

EROSION EXPOSURE ASSESSMENT—POINT LAY

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Point Lay, Alaska, in 2010. ShoreZone, shorezone.org.



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Report of Investigation 2021-3 Point Lay

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EROSION EXPOSURE ASSESSMENT—POINT LAY

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POINT LAY EROSION EXPOSURE ASSESSMENT

This is a summary of erosion forecast results near infrastructure at Point Lay, Alaska. We conduct a shoreline change analysis, forecast 60 years of erosion, and estimate the replacement cost of infrastructure in the forecast area. Buzard and others (2021) describe the method and guidance for interpreting tables and maps.

Source data for this summary include the following:

- Delineated vegetation lines and change assessment by Buzard and others (2021) following the methods of Overbeck and others (2020).
- Infrastructure AutoCAD outlines and meta-data from the Division of Community & Regional Affairs (2013) Community Profile Map series.
- Added infrastructure such as roads and out-buildings, delineated if visible in the most up-to-date high resolution (≤ 0.66 ft [20 cm] ground sample distance) aerial orthoimagery (Quantum Spatial, 2019).
- Computed infrastructure cost of replacement based on square or linear footage from Buzard and others (2021).

Point Lay is on the northwest coast of Alaska's North Slope. The community sits atop vegetated permafrost bluffs adjacent to the Kasegaluk Lagoon, sheltered from the Chukchi Sea by a narrow strip of barrier islands. Wave action and storm surge events cause erosion of the sheltered coastline, leading to thermal degradation of exposed permafrost bluffs and resulting subsidence



(U.S. Army Corps of Engineers, 2009). Erosion rates range between 3 and 6 feet per year along the shoreline south of the airport, while the shoreline fronting most infrastructure is near stable (Overbeck and others, 2020). The community's water source eroded and drained in 2016 (Native Village of Point Lay, 2017). Most infrastructure is located far away from the shoreline and no mitigation measures have taken place.

We forecast erosion 60 years from the most recent shoreline (2019) at 20-year intervals to identify the exposure of infrastructure to erosion. Most infrastructure are outside the erosion forecast area through 2079 (table 1; fig. 1). The only infrastructure exposed to erosion is a single sewer line running south of the airport that the shoreline is forecast to reach by 2059 (table 1). The total estimated replacement cost of the water line is \$67 thousand (\pm \$20 thousand) by 2079 (table 2; fig. 1).

ACKNOWLEDGMENTS

This work was funded by the Denali Commission Village Infrastructure Protection Program through the project "Systematic Approach to Assessing the Vulnerability of Alaska's Coastal Infrastructure to Erosion." The community of Point Lay was not consulted for this report.

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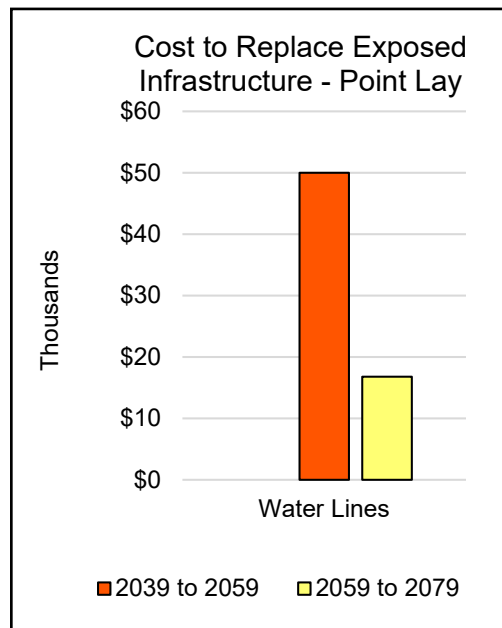
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Table 1. Quantity of infrastructure with estimated erosion exposure by linear footage (LF), square footage (SF), or count (n).

Quantity of Exposed Infrastructure					
Erosion Forecast Date Range	Buildings & Tank Facilities (n)	Power Lines (LF)	Fuel Lines (LF)	Water Lines (LF)	Roads & Boardwalks
2019 to 2039	0	0	0	0	0
2039 to 2059	0	0	0	79	0
2059 to 2079	0	0	0	88	0
Combined Total	0	0	0	167	0

Table 2. Replacement cost of infrastructure exposed to erosion per 20-year interval.

Cost to Replace Impacted Infrastructure						
Erosion Forecast Date Range	Buildings & Tank Facilities	Power Lines	Fuel Lines	Water Lines	Roads & Boardwalks	Sum
2019 to 2039	\$0	\$0	\$0	\$0	\$0	\$0
2039 to 2059	\$0	\$0	\$0	\$50,000	\$0	\$50,000
2059 to 2079	\$0	\$0	\$0	\$16,800	\$0	\$16,800
Combined Total	\$0	\$0	\$0	\$66,800	\$0	\$66,800

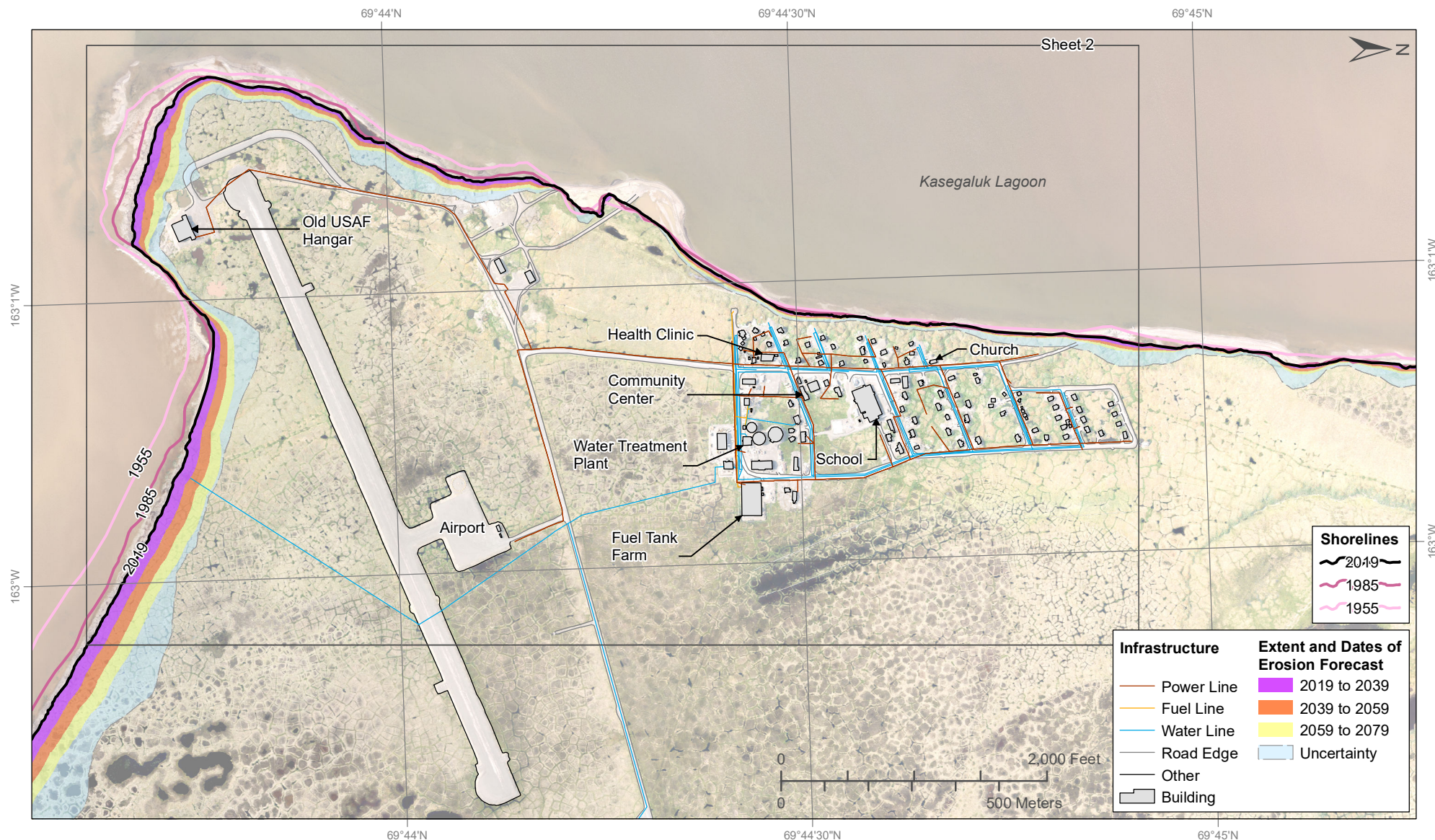
**Figure 1.** This figure summarizes the replacement cost of all infrastructure in the erosion forecast area. Twenty-year intervals are symbolized by color: red represents 2039 to 2059 and yellow represents 2059 to 2079. A single sewer line is the only infrastructure at risk from erosion between 2039 and 2079.

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Erosion Forecast Point Lay, Alaska

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Buzard and others, 2021
Point Lay, Sheet 1 of 2



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Projection: NAD83 UTM Zone 3N. Orthoimagery year: 2019. Orthoimagery available from elevation.alaska.gov

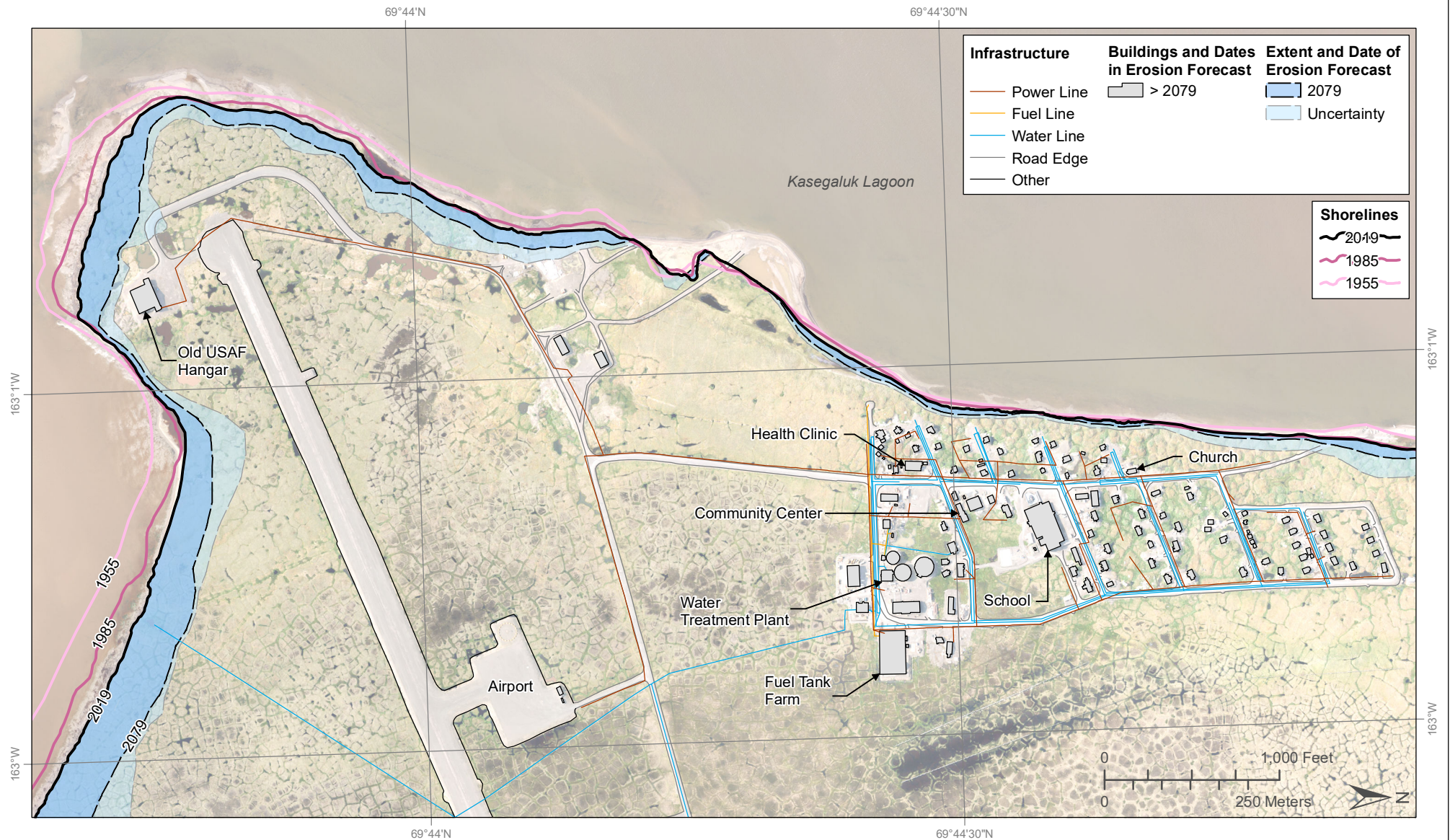
Erosion and accretion of coasts and rivers result in shoreline change. These rates of shoreline change at Alaska communities are calculated from historical and modern shorelines (shorelines shown as lines in pink scale and labeled by year). The long-term (1955 to 2019) shoreline change rate is used to forecast where erosion could impact community infrastructure. Erosion is forecast to reach the colored areas by specified time intervals: 2019 to 2039 (purple), 2039 to 2059 (orange), and 2059 to 2079 (yellow). The area of uncertainty of the 2079 shoreline at a 90 percent confidence interval is light blue. Areas that are not colored by time interval are not forecast to erode by 2079 based on the historical shoreline change rate. For more detailed information about the impacts to infrastructure from erosion at Point Lay, refer to the Point Lay erosion exposure assessment report.

This work is part of the Coastal Infrastructure Erosion Vulnerability Assessment project funded by the Denali Commission Environmentally Threatened Communities Grant Program. Components of this map were prepared by the Alaska Department of Commerce, Community, and Economic Development (DCCED) using funding from multiple municipal, state, federal, and tribal partners. The original AutoCAD drawing of the infrastructure data layers was converted to ArcGIS.



Erosion Exposure Point Lay, Alaska

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Erosion and accretion of coasts and rivers result in shoreline change. These rates of shoreline change at Alaska communities are calculated from historical and modern shorelines (shorelines shown as lines in pink scale and labeled by year). The long-term (1955 to 2019) shoreline change rate is used to forecast where erosion could impact community infrastructure. Erosion is forecast to year 2079 (dark blue) with a 90 percent confidence interval area of uncertainty (light blue). Buildings forecast to be impacted by erosion are colored by the range of years when the impact is forecast to occur: 2019 to 2039 (purple), 2039 to 2059 (orange), 2059 to 2079 (yellow), and no impacts expected by 2079 (gray). For more detailed information about the impacts to infrastructure from erosion at Point Lay, refer to the Point Lay erosion exposure assessment report.

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