

Report of Investigation 2021-3 St. Michael

EROSION EXPOSURE ASSESSMENT—ST. MICHAEL

Richard M. Buzard, Mark M. Turner, Katie Y. Miller, Donald C. Antrobus, and Jacquelyn R. Overbeck



St. Michael, Alaska, in 2015. Shorezone, shorezone.org.



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State of Alaska
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EROSION EXPOSURE ASSESSMENT—ST. MICHAEL

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ST. MICHAEL EROSION EXPOSURE ASSESSMENT

This is a summary of results from an erosion forecast near infrastructure at St. Michael, 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 metadata from Division of Community & Regional Affairs (DCRA, 2004) Community Profile Map series.
- Added infrastructure such as roads, water and sanitation facilities, and outbuildings, delineated if visible in the most up-to-date high resolution (≤ 0.66 ft [20 cm] ground sample distance) aerial orthoimagery (Overbeck and others, 2016).
- Computed infrastructure cost of replacement based on square or linear footage from Buzard and others (2021).

St. Michael is located on the southeast shoreline of Norton Sound, in the lee of Stewart Island. Wave and tide activity, storm surge, and traffic along the beaches all contribute to erosion at St. Michael (U.S. Army Corps of Engineers [USACE], 2007). The shoreline along St. Michael's Bay is



near stable while erosion rates along the northern shoreline facing Norton Sound range between 1.0 and 2.3 feet per year (Overbeck and others, 2020). The community has relocated homes in the past to mitigate erosion exposure (USACE, 2007). There is a rubble mound or relict rip rap protection placed on the northern shoreline near the old airport and along St. Michael's Bay in front of a few homes. We do not forecast erosion in areas with erosion protection.

We forecast erosion 60 years from the most recent shoreline (2015) at 20-year intervals to identify the exposure of infrastructure to erosion. While erosion is present, especially on the north shore, no infrastructure lies within the 2075 erosion forecast area. Erosion could reach the cemetery by 2075, but the cemetery's extent is not defined in the community profile map provided by DCRA (2004), so the timing is uncertain.

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 St. Michael was not consulted for this report.

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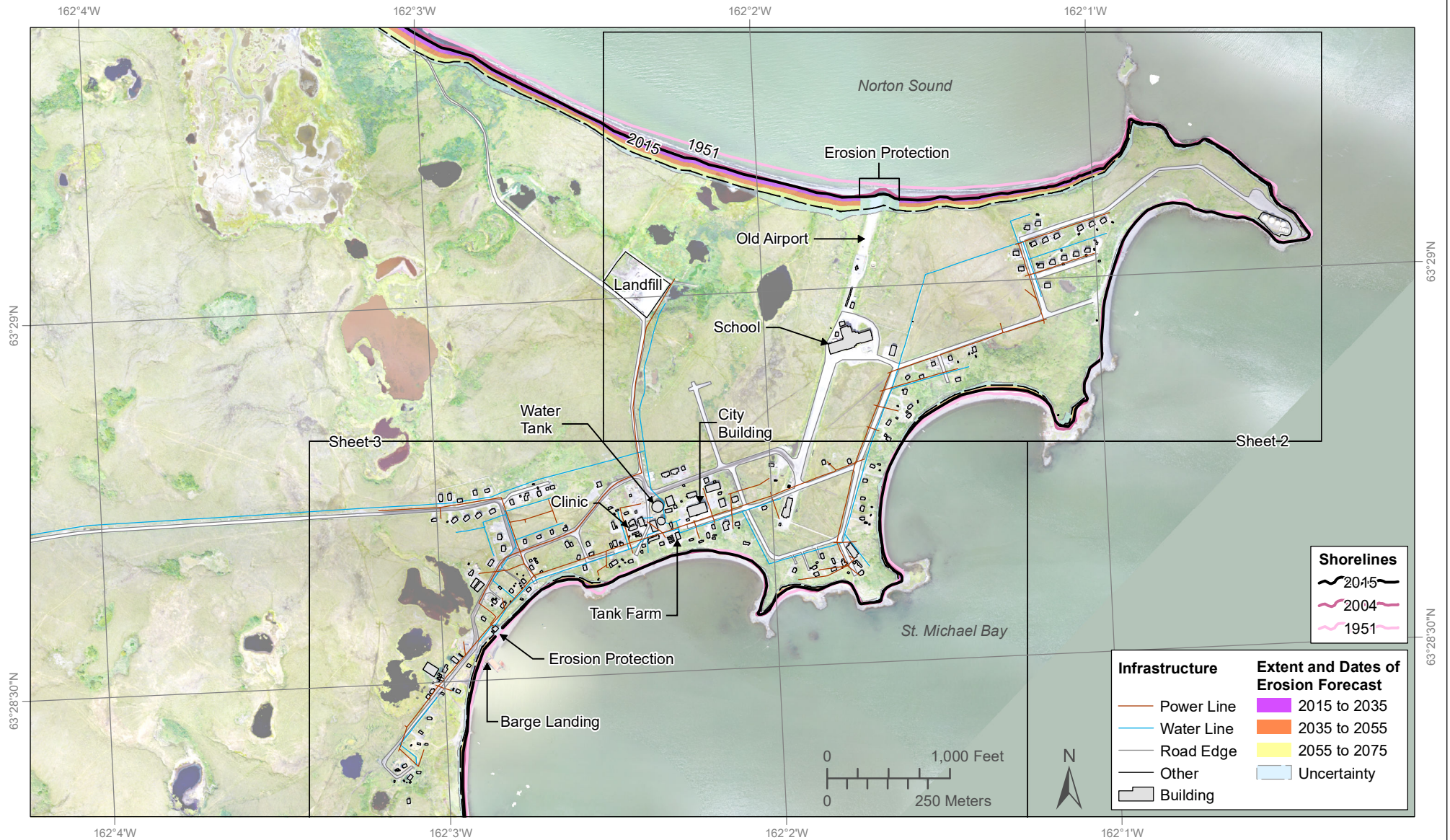
² Alaska Native Tribal Health Consortium, 4000 Ambassador Drive, Anchorage, Alaska 99508

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- Buzard, R.M., Turner, M.M., Miller, K.Y., Antrobus, D.C., and Overbeck, J.R., 2021, Erosion exposure assessment of infrastructure in Alaska coastal communities: Alaska Division of Geological & Geophysical Surveys Report of Investigation 2021-3. <https://doi.org/10.14509/30672>
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Erosion Forecast St. Michael, Alaska

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Buzard and others, 2021
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Projection: NAD83 UTM Zone 3N. Orthoimagery year: 2015. 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 (1951 to 2015) 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: 2015 to 2035 (purple), 2035 to 2055 (orange), and 2055 to 2075 (yellow). The area of uncertainty of the 2075 shoreline at a 90 percent confidence interval is light blue. Areas that are not colored by time interval are not forecast to erode by 2075 based on the historical shoreline change rate. For more detailed information about the impacts to infrastructure from erosion at St. Michael, refer to the St. Michael 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.



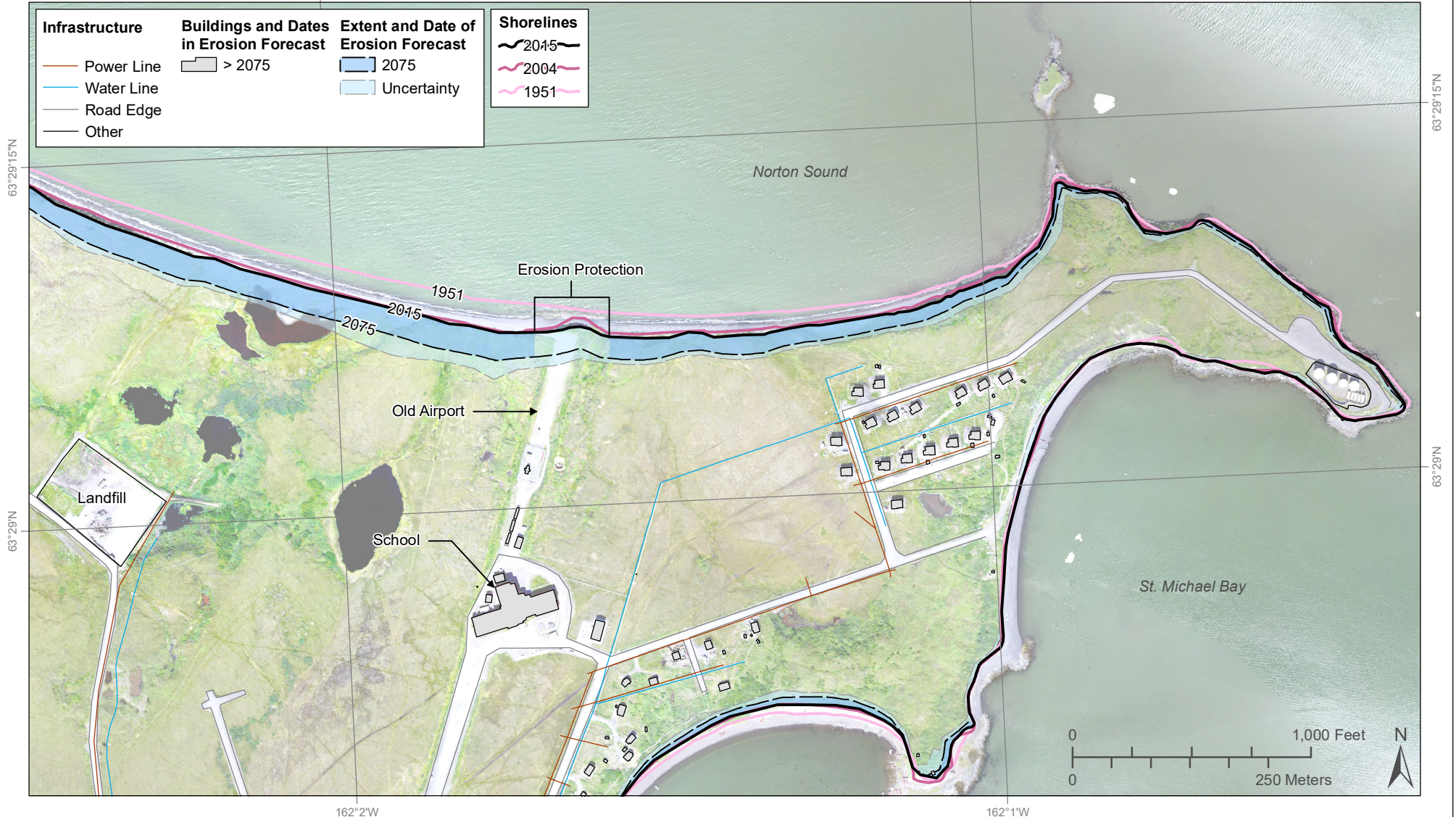
Erosion Exposure

St. Michael, Alaska

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162°2'W

162°1'W



162°2'W

162°1'W

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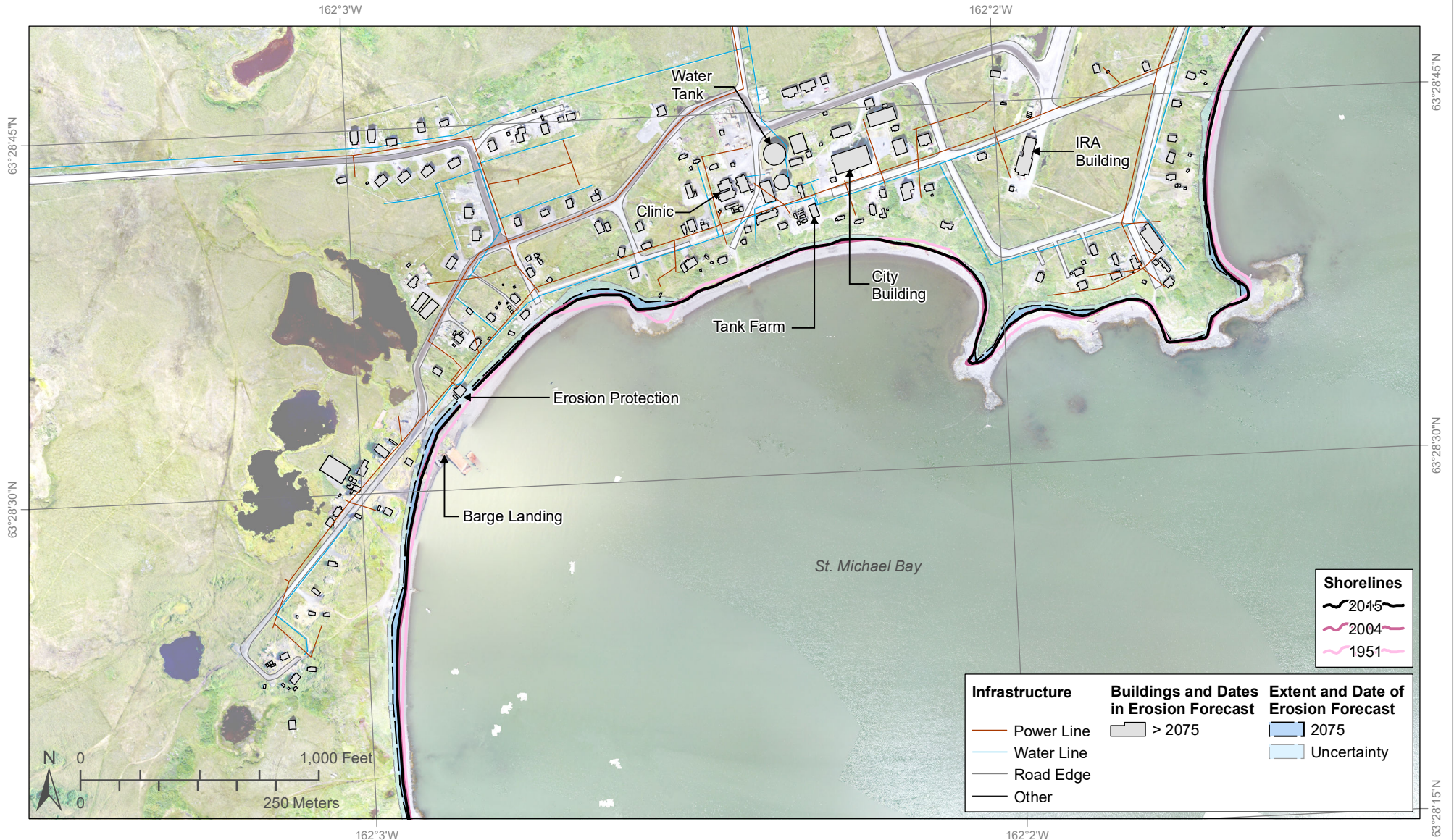
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Erosion Exposure

St. Michael, Alaska

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