waste identification, will be submitted to the U.S. Environmental Protection Agency for approval before disposal well operations begin.

The drilling and construction camp(s) will use dedicated water and waste treatment utilities.

Appropriately designed storage areas for all wastes, including hazardous wastes, will be constructed and managed to comply with all permit stipulations and applicable regulatory requirements.

12.3.2 Drilling

The drilling program for the Project is underway, and most drilling wastes are back-hauled to waste facilities for disposal in the Prudhoe Bay area. Drilling muds will be recycled and reused, and spent drilling muds and cuttings will be delivered from the rig to a permitted temporary storage area on the pad or hauled off site for disposal. After the Class I disposal well is operational, drilling waste will be processed at a grind and inject facility, and injected into the disposal well. Wastewater from the drilling camp is discharged under the provisions of a general APDES permit.

12.3.3 Construction

Wastes generated during the construction phase of the Project will follow the pattern as described for drilling. Wastewater from construction camps will be discharge under the general permit and an incinerator(s) will be used for some solid wastes. Other wastes will typically be back-hauled to waste facilities for disposal in the Prudhoe Bay area. Additional options for waste management will be identified as the Project progress.

12.3.4 Operations

The Class I disposal well and an incinerator will be available as disposal options during the operations phase. Wastes that cannot be disposed on-site will be disposed off-site as discussed above.

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13.0 FACILITY ABANDONMENT

The design life of Project facilities is predicted to be approximately 30 years. Detailed facility abandonment procedures will be developed prior to when the operations terminate. Abandonment procedures will be based on the applicable regulatory requirements at that time.

Abandonment of Project facilities is subject to a number of federal, state, and local authorities, and will require approval from multiple agencies, including:

- USACE Section 404/10 permit requirements
- State of Alaska oil and gas lease terms
- State Pipeline Coordinator's Office (SPCO) pipeline ROW lease terms
- Alaska Oil and Gas Conservation Commission (AOGCC) requirements for plugging and abandonment of wells
- NSB Title 19 compliance

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14.0 SCHEDULE

The estimated timeframes for major elements of the Project are shown in **Table 14-1**. ExxonMobil is committed to production by the end of 2014 and will pursue opportunities to advance the schedule.

Table 14.1 Point Thomson Project Schedule

PROJECT ELEMENT	ESTIMATED TIME FRAME	DESCRIPTION
Conceptual Engineering	Sept 2008 – June 2009	Initial engineering design.
Mobilize Drilling Rig	Winter 2008 – 2009	The drilling rig was mobilized from Prudhoe Bay to Point Thomson during the winter of 2008-2009.
Drilling	Through 2010 for PTU-15 and PTU-16 (additional drilling will occur as required).	Drilling is being conducted with one rig at the present time.
Environmental Studies	Summer 2009 (additional summers as necessary).	Environmental studies such as river and stream hydraulic investigations are planned for the summer of 2009. Other studies will be planned and initiated in accordance with discussions with resource agency personnel.
Front End Engineering Design (FEED)	2009 – 2010	Preliminary engineering, optimization, technical definition, and execution planning.
Construction- and Operations-Related Permits	July 2009 – December 2011	All applicable U.S. federal, state, and local permits secured to construct and operate production facilities and the export pipeline.
Detail Engineering	July 2010 – June 2012	Detailed engineering, procurement, and execution planning to support fabrication and construction.
Engineering Support	June 2010 – start-up	Follow-on engineering support for fabrication, installation, hookup, and commissioning.
Fabrication of Processing Modules and Other Equipment	2011 - 2013	Off-site fabrication of modular processing equipment, utilities, and other equipment.
Gravel Construction	Dec 2011 – Late April / Early May 2012	Gravel construction is expected to commence late in 2011 utilizing equipment mobilized over ice roads. Most gravel work at the Project site is expected to be completed, with gravel being obtained from a new local mine site.
Support Infrastructure Construction	Winter 2011 – Winter 2013	Construction of infrastructure such as airstrip, infield roads, power generation, storage tanks, and temporary camps.
Module Transportation	Summer 2013	Modules for the Central Pad will be brought to Point Thomson by sealift and offloaded at the Barge Offloading Facility.
Module Installation and Commissioning	Summer 2013 – Summer 2014	Place and install the modules at Point Thomson and begin testing for commissioning.
Pipeline Construction	January 2013 – April 2013	Pipeline construction is expected to commence in the winter 2013 and be completed by April 2013.
Production	4th Quarter 2014	Production from Point Thomson is expected to commence by the end of 2014.

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