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Alaska Aviation System Plan

FACT SHEET

August 2025

Airport Resiliency in Alaska

Extreme Environment

Maintaining an airport is a challenge, especially in Alaska where the weather is harsh and communities are isolated. Alaska's airports face a range of tough environmental conditions, from increasing precipitation to thawing permafrost, that can cause or worsen settlement, rutting, cracking, shoulder rolling, and more. These physical issues cause safety problems by weakening embankments, damaging lighting systems, and creating hazards on the landing surface.

Environmental Conditions and Physical Issues

Where, when, and how an airport is constructed significantly impacts performance. Nearby features such as rivers and drainage routes can lead to flooding. Subsurface materials like permafrost and ice lenses can cause differential settlement if thawed, which is more likely to happen if embankment materials are placed when summer heat is at its peak, trapping that heat underground. Design and construction choices like using local or imported materials, over or under sizing culverts, or using insulation board all impact long-term performance. Often, choices are limited by budget, terrain, need for proximity to the airport's community, and land ownership. Altogether, it is challenging to build an airport to withstand Alaska's harsh conditions. In response to these challenges, new techniques and standards are in development to create more resilient airports.

Kongiganak Airport

Like many airstrips across Alaska, Kongiganak Airport (DUY),is located near the Kongnignanohk River, not connected to the contiguous road system, and has a history of embankment slope erosion and runway surface issues, including softness, heaves, dips, and cracks. These issues may stem from permafrost and ice beneath the airport. As permafrost and ice thaw, they create gaps for the embankment to settle into, and as water freezes in the winter, it pushes material up to create heaves. These issues, especially embankment slope erosion, often impacts the lighting systems as well. Runway surface damage and inoperable lighting create safety hazards for aircraft and require significant repair to maintain access.

Seed and topsoil on the embankment slope of Kongiganak airport (DUY) during Stage 1 of construction.

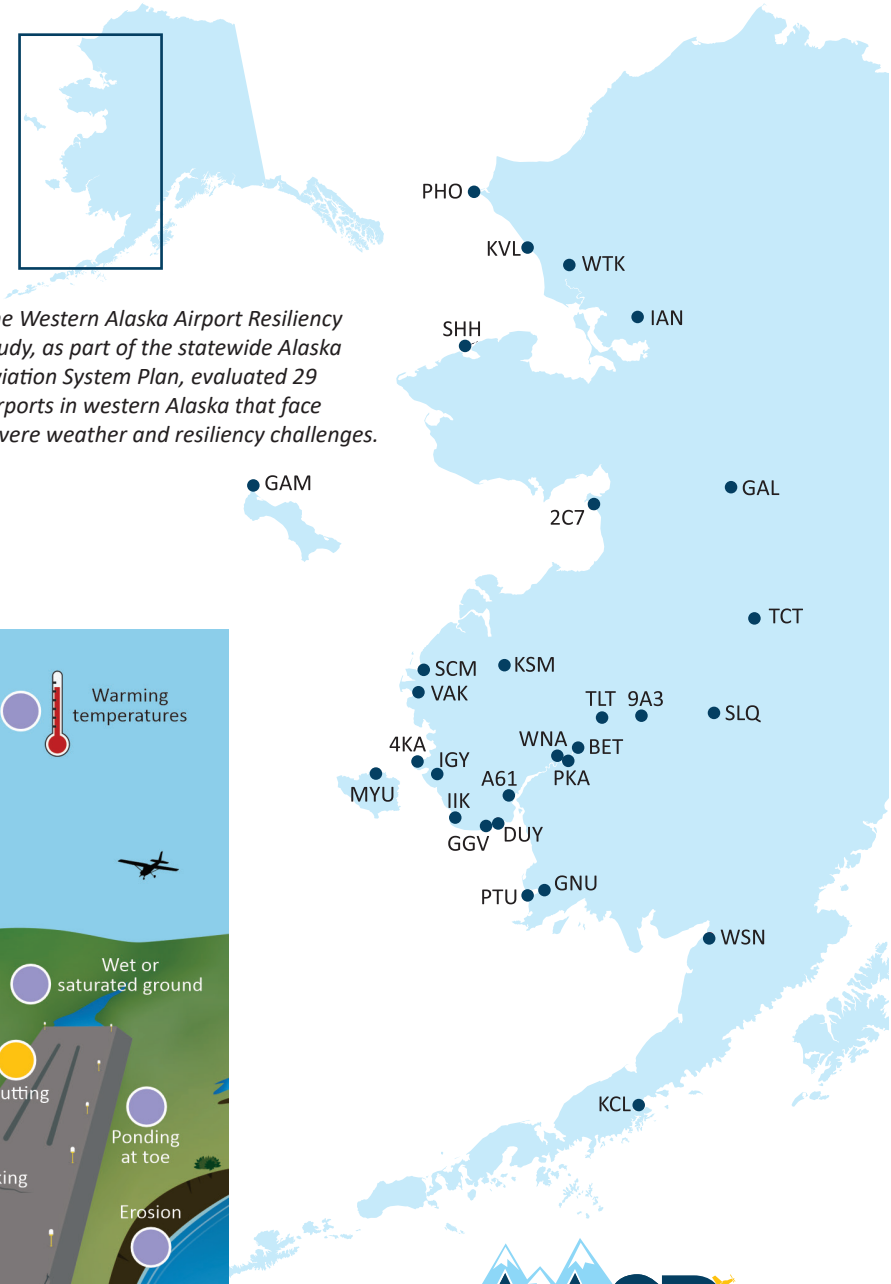
DUY received Airport Improvement Program (AIP) funding to rehabilitate its runway, taxiway, and apron and reconstruct lighting. The project is nearly complete and includes using a geogrid and fabric for greater stabilization of the runway. As work is completed, seed and topsoil must be applied to the embankment slopes to mitigate erosion, as seen above. These improvements are expected to resolve the physical and safety issues that were present at the airport pre-construction.

Improving Resiliency

DOT&PF strives to construct and maintain safe, resilient airports that make efficient use of funding and materials. New strategies and technologies are always emerging support this goal, including the Western Alaska Airport Resiliency Study as part of the statewide Alaska Aviation System Plan. The study[1], released in December 2024, reviewed research and best practices from cold climate regions and evaluated 29 airports in western Alaska that face severe weather and resiliency challenges. The study team evaluated available data for each

airport, including construction documents, inspection reports, and financial data, and interviewed DOT&PF staff to understand existing conditions. The study also compared construction techniques and environmental context to the physical issues documented at each airport to assess what may have caused the issues and how avoid in the future. Five of the 29 airports, Chevak (VAK), Kipnuk (IIK), Nightmute (IGT), Tuntutuliak (A61) and Tununak (4KA) were also selected for more detailed evaluation, including site visits and additional interviews.

To read the full analysis and report recommendations, as well as an annotated bibliography of cold region resiliency research, visit the AASP website.[2]



The Western Alaska Airport Resiliency Study, as part of the statewide Alaska Aviation System Plan, evaluated 29 airports in western Alaska that face severe weather and resiliency challenges.

Examples

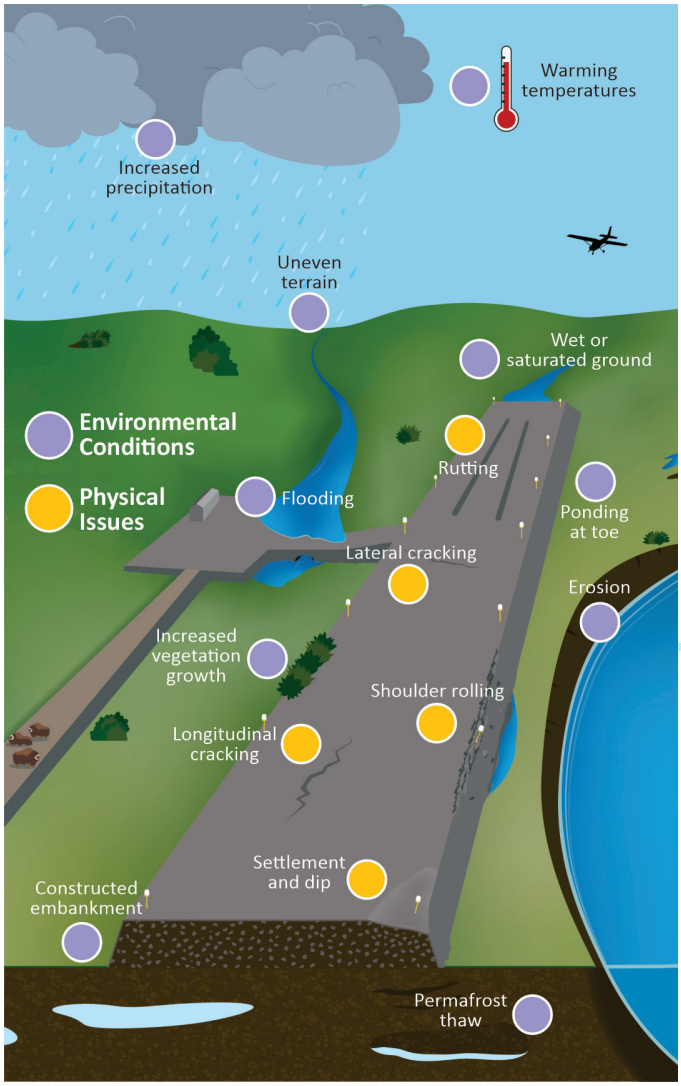

Rutting


Flooding and erosion


Vegetation growth


Shoulder rolling


Lateral/longitudinal cracking



Common environmental conditions and physical issues faced by Alaska's airports. Photos by DOT&PF

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[1]https://www.alaskaasp.com/media/5041/2024_resiliency-study_with-appendices_final.pdf
[2]https://www.alaskaasp.com

The AASP project is managed by the State of Alaska Department of Transportation and Public Facilities (DOT&PF), Division of Statewide Aviation. Additional assistance is provided by the Aviation Advisory Board, private aviation organizations, local airport sponsors, air carriers, aviation related businesses and pilots.

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