Temporary Land Use Permit Application Supplemental Information

Foggy Island Bay State No. 1 Corrective Action Project

BP America Production Company

October 2022

Project No.: 0612478

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Foggy Island Bay State No. 1 Corrective Action Project

Julie McKim
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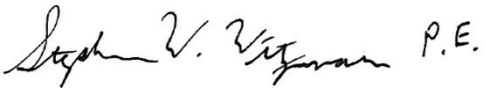

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CONTENTS

Acronyms and Abbreviations

Name	Description
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADL	Alaska Division of Land
ADNR	Alaska Department of Natural Resources
DMLW	Division of Mining, Land, and Water
LCY	loose cubic yards

1. INTRODUCTION

On behalf of BP America Production Company, ERM Alaska, Inc. has prepared this this document to accompany the Land Use Permit Application Form. This document contains the necessary information for a complete Land Use Permit Application Package.

2. PROJECT DESCRIPTION

Foggy Island Bay State No.1 is a gravel pad that was constructed for oil and gas exploration activities in 1975. Corrective Action is required under Alaska Department of Environmental Conservation (ADEC) regulations and will be performed in accordance with an ADEC-approved corrective action plan. In addition, the exploration well will be plugged and abandoned in accordance with Alaska Department of Natural Resources (ADNR) Division of Oil and Gas regulations. The pad is off the road system in the Sagavanirktok River delta adjacent to the Beaufort Sea, approximately 20 miles northeast of Deadhorse. A Vicinity Map and Site Location Map are provided in Appendix A as Figures 1 and 2, respectively.

The pad is positioned just outside the eastern boundary of the Prudhoe Bay Unit and outside the southern boundary of the Duck Island Unit. The pad is in Section 19, Township 11 North, Range 17 East, Umiat Meridian, at latitude 70.2873º north and longitude 147.9082º west. The planned, approximately 1.1 mile-long ice road and spur are in Sections 19 and 30, Township 11 North, Range 17 East, and Section 25, Township 11 North, Range 16 East, Umiat Meridian. The site is located on property owned by the State of Alaska, managed by ADNR and leased to Hilcorp Alaska, LLC under Alaska Division of Land (ADL) file number 47506.

Corrective action is being performed within the approximately 8-acre pad site (as depicted on Figure 3 in Appendix A) to support closure of the inactive reserve pit, burn pit, sewer pit, lined fuel storage area, and cellar drain pit. The pad was constructed with a layer of foam insulation; the insulation will be removed from the site and disposed of properly. The objective of the work is to restore the site to conditions that meet the requirements of ADNR, ADEC, and other stakeholders. Site work is tentatively scheduled to occur during the winter of 2022/2023, depending on ice road access and equipment/crew availability.

Corrective action activities include the following:

- Install two ice road monitoring stations within the main ice road alignment (installed September 1, 2022 in accordance with a Letter of Non-Objection issued August 31, 2022 by ADNR-Division of Mining, Land, and Water [DMLW])
- Pre-pack the main ice road route once tundra conditions allow (anticipated December 2022)
- Construct an ice road for access to the pad during winter months (anticipated January 2023). The approximate ice road route and spur to one of the water sources are shown on Figure 2 in Appendix A
- Construct an ice pad around the pad (early 2023) for material and equipment staging, as well as to allow equipment to maneuver (Figure 3 in Appendix A)
- Properly plug and abandon the exploration well
- Loosen and remove sand/gravel (soil) above existing foam board and segregate clean versus contaminated soil; some snow clearing may be required
- Remove foam board insulation and haul offsite for landfill disposal
- Remove and segregate uncontaminated and minimally-contaminated (“conditional use”) soil from the reserve and burn pits for use as backfill for excavated pit areas

- Excavate contaminated soil from the various pit areas and from the lined fuel storage area and transport offsite for proper disposal at the Grind and Inject facility
- Collect excavation confirmation soil samples for field screening and laboratory analysis
- Once cleanup levels are attained, backfill and grade excavated areas and final surface elevation; top dress surface soil with 3 to 5 inches of organic-rich overburden (to be obtained from the Put 23 Mine Site via a Material Sales Contract with ADNR)
- Pickup debris from winter activities and implement initial revegetation activities, including seeding and fertilizing (summer 2023). Revegetation monitoring is anticipated to continue for up to ten years

3. SITE DESCRIPTION

The site lies within the Arctic Coastal Plain ecoregion. Permafrost-driven pingos along with ice-wedge polygons, streams, lakes, ponds, and frost boils create the only topography of the area. The region's soils are poorly drained except along streams and rivers and have developed beneath thick vegetation cover. The vegetation in this ecoregion, as well as that in the vicinity of Foggy Island Bay State No. 1, is classified as wet graminoid herbaceous tundra, dominated by grasses (e.g., primarily *Dupontia* and *Alopecurus* species in dry areas and *Arctophila* species in standing water), sedges (e.g., primarily *Eriophorum* and *Carex* species), and mosses. The dwarf shrub communities in the upland areas of this ecoregion are dominated by *Dryas*, *Vaccinium*, *Arctostaphylos*, and *Salix* species. Migratory birds, caribou, fox, and polar bears have the potential to use the area.

Since site construction in 1975, the pad has remained intact. Pad material was used to fill the reserve pit, burn pit, sewer pit, lined fuel storage area, and cellar drain pit. Various site features/conditions were noted by Amoco Production Company, Inc. during a 1989 site investigation and are summarized in the following bullets:

- The gravel pad measured approximately 800 feet long by 200 feet wide and appeared to be approximately 3 feet thick when compared to surrounding tundra elevation. The pad surface was level with no evidence of surface water being retained.
- A capped drilling waste reserve pit was located to the southeast of the wellhead. In 1983, the pit was filled with gravel and leveled. At the time of the 1989 assessment, slight depressions were noticed in the cap, but no standing water was observed.
- Four lined fuel storage areas (on the western corner) were filled with gravel and leveled in 1989.
- The site has an associated cellar drain pit, burn pit, sewage pit, and incinerator pad; these were filled and graded in 1983.

Based on the latest available data, including a 2013 Phase II assessment, the condition of the site remains similar to what was reported in the 1989 site investigation. The gravel pad remains relatively debris free, with sparse vegetation growth. No hydrocarbon staining or standing water were visible on the pad surface during the Phase II assessment.

Review of historical aerial photographs from various years between 1977 and 2012 and on-site observations during the 2013 Phase II assessment indicate that only slight-to-moderate thermokarsting has developed in the gravel pad over the past 35 years. Comparing aerial photographs between 1984 and 2012 (Appendix B), the majority of the gravel pad perimeter remained well-defined during this time relative to the surrounding tundra.

A layer of foam board, believed to be approximately 6 inches thick at the time of installation, extends beneath the entire area of the gravel pad at a depth of approximately 1.4 feet below the present-day

gravel pad surface. Pieces of the foam board, approximately 5 inches thick, were observed during the Phase II assessment near the northeastern edge of the gravel pad (see Appendix B). Borings taken during the Phase II assessment show that the foam has compressed to approximately 1 to 2 inches thick.

The *Site Rehabilitation Plan* (Appendix C) will be implemented to stabilize and revegetate the site to eventually create a habitat similar to adjacent undisturbed areas. Details on the rehabilitation treatment and monitoring are included in the *Site Rehabilitation Plan*. The *Site Rehabilitation Plan* was revised to incorporate comments received from ADNR-DMLW on August 22 and September 22, 2022.

4. NUMBER OF PEOPLE

Up to 15 people are anticipated to be working at the site at any time during winter activities, including pre-packing and ice road/pad construction. Personnel include on-site crew and drivers for dump trucks. The site will be used for up to 125 days between January 2023 and early May 2023. Summer revegetation activities will require a crew of up to 5 people to be on site for 5 days in the summer of 2023. Subsequent monitoring is expected to require crews and a shorter duration for each summer visit; actual crew size and visit duration will vary with the success of revegetation efforts.

5. SPILL PLAN AND PREVENTION METHODS

Corrective action will require the removal and disposal of contaminated materials, including drilling waste and associated hydrocarbon-impacted material, crude-oil impacted material, and potentially gravel and underlying foam board (if found contaminated). Drilling waste and associated hydrocarbon-impacted material is estimated at approx. 4,600 loose cubic yards (LCY). Crude-oil impacted material is estimated at 6,800 LCY. Approx. 9,900 LCY of foam board is estimated to be removed from the site, the contaminated volume will be determined during site activities. About 9,400 LCY of clean or conditional-use gravel will be used to restore areas excavated below tundra grade.

The work will be conducted in accordance with the Construction General Permit for Storm Water Discharges for Large and Small Construction Activities (AKR10000). Spill plan and prevention methods include the use of control measures and best management practices such as the use of secondary containment or surface liners (e.g., duck ponds) during vehicle refueling. Duck ponds will also be used beneath other potential, stationary sources (e.g., light plants and vehicles). Spill response equipment will be available on site to respond to spills. Vehicle and heavy equipment refueling will occur within the pad area or on other existing gravel areas. Equipment inspections will occur on a regular basis. Hazardous waste and fuel storage containers will not be stored on site; however, fuel will be available for vehicle refueling in a 4,000 gallon fuel truck that will remain on site at all times. The fuel truck is equipped with secondary containment.

In the event of an inadvertent release, BP America Production Company has an agreement with Alaska Clean Seas, Inc. to provide emergency response. Any release in excess of 55 gallons of petroleum products to land will be reported to ADEC as soon as the discharge is recognized. Any release of petroleum products to land in excess of 10 gallons by less than 55 gallons will be reported to ADEC within 48 hours after the discharge is recognized. A written record of discharges of petroleum products greater than one gallon to land will be maintained and provided to ADEC within one month. Any release of petroleum products in excess of 55 gallons to impermeable secondary containment areas will be reported to ADEC within 48 hours after the discharge is recognized. Additionally, notifications will be made to the appropriate federal, state, and local agencies in accordance with reporting requirements.

6. OTHER APPROVALS/PERMITS

The Project will be conducted in accordance with the requirements of federal, state, and local approvals and permits including, but not limited to:

- ADEC Contaminated Sites Program approval of the *Corrective Action Plan*
- ADEC Solid Waste Management Program approval
- ADEC Construction General Permit for Storm Water Discharges for Large and Small Construction Activities (AKR10000)
- Alaska Department of Fish and Game (ADFG) Public Safety Permit
- ADFG Fish Habitat Permit
- ADNR - DMLW Temporary Land Use Permit
- ADNR - DMLW Letter of Non-Objection
- ADNR - DMLW Temporary Water Use Authorization
- North Slope Borough (NSB) Traditional Land Use Inventory Clearance
- NSB Administrative Approval
- US Environmental Protection Agency Class I Underground Injection Control Permit (for operation of the Grind and Inject facility)
- US Army Corps of Engineers Approved Jurisdictional Determination
- US Fish and Wildlife Service Incidental Harassment Authorization

APPENDIX A FIGURES

M:\Projects\BPXA\CSM Sites\Maps\Foggy Island Bay\Fig 1 Site Locations.mxd, REVISED: 05/19/2022, SCALE: 1:132,000 when printed at 8.5x11 DRAWN BY: Jake Sullivan

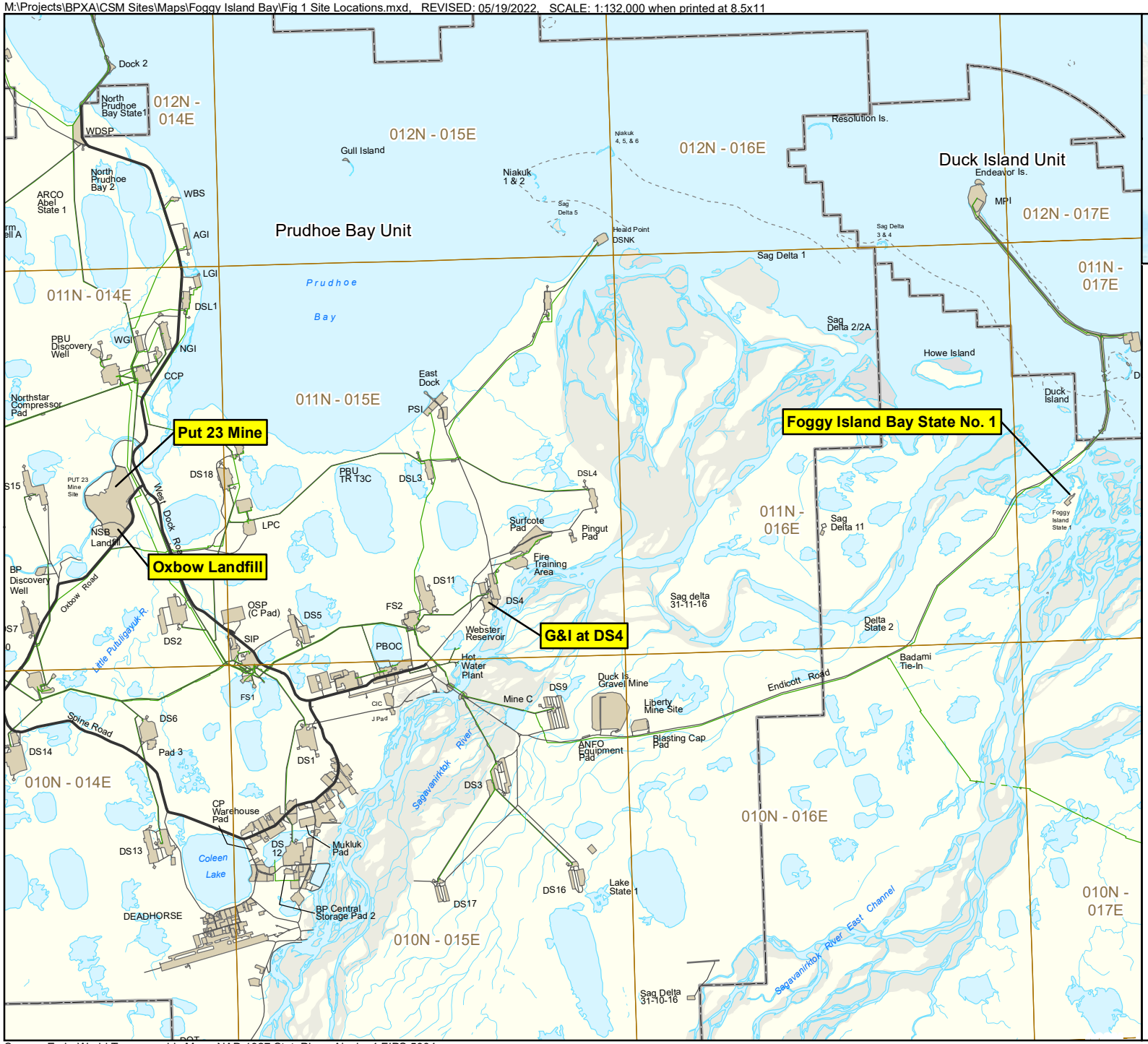

Figure 1
Site Vicinity Map
Foggy Island Bay State No. 1

Environmental Resources Management
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ERM

Source: Esri - World Topoographic Map; NAD 1927 StatePlane Alaska 4 FIPS 5004

M:\US\Projects\A-C\BP\CSM Sites\Maps\Foggy Island Bay\8-24-22 updates\Fig 3 Site Vicinity.mxd, REVISED: 09/26/2022, SCALE: 1:16,000 when printed at 8.5x11 DRAWN BY: Jake Sullivan

Legend

- Approximate Proposed Ice Road
- Thermistor Locations
- Gravel Pad to be Rehabilitated
- Ice Pad
- Township and Range Border
- Section Border

N

0 650 1,300 2,600 Feet

Figure 2
Site Location Map
Foggy Island Bay State No. 1
Foggy Island Bay, Alaska

ERM
Environmental Resources Management
www.erm.com

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

M:\US\Projects\A-C\BP\CSM Sites\Maps\Foggy Island Bay\8-24-22 updates\Figure 4 Site Layout Plan View.mxd, REVISED: 09/23/2022, SCALE: 1:2,600 when printed at 8.5x11

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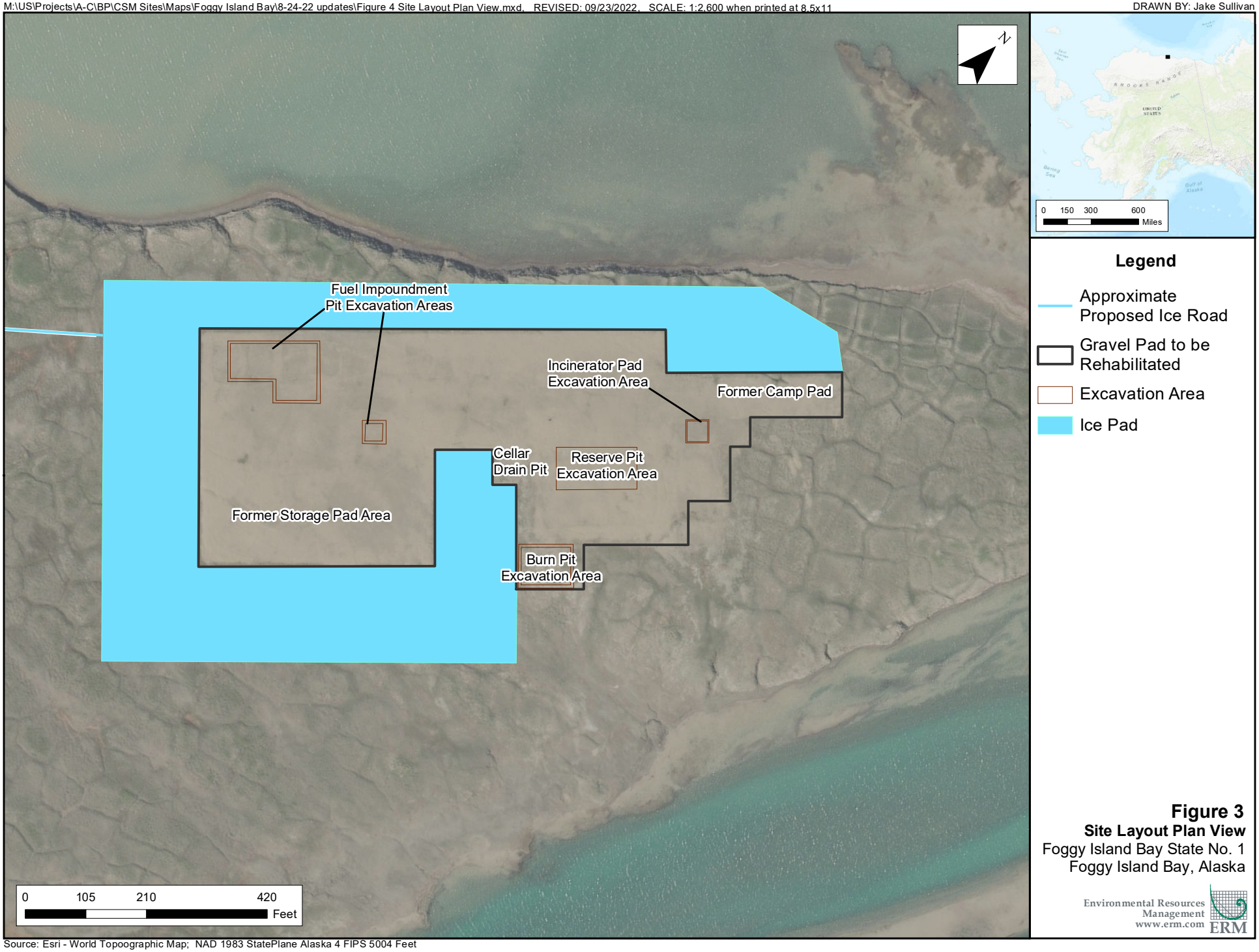

Figure 3
Site Layout Plan View
Foggy Island Bay State No. 1
Foggy Island Bay, Alaska

Environmental Resources
Management
www.erm.com
ERM

Source: Esri - World Topoographic Map; NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

APPENDIX B AERIAL PHOTOGRAPHS

PHOTOGRAPH 1: AERIAL PHOTOGRAPH; AEROMETRIC. 28 JULY 1968.

PHOTOGRAPH 2: AERIAL PHOTOGRAPH; AEROMETRIC. 24 JULY 1977.

PHOTOGRAPH 3: AERIAL PHOTOGRAPH; AEROMETRIC. 4 JULY 1983.

PHOTOGRAPH 4: AERIAL PHOTOGRAPH; AEROMETRIC. 11 JULY 2012.

APPENDIX C FOGGY ISLAND BAY STATE NO. 1 SITE REHABILITATION PLAN

Foggy Island Bay State No. 1

Site Rehabilitation Plan

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29 September 2022

Foggy Island Bay State No. 1

Site Rehabilitation Plan

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Tables

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Appendices

Acronyms and Abbreviations

Name	Description
°F	degrees Fahrenheit
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADL	Alaska Division of Land
ADNR	Alaska Department of Natural Resources
Amoco	Amoco Production Company, Inc.
API	American Petroleum Institute
CAP	Corrective Action Plan
dS/m	deciSiemens per meter
ERM	ERM Alaska, Inc.
GPS	Global Positioning System
lbs/acre	pounds per acre
N-P-K	nitrogen-phosphorus-potassium

1. INTRODUCTION

This Site Rehabilitation Plan has been prepared in conjunction with the *Corrective Action Plan Foggy Island Bay State No. 1* (ERM 2020) (CAP) to facilitate the closure and rehabilitation of BP America Production Company's Foggy Island Bay State No. 1 former exploratory drill site. The site is listed in the Alaska Department of Environmental Conservation (ADEC) Contaminated Sites Program database as: Hilcorp NS Foggy Island Bay State #1 (AMOCO) (BPX), Hazard ID 2686. The CAP proposes to remove, segregate, and manage impacted gravel/tundra as needed, in accordance with 18 Alaska Administrative Code (AAC) 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2018). The CAP also proposes removal of a layer of foam insulation that is part of the pad. Corrective action activities will be directed by BP America Production Company.

Excavation, backfilling, and grading are scheduled to begin as early as January 2023 but are dependent on construction of ice roads. Rehabilitation activities will likely take place during the following summer 2023, several months after corrective action is complete (corrective actions are designated as Year 0 in Table 1).

2. SITE CONDITIONS

2.1 Site Description

The Foggy Island Bay State No. 1 site is off the road system in the Sagavanirktok River delta adjacent to the Beaufort Sea, approximately 20 miles east of Prudhoe Bay. The 4-acre site is positioned outside the eastern boundary of the Prudhoe Bay Unit. The exploratory well is in the southeast quarter of Section 19, Township 11N, Range 17E, Umiat Meridian, at latitude 70º 17' 16" N and longitude 147º 54' 15" W (Figure 1) and is classified as plugged and abandoned. The American Petroleum Institute (API) Number for the Foggy Island Bay State No. 1 well is 50-029-20146, Permit No. 74-44, and Lease Designation Alaska Division of Land (ADL) 47506. The State of Alaska is the owner of surface rights.

Various site features/conditions were noted by Amoco Production Company, Inc. (Amoco) during a 1989 site investigation:

- The gravel pad measures approximately 800 feet long by 200 feet wide and appears to be approximately 3 feet thick, when compared to surrounding tundra elevation. The pad surface is level with no evidence of surface water being retained.
- A capped drilling waste reserve pit lies to the southeast of the wellhead. In 1983, the pit was filled with gravel and leveled. At the time of the 1989 assessment, slight depressions were noticed in the cap, but no standing water was observed.
- Four lined areas that were used for fuel storage when the pad was operational are on the western corner and were filled with gravel and leveled in 1989.
- The site also has an associated cellar drain pit, burn pit, sewage pit, and incinerator pad.

ERM Alaska, Inc. (ERM) personnel visited the site in September 2013 for a Phase II assessment (ERM 2019). ERM observed that since site construction in 1975, the gravel pad has remained largely intact, and drilling waste within the reserve pit has either been removed or capped. The pad is generally in good condition with no significant thermokarsting visible. No hydrocarbon staining or standing water were visible on the pad surface. A layer of foam board, that is believed to have been approximately 6 inches thick at the time of construction, extends beneath the entire area of the gravel pad at a depth of approximately 1.4 feet below pad grade. A site visit was also conducted on 1 September 2022.

As of the 2013 and 2022 site visits, the site remains similar to what was reported in the 1989 site investigation. The gravel pad remains relatively debris free, with sparse vegetation growth. Some slight thermokarsting has developed within the footprint of the gravel pad.

2.2 Environmental Setting

The site lies within the Arctic Coastal Plain ecoregion (Gallant et al. 1995). This ecoregion is characterized by arctic climatic conditions, with very low mean annual temperatures (average daily minimum during winter is -4 degrees Fahrenheit [°F] and during summer is just above 32 °F) and very low annual precipitation (approximately 4 inches annually). These conditions result in a unique situation where, although the precipitation rate is similar to that of a desert, the region is dominated by wetlands, formed as a result of the continuous layer of permafrost and the low evapotranspiration rate. The winds are strong and persistent over the gradually sloping (less than or equal to 1 degree) plain. Permafrost-driven pingos along with ice-wedge polygons, streams, lakes, ponds, and frost boils create the only topography of the area. The region's soils are poorly drained except along streams and rivers; the soils developed beneath thick vegetation cover.

The vegetation in this ecoregion, as well as that in the vicinity of Foggy Island Bay State No. 1, is classified as wet graminoid herbaceous tundra, dominated by grasses (e.g., primarily *Dupontia* and *Alopecurus* species in dry areas and *Arctophila* species in standing water), sedges (e.g., primarily *Eriophorum* and *Carex* species), and mosses. The dwarf shrub communities in the upland areas of this ecoregion are dominated by *Dryas*, *Vaccinium*, *Arctostaphylos*, and *Salix* species.

2.3 Soils

Boring logs presented in the *Final Foggy Island Bay State No. 1 Phase II Site Assessment Report* (ERM 2019) indicate the following predominate soil types:

- Off-pad areas: Sand with trace fines (United States Soil Classification SP) (data is from a limited area). This is generally saturated (hydric) soil.
- Gravel pad above the geofoam insulation: gravelly sand with fines (SW). This is generally very dry, well-drained soil (xeric).
- Gravel pad below the geofoam insulation: silty sand with fines (SM). This soil ranges from moderate to constant moisture content (mesic) to hydric.

2.4 Drill Pad History

The spud date for the Foggy Island Bay State No. 1 well was 3 February 1975, and the well was drilled to 11,202 feet by 1 April 1975. The operator at that time was Amoco.

On 26 April 1975, the well was suspended. Review of records indicates that the well was subsequently plugged on 28 April 1975 (Amoco 1992).

Pit liners were removed in 1982 during pad cleanup. Pad abandonment was performed in October 1983. The pits were filled and graded with gravel from the pad area. Abandonment also included using gravel to backfill four lined fuel storage areas on the western corner of the pad, the reserve pit, the sewage pit, and the burn pit east of the rig pad (Figure 2)[1]. A blade was used to scrape gravel from the storage pad and rig pad to backfill all the pits at the site. A maximum of 1 foot of gravel was removed from the storage pad and rig pad to minimize the possible exposure of the buried foam board insulation. The 12-inch by 20-inch spool on the wellhead was left in place per verbal approval from the Alaska Oil and Gas Conservation Commission. The entire drilling pad was smoothed to prevent water entrapment. Amoco was the operator during this abandonment phase (Amoco 1992).

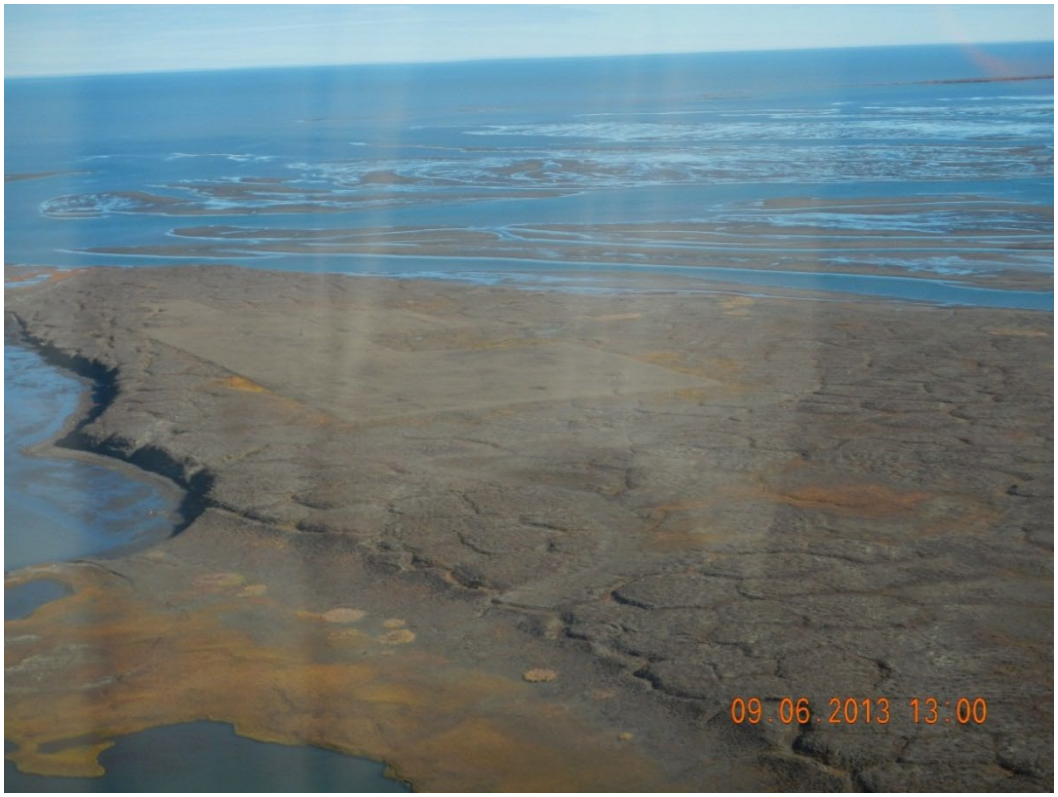
[1] For rehabilitation, Foggy Island Bay State No. 1 is considered a single pad. However, some historical documents break the pad down into the following areas: 1) storage pad (southern portion), 2) camp pad (thin area extending to the north), and 3) rig pad (central portion between the storage pad and the camp pad).

3. REHABILITATION PLAN

3.1 Goals and Objectives

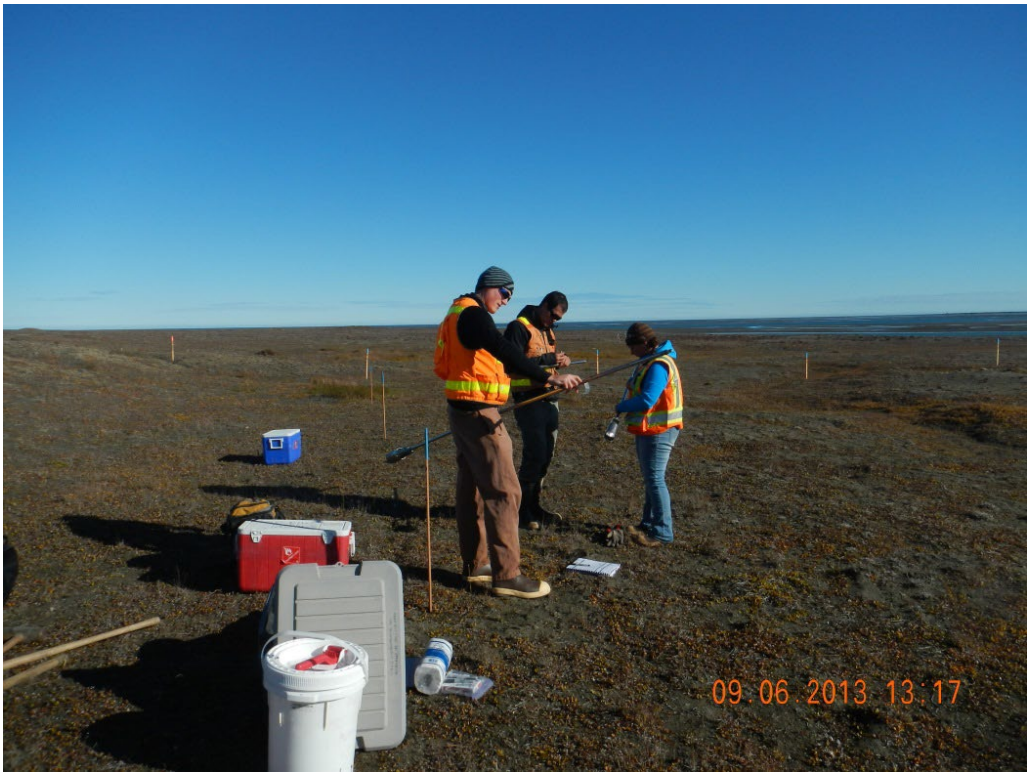
This Site Rehabilitation Plan for the Foggy Island Bay State No. 1 takes into consideration the importance of the successful establishment of live vegetation at the site but focuses on the total ecological habitat value for both plants and wildlife at completion. The ultimate rehabilitation goal at Foggy Island Bay State No. 1 is to achieve a self-sustaining vegetation community through eventual natural colonization of indigenous vegetation species.

The short-term objective is to re-use the excavated organic overburden material to stabilize the site and create a favorable medium for plant establishment by providing additional soil nutrients and more favorable soil textures. However, the overall goal is to create a habitat that is similar to adjacent undisturbed areas. The following photographs show recent conditions and levels of vegetation on and surrounding the pad.



PHOTOGRAPH 1: AERIAL VIEW LOOKING EAST, 6 SEPTEMBER 2013

PHOTOGRAPH 2: AERIAL VIEW LOOKING NORTHWEST, WITH BURN PIT NEAR LOWER RIGHT-HAND CORNER OF PHOTOGRAPH, 26 AUGUST 2013



PHOTOGRAPH 3: SAMPLING TEAM LOCATED ON THE PAD PREPARING HAND AUGER, 6 SEPTEMBER 2013.

PHOTOGRAPH 4: VEGETATION AND FOAM BOARD (STYROFOAM, APPROXIMATELY 5 INCHES THICK) OBSERVED NEAR NORTHEAST CORNER OF PAD, BY THERMOKARST TROUGH.

3.2 Corrective Action Plan Summary

The proposed January 2023 corrective action work will remove contaminated soil and foam insulation. This includes:

- Excavate and properly dispose of drilling waste and associated hydrocarbon-impacted tundra/mineral soil from the inactive reserve pit and the burn pit.
- Collect confirmation samples to verify proposed cleanup criteria are met.
- Backfill the excavated reserve pit and burn pit with conditional use or clean gravel to a pre-settlement elevation that will minimize future water ponding, then cap with overburden.
- Cut off the casing of the existing exploration well at least 3 feet below tundra grade.
- Remove the gravel pad and segregate/manage impacted gravel/tundra as needed, in accordance with 18 AAC 75, *Oil and Other Hazardous Substances Pollution Control* (ADEC 2018).
- Remove debris, including geofoam insulation beneath the pad, and dispose of debris in the North Slope Borough Oxbow Landfill.

The project will remove an estimated 42,300 loose cubic yards of material of the gravel pad area. Removal of contaminated soil from the burn pit, reserve pit, and other isolated areas will temporarily leave the surface of those areas below tundra grade. Approximately 9,400 loose cubic yards of clean or

conditional use gravel will be used to restore those areas to just above tundra grade. Some settlement of the fill material is anticipated in the initial year or two after construction. Gravel settlement of up to 20 percent is expected when backfilling with previously used or "seasoned" gravel. Material will be mounded as necessary to compensate for expected settlement. To minimize surface water ponding, final settlement grade of the backfilled pit is anticipated to be a minimum of 6 inches above adjacent tundra grade. Backfill will be allowed to settle for several months and revegetation activities will begin in summer 2023, as discussed below.

Following confirmation sampling at the reserve pits, burn pit, incinerator pad, fuel impoundment pits, and one other small area of the pad known to be contaminated (labeled GP-C on Figure 2), and following receipt of results indicating achievement of target cleanup levels, areas excavated below tundra grade will be backfilled and roughly graded. Areas excavated to depths of approximately 1 foot or more below tundra grade will be backfilled with clean or conditional-use gravel to a final settlement elevation that is at least 6 inches above tundra grade. At that time, soil at the ground surface will be primarily gravelly sand with fines (SW), possibly with some silty sand with fines (SM) mixed in. Approximately 3 inches to 5 inches of organic-rich overburden, which may provide some native seeds, will then be imported from the Put 23 borrow pit (if available) under a Material Sales Contract with ADNR.

Several options were considered to minimize wind-blown loss of imported organic overburden. Using heavy equipment, the organic-rich material will be mixed into the clean material that was removed to allow access to the insulation. Mixing the gravelly sand and organic material will increase the density of the soil and help minimize the amount of organic material that blows off the site. Once place, the material will be scarified by heavy equipment to a depth of approximately 6 to 8 inches to provide micro-topography to support the establishment vegetation. Based on data from Prudhoe Bay, the strongest winds and most frequent winds come out of the east northeast and the northeast. Scarifications will be aligned perpendicular to the prevailing winds. Use of snow fencing was also considered as a technique to minimize wind loss of organic overburden but was determined not to be practical in that it would create areas of heavy snow accumulation and areas devoid of snow, hampering revegetation efforts.

Before seeding begins, a soil nutrient and salinity analysis at Foggy Island Bay State No. 1 will be completed to determine soil deficiencies and if additional soil treatments should be applied to the site. Soil chemistry may need to be adjusted to facilitate obtaining goals for biodiversity and percent cover. After addition of organic-rich overburden, four soil samples will be collected: two from representative areas on the gravel pad and two from backfilled pits. Samples will be collected at the soil surface, from the soil surface to be revegetated (i.e., after geofoam insulation is removed and/or after excavations are backfilled). Samples will be analyzed at the Alaska Plant Materials Center Soils Lab for the following constituents and chemistry data: nitrogen, phosphorus, and potassium content, pH, and salinity. The Alaska Plant Materials Center will be consulted for recommended fertilizer composition based on the results of the soil analysis. Agricultural soils are considered saline if electrical conductivity is greater than 4 deciSiemens per meter (dS/m). Tundra soils that are not salt affected typically have electrical conductivity less than 2 dS/m.

3.3 Revegetation

The entire gravel site, including the reserve pit, burn pit, etc., will be revegetated as follows with grass seed, fertilizer, and sprigs, if needed. Organic material being imported to the site will likely contain some native plant seeds. Additional grass seed will be added establish quicker site cover, keep the organic material from blowing away, and protect the underlying permafrost. If seeds of regionally-appropriate native forb and shrub species are available at the time of revegetation and are not cost prohibitive, we will incorporate them into the seed mixture.

Grass seed will be applied on the site. Seed used in summer 2023 should be commercially available and of the type that is regularly used for rehabilitating sites on the North Slope (e.g., 'Alyeska' polargrass [*Arctagrostis latifolia*], 'Gruening' alpine bluegrass [*Poa alpina*], 'Tundra' glaucous bluegrass [*Poa glauca*], 'Nortran' tufted hairgrass [*Deschampsia caespitosa*], and/or American Sloughgrass [*Beckmannia syzigachne*]). Profiles for each of these species from the *Alaska Coastal Revegetation & Erosion Control Guid*e (Wright and Czapla 2013) are included as Appendix A. Actual seed mix and species will be determined based on availability in the year of seeding; at least three species will be seeded. The seed application rate for the entire seed mix will be between 20 pounds per acre (lbs/acre) and 40 lbs/acre, depending on soil type, and a weighted average of the seeds being used per the table on "Revegetation Suggestions: Arctic Region" in the *Alaska Coastal Revegetation & Erosion Control Guide* (Wright and Czapla 2013). This application rate is intended to help balance between site stability/effective erosion protection and allowing native species to re-establish over time. Commercially available seed from Alaska Mill and Feed is guaranteed to be pure and invasive species free.

The seed mix may also be modified if soils demonstrate high salinity. However, no commercial seed sources are available for salt-tolerant tundra plant species.

Timing is critical to revegetation success. Seeds need to be planted before the primary growing season begins, which is in the late spring or early summer. The earliest time to plant is once the snow melts, and the latest time to plant is mid-July (Wright and Czapla 2013). It is not recommended to plant seeds in the winter due to the potential for wind to carry the seeds away from the site. Therefore, seeds will be applied to the site in late May or early June, when the snow melts and the site is accessible. Activities on the site after 13 July may require additional polar bear permits and are not proposed.

In the Prudhoe Bay area, a balanced fertilizer application of 10-20-20 nitrogen-phosphorus-potassium (N-P-K) is commonly used to encourage revegetation and establishment of seeded species on disturbed sites. An application of about 60 lbs/acre of phosphorous alone is often sufficient to encourage natural colonization from the surrounding plant communities (BPXA et al. 2014). Because overburden will be applied to the site prior to revegetation activities, a fertilizer application rate of 200 lbs/acre of 10-20-20 N-P-K fertilizer is proposed (BPXA et al. 2014). However, the Alaska Plant Materials Center may recommend using a different fertilizer composition or application rate pending the results of the soil nutrient analysis conducted prior to seeding and fertilizing.

Some areas of the site may settle above tundra grade and therefore be drier than other portions of the site. These raised areas will receive grass seed species that are more suited for upland environments, such as 'Tundra' glaucous bluegrass and 'Gruening' alpine bluegrass. Lower (tundra grade but not ponded) portions of the site will receive grass seed species suited for more saturated soils, such as 'Alyeska' polargrass and 'Nortran' tufted hairgrass.

Some areas of the site may settle below tundra grade and become ponded with water, creating a mosaic of uplands and wetlands. Wet areas with standing water between 6 to 27 inches will be revegetated by transplanting (sprigging) indigenous species to improve habitat conditions. *Arctophila fulva* is an indigenous grass that provides quality habitat for many species of birds. Sprigging *A. fulva* has been successful at many areas around Prudhoe Bay. This species can establish and reproduce under a variety of soil moisture conditions ranging from terrestrial to shallow flooded. As soils are generally phosphorous limited in the Prudhoe Bay area, a 0-45-0 N-P-K slow-release tablet may be applied with *A. fulva* sprigs. Only the edges of the wetlands need to be sprigged for *A. fulva* to become established. Note that *Arctophila fulva* must be collected in the field, and a collection permit is required from the Alaska Department of Natural Resources (ADNR). Sprig collection and planting will not be conducted during the 2023 planting season. Instead, the amount of subsidence and ponded water accumulation will be assessed while seed is planted during 2023 and sprig planting will be considered for subsequent years, as appropriate and required.

3.4 Performance Standards

By the tenth year following the application of native grass treatments (2033), disturbed areas will be expected to support at least 10 percent total live vascular cover comprised of at least five naturally colonizing species with 0.2 percent cover each. These performance standards should lead to a stabilizing plant cover on the site while also promoting eventual replacement of seeded grasses with naturally colonizing species. These standards do not apply to areas that are ponded for more than 4 weeks during the growing season. Monitoring and rehabilitation measures will continue biennially until 1) dry areas are on a vegetation growth trajectory that will result in a vegetation community similar to that of undisturbed adjacent areas through natural succession, and 2) the areas with surface water are on a trajectory that natural succession will lead to a habitat quality and diversity that is similar to same-sized areas in the vicinity. Successful rehabilitation will occur when the trajectories are achieved, and further rehabilitation measures are no longer necessary.

3.5 Monitoring for Performance Standards

Biennial monitoring will be used to evaluate progress toward the performance standards. Revegetation success of areas without surface water will be monitored using a combination of repeat photography and a point sample sampling technique along a fixed transect. Vascular plant cover will be measured using a point sample sampling method. Transects will be established on the site in 2023 with survey lath marking each end of the transect to guide monitoring in subsequent years. Seven transects will be established (Figure 2): three southwest-northeast and four northwest-southeast transects. Sample points will be collected approximately 50 feet apart along transects. A total of 90 sampling points will be established.

- Transect A-A': Approximately 460 feet long, 9 sampling points
- Transect B-B': Approximately 540 feet long, 10 sampling points
- Transect C-C': Approximately 400 feet long, 8 sampling points
- Transect D-D': Approximately 400 feet long, 8 sampling points
- Transect E-E': Approximately 800 feet long, 16 sampling points
- Transect F-F': Approximately 1,120 feet long, 21 sampling points
- Transect G-G': Approximately 850 feet long, 18 sampling points

At each sampling point a Global Positioning System (GPS) point and a photo will be taken. Existing vegetation will be identified to species and counted at each point. These established transects and points will be used in subsequent monitoring years to determine the success of the rehabilitation efforts.

Areas with visible surface water will be monitored using repeat photography from established photo-point locations. If intermediate sampling and monitoring indicates that progress of revegetation is not sufficient to meet the proposed standards, additional remedial actions will be considered and presented for approval.

3.6 Remedial Action

After the initial seeding and fertilizing event in 2023, further site treatments may be necessary to meet the rehabilitation goals. Soil chemistry may need to be adjusted to facilitate biodiversity and the growth of cover. Soil parameters such as pH, soil conductivity, ammonium, nitrate, phosphorus, potassium, carbon, and nitrogen content greatly impact vascular plant growth. If vegetation is slow to establish, a soil nutrient and salinity analysis at Foggy Island Bay State No. 1 should be considered to determine soil deficiencies and if additional soil treatments should be applied to the site.

3.7 Reporting

Revegetation reports will be provided to the ADNR for review and comment. A CAP report will be completed after winter 2022-2023 corrective action activities and a Year 0 rehabilitation report will be completed after summer 2023 revegetation activities. Rehabilitation progress reports will be prepared for each year in which the site is monitored and/or treated. These progress reports are to document the treatment activities and summarize the monitoring data collected. Reports will discuss progress toward reaching rehabilitation goals. If needed, adjustments to the rehabilitation treatments and/or monitoring schedule will be discussed. A report will be completed after site rehabilitation is considered complete when goals are met, or when Year 10 is reached even if goals are not yet met.

3.8 Schedule

Table 1 presents a guide of when site treatments and monitoring events are expected to occur.

Table 1: Foggy Island Bay State No. 1 Site Rehabilitation Treatment and Monitoring Schedule

Monitoring Year	Treatment	Monitoring
Year 0 Winter 2022–2023	Corrective actions: excavate reserve pits and burn pit, fill reserve pits and burn pit, remove gravel pad, overburden placement on reserve pit cap and burn pit cap	N/A
Year 1 Early Summer 2023 (~June)	Receive collection permit from the ADNR, apply seed and fertilizer to site	Take aerial photos, establish monitoring transects, take photos at sample points, count and identify vegetation at sample points
Year 3 Summer 2025	Site assessment: apply additional site treatments as necessary (e.g., seed application, sprigs in inundated areas, sample soils if vegetation appears lacking)	Take aerial photos, take photos at sample points, count and identify vegetation at sample points
Year 5 Summer 2027	Site assessment: apply additional site treatments as necessary (e.g., seed application, sprigs in inundated areas)	Take aerial photos, take photos at sample points, count and identify vegetation at sample points
Year 7 Summer 2029	Site assessment: apply additional site treatments as necessary (e.g., seed application, sprigs in inundated areas)	Take aerial photos, take photos at sample points, count and identify vegetation at sample points
Year 9 Summer 2031	Site assessment: apply additional site treatments as necessary (e.g., seed application, sprigs in inundated areas)	Take aerial photos, take photos at sample points, count and identify vegetation at sample points
Year 10* Summer 2033	Final site assessment: if goals have not been reached, generate a new Site Rehabilitation Plan with new goals, if required	Take aerial photos, take photos at sample points, count and identify vegetation at sample points

**If goals are met before Year 10, the site will be considered rehabilitated and monitoring efforts will cease. A final report will be produced at that time.*

4. REFERENCES

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FIGURES

DRAWN BY: MJA

FILE: M:\Projects\Temp\Exxon Foggy Bay\Figure 1 Site Location.mxd, REVISED: 11/19/2021 , SCALE: 1:63,360 when printed at 11x17

Endeavor Island
Endicott

Howe Island

Duck
Island

Duck
Island 3
Shoal

Point
Brower

Site
Location

15 miles to Prudhoe Bay/Deadhorse

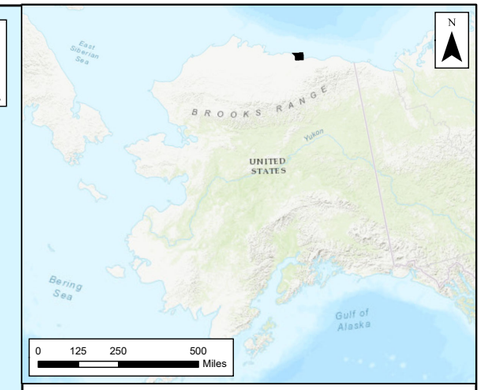
Endicott Road

Foggy
Island

Foggy Island Bay

0 1.5 3 Miles

N



Legend

- Site Location
- Gravel Pad
- Non-Vegetated Area
- Mud Flat
- Tundra
- Access Road
- Pipeline, Above Ground
- Pipeline, Buried

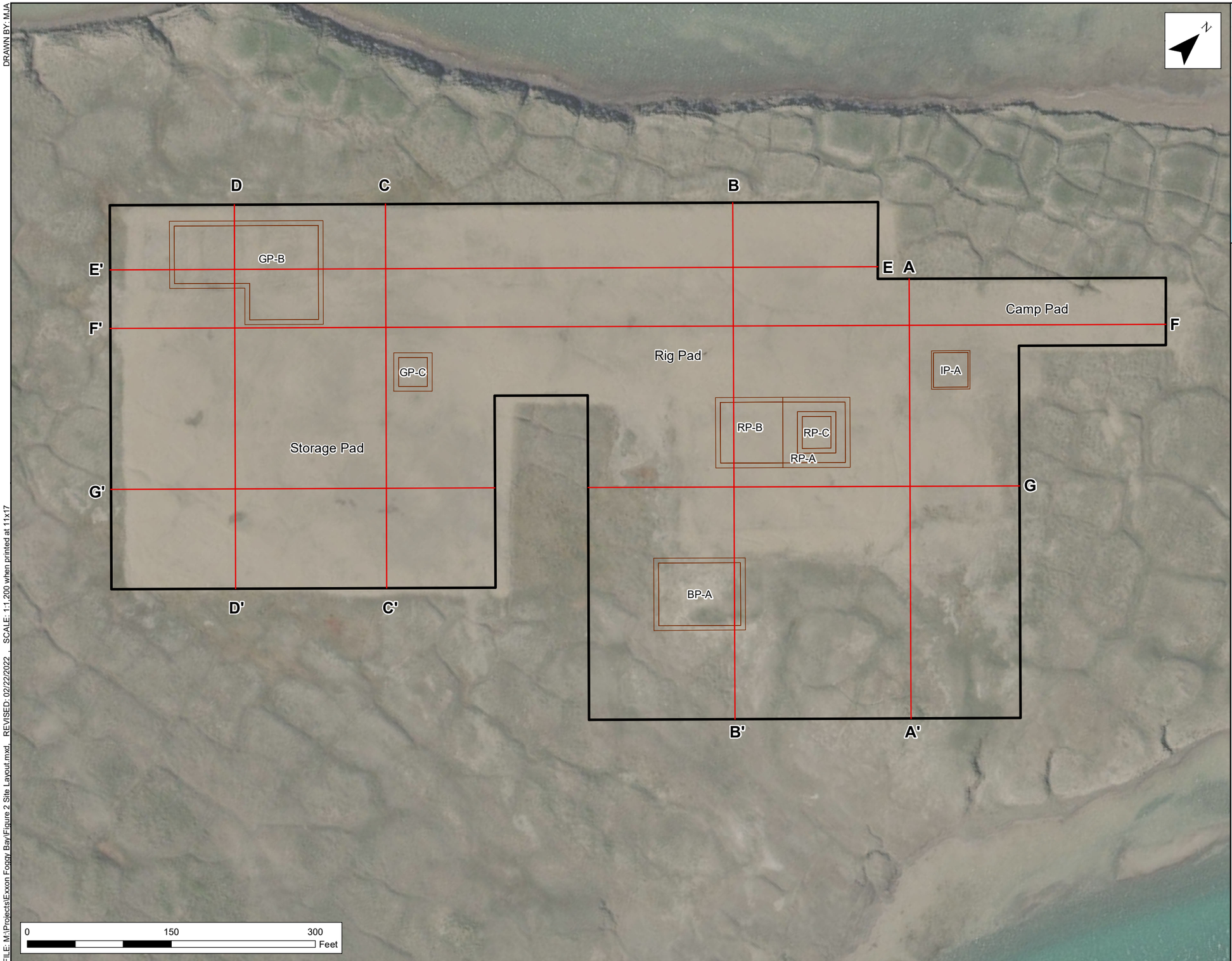
Source: BPXA 2017: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

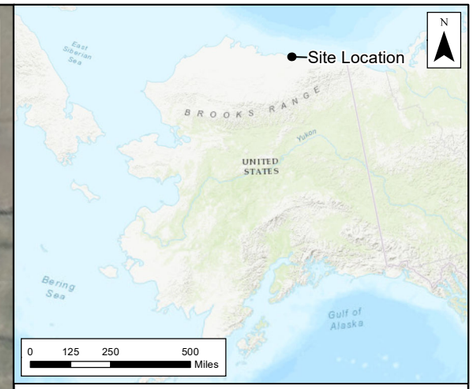
Figure 1
Site Location Map
Foggy Island Bay State No. 1
Site Rehabilitation Plan
Foggy Island Bay, Alaska

Environmental Resources Management
www.erm.com
ERM

DRAWN BY: MJA

FILE: M:\Projects\Exxon Foggy Bay\Figure 2 Site Layout.mxd REVISED: 02/22/2022 SCALE: 1:1,200 when printed at 11x17





Legend

- Transect Line
- Impoundment Pit
- Site Boundary

Figure 2
Site Layout
Foggy Island Bay State No. 1
Site Rehabilitation Plan
Foggy Island Bay, Alaska

Environmental Resources Management
www.erm.com

Source: BPXA 2017: NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

APPENDIX A GRASS SEED SPECIES PROFILES

Polargrass,
Arctagrostis latifolia

Polargrass is a species that is ideal for forage and revegetation in Alaska (Mitchell, 1987). Polargrass is adapted to moderately wet areas (Wright, 1992). It is tolerant of low temperatures and acidic soils. Polargrass is a pioneer species in disturbed areas, especially those that are moist and acidic (Walkup, 1991). Polargrass does not grow well with fertilization or competition.

ADAPTED COMMERCIAL VARIETIES OR RELEASES:

'Kenai' is from southern Alaska, and should be planted appropriately.

'Alyeska' is suitable for revegetation in western and arctic Alaska (Mitchell, 1980).

'Alyeska' **Polargrass**, *Arctagrostis latifolia*

Availability	Growth Form	Average Height	pH Range	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness
Fair	Sod	24 in.	4.9-6.8	Poor	Poor	Good	Weak

'Alyeska' 'Alyeska' 'Kenai' 'Kenai' 'Kenai'

American Sloughgrass,
Beckmannia syzigachne

American Sloughgrass has a high potential for wetland reclamation. Additionally, the species benefits wildlife by providing forage and seed for waterfowl. Revegetation and erosion control plantings in seasonally wet places between 60 degrees north latitude and the Arctic Circle will benefit from including Sloughgrass as part of the seed mix.

ADAPTED COMMERCIAL VARIETIES OR RELEASES:

'Egan'

'Egan' **American Sloughgrass**, *Beckmannia syzigachne*

Availability	Growth Form	Average Height	pH Range	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness
Good	Bunch	18 in.	5.5-7.5	Good	Poor	Excellent	Moderate

Tufted Hairgrass,
Deschampsia caespitosa

Tufted Hairgrass is well adapted to northern regions of Alaska (Mitchell, 1985). Tufted Hairgrass is a cool season bunch grass. It will grow in most any soil. In the wild, Tufted Hairgrass is found in moist or boggy areas. An arctic species, Tufted Hairgrass is well suited for many of Alaska's harshest environments. It is not recommended for revegetation of streambank areas, however, since the tufted fibrous roots provide limited bank stabilization (Mitchell, 1986).

ADAPTED COMMERCIAL VARIETIES OR RELEASES:

'Nortran'

'Nortran' **Tufted Hairgrass**, *Deschampsia caespitosa*

Availability	Growth Form	Average Height	PH Range	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness
Good	Bunch	20 in.	4.8-7.2	Poor	Good	Good	Strong

Alpine Bluegrass,
Poa alpina

Alpine Bluegrass is a species widely adapted throughout Alaska. As the name implies, the species is adapted to high elevation areas. It also performs well on drier sites. Seed availability is limited. Availability of seed should be researched before Alpine Bluegrass is included in a planting plan.

Alpine Bluegrass grows in a wide range of habitats and soil conditions in the wild. Some of these are: dry slopes, gravelly sites, rocky sites, alpine and sub-alpine sites, and meadows. *Poa alpina* is a perennial grass that can serve as the pioneer species for a revegetation project. Once established, other plants can follow. *Poa alpina* is tolerant to climatic, soil, fire, and drought conditions. This flexibility makes the species important for high altitude revegetation. Alpine Bluegrass also has low nutrient needs.

ADAPTED COMMERCIAL VARIETIES OR RELEASES:

'Gruening' is a variety that can be established on dry soil as long as there is some irrigation.

Teller selected class germplasm is a native collection of *Poa alpina* intended for general revegetation projects throughout Alaska.

'Gruening' **Alpine Bluegrass**, *Poa alpina*

Availability	Growth Form	Average Height	pH Range	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness
Poor - Fair	Bunch	6 - 8 in.	5.0-7.2	Poor	Good	Poor	Weak

'Gruening' Teller | Teller | 'Gruening' Teller | 'Gruening' | 'Gruening'

Glaucous Bluegrass,
Poa glauca

Glaucous Bluegrass can be found on many types of soil - from slightly acidic to slightly basic; in very dry to slightly moist areas; and on gravel, sand, or organic matter. It is a pioneer species, forming tussocks in disturbed areas. This provides a cover where willows and forbs can become established (Aiken, et al., 1995). In the extreme arctic, Glaucous Bluegrass's growth form is short and erect. In other areas of Alaska, it is more spreading.

ADAPTED COMMERCIAL VARIETIES OR RELEASES:

'Tundra' is a variety best suited for revegetation in extreme northern areas with severe environmental conditions (Mitchell, 1980).

Nome selected class germplasm is a relatively common grass on dry mineral soils in the state. This variety has a wider use range than 'Tundra'; however, it is not recommended for use in the arctic region.

'Tundra' **Glaucus Bluegrass**, *Poa glauca*

Availability	Growth Form	Average Height	pH Range	Saline Tolerance	Drought Tolerance	Wet Soil Tolerance	Competitiveness
Poor - Fair	Bunch	10 - 12 in.	5.0-8.0	Good	Excellent	Poor	Strong

Nome Nome 'Tundra' Nome 'Tundra'