National Science Foundation
Office of Polar Programs
Arlington, Virginia

ENVIRONMENTAL DOCUMENT CONCURRENCE

Activity:
Establishing Phoenix Airfield Town Site and Closing Pegasus Airfield at McMurdo Station, Antarctica

MCST1601.IEE.AM1

I have read the attached document and concur with the findings and recommendation. I concur that the proposed activity can commence.

Nature McGinn for — January 26, 2017

Susanne LaFratta
Section Head, Polar Environment, Safety and Health

Date

National Science Foundation
Office of Polar Programs
Arlington, Virginia

ENVIRONMENTAL DOCUMENT AND FINDING OF NOT MORE THAN MINOR OR TRANSITORY ENVIRONMENTAL IMPACT

Establishing Phoenix Airfield Town Site and Closure of Pegasus Airfield at McMurdo Station, Antarctica

MCST1601.IEE.AM1

FINDING

The U.S. Antarctic Program (USAP) proposes to set up the Phoenix Airfield town site (previously called Alpha Runway) and close Pegasus White Ice Runway and Skiway (Pegasus Airfield) to move flight operations from Pegasus Airfield to Phoenix Airfield in the McMurdo Station area. The recently constructed Phoenix Airfield, previously designated as Alpha Site Runway, is located on the Ross Ice Shelf approximately 17 kilometers (km) from McMurdo Station and six km from Pegasus Airfield. The Phoenix Airfield will support wheeled aircraft used by the USAP, including LC-130s and C-17s. The proposed action would include setting up the Phoenix Airfield town site, flight navigation, runway markers and lighting, automated weather stations and cleanup of Pegasus Airfield after closure. In addition, in future seasons, a new transponder landing system (TLS), may be deployed and operated to replace the existing microwave landing system. Construction, operation, and maintenance of Phoenix Airfield were assessed in the original IEE and no changes have been made to those proposed actions. Therefore, they are not part of this amendment.

Based on the analyses in the environmental document, the National Science Foundation (NSF) Office of Polar Programs (OPP) has determined that implementing the actions listed is not a major federal action that would have a significant effect on the human environment, within the meaning of the National Environmental Policy Act (NEPA) of 1969. The action would not create more than a minor or transitory effect on the Antarctic environment, within the meaning of NSF's implementing requirements for the Protocol on Environmental Protection to the Antarctic Treaty. Therefore, an environmental impact statement and/or comprehensive environmental evaluation will not be prepared.

I recommend the activity proceed based on implementation of the modified proposed action (Amendment No. 1). The amended proposed action provides for setting up the Phoenix Airfield town site and closing Pegasus Airfield. This proposed action is consistent with NSF's efforts to promote scientific investigation and provide for the safety of its participants, while protecting the Antarctic environment.

Polly A Penhale	01/26/2017	\s\\ Margaret Knuth	01/26/2017
Recommending Official	**Date**	**Recommending Official**	**Date**
Polly Penhale		Margaret Knuth	
Environmental Officer		Manager, Operations	
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INTRODUCTION

The National Science Foundation (NSF) Office of Polar Programs (OPP) prepared an Initial Environmental Evaluation (IEE) in 2015 (MCST1600.IEE) that evaluated the construction of a new runway previously called Alpha Runway The site is now officially called Phoenix Airfield located on the snow-covered Ross Ice Shelf near McMurdo Station. The Phoenix Airfield is located approximately 17 km from McMurdo Station, directly adjacent to the existing snow road to Pegasus White Ice Runway and Skiway (Pegasus Airfield), near Milepost 11 (see Figure 1). The Alpha Site was selected due to its optimal location, one that is relatively unaffected by local snow accumulation and soil deposition from Black Island. Once constructed, the runway would be tested and then certified. The IEE also included a preliminary evaluation of the potential operation of the new runway. NSF elected to implement the proposed action to construct, test, certify, and potentially operate the new runway in the Finding of No Significant Impact (FONSI).

The proof of concept (construction and certification) and potential use of the Phoenix Airfield runway and aprons was started in Aug 2015 and is estimated to be completed by Feb 2017. The construction involves constructing the snow-compacted runway and aprons surface. The Phoenix Airfield is planned to become fully operational by February 2017.

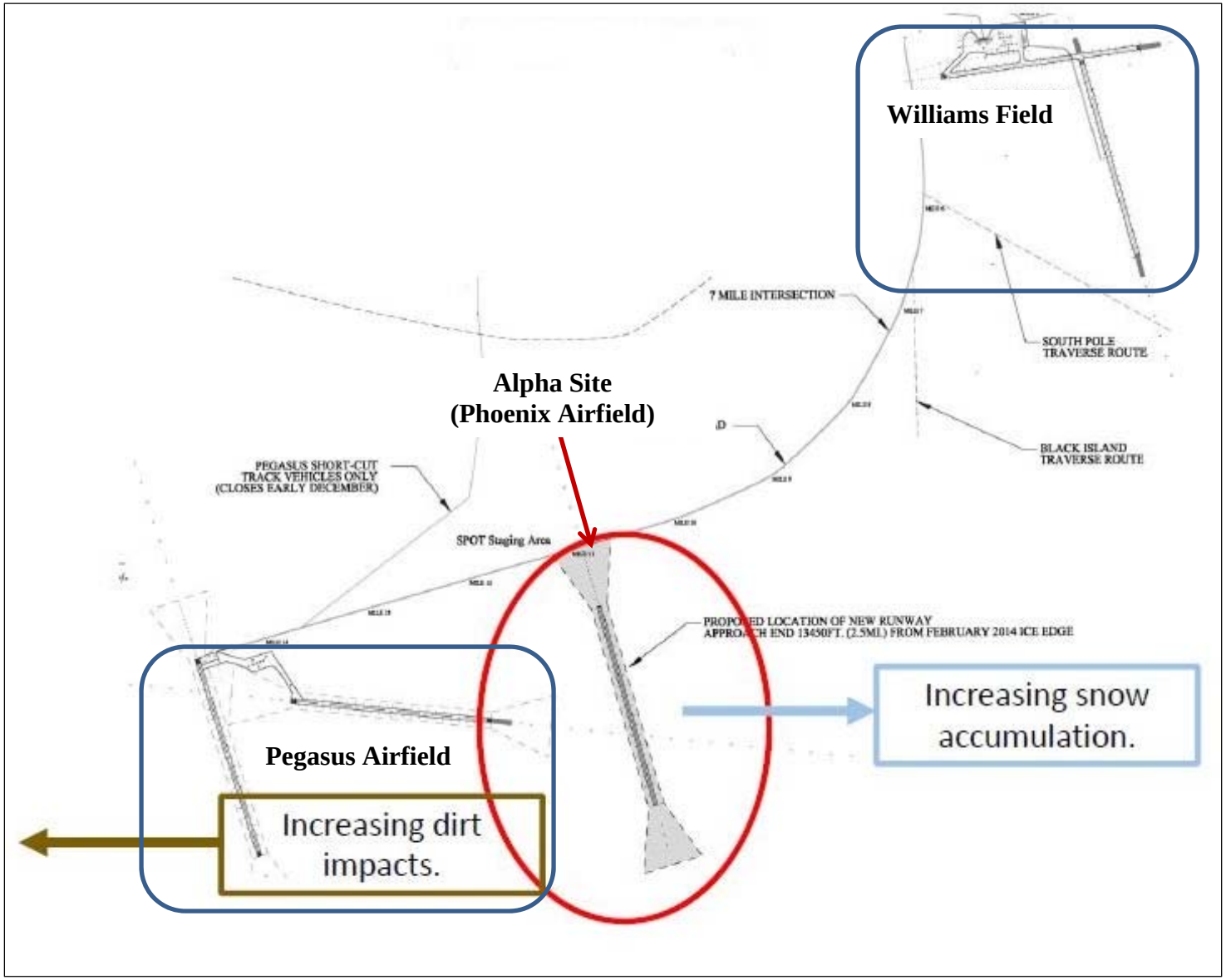
Based on the success of the proof of concept at Phoenix Airfield, NSF is proposing to set up the Phoenix Airfield town site and close and clean up Pegasus Airfield.

1.0 PURPOSE AND NEED

As discussed in the original IEE (NSF, 2015), USAP aircraft provide essential logistical support by transporting personnel and cargo from Christchurch, New Zealand to McMurdo and on to South Pole Station and field sites. Fixed-wing aircraft (including wheeled C-17, A-319, B-757, and C-130 aircraft) use McMurdo area airfields for intercontinental flights, primarily during the austral summer (October through February). Winter testing and use of the runway occurs from March through September. Intracontinental flights out of McMurdo Station (from Williams Field) are made by LC-130, Twin Otter, and Basler aircraft, which are equipped with both skis and wheels.

The Phoenix Airfield would provide a compacted snow runway capable of year-round operations (e.g., extended operations, emergency transport during the winter), and able to support the suite of aircraft currently used in the program. Moving flight operations from the runway at Pegasus Airfield to Phoenix Airfield would maintain current flight operations while reducing maintenance caused by dust from Black Island. It will also reduce travel time for flight crews, ground support staff, and passengers.

Figure 1. Phoenix Airfield location in relation to Pegasus Airfield and Williams Field



2.0 AMENDED PROPOSED ACTION

In 2016, several activities will be completed under the original IEE (NSF, 2015), including: completing construction of the ramp and runway, obtaining single FAA Flight Certification of Navigation Systems, and completing testing and certification of the ramp and runway. In addition, the Phoenix Airfield runway/ramp will be tested to obtain U.S. Air Force Air Mobility Command (AMC) certification. Once certified, Phoenix Airfield will be operated in place of the runway at Pegasus Airfield.

Under the amended proposed action, Pegasus Airfield would be closed and materials would be removed to the maximum extent possible. While the Phoenix Airfield layout and the process to establish the Phoenix Airfield town site were described in the original IEE, this IEE amendment provides additional detail on the Phoenix Airfield layout and the process to establish the Phoenix Airfield town site. In addition, this amendment notes that a transponder landing system (TLS) if funded, would replace the existing microwave landing system (MLS) over the next several years. A similar, transportable TLS would replace the MLS at Williams Field.

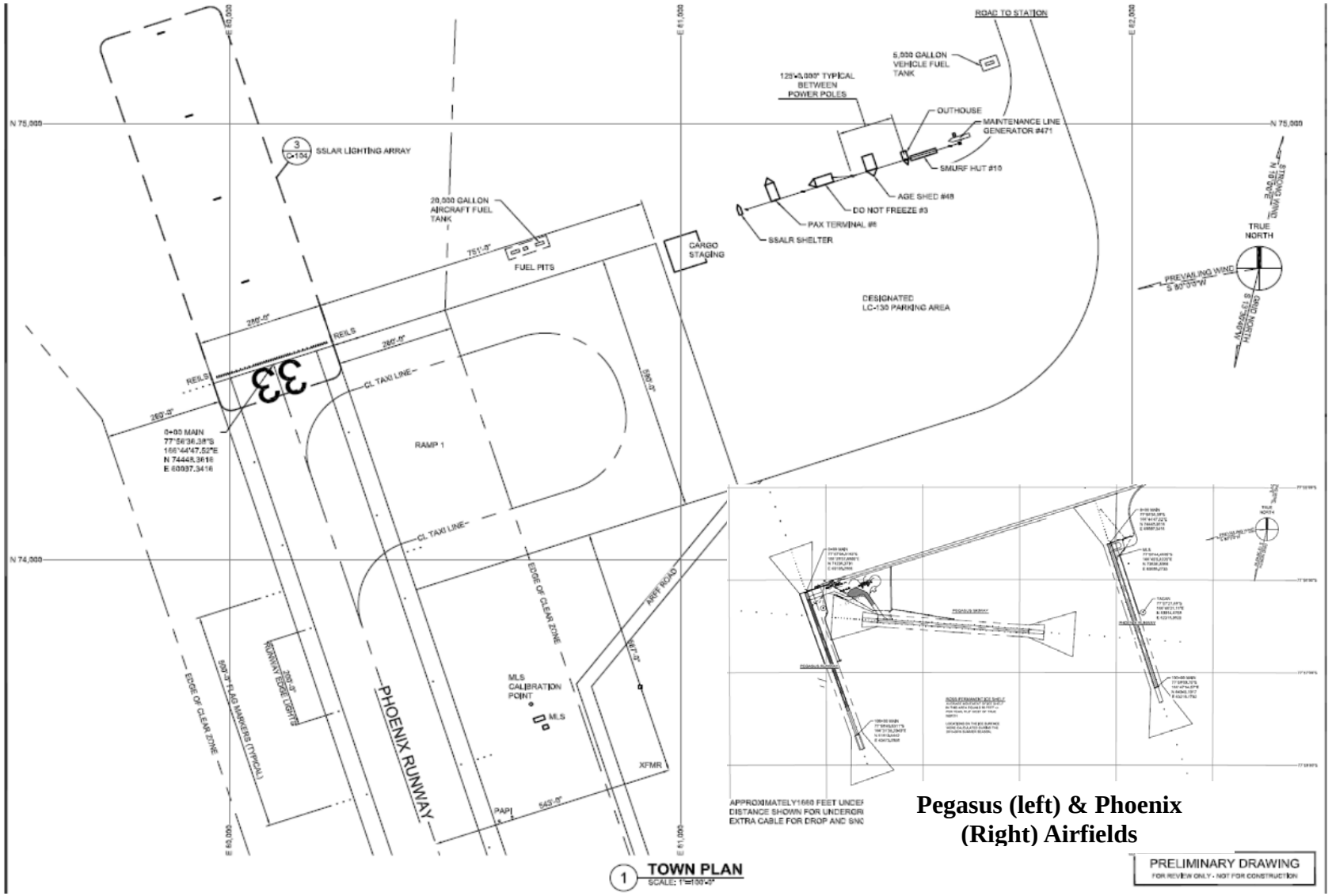
Phoenix Airfield Setup

The Phoenix Airfield would include a taxiway, aircraft apron, and related support facilities (Figure 2). Support capabilities and facilities would be similar to those at Pegasus Airfield and include a cargo staging area, 75,000 L fuel pit, 19,000 L fuel tank, passenger terminal, air operations building, bathroom, storage buildings, and an aerospace ground equipment (AGE) storage building. Power would be supplied by on-site generators with wiring buried along the runway, apron, and on poles at the town site. The power infrastructure would include approximately 215 m of aerial cable on six poles spaced 38 m apart. In addition, approximately 1,830 m of trench would be dug to bury 4,400 m of cable. Aircraft operation systems would also be deployed, including MLS, tactical air navigation (TACAN), simplified short approach lighting on rails (SSALR), precision approach path indicator lights (PAPI), runway end indicator lights (REILS), automated weather stations, runway edge lights for night operation, runway markers for day time operations, and night vison cones for night operations.

The runway structures would be mounted on skis or built on wooden supports. The structures would be moved into place at the beginning of each summer with tractors, pickup trucks, deltas, and tractors with haul trailers. Other items, such as cargo containers (milvans), pallets, and waste storage boxes or drums, may be placed on ski-mounted platforms or directly on the snow surface. It is anticipated some of the structures may stay in place annually to support year-round flight operations

Approximately four to six workers would be required to open Phoenix Airfield each year. This includes the 2016-2017 season. Heavy equipment needed to groom the runway and move facilities into place would include graders, tractors, dozers, loaders, and sleds. A sled-mounted 76,000 L fuel tank with secondary containment would be used to fuel ground equipment. During set-up and operations, all waste (including solid, human, and food waste) would be contained and transported to McMurdo Station for disposal. As described and assessed in the original IEE (NSF, 2015), Phoenix Airfield is anticipated to become fully operational by February 2017.

Figure 2. Phoenix Airfield apron and town site layout



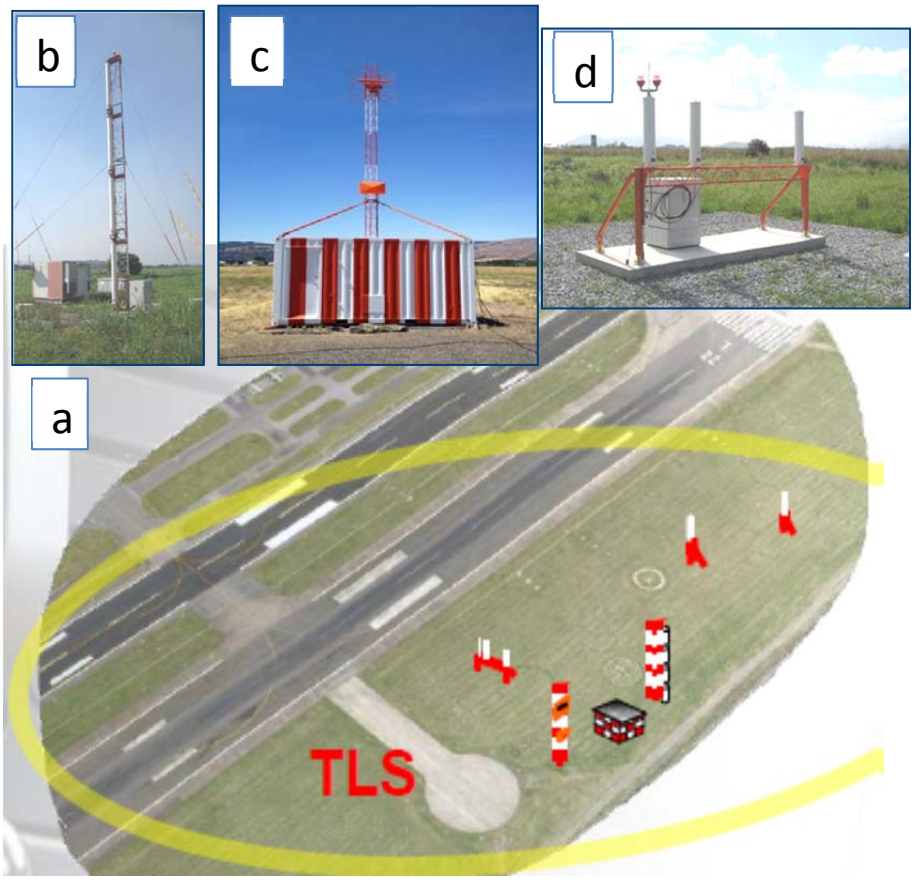
Pegasus (left) & Phoenix (Right) Airfields

Transponder Landing System (TLS)

The Space and Naval Warfare System Center Atlantic provides MLSs, a precision landing system, for airfields at McMurdo Station. These landing systems allow aircraft pilots to make runway approaches during instrument flight rule (IFR) conditions. The systems analyze radar beacon signals to measure aircraft range, elevation, and azimuth. Under this amendment, two TLSs may be installed in future years to replace the existing MLSs currently in use. Once commissioned, the TLSs would serve as the precision landing system for the USAP. The MLSs would be decommissioned after the TLS is installed.

If funded in future seasons, a fixed TLS would be installed near the approach end of the Phoenix Airfield (Figure 3). A similar, transportable TLS would be installed at Williams Field, but it would be removed and stored on a berm at the end of each season. The TLSs would include a heated electronic shelter; external sensor, glide slope, and azimuth antennas; and a power system. The sensor antennas would be placed on 65G Rohn towers, which would allow three-meter sections to be added as snow accumulates. The azimuth and glide slope antennas would be placed on berms to minimize snow management efforts. The TLSs would require approximately 4.6 kilowatts (kw) of power for the electronics, heating, and battery charging. Power would be provided by the runway power system at each site, backed up by on-site generators.

Figure 3. Proposed TLS illustrating (a) approximate location in relation to runway, (b) sensor antenna, (c) glide slope antenna, and (d) azimuth sensor.



Each TLS (including antennas) would be shipped in a single 6-m-long CONEX box, which would serve as the electronic shelter. Installing the TLSs would include delivering the shelter, antenna, and generator; drilling holes for the antenna towers at four locations; installing the antennas on towers; and connecting fiber optic and power cables. The fiber optic and power cables would be buried in trenches.

Closure of Pegasus Airfield

The Pegasus skiway, which together with the Pegasus runway make up the Pegasus Airfield (Figure 1), would continue to be operated from December 2016 through February 2017. Selected infrastructure would remain at Pegasus Airfield through October 2017 while the runway at Phoenix Airfield is being proven. This infrastructure includes: TACAN, MLS and PAPI navigational aids; runway edge and lead-in markers on bamboo poles; and power poles and overhead power wiring. Runway markers poles, and flags may remain through February 2018 to allow ice to fully freeze for safer/easier access. Once the Pegasus Airfield is closed, personnel would conduct a visual survey of the airfield to locate and remove any debris. Any snow discolored from past spills would be removed. All underground wiring (several thousand meters) would be abandoned in place.

3.0 EXISTING CONDITIONS

3.1 Environmental Setting

The Phoenix Airfield (166º35'E, 78ºS) is located between the Pegasus Airfield and Williams Field on the McMurdo Ice Shelf portion of the larger Ross Ice Shelf (see Figure 1). The site is in a transition zone between snow accumulation and ablation (evaporation) regions. The winds in the area are variable, but the prevailing wind is generally from the east. There are no rock exposures in the vicinity. McMurdo Sound lies approximately 6.5 km to the northwest and is typically covered by seasonal sea ice that may extend approximately 40-50 km from McMurdo Station and may break up during the austral summer.

The Phoenix Airfield site has a thin but permanent and complete snow cover. The snow is underlain by a contiguous mass of glacial ice. Seasonal melting may occur during December and the first half of January, when relatively high temperatures and intense (24-hour) sunshine predominate. However, significant melting, as experienced at the Pegasus Airfield, is not expected at the Phoenix Airfield. Any melting that may occur would take place either on the surface or at a level slightly below the surface of the ice.

The ice shelf at Phoenix Airfield is approximately 30 m thick. Depending on the temperature, crystallographic structure, and impurities, the ice has a flexural strength of 5 to 10 kg/cm^2 (490 to 980 kilopascals), which is capable of supporting heavy wheeled aircraft (NSF, 2009).

3.2 Biota

Wildlife does not inhabit the airfield area, but occasionally transient skuas and other wildlife (e.g., seals or penguins) may be seen in the vicinity. Nearby McMurdo Sound is an important habitat for marine mammals and birds. Weddell seals and Adélie penguins, and emperor

penguins are present in the area. Historically, seals and penguins have been affected by anthropogenic activities in the McMurdo vicinity, but current impacts are minimal (NSF, 1991).

3.3 Antarctic Protected or Managed Areas

The Northwest White Island Antarctic Specially Protected Area (ASPA 137) is located approximately 15 km southeast of Phoenix Airfield. This ASPA contains an unusual breeding population of Weddell seals that has been physically isolated from other populations by the advance of the McMurdo and Ross Ice Shelves. Protective measures described in the ASPA Management Plan include entry and overflight restrictions.

4.0 ENVIRONMENTAL ANALYSIS

This section of the IEE amendment identifies the potential environmental effects resulting from setting up the Phoenix Airfield town site and from closing the Pegasus Airfield. In addition, impacts from the installation, use and maintenance of the TLS, if funded in future years, are also assessed in this IEE amendment. Impacts related to the operation of the Phoenix Airfield were previously assessed (NSF, 2015), as was the operation of multiple airfields in the McMurdo area (NSF, 2009). As described in the previous IEE (MCST1600.IEE), the anticipated impacts from operating the Alpha (Phoenix) Runway would be similar to or less than impacts from operating the Pegasus Airfield. In addition, the proposed actions associated with the Phoenix Airfield would not alter the number or type of aircraft missions flown by the USAP.

Environmental impacts may result from physical disturbances, such as storing, handling, and using materials containing designated pollutants (i.e., fuel); the release of substances to the environment (air emissions); noise; effects on biota; and visual disturbances. Environmental releases or effects would not exceed what is currently delineated in the USAP Master Permit for an operating airfield.

5.1 Physical Disturbances

Physical disturbance to the environment is a certain outcome of setting up the Phoenix Airfield (with the TLS) and closing Pegasus Airfield. The disturbances would be from terrain alteration (grading and compaction of snow surfaces), placing support structures, storing materials, and using fuel-powered equipment. The area affected would be less than 0.5 km^2, all of it within the area previously disturbed by construction of the Phoenix Airfield runway.

Disturbances to the snow surface at Phoenix Airfield would be caused by creating the maintenance runway, apron, and town site, and by developing berms for winter storage of equipment and buildings. Removing structures, poles, and debris from the Pegasus Airfield would result in minor disturbances to the snow surface.

In addition, the existing 23-km snow roadway from McMurdo Station to the Pegasus Airfield passes Phoenix Airfield and Williams Field and would continue to be routinely used and maintained.

The extent of these physical disturbances is considered minor and localized in the context of the environmental setting and vast expanse of the Ross Ice Shelf. These physical changes would be surficial and continue to be visually apparent during the time the airfield is in operation. Should the airfield be decommissioned and removed in the future, snow will accumulate and return the area to a relatively undisturbed condition.

Physical disturbances may also result from meltwater generated or increased by heating effects or solar gain due to the presence of the airfield, structures, equipment, and operations needed to maintain the facility. The USAP would implement measures to reduce the release of foreign substances (e.g., soot, dirt) that could accelerate the effect of solar heating during warm weather conditions. However, localized meltwater pools may form occasionally and require redistribution by pumping to prevent them from hindering aircraft operations. Meltwater effects at the Phoenix Airfield, if any, are expected to be significantly less than experienced at the Pegasus Airfield. Therefore, the environmental effects resulting from managing meltwater at the airfield are expected to be minor.

5.2 Handling, Storage, and Use of Materials Containing Designated Pollutants

During the actions described in this amendment, heavy equipment and other vehicles would be fueled using a day tank with secondary containment. This fuel would be the primary material containing designated pollutant constituents (i.e., hazardous substances) that would be stored and used at the Phoenix Airfield and Pegasus Airfield during set-up and closure, respectively. During set-up, the fuel would be stored in a day tank (11,300 L to 37,900 L capacity) at Phoenix Airfield or delivered via tanker truck. No fuel would be stored at Pegasus Airfield after closure activities are completed.

Consistent with current USAP practices for airfield set-up and operation, best management practices (BMPs) would be consistently implemented to prevent the release of fuel and other materials containing designated pollutants to the environment. For example, during fuel transfer operations, personnel would continuously monitor the hose lines for leaks. Spill kits would be available to immediately clean up accidental spills.

Through the consistent use of BMPs, environmental impacts resulting from the use of materials containing designated pollutants are expected to be less than minor.

5.3 Releases to the Environment

Air Emissions

Fuel combustion byproducts would be released to the air at Phoenix Airfield from heavy equipment, other vehicles, and the ancillary equipment used during set-up of the town site and TLS. Emissions were evaluated in the IEE "Operate a Single Airfield Facility at McMurdo Station, Antarctica" (MCST1001.IEE) (NSF, 2009). The quantity of emissions would be directly proportional to the volume of fuel consumed. Fuel combustion byproducts and fuel evaporative emissions would be estimated for all USAP facilities in the McMurdo Station area and reported for the Master Permit (NSF, 2014).

Fuel combustion byproducts and evaporative emissions from equipment and ground vehicles at Phoenix Airfield during set-up and at Pegasus Airfield during closure are expected to disperse rapidly in steady winds and dissipate in the atmosphere. The total volume of exhaust emissions from equipment used at the runways would be similar to emissions in past years for similar activities. Overall, the exhaust emissions are not expected to accumulate to levels that would alter the physical and chemical properties of the terrain or adversely affect local air quality. The effects of emissions are expected to be localized, minor, and transitory.

Operational Materials

Limited materials may be released to the environment as a result of setting up the Phoenix Airfield town site and TLS. These releases may include items such as wood, anchor pins, marker flags, or cables. Loss of irretrievable items is expected to be minimal and the resulting impacts from these types of incidental releases are expected to be minor.

Accidental Releases

Accidental releases typically involve unplanned events, such as spills, leaks, or the unintentional loss of equipment or materials, including items containing designated pollutants or wastes. Since accidental releases are not planned, their frequency, magnitude, composition, and resulting environmental effects cannot be projected. The potential for spills and the resulting impacts during the set-up of the Phoenix town site and potentially the TLS plus closure of the Pegasus Airfield would be significantly less than would be realized during the operation and maintenance of either the Phoenix or Pegasus runways. Appropriate BMPs would routinely be used to prevent the accidental release of fuel or other materials containing designated pollutants. These measures include the use of secondary containment and/or spill prevention devices during fuel storage and handling and spill detection monitoring during fueling activities. Spill kits and absorbent materials will be available at locations where fuel or other designated pollutants are handled and stored. Airfield personnel will be trained in response actions and the proper use of spill kits.

If a liquid is accidentally released on the snow-covered ice shelf, the fate and transport of the material will depend on the environmental setting. Spilled liquid is expected to migrate vertically through the snow cover and spread laterally on the glacial ice, or it may accumulate in depressions on the ice (Christensen, 2008). There is no pathway at the Phoenix Airfield for fuel accidently released to reach openings in the ice and migrate into the sea. The environmental effect of a fuel release on the ice shelf may be detectable on a long-term basis, in proximity to the release source, but the overall severity likely would be minimal. If a release occurs, cleanup procedures would be promptly implemented to remove contaminated media (i.e., snow and ice) to the maximum extent practical. An impact resulting from an accidental spill is expected to be localized and minor. All spills would be documented and reported, consistent with the requirements of 45 CFR §671 and the USAP Master Permit.

5.4 Noise

Noise is a certain outcome of setting up the town site and TLS and closing the Pegasus Airfield. Sources of noise and vibrations include the mobile equipment (tracked and wheeled) required to perform the work. Construction noise sources would be small and short-term. Therefore, the effects from noise are expected to be minor and transitory.

5.5 Biota

With the exception of an occasional transient seal, penguin, or seabird, flora and fauna are not expected to be present at Phoenix Airfield or Pegasus Airfield. The nearest known sensitive biological community is the seal colony in the Northwest White Island ASPA (ASPA No. 137), approximately 15 km away. The set-up of the town site and TLS is not expected to displace or disturb seals at the ASPA or adversely affect the normal behavior patterns of any transient wildlife in the area.

Certain animals, particularly seals, are routinely present in the Scott Base land/ice-shelf transition zone and near cracks or openings in the seasonal sea ice. The Antarctic Conservation Act prohibits acts which may disturb or adversely affect these animals. Transportation procedures and the existing McMurdo area roadways have been configured to mitigate adverse effects on the biota. Therefore, setting up the town site and TLS are not expected to create disturbances that would displace animals or alter their behavior patterns.

5.6 Visual Characteristics

Aesthetic resources in Antarctica are not readily defined but can generally be characterized as the wilderness value, which encompasses an absence of permanent developments and/or visible evidence of human activity. The areas of the Antarctic continent that exist beyond established stations, support facilities, and research sites allow visitors to experience the remoteness of the continent and its unique landscapes, particularly those characterized by the sweeping glaciers and ice-free ridges, valleys, islands, and coastal regions.

Phoenix Airfield structures would detract from the aesthetic wilderness value of this portion of the Ross Ice Shelf. However, this impact would be offset by the removal of the Pegasus Airfield town site. Therefore, the effects are expected to be minor and transitory.

5.7 Indirect and Cumulative Effects

The proposed set-up of the Phoenix town site and TLS and the closure of Pegasus Airfield, combined with the continued operation of Williams Field and the Long Duration Balloon (LDB) Facility, would require logistical support from McMurdo Station. Setting up the Phoenix Airfield town site and TLS and closing the Pegasus Airfield would result in a short-term increase in heavy equipment operation and labor hours. Impacts would include:

- Using a roadway system between McMurdo Station and the airfields to transport flight crews, airfield support personnel, equipment, and supplies;
- Maintaining the vehicle fleet needed to transport personnel, equipment, and supplies; and
- Maintaining the roadway system to transport personnel, equipment, and supplies between McMurdo Station and the airfields (grooming, filling, compacting)

Effective planning and resource management would be used to mitigate potential conflicts. Therefore, the indirect impacts of Phoenix Airfield set-up and Pegasus Airfield closure on McMurdo operations are expected to be minor and transitory.

In addition to opening and operating the LDB facility, other activities that occur in the general area include preparation and staging activities for overland traverse. Thus it is unlikely that the proposed action plus operation of Williams Field would have a significant cumulative effect on the environment. The cumulative effects of the activities, such as physical disturbances, would increase temporarily but would be localized to the runways, support facilities, and roads. Therefore, cumulative impacts are expected to be minor and transitory.

5.8 Summary

The potential environmental impacts associated with the proposed action to set up the Phoenix Airfield town site and TLS and close Pegasus Airfield have been identified and evaluated in this IEE. Table 1 summarizes the potential environmental impacts that may result from these activities. Overall, the findings of this assessment indicate that the proposed action would provide an effective resource for wheeled aircraft at McMurdo Station while significantly avoiding disruptions associated with meltwater and other operational challenges.

Table 1. Summary of Impacts Resulting from Setup of the Phoenix Airfield Town Site plus TLS, and Closure of Pegasus Airfield at McMurdo Station

Activity	Output	Environmental and Operational Impacts					
		Affected Environment	**Duration**	**Extent**	**Intensity**	**Impact Probability**	**Overall Rating (see note)**
Setup of Phoenix Airfield Town Site plus TLS and Closure of Pegasus Airfield	Physical Disturbance	Snow and Ice	Short-term	Localized (≤ 0.5 km^2)	Low	Certain	2
		Biota	Short-term	Localized	Low	Unlikely	1
	Air Emissions	Air	Short-term	Localized	Low	Unlikely	1
	Releases (operational materials)	Snow and Ice	Long-term	Localized	Low	Unlikely	3
	Noise	Biota	Short-term	Localized	Low	Possible	1
	Alteration of Visual Characteristics	Aesthetic & Wilderness Values	Short-term	Localized	Low	Certain (reversible)	1
	Accidental Releases (spills)	Snow and Ice	Long-term	Localized	Low	Possible	3
	Indirect Effects & Cumulative Impacts	Airfield Personnel; McMurdo Station Operations	Short-term	Localized	Low	Possible	2

Notes: + = environmental improvement; 0 = no substantial effect; 1 = minor, short-term effect; 2 = minor effect that continues for a limited period of time after the activity is completed; 3 = minor, localized long-term effect; 4 = environmental effects may be substantial or long-term

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