Report of Investigation 2025-8

COASTAL FLOOD IMPACT ASSESSMENT FOR STEBBINS, ALASKA

Jessica E. Christian, Keith C. Horen, and Nora M. Nieminski

Alaska Division of Geological & Geophysical Surveys staff surveying high water marks after Typhoon Merbok in Stebbins, Alaska, in September 2022.

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State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys

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DEPARTMENT OF NATURAL RESOURCES
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COASTAL FLOOD IMPACT ASSESSMENT FOR STEBBINS, ALASKA

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OVERVIEW

This Division of Geological & Geophysical Surveys (DGGS) report is an investigation of the historical flood record and provides an assessment of flood impacts for the community of Stebbins, Alaska. This community-specific report has three sections: data description, flood impact categorization, and historical flood record. Methods used to evaluate historical floods and delineate flood impact categories (minor, moderate, major), as defined by the National Weather Service (NWS), are described in detail in Horen, Poisson, and others (2024), an update from the methods described by Buzard and others (2021). Flood and infrastructure heights are relative to the local mean higher high water (MHHW) datum in feet (ft).

SUMMARY

The community of Stebbins, formerly known as Tapraq, meaning "low land with beach grass," originated from the settlements of Atravik and Penuq and is located on the northwest coast of St. Michael Island on Norton Sound approximately 10 miles northwest of St. Michael and 120 miles southeast of Nome. Stuart Island shelters the community of Stebbins to the northwest. The U.S. Army Corps of Engineers (USACE; 2017) 100-year flood estimate recommends a minimum building first-floor height of 14.8 ft (4.50 m) MHHW. Additional data collection will improve our understanding of flooding threat to this community.

Seven disaster declarations (2004, 2005, 2011, 2013, 2022, 2023, and 2024) have been reported for severe storms and flooding in Stebbins (Federal Emergency Management Agency [FEMA], 2004; 2005; 2011; 2014; 2022; 2023; and 2025). Based on research done for this report, Stebbins experienced at least 18 storm surge flood events between 1959 and 2024. We estimated the peak still water heights for 11 of these flood events categorizing two as minor, one as moderate, and eight as major. The highest flood occurred on November 10, 2013, reaching an estimated still water height of 12.2 ft (3.71 m) MHHW.

DATA

DGGS used geospatial data to assess infrastructure impacts and estimate flood heights from various sources of evidence (e.g., personal accounts, photographs, official reports, etc.). We used Esri's ArcGIS Pro version 3.2.1 to process and map these geospatial data.

Digital Elevation Models and Orthoimagery

Accurate, high-resolution elevation models and orthoimagery are used to measure flood heights in the absence of high-water mark (HWM) data. One digital elevation model (DEM; table 1) and two orthoimages (table 2) are available for Stebbins. Orthoimagery was collected in 2004 for

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a Community Profile Map (CPM; Alaska Division of Community & Regional Affairs [DCRA], 2004). Aerial imagery was collected in 2022, which was used to create a digital surface model (DSM) and orthoimagery derived from photogrammetric structure from motion (SfM) processing (Horen, Brayton, and others, 2024). All DEM and orthoimagery will be referenced in this report by the names assigned in tables 1 and 2.

First-Floor Height Survey

USACE conducted a field survey that included first-floor and ground heights of multiple buildings and features in Stebbins between September 8 and 10, 1987. These data were collected in an arbitrary datum in feet, assigning a height of 50.0 ft (15.24 m) to a "Geodetic Survey triangulation marker… attached to the first power pole north of the community center… numbered 8151A 1982" (USACE, 1987). A USACE (1988) flood damage reduction reconnaissance report indicates "the majority of residences [had] first floors on grade, or a few inches above ground elevation," suggesting this survey can be assumed to be a reasonable representation of building heights both at the time of and prior to the 1987 survey. No accuracy information is provided in either the 1987 survey report (USACE) or the follow-up report (USACE, 1988) and thus we assume an accuracy equal to one-half of the reported precision of these data, ± 0.05 ft (0.02 m), though the actual potential error is likely greater than this value. This survey will be referenced within this report as the 1987 survey.

Table 1. Summary of digital elevation models available for Stebbins, Alaska.

	2022 DSM
Collection date	2022-JUL-10
Elevation type	Photogrammetric SfM
Vertical datum	NAVD88 (GEOID12B)
Ground sample distance	0.2 ft (0.07 m)
Accuracy	0.2 ft (0.05 m)

Table 2. Summary of orthoimagery available for Stebbins, Alaska.

	2004 Orthoimagery	2022 Orthoimagery
Collection date	2004-JUN-27	2022-JUL-10
Ground sample distance	2.0 ft (0.61 m)	0.1 ft (0.03 m)

The Alaska Native Tribal Health Consortium completed a field survey of the first-floor heights of occupied buildings in Stebbins on March 14, 2024. These data were collected in the North American Vertical Datum 1988 with Geoid 12B applied (NAVD88 [GEOID12B]) in U.S. survey feet (usft) (app. A). The reported vertical accuracy achieved during this survey is ± 0.3 ft (0.08 m). This survey will be referenced within this report as the 2024 first-floor survey. DGGS spatially joined these first-floor heights to building footprints digitized from the 2022 orthoimagery, identifying 167 as occupied buildings (i.e., residential, public, or commercial structures in which people live or work), 137 of which are residential.

GNSS Survey

DGGS performed a Global Navigation Satellite System (GNSS) survey on July 10–11 and September 23, 2022, during visits to Stebbins. The purpose of these surveys was to collect community reports and HWM data. These data were collected in the NAVD88 (GEOID12B) vertical datum in meters (m) and reported in feet (ft). The vertical accuracy achieved during both surveys is ± 0.2 ft (0.06 m). These surveys will be referenced within this report as the July 2022 survey and September 2022 survey (Horen and others, 2022).

Optical Survey

Michael Baker Jr., Inc., and Coastal Fron-

tiers Corporation performed an optical survey using a total station on August 23, 2005, to identify the heights of "strandline" HWM associated with flooding in October 2004. These data were collected in a local Alaska Department of Transportation & Public Facilities (ADOT&PF) datum in feet and reported in the Mean Lower Low Water (MLLW) (1982) datum in feet (Baker and Coastal, 2007). The reported vertical accuracy achieved during this survey is ± 0.1 ft (0.03 m). This survey will be referenced within this report as the August 2005 survey.

Vertical Datums

Local tidal datums (table 3) for Stebbins are described by NOAA Center for Operational Oceanographic Products (CO-OPS) tide station 946 8151 available from tidesandcurrents.noaa.gov/datums.html?id=9468151. At least three additional datums exist for Stebbins that are pertinent to flooding: an arbitrary datum established by USACE in 1987, a MLLW datum, presumably established in 1982 as alluded to by USACE in 1988, and an ADOT&PF datum as described by Baker and Coastal (2007). According to a 1993 USACE trip report, the height of the basis of vertical control used during the 1987 survey, which was assigned a height of 50.0 ft (15.24 m) at the time of the survey, "was later determined to be 13.31 feet MLLW" (USACE, 1993), most likely in the local tidal datums derived from data collected by the "State of Alaska Division of Technical Services, Coastal/Marine Boundary Section… and sent to the National Oceanic and Atmospheric Administration (NOAA) for processing" (USACE, 1988), though NOAA CO-OPS does not list, nor could we locate, any previous datum epoch for the Stebbins tide station. Baker and Coastal Frontiers (2007) indicate the ADOT&PF datum is "2.77 feet higher" than the MLLW (1982) datum.

It is possible to relate the USACE (1987) and MLLW (1982) datums to the NAVD88 (GEOID12B) datum using the first-floor heights of the current school building and the old municipal garage, both structures being extremely unlikely to have had their first floors raised or lowered in the time between surveys. The first-floor height of the school was collected in the MLLW (1982) datum in 1993 and in the NAVD88 (GEOID12B) datum in 2024. The first-floor height of the municipal garage was collected in the USACE (1987) datum and, though noted as abandoned, was collected again in 2024 in the NAVD88 (GEOID12B) datum.

Table 3. Local tidal datums for Stebbins, Alaska (NOAA CO-OPS tide station 946 8151).

Tidal Datum	Abbreviation	ft MHHW	m MHHW	ft NAVD88 (GEOID12B)	m NAVD88 (GEOID12B)
USACE (1987)	USACE (1987)	31.0	9.43	35.7	10.89
Mean Higher High Water	MHHW	0.0	0.00	4.8	1.45
Mean High Water	MHW	-0.2	-0.08	4.5	1.38
Mean Tide Level	MTL	-1.3	-0.41	3.4	1.05
Mean Sea Level	MSL	-1.4	-0.44	3.3	1.01
Mean Low Water	MLW	-2.4	-0.74	2.3	0.72
Mean Lower Low Water	MLLW	-2.7	-0.81	2.1	0.64
ADOT&PF	ADOT&PF	-3.0	-0.90	1.8	0.55
North American Vertical Datum 1988 (GEOID12B)	NAVD88 (GEOID12B)	-4.8	-1.45	0.0	0.00
Mean Lower Low Water (1982)	MLLW (1982)	-5.7	-1.75	-1.0	-0.30

Given that the height of the basis of vertical control for the 1987 survey is situated at 50.0 ft (15.24 m) in the USACE (1987) datum and 13.31 ft (4.06 m) in the MLLW (1982) datum, we can establish an offset of -36.69 ft (-11.18 m) from the former to the latter. The 1987 survey provides a USACE (1987) height of 52.6 ft (16.03 m) for the "floor of [the] municipal garage," which would correspond to a MLLW (1988) height of 15.91 ft (4.85 m). The 1993 USACE report provides a MLLW (1982) height of 22.6 ft (6.89 m) for the "1st floor of [the] new school," although a handwritten note on the 1987 survey report lists a more precise MLLW (1982) height of 22.58 ft (6.88 m) for the "1st floor [of the] new high school." From the 2024 first-floor survey, we are provided NAVD88 (GEOID12B) heights of 16.90 ft (5.15 m) and 23.53 ft (7.17 m) for the "abandoned garage" and "school," respectively. Thus, the difference between the NAVD88 (GEOID12B) height and the MLLW (1982) height for the garage is -0.99 ft (-0.30 m), and the difference between the height of the school in these datums is -0.95 ft (-0.29 m), for an average offset of -0.97 ± 0.02 ft (-0.30 ± 0.01 m), allowing us to tie the MLLW (1982) datum and, by extension, the USACE (1987) and ADOT&PF datums into the local tide datums for Stebbins.

FLOOD IMPACT CATEGORIES

Flood impact categories are used by the NWS to define and communicate flood risk to the public. These categories are designated as major, moderate, and minor (NWS, 2016). Definitions for these categories in the NWS guidance specific to Alaska are provided in the form of statements regarding flood impacts, some of which are more qualitative than quantitative (NWS, 2016). To ensure impact assessments are consistent and repeatable, DGGS developed a set of quantitative criteria for each category (Horen, Poisson, and others, 2024). A fourth category, extreme flooding, as defined by DGGS, is included in this report to delineate critical infrastructure situated at heights above the anticipated maximum based on the specifics of the local historical flood record, though flooding is still possible above this height (Horen, Poisson, and others, 2024).

Short definitions for each flood impact category are listed below and are explained in greater detail by Horen, Poisson, and others (2024). Table 4 provides a list of key infrastructure heights and the risk categories they fall within. Additional information about each piece of key infrastructure is detailed in the category blocks that follow table 4. The map series that accompanies this report depicts the potential inundation extents for each flood impact category.

Minor Flooding: "Minimal or no property damage, but possibly some public threat" (NWS, 2016).

Moderate Flooding: "Some inundation of structures and roads... Some evacuations of people and/or transfer of property to higher elevations may be necessary" (NWS, 2016).

Major Flooding: "Extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations are necessary" (NWS, 2016).

Extreme Flooding: Any flooding that reaches a height above the highest estimated flood height plus the confidence of that estimate. (Horen, Poisson, and others, 2024; NWS, 2018).

Table 4. Summary of infrastructure heights and flood categories. Gray = extreme, purple = major, red = moderate, yellow = minor. The extreme category represents infrastructure situated at heights above the highest estimated flood height with confidence included. Categories are based on current infrastructure conditions.

Feature	Height (ft MHHW)	Confidence (ft)	Height (m MHHW)	Confidence (m)
Community association building	58.5	0.3	17.84	0.08
Native store fuel tank farm	19.3	0.3	5.88	0.08
Power plant fuel tank farm	19.3	0.3	5.87	0.08
School	18.8	0.3	5.72	0.08
Water treatment plant fuel tank	17.3	0.3	5.28	0.08
Water treatment plant	17.1	0.3	5.22	0.08
Water storage tank	17.0	0.3	5.18	0.08
Power Plant	16.6	0.3	5.06	0.08
Elder center	16.6	0.3	5.05	0.08
Washeteria	16.0	0.3	4.88	0.08
Clinic	16.0	0.3	4.87	0.08
School generator	15.4	0.3	4.69	0.08
Airstrip inundated	14.7	0.2	4.48	0.05
Post office/City office/Store	14.5	0.3	4.41	0.08
Library	14.4	0.3	4.40	0.08
Head Start	13.9	0.3	4.24	0.08
Extreme	**13.5**		**4.12**	
Airport maintenance building	13.3	0.3	4.06	0.08
Airport lighting building	13.2	0.3	4.03	0.08
Stebbins Native Corporation	13.1	0.3	4.00	0.08
Fuel pump	12.7	0.3	3.87	0.08
Public safety office	12.1	0.3	3.70	0.08
Many buildings flooded	11.8	0.3	3.59	0.08
Native store storage	11.6	0.3	3.54	0.08
Several buildings flooded	11.3	0.3	3.45	0.08
Lowest residences flooded	10.7	0.3	3.27	0.08
Evacuation road	9.6	0.2	2.93	0.05
Sewer lift station flooded	9.2	0.2	2.80	0.05
Major	**9.0**		**2.75**	
Subsistence materials and structures threatened	7.9	0.2	2.41	0.05
Sewer lift station first-floor height	7.9	0.3	2.40	0.08
Moderate	**7.8**		**2.37**	
Private property threatened	6.9	0.2	2.11	0.05
Minor	**6.8**		**2.06**	

Coastal Flood Impact Map

Stebbins, Alaska

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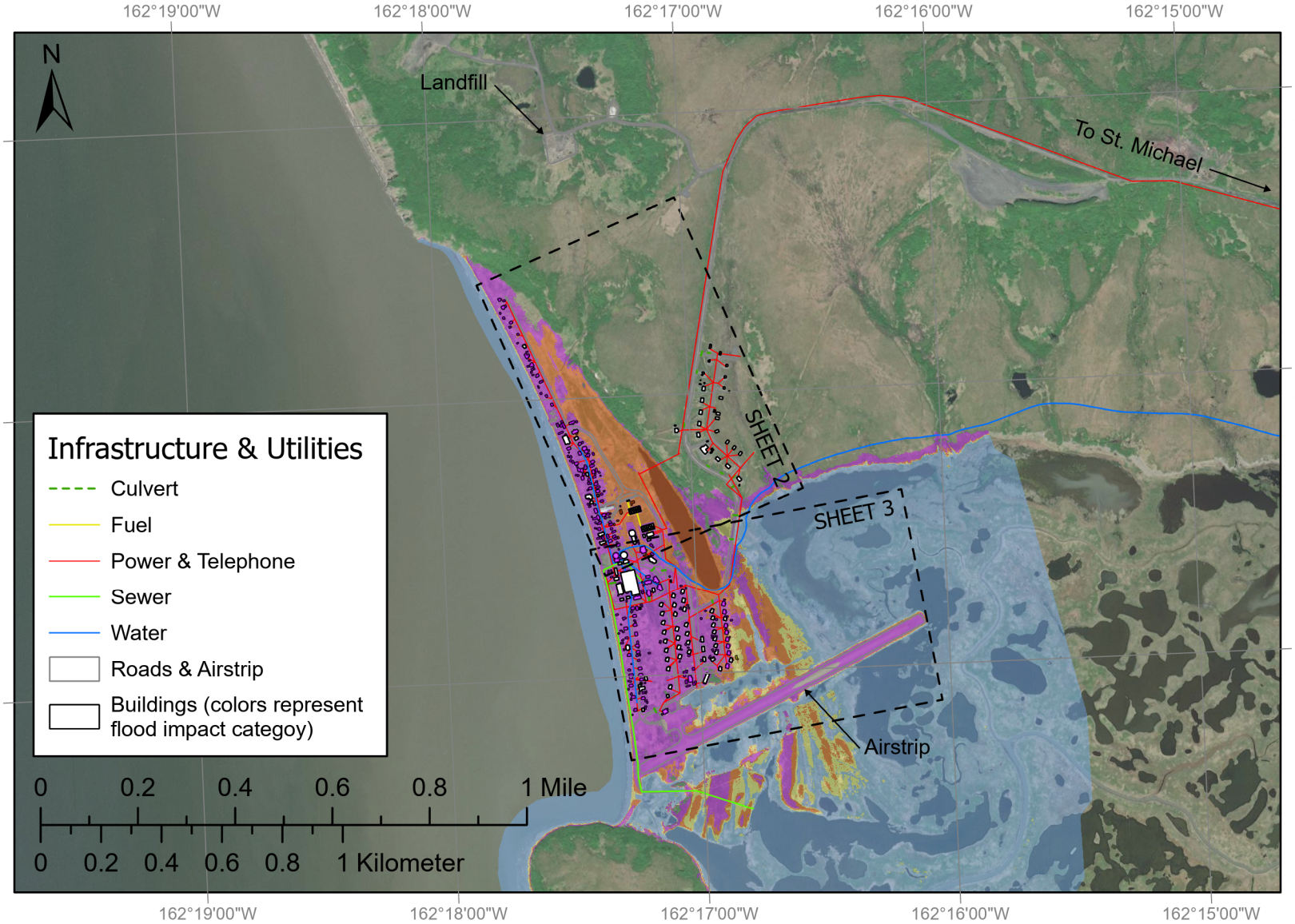
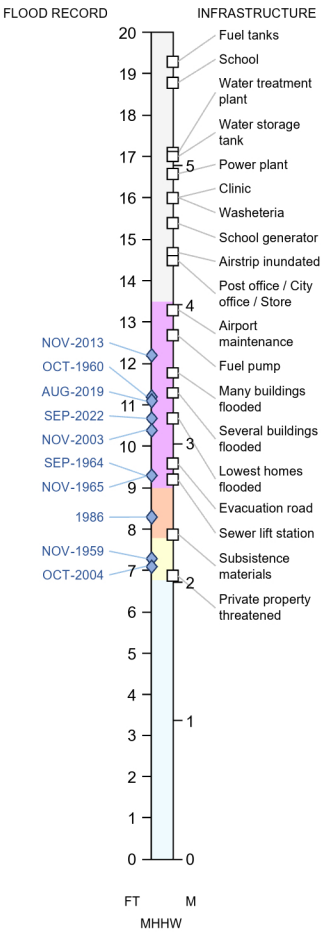
SHEET 1 OF 3





To calculate height above
NAVD88: add 4.77 ft (1.453 m)
MLLW: add 2.66 ft (0.810 m)

Projection: NAD83 (2011) UTM Zone 3N
Infrastructure based on DCRA community map
Orthoimagery and DSM available from elevation.alaska.gov

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Major Flooding is defined as extensive inundation of structures and roads. Significant evacuation of people and/or transfer of property to higher elevations are necessary.

Moderate Flooding is defined as some inundation of structures and roads at lower elevations. Some evacuation of people and/or transfer of property to higher elevations are necessary.

Minor Flooding is defined as minimal or no property damage. Evacuation of people and/or transfer of property to higher elevations are typically not necessary.

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Coastal Flood Impact Map

Stebbins, Alaska

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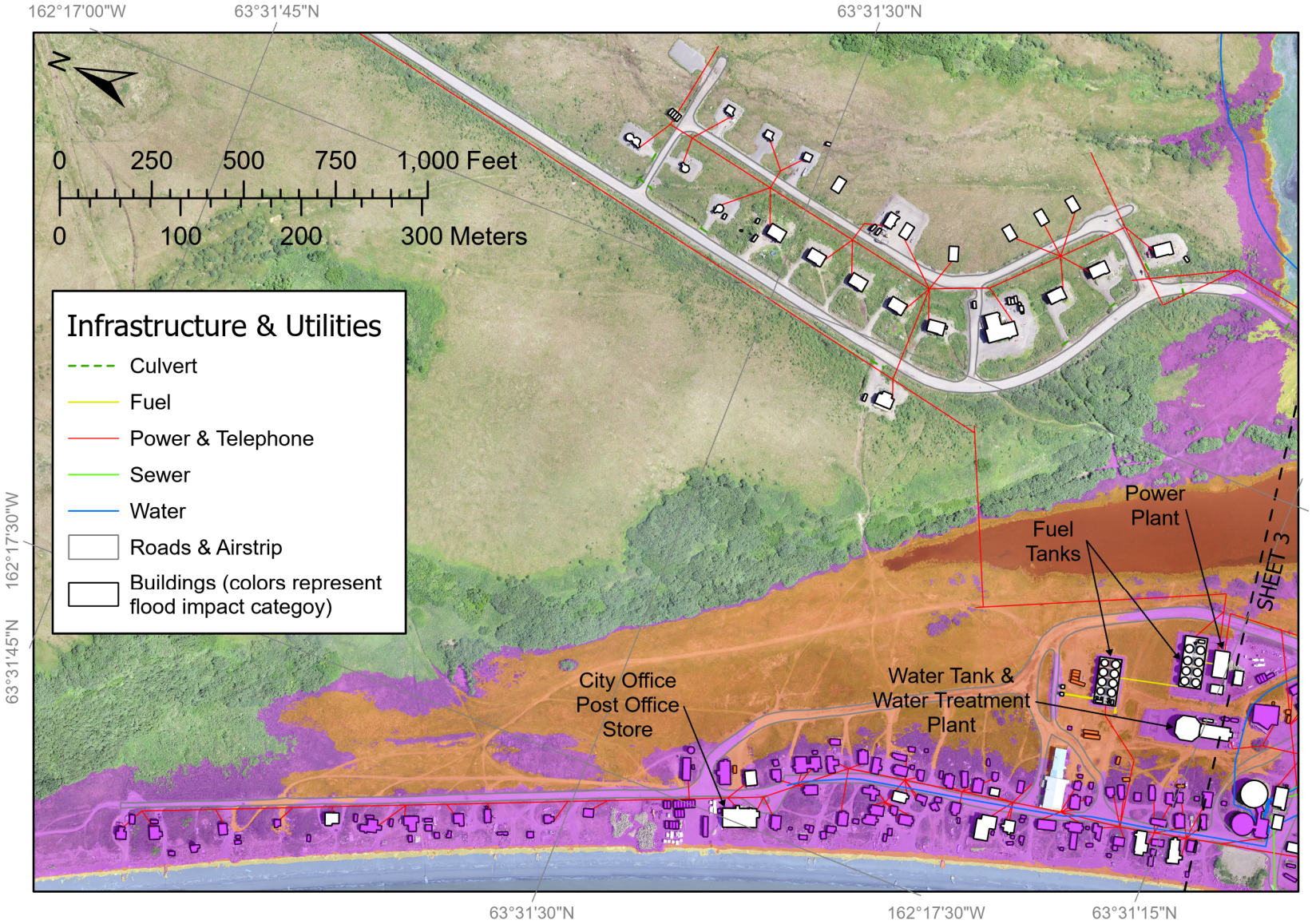

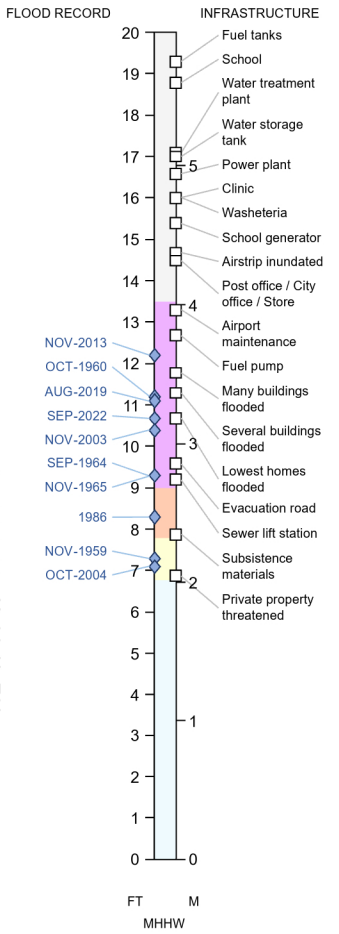

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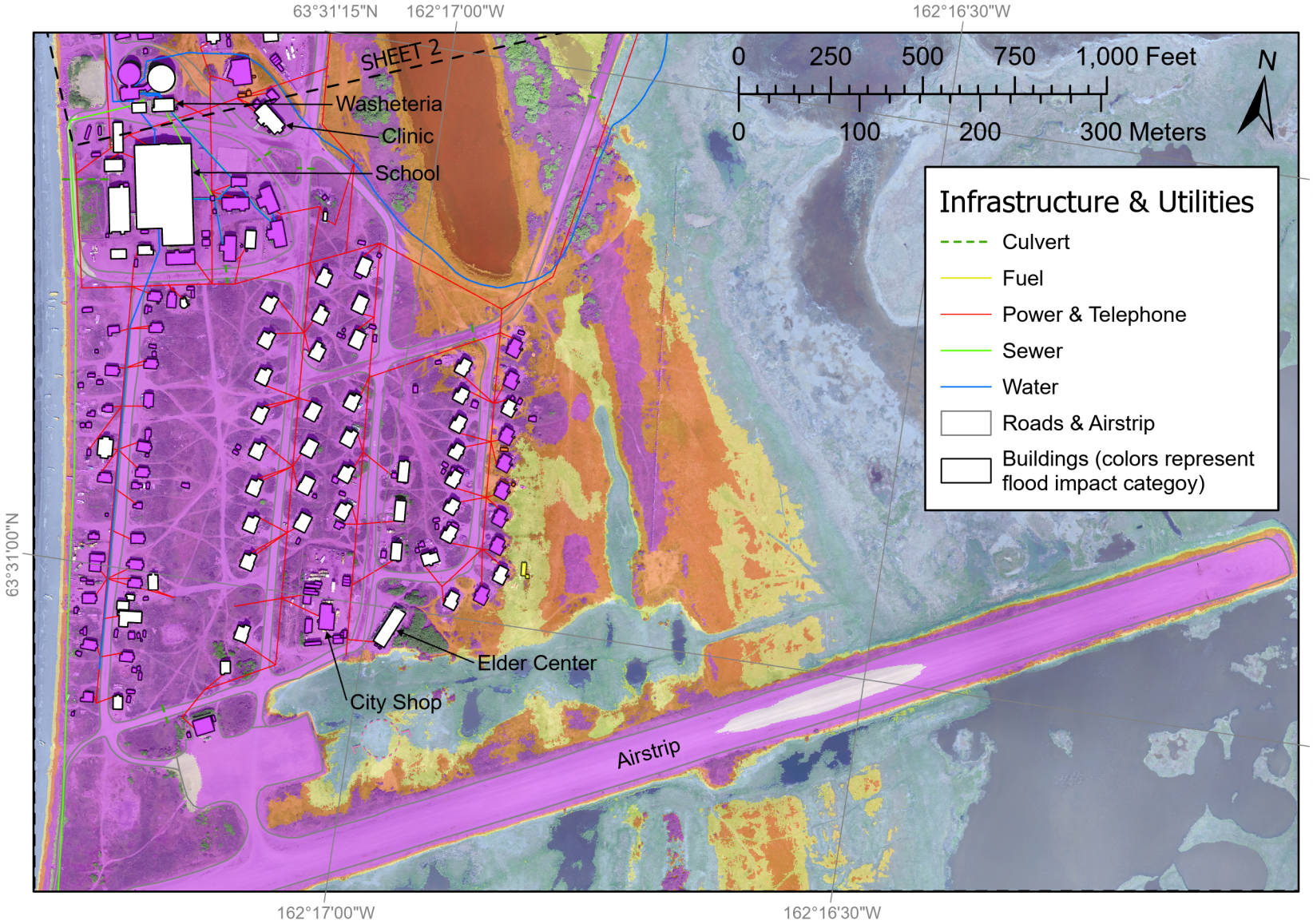
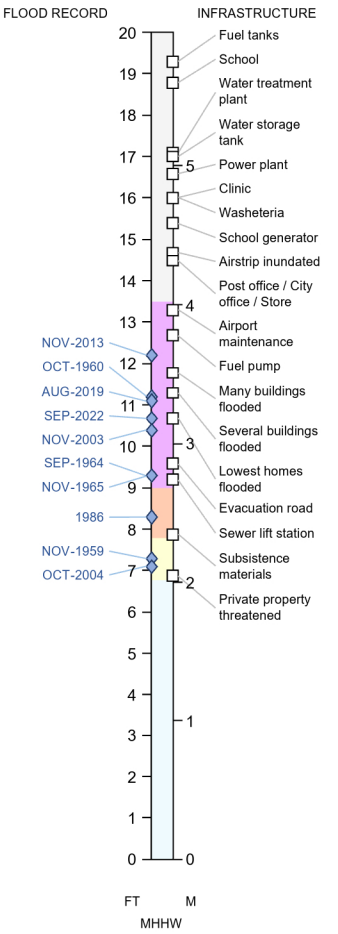
SHEET 3 OF 3





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Extreme Flooding: greater than 13.5 ft (4.12 m) MHHW

Community association building: 58.5 ± 0.3 ft (17.84 ± 0.08 m) MHHW

The community association building is the public building with the highest first-floor height.

Native store fuel tank farm: 19.3 ± 0.3 ft (5.88 ± 0.08 m) MHHW

This is the height of the protective barrier surrounding the fuel tank farm. This tank farm is connected to the fuel pumps.

Power plant fuel tank farm: 19.3 ± 0.3 ft (5.87 ± 0.08 m) MHHW

This is the height of the protective barrier surrounding the power plant fuel tank farm. This tank farm is connected to power plant.

School: 18.8 ± 0.3 ft (5.72 ± 0.08 m) MHHW

As the largest public building possessing a relatively high first-floor height, the school is identified as the most suitable evacuation shelter within the community.

Water treatment plant fuel tank: 17.3 ± 0.3 ft (5.28 ± 0.08 m) MHHW

This fuel tank provides fuel to power the water treatment plant.

Water treatment plant: 17.1 ± 0.3 ft (5.22 ± 0.08 m) MHHW

The water treatment plant is the community's primary source of clean fresh water.

Water storage tank: 17.0 ± 0.3 ft (5.18 ± 0.08 m) MHHW

This tank stores the community's fresh water.

Power plant: 16.6 ± 0.2 ft (5.06 ± 0.08 m) MHHW

This is the first-floor height of the community's primary power source.

Elder center: 16.6 ± 0.2 ft (5.05 ± 0.08 m) MHHW

Washeteria: 16.0 ± 0.3 ft (4.88 ± 0.08 m) MHHW

The washeteria provides resources such as laundry, showers, and toilets.

Clinic: 16.0 ± 0.3 ft (4.87 ± 0.08 m) MHHW

The clinic provides medical services to the community.

School generator: 15.4 ± 0.3 ft (4.69 ± 0.08 m) MHHW

This generator provides backup electricity to the school in the event of a power outage.

Airstrip inundated: 14.7 ± 0.3 ft (4.48 ± 0.08 m) MHHW

Measured from the 2022 DSM, at this height the airstrip would be completely inundated across its full width.

Post office/City office/Store: 14.5 ± 0.3 ft (4.41 ± 0.08 m) MHHW

This building currently serves as the post office, city office, and the community's only store.

Library: 14.4 ± 0.3 ft (4.40 ± 0.08 m) MHHW

The library provides educational resources to the community.

Head Start: 13.9 ± 0.3 ft (4.24 ± 0.08 m) MHHW

This facility provides early education services.

Major Flooding: 9.0 to 13.5 ft (2.75 to 4.12 m) MHHW

Airport maintenance building: 13.3 ± 0.3 ft (4.06 ± 0.08 m) MHHW

This building houses maintenance equipment for the airstrip.

Airport lighting building: 13.2 ± 0.3 ft (4.03 ± 0.08 m) MHHW

This building houses controls for the airstrip lighting and safety systems.

Stebbins Native Corporation: 13.1 ± 0.3 ft (4.00 ± 0.08 m) MHHW

This building houses the Stebbins Native Corporation offices.

Fuel pump: 12.7 ± 0.3 ft (3.87 ± 0.08 m) MHHW

This is the first-floor height of the lowest of the three fuel pumps.

Public safety office: 12.1 ± 0.3 ft (3.70 ± 0.08 m) MHHW

This building houses the public safety offices.

Many buildings flooded 1.0 ft (0.30 m) or more: 11.8 ± 0.3 ft (3.59 ± 0.08 m) MHHW

We consider "many" buildings to describe more than five occupied buildings. Occupied buildings are residential, public, or commercial structures in which people live or work.

Native store storage: 11.6 ± 0.3 ft (3.54 ± 0.08 m) MHHW

Store goods are housed in this storage facility.

Several buildings flooded less than 1.0 ft (0.30 m): 11.3 ± 0.3 ft (3.45 ± 0.08 m) MHHW

We consider "several" buildings to describe more than one but fewer than six occupied buildings.

Lowest residences flooded 1.0 ft (0.30 m) or more: 10.7 ± 0.3 ft (3.27 ± 0.08 m) MHHW

This is the height at which the two lowest residential buildings would experience significant flooding.

Several buildings flooded less than 1.0 ft (0.30 m): 11.6 ± 0.3 ft (3.45 ± 0.08 m) MHHW

We consider "several" buildings to describe more than one but fewer than six occupied buildings.

Evacuation road: 9.6 ± 0.2 ft (2.93 ± 0.05 m) MHHW

This is the height at which the evacuation road would become unsafe to traverse. Measured from the 2022 DSM, the lowest section of the evacuation road is 8.6 ft (2.62 m) MHHW. The NWS assumes a depth of 1.0 ft (0.30 m) to be the maximum for reasonably safe travel on flooded roads (NWS, 2023).

Sewer lift station flooded: 9.2 ± 0.2 ft (2.80 ± 0.05 m) MHHW

Though the sewer lift station first-floor height is lower than this value, this building is located in an area surrounded by elevated roads. Measured from the 2022 DSM, this is the height at which flood waters would be able to reach and flood the sewer lift station. This height forms the basis for the lower limit of the major flooding category.

Moderate Flooding: 7.8 to 9.0 ft (2.37 to 2.75 m) MHHW

Subsistence materials and structures threatened: 7.9 ± 0.2 ft (2.41 ± 0.05 m) MHHW

Measured from the 2022 DSM, this is the height at which flooding would cause significant damage to private property, including storage sheds, boats, fishing equipment, vehicles, and other property at ground level outside of occupied structures. From the 2022 orthoimagery, we identified 263 features meeting this description. This height forms the basis for the lower limit of the moderate flooding category.

Sewer lift station first-floor height: 7.9 ± 0.3 ft (2.40 ± 0.08 m) MHHW

This is the first-floor height of the sewer lift station, though it is partially protected by elevated roads surrounding it.

Minor Flooding: 6.8 to 7.8 ft (2.06 to 2.37 m) MHHW

Private property threatened: 6.9 ± 0.2 ft (2.11 ± 0.05 m) MHHW

Measured from the 2022 DSM, flooding would reach the lowest private property at this height. Private property may include storage sheds, boats, fishing equipment, vehicles, and other property at ground level outside of occupied structures. From the 2022 orthoimagery, we identified 263 features meeting this description. This height forms the basis for the lower limit of the minor flooding category.

HISTORICAL FLOOD RECORD

The historical flood record for Stebbins is listed in chronological order below, with estimated floods identified by impact category. This record was compiled from local knowledge shared with DGGS staff during a July 2022 site visit and from information available to the public through open sources or upon request. It is possible that additional, undocumented flood events have impacted the community. Historical information was used in conjunction with the best available, temporally relevant geospatial data to estimate flood heights where possible.

All estimates and confidences were calculated following the methods developed by Horen, Poisson, and others (2024). As described by Horen, Poisson, and others (2024), each estimate is accompanied by two confidence metrics, an estimate confidence based on the combined known potential errors and a time-based confidence based on the temporal relevance of the data used to estimate the given event. Temporal confidence values are noted with an asterisk (*) where the data used to estimate the flood event height were collected 20 years or more before or after the event: in these cases, the large temporal discontinuity may result in a value that could potentially exceed what the confidence model predicts (Horen, Poisson, and others, 2024).

For each flood event, a list and summarization of sources is included, as well as an explanation of the data used and steps performed during estimation, where relevant. Each flood height estimate is classified into a single flood impact category but estimate confidences may span more than one category. Table 5 provides a complete list of the flood events found during our research, with estimated floods categorized and listed in order from highest to lowest, and floods not estimated listed in chronological order. Figure 1 provides a timeline of the estimated flood events and a visual representation of the flood height estimates and confidences.

Table 5. Summary of historical floods in Stebbins, Alaska. Flood categories are included for reference: purple = major, red = moderate, yellow = minor.

	Estimated Floods							
	Flood Date	Type	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)
Major	2013-NOV-10	Storm Surge	12.2	± 0.8	± 0.5	3.71	± 0.25	± 0.16
	1960-OCT-03	Storm Surge	11.2	± 0.3	± 1.0*	3.40	± 0.08	± 0.30
	2019-AUG-03	Storm Surge	11.1	± 0.2	± 0.2	3.37	± 0.06	± 0.05
	2022-SEP-17	Storm Surge	10.7	± 0.9	± 0.0	3.27	± 0.28	± 0.00
	2003-NOV-09	Storm Surge	10.4	± 0.4	± 1.0	3.18	± 0.11	± 0.30
	1974-NOV-11	Storm Surge	10.0	± 0.3	± 0.7	3.04	± 0.08	± 0.21
	1964-SEP-22	Storm Surge	9.3	± 0.3	± 1.0*	2.82	± 0.08	± 0.30*
	1965-NOV-14	Storm Surge	9.3	± 0.3	± 1.0*	2.82	± 0.08	± 0.30*
Moderate	1986	Storm Surge	8.3	± 0.3	± 0.1	2.52	± 0.08	± 0.02

Table 5, continued. Summary of historical floods in Stebbins, Alaska. Flood categories are included for reference: purple = major, red = moderate, and yellow = minor.

Estimated Floods

	Flood Date	Type	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)
Minor	1959-NOV-15	Storm Surge	7.3	± 0.3	± 1.0*	2.21	± 0.08	± 0.30*
	2004-OCT-19	Storm Surge	7.1	± 0.3	± 0.1	2.18	± 0.10	± 0.02

Floods Not Estimated

Date	Type	Date	Type
1973-NOV-10	Storm Surge	2016-DEC-30	Storm Surge
1996-OCT-27	Storm Surge	2023-MAY-13	Storm Surge
2005-SEP-23	Storm Surge	2024-OCT-22	Storm Surge
2011-NOV-09	Storm Surge		

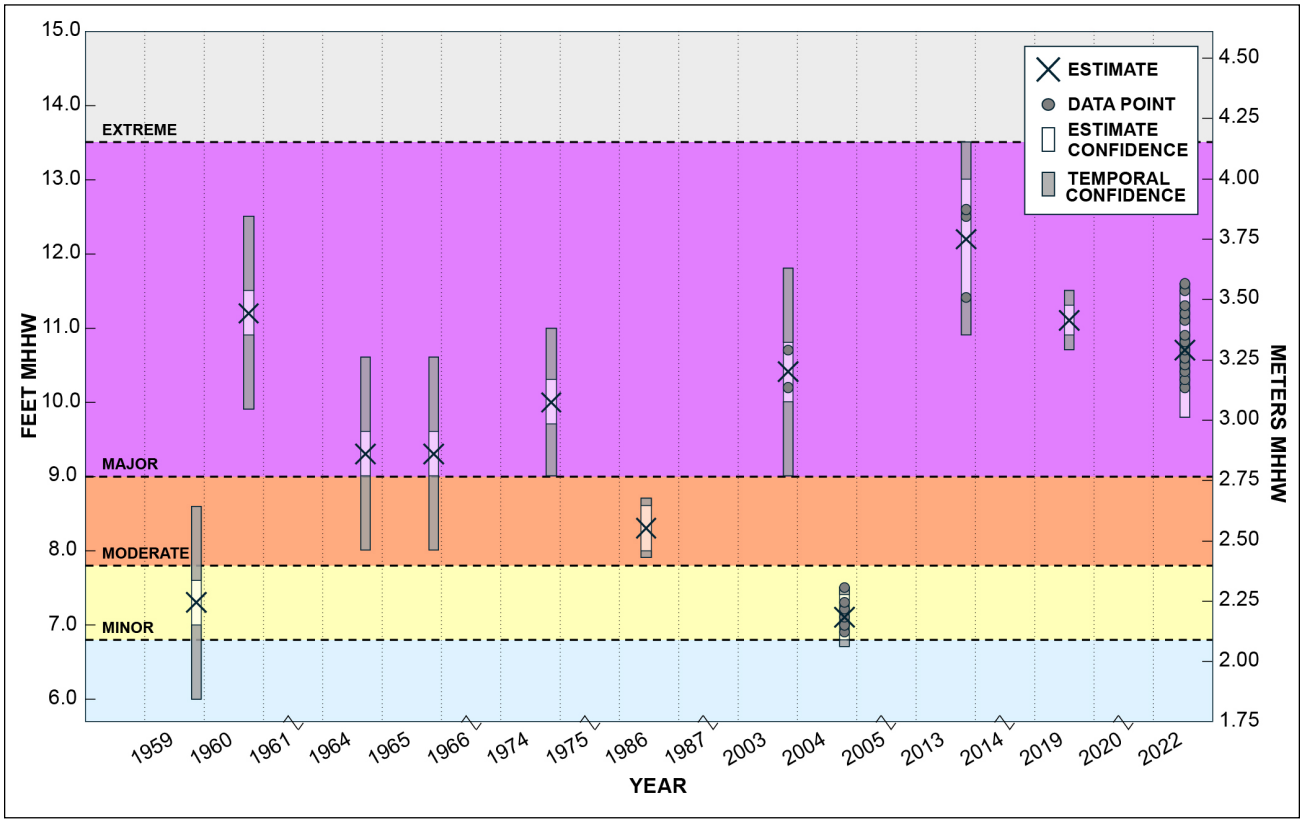

Figure 1. Timeline of estimated flood events and visual representation of flood height estimates and confidences for Stebbins, Alaska. Flood height estimates were calculated following the methods developed by Horen, Poisson, and others (2024). Estimates are denoted by black X symbols. Data points used during estimation are represented by dark-gray dots. Estimate confidences are displayed as vertical, light-gray boxes. Temporal confidences are displayed as vertical, dark-gray boxes. Each flood height estimate may only be classified into a single flood impact category, but total estimate confidences may exceed the upper and lower bounds of the data used during estimation and may span more than one flood impact category.

FLOOD EVENT SUMMARIES

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
1959-NOV-15	7.3	± 0.3	± 1.0*	2.21	± 0.08	± 0.30*	Minor

NOAA (1959) reported "[s]trong winds affecting a wide area from Umnak Island through the Alaska Peninsula and up the western coast to Norton Sound" between November 14 and 16, 1959. USACE (1988) estimated a flood height during this event at 13.0 ft (3.96 m) MLLW (1982), which translates to 7.3 ft (2.21 m) MHHW.

Though this flood estimate is categorized as minor based on the average, the relatively large confidence range associated with this estimate could also place this flood event within the moderate impact category.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
1960-OCT-03	11.2	± 0.3	± 1.0*	3.40	± 0.08	± 0.30*	Major

NOAA (1960) reported a "[w]indstorm accompanied by strong wave action" in Norton Sound between October 2 and 4, 1960. USACE (1988) estimated a flood height during this event at 16.9 ft (5.15 m) MLLW (1982), which translates to 11.2 ft (3.40 m) MHHW.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
1964-SEP-22	9.3	± 0.3	± 1.0*	2.82	± 0.08	± 0.30*	Major

USACE (1973) included a note dated October 24, 1968, that reported an event in September 1964 "resulted in flooding of about 12 to 14 homes" with major losses of subsistence stores and "3 to 4 feet" of deposition on the beach. Wise and others (1981) place the date of this event on September 22, 1964. USACE (1988) estimated a flood height during this event at 15.0 ft (4.57 m) MLLW (1982), which translates to 9.3 ft (2.82 m) MHHW.

Though this flood estimate is categorized as major based on the average, the relatively large confidence range associated with this estimate could also place this flood event within the moderate impact category.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
1965-NOV-14	9.3	± 0.3	± 1.0*	2.82	± 0.08	± 0.30*	Major

NOAA (1965) reported a series of storms that impacted the western coast of Alaska between November 5 and 15, 1965, the second of which impacted "the Unalakleet area, affecting the coastal area all along Norton Sound." USACE (1988) estimated a flood height during this event at 15.0 ft (4.57 m) MLLW (1982), which translates to 9.3 ft (2.82 m) MHHW.

Though this flood estimate is categorized as major based on the average, the relatively large confidence range associated with this estimate could also place this flood event within the moderate impact category.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
1973-NOV-10	–	–	–	–	–	–	No flood height estimate

A note from USACE (1973) labeled "Bearing [sic] Sea Storm Nov. 10, 1973" reports no damage to Stebbins during this event because "preventive measures taken by local officials prevented loss of personal property."

A flood height could not be estimated for this event because a specific water height could not be identified from the information provided.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
1974-NOV-11	10.0	± 0.3	± 0.7	3.04	± 0.08	± 0.21	Major

NOAA (1974) reported "[o]n November 11, 1974, a dissterous [sic] storm struck the northwest coastal region of Alaska" and "[t]wo families suffered minor personal property loss" in Stebbins. USACE (1988) estimated a flood height during this event at 15.7 ft (4.79 m) MLLW (1982), which translates to 10.0 ft (3.04 m) MHHW.

Though this flood estimate is categorized as major based on the average, the relatively large confidence range associated with this estimate could also place this flood event within the moderate impact category.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
1986	8.3	± 0.3	± 0.1	2.52	± 0.08	± 0.02	Moderate

USACE (1988) estimated a flood height during this event at 14.0 ft (4.27 m) MLLW (1982), which translates to 8.3 ft (2.52 m) MHHW.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
1996-OCT-27	–	–	–	–	–	–	No flood height estimate

NOAA (1996) reported high winds as the remnants of typhoon Carlo entered the Norton Sound area.

A flood height could not be estimated for this event because a specific water height could not be identified from the information provided.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2003-NOV-09	10.4	± 0.4	± 1.0	3.18	± 0.11	± 0.30	Major

The National Centers for Environmental Information (NCEI) Storm Events Database reported storm surge in the Bering Sea and Norton Sound area between November 7 and 9, 2003, noting "[h]ouses were flooded and post office had water up to the door" and "Main Street was underwater" in Stebbins (NCEI, 2003).

The first-floor height of the post office is 14.5 ft (4.41 m) MHHW, which situates it higher than the first-floor heights of 86 residential buildings and the highest point along Abel Street, the most likely "main" street to which the NCEI report refers. A flood of this magnitude would also result in near total inundation of the airstrip, but Baker and Coastal (2007) conducted interviews with community members during a site visit in 2005, noting "at no time has the Stebbins airport been under water since its construction in 1963." In deference to the local knowledge gathered by Baker and Coastal (2007), it is reasonable to assume that the "water up to the door" at the post office may have been a component of runup and thus would not be suitable for estimating this flood event; instead, we assessed the remaining information provided by NCEI (2003).

Measured from the 2022 DSM, the lowest portion of Abel Street, in front of the post office, would be flooded across its full width at a height of 10.2 ft (3.11 m) MHHW, while the greatest flood height possible without causing inundation of the airstrip would be 10.7 ft (3.25 m) MHHW. Based on the 2024 first-floor survey, a minimum of at least two residential buildings would have flooded at a height of 9.7 ft (2.96 m) MHHW, meaning that the upper and lower limits of flooding necessary to inundate at least some portion of Abel Street would be sufficient to flood more than one residence. An average of the two heights along Abel Street was calculated to estimate a flood height of 10.4 ft (3.18 m) MHHW.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2004-OCT-19	7.1	± 0.3	± 0.1	2.18	± 0.10	± 0.02	Minor

The NCEI Storm Events Database reported storm surge along the western coast of Alaska on October 18 and 19, 2004, noting "no damage to structures but some erosion problems and road damages" in Stebbins, with "[s]ome people… evacuated to St. Michael during the storm" (NCEI, 2004). During a site visit in 2005, Baker and Coastal (2007) collected "strandline" HWM associated with this event, 13 of which were strong indicators located along the south side of the airstrip (fig. 2), with heights ranging from 6.9 ft (2.09 m) to 7.5 ft (2.27 m) MHHW. An average of the 13 heights recorded by Baker and Coastal (2007) was calculated to estimate a flood height of 7.1 ft (2.18 m) MHHW.

Figure 2. High water mark "strandline" along the southern edge of the airstrip in Stebbins, Alaska, associated with the October 2004 flood event and collected in August 2005 by Baker and Coastal (2007).

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2005-SEP-23	–	–	–	–	–	–	Moderate

The NCEI Storm Events Database reported storm surge along the western coast of Alaska on September 23, 2005, noting "damage to Cache house, Smoke house and Sauna house near the beach" in Stebbins, as well as stating the "BIA road damaged" and "[t]he floats south of Stebbins were flooded approximately 1/2 mile inland" (NCEI, 2005). Baker and Coastal (2007) conducted follow-up interviews with two community members in the days following this flood event for comparison with the 2004 event, with one commenting "[t]he waves were significantly larger… however, the water levels did not reach as high" and another commenting the "2005 flood level was higher than what was observed in 2004."

A flood height could not be estimated for this event. However, even though a specific water height could not be identified from the information provided, we categorize this event as moderate because subsistence materials were damaged.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2011-NOV-09	–	–	–	–	–	–	No flood height estimate

The NCEI Storm Events Database reported a storm on September 9, 2011, that "was one of the strongest storms to impact the west coast of Alaska since November 1974," noting "[a]t Stebbins, local law enforcement reported… coastal flooding with a lot of water around the village, but no reports that any structures were flooded" (NCEI, 2011).

A flood height could not be estimated for this event because a specific water height could not be identified from the information provided.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2013-NOV-10	12.2	± 0.8	± 0.5	3.71	± 0.25	± 0.16	Major

The NCEI Storm Events Database reported a series of Bering Sea storms that occurred in early November 2013, the most severe of which impacted Stebbins between November 9 and 10, coinciding with high tide and leaving 16 homes damaged, four of which "were deemed unlivable" (NCEI, 2013). During the July 2022 survey, water heights were identified corresponding to this flood event (figs. 3 and 4).

Figure 3. High water mark associated with the November 2013 flood event identified on the back exterior wall of the teacher housing building in Stebbins, Alaska.

Figure 4. High water mark associated with the November 2013 flood event identified at the northeast corner of the old store in Stebbins, Alaska.

To estimate the height of this flood, we first used pixel comparison measurements to determine the height of the HWM identified in the photograph taken at the time of the event (fig. 3), finding the indicated location on the side of the teacher housing building to be 1.3 ft (0.41 m) above the first-floor height of 11.2 ft (3.40 m) MHHW, for a combined height of 12.5 ft (3.81 m) MHHW. During the September 2022 survey (Horen and others, 2022), the ground height at the corner of the old store building featured in the photograph (fig. 4) was surveyed at 6.7 ft (2.04 m) MHHW. Using pixel comparison measurements, we found the height of the indicated HWM to be 5.9 ft (1.80 m) above ground level, providing a combined height of 12.6 ft (3.84 m) MHHW. Finally, given the description that 16 homes were damaged, with four of those condemned, we identified the 16 lowest current and former residential buildings from the 2024 first-floor survey, the highest of which has a first-floor height of 11.4 ft (3.49 m) MHHW. An average of these three heights was calculated to estimate a flood height of 12.2 ft (3.71 m) MHHW.

The upper limit of this estimate's confidence forms the basis for the threshold between the major and extreme impact categories.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2016-DEC-30	–	–	–	–	–	–	No flood height estimate

The NCEI Storm Events Database reported "[b]ack to back strong low pressure systems affected much of the state over several days from December 28th 2016 until January 2nd 2017" and "[v]illages along Norton sound [sic] reported high surge values of 5 to 9 feet breaking up the ice near shore and pushing it up onto the land" (NCEI, 2016).

A flood height could not be estimated for this event because a specific water height in Stebbins could not be identified from the information provided.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2019-AUG-03	11.1	± 0.2	± 0.2	3.37	± 0.06	± 0.05	Major

The NCEI Storm Events Database reported storm surge in Norton Sound on August 2 and 3, 2019, noting "minor flooding was observed" in Stebbins and "a few homes were surrounded by water" (NCEI, 2019). A HWM was identified by a community member (fig. 5) and collected by DGGS during the July 2022 survey. The height of this HWM is 11.1 ft (3.37 m) MHHW.

Figure 5. High water mark associated with the August 2019 flood event identified by a community member at the steps of a residence in Stebbins, Alaska.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2022-SEP-17	10.7	± 0.9	± 0.0	3.25	± 0.28	± 0.00	Major

NCEI (2022) reported the remnants of Typhoon Merbok reached the eastern coast of Norton Sound on September 17, 2022, with an estimate "that water levels peaked at 10 feet above Mean Higher High Water Saturday afternoon but remained elevated into Sunday afternoon" in Stebbins. NCEI (2022) detailed several impacts from this storm, including "[m]ajor flooding and erosion… in parts of the village," and damage to two homes, as well as the school.

DGGS deployed a team to Stebbins on September 23, 2022, to collect HWM data following this storm event (Horen and others, 2022). The team photographed and measured 36 HWM points, recording the GNSS position, type of high-water feature, height above ground (if applicable), and description of each mark (Horen and others, 2022). One "present-at-the-peak" HWM was found to be more than three standard deviations above the mean of all HWM and so was deemed unreasonably high in comparison. An average of the remaining 35 HWM was calculated to estimate a flood height of 10.7 ft (3.25 m) MHHW.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2023-MAY-13	–	–	–	–	–	–	No flood height estimate

The NCEI Storm Events Database reported high winds impacted the west coast of Alaska on "the afternoon of the 13th and continued into the early morning hours of the 14th" (NCEI, 2023). A federal disaster declaration was issued on August 23, 2023, stating "the damage in certain areas of the State of Alaska resulting from flooding during the period of May 12 to June 3, 2023, is of sufficient severity and magnitude to warrant a major disaster declaration" (FEMA, 2023).

A flood height could not be estimated for this event because a specific water height in Stebbins could not be identified from the information provided.

Flood Date	Height (ft MHHW)	Estimate Confidence (ft)	Temporal Confidence (ft)	Height (m MHHW)	Estimate Confidence (m)	Temporal Confidence (m)	Category
2024-OCT-22	–	–	–	–	–	–	No flood height estimate

The NCEI Storm Events Database reported a "major fall storm" that "brought coastal flooding" and "pushe[d] a surge of water all along the West Coast," with "minor erosion and debris" reported in Stebbins (NCEI, 2024).

A flood height could not be estimated for this event because a specific water height in Stebbins could not be identified from the information provided.

ACKNOWLEDGMENTS

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REFERENCES

Alaska Division of Community & Regional Affairs (DCRA), 2004, Community profile map, Stebbins: Department of Commerce, Community, and Economic Development. https://www.commerce.alaska.gov/web/dcra/PlanningLandManagement/CommunityProfileMaps.aspx

Baker, Michael Jr., and Coastal Frontiers Corporation (Coastal), 2007, Stebbins hydrologic and hydraulic report: Alaska Department of Transportation & Public Facilities, Northern Region, 96 p.

Buzard, R.M., Overbeck, J.R., Chriest, Jonathan, Endres, K.L., and Plumb, E.W., 2021, Coastal flood impact assessments for Alaska communities: Alaska Division of Geological & Geophysical Surveys Report of Investigation 2021-1, 16 p. https://doi.org/10.14509/30573

Federal Emergency Management Agency (FEMA), 2004, Alaska severe winter storm, tidal surges and flooding: Disaster Declaration DR-1571-AK. https://www.fema.gov/disaster/1571

———2005, Severe fall storm, tidal surges, and flooding in Alaska: Disaster Declaration DR-1618-AK. https://www.fema.gov/disaster/1618

———2011, Severe winter storms and flooding in Alaska: Disaster Declaration DR-4050-AK. https://www.fema.gov/disaster/4050

———2014, Severe storms, straight-line winds, and flooding in Alaska: Disaster Declaration DR-4162-AK. https://www.fema.gov/disaster/4162

———2022, Alaska severe storm, flooding, and landslides: Disaster Declaration DR-4672-AK. https://www.fema.gov/disaster/4672

———2023, Alaska flooding: Disaster Declaration DR-4730-AK. https://www.fema.gov/disaster/4730

———2025, Alaska severe storm and flooding: Disaster Declaration DR-4859-AK. https://www.fema.gov/disaster/4859

Horen, K.C., Poisson, A.C., Siemsen, Z.J., Donohue, J.M., Widmer, K.L., Adams, J.D., and Overbeck, J.R., 2022, Storm impact survey data for selected Alaska coastal communities in response to Extra-Tropical Cyclone Merbok, September 2022: Alaska Division of Geological & Geophysical Surveys Raw Data File 2022-14, 8 p. https://doi.org/10.14509/30909

Horen, K.C., Brayton, C.E., Christian, J.E., Overbeck, J.R., Poisson, A.C., and Siemsen, Z.J., 2024, Photogrammetry-derived orthoimagery and elevation data for Stebbins, Alaska, collected July 10, 2022: Alaska Division of Geological & Geophysical Surveys Raw Data File 2024-23, 6 p. https://doi.org/10.14509/31292

Horen, K.C., Poisson, A.C., Christian, J.E., and Nieminski, N.M., 2024, Methods for evaluating coastal flood impacts in Alaska communities: Alaska Division of Geological & Geophysical Surveys Miscellaneous Publication 177, 13 p. https://doi.org/10.14509/31279

National Centers for Environmental Information (NCEI), 2003, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5335279

———2004, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5426735

———2005, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=5474431

———2011, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=350803

———2013, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=485202

———2016, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=671893

———2019, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=852822

———2022, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncei.noaa.gov/stormevents/eventdetails.jsp?id=1058048

———2023, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=1104906

———2024, Storm events database: National Oceanic and Atmospheric Administration, 1 p. https://www.ncdc.noaa.gov/stormevents/eventdetails.jsp?id=1220721

National Oceanic and Atmospheric Administration (NOAA), 1959, Storm data—November 1959: U.S. Department of Commerce, v. 1, no. 11, 5 p

———1960, Storm data—October 1960: U.S. Department of Commerce, v. 2, no. 10, 7 p.

——— 1965, Storm data—December 1965: U.S. Department of Commerce, v. 7, no. 12, 5 p.

———1974, Storm data—November 1974: U.S. Department of Commerce, v. 16, no. 11, 7 p.

———1996, Storm data—October 1996: U.S. Department of Commerce, v. 38, no. 10, 120 p.

National Weather Service (NWS), 2016, High water level terminology, accessed May 8, 2024, https://www.weather.gov/aprfc/terminology.

———2018, Coastal flood categories: National Weather Service Eastern Region supplement 01-2018, 9 p. https://www.weather.gov/media/directives/010_pdfs/pd01001003a012018curr.pdf

United States Army Corps of Engineers (USACE), 2017, Stebbins floodplain notes: USACE Alaska District Floodplain Manager, 2 p.

———1973, Stebbins Floodplain Notes: USACE Alaska District Floodplain Manager, 3 p.

———1987, Trip report, Stebbins, 8 thru 10 September 1987: USACE Alaska District Floodplain Manager, 19 p.

———1988, Flood damage reduction section 205 reconnaissance report Stebbins, Alaska: USACE Alaska District Floodplain Manager, 35 p.

———1993, Field trip, Saint Michael and Stebbins: USACE Alaska District Floodplain Manager, 3 p.

Wise, J.L., Comiskey, A.L., and Becker, Richard, Jr., 1981, Storm surge climatology and forecasting in Alaska: Arctic Environmental Information and Data Center, University of Alaska, 61 p.

APPENDIX A: STEBBINS, ALASKA, FIRST-FLOOR HEIGHTS

March 18, 2024

Stebbins, Alaska Finish Floor Elevation Study ANTHC Project No. AKAJK9-1499MDS

The data provided is from a field survey completed by ANTHC on March 14, 2024. Project elevations are NAVD88 Orthometric heights (U.S. Feet), computed using GEOID12B, and were measured utilizing Trimble R12i and Trimble R10 GPS Receivers using RTK GPS.

BASIS OF HORIZONTAL CONTROL:
The Basis of Horizontal Control is ANTHC Point 401, a PK nail set approximately 300 feet northwest of the Stebbins fuel farm and approximately 10 feet west of gravel road edge of Fulton Street. The position for this point was derived through a static GPS session using a Trimble R12i GPS Receiver post processed using the National Geodetic Survey (NGS) Online Positioning User Service (OPUS). Said point has the following coordinates:

NAD83(2011)(EPOCH2010.00) Geodetic Coordinates: Latitude = 63° 31' 21.37739" N
Longitude = 162° 17' 18.68744" W

NAD83(2011)(EPOCH2010.00) Alaska State Plane Zone 7, U.S. Feet: Northing = 3,479,807.30'
Easting = 1,593,314.09'

BASIS OF VERTICAL CONTROL:
The Basis of Vertical Control is ANTHC Point 401, a PK nail set approximately 300 feet northwest of the Stebbins fuel farm and approximately 10 feet west of gravel road edge of Fulton Street. Said point has a NAVD88 Orthometric height of 2.953m/9.69'.

Sincerely,

Paul Russell, PLS Survey Manager

Enclosures:

- Stebbins-FF_AKSPZ7.csv
- Stebbins-FF_NAVD83(2011).csv
- OPUS Report_Pt-401_20240314.pdf

FF = Finish Floor GS = Ground Shot

401	3479807.3	1593314.09	9.69	PK
551	3477734.3	1593426.19	15.01	DRIVE ROD
4001	3481795.11	1592183.77	16.88	FF HOME
4002	3481411.57	1592357.32	16.1	FF HOME
4003	3481291.57	1592422.61	19.12	FF ABANDONED
4004	3481143.95	1592442.53	16.56	FF ABANDONED
4005	3480898.1	1592586.68	15.91	FF ABANDONED
4006	3480636.88	1592692.15	17.73	FF HOME
4007	3480724.12	1592631.41	17.47	FF HOME
4008	3480226.48	1592858.64	19.22	FF POST OFFICE / CITY OFFICE / STORE
4009	3480153.18	1592859.44	17.44	FF HOME
4010	3480110.36	1592949.9	15.85	FF HOME
4011	3479917.48	1593022.73	14.67	FF HOME
4012	3479885.73	1592975.73	16.29	FF HOME
4013	3479966.2	1592904.19	16.94	FF HOME
4014	3479872.31	1592998.26	16.17	FF HOME
4015	3479839.44	1592974.35	17.05	FF HOME
4016	3479838.07	1593035.41	19.64	FF HOME
4017	3479815.84	1593038.89	15.07	FF HOME
4018	3479694.56	1593046.81	17.15	FF HOME
4019	3479749.84	1593038.27	14.48	FF HOME
4020	3479616.84	1593069.39	22.18	FF CHURCH
4021	3479573.62	1593063.16	18.77	FF HOME
4022	3479330.49	1593152.5	16.41	FF HOME
4023	3479275.63	1593149.41	17.82	FF TELALASKA
4024	3479189.5	1593154.68	18.66	FF HEAD START
4025	3479173.65	1593174.56	16.92	FF HOME
4026	3479087.58	1593158.33	18.3	FF HOME
4027	3479064.29	1593208.99	18.11	FF ABANDONED
4028	3479066.91	1593285.72	16.93	FF ABANDONED
4029	3479063.91	1593310.91	16.93	FF HOME
4030	3479135.94	1593263.61	16.91	FF HOME
4031	3479147.21	1593291.22	17.36	FF HOME
4032	3479180.13	1593277.2	16.5	FF HOME
4033	3479200.04	1593217.05	16.11	FF HOME
4034	3479220.35	1593295.73	16.46	FF HOME
4035	3478873.42	1593370.06	20.78	FF WASHETERIA
4036	3478863.69	1593327.79	21.03	FF WASHETERIA
4037	3478890.83	1593292.05	17.88	FF OLD WASHETERIA
4038	3478990.53	1593415.49	18.49	FF OLD WATER STORAGE TANK
4039	3479079.85	1593511.82	21.88	FF WATER TREATMENT PLANT
4040	3479137	1593531.05	22.09	FF WATER TREATMENT PLANT FUEL TANK
4041	3479186.99	1593520.72	21.75	FF WATER STORAGE TANK
4042	3479035.31	1593560.66	17.86	FF STEBBINS NATIVE CORPORATION
4176	3478469.05	1593362.6	21.96	FF TEACHER HOUSING
4177	3478494.16	1593434.93	19.08	FF TEACHER HOUSING ABANDONED

4178	3478513.37	1593529.88	18.2	FF TEACHER HOUSING
4179	3478542.77	1593560.77	18.07	FF TEACHER HOUSING
4180	3478560.68	1593576.41	18.02	FF TEACHER HOUSING
4181	3478537.93	1593610.03	17.94	FF TEACHER HOUSING
4182	3478632.79	1593620.48	15.92	FF TEACHER HOUSING
4183	3478659.48	1593698.7	18.27	FF TEACHER HOUSING
4184	3478703.17	1593620.37	15.04	FF TAPRAQ ROCK LLC
4185	3478668.39	1593574.2	12.64	FF SEWER LIFT STATION
4186	3478595.81	1593727.09	17.98	FF BLDG
4187	3478539.13	1593696.48	18.7	FF BLDG
4188	3478389.98	1593535	19.39	FF COUNSELING OFFICE
4189	3478394.1	1593490.71	18.17	FF HOME
4190	3478377.97	1593434.44	16.46	FF HOME
4191	3478293.24	1593452	16.82	FF HOME
4192	3478193.32	1593451.38	16.82	FF HOME
4193	3478113.55	1593464.91	16.36	FF HOME
4194	3477969.32	1593467.06	17.4	FF HOME
4195	3477900.58	1593471.17	16.98	FF HOME
4196	3477841.58	1593472.94	17.15	FF ABANDONED
4197	3477809.25	1593478.05	17.57	FF HOME
4198	3477719.76	1593485.66	17.54	FF HOME
4199	3477647.18	1593483.98	17.98	FF HOME
4200	3477626.56	1593547	18.9	FF HOME
4201	3477217.78	1593750.79	18.08	GS AIRPORT MAINTENANCE BUILDING
4202	3477973.51	1596406.41	14.07	GS RUNWAY EDGE
4203	3477297.87	1594959.32	16.21	GS RUNWAY EDGE
4204	3476676.28	1593680.47	16.17	GS RUNWAY EDGE
4205	3477386.44	1593783.83	18.97	FF HOME
4206	3477513.56	1593838.41	22.29	FF HOME
4207	3477681.75	1593818.74	19.88	FF HOME
4208	3477780.67	1593810.91	20.4	FF HOME
4209	3477812.24	1593920.47	21.43	FF HOME
4210	3477914.72	1593914.95	19.8	FF HOME
4211	3477914.93	1593815.85	19.91	FF HOME
4212	3478024.33	1593812.14	20.5	FF HOME
4213	3478014.63	1593909.7	19.66	FF HOME
4214	3478645.78	1593874.49	20.57	FF GCI
4215	3478715.73	1593876.8	13.63	FF GCI
4216	3478519.65	1594015.35	21.68	FF HOME
4217	3478412.63	1594018.23	22.03	FF HOME
4218	3478335.59	1594035.18	22.22	FF HOME
4219	3478146.99	1594031.38	22.33	FF HOME
4220	3478097.52	1594041.7	22.67	FF HOME
4221	3477998.79	1594054.45	22.36	FF HOME
4222	3477894.14	1594067.87	21.85	FF HOME
4223	3477834.22	1594054.45	17.27	FF HOME
4224	3477702.13	1594371.4	19.25	FF HOME
4225	3477685.74	1594431.85	18.24	FF HOME

4226	3477748.95	1594475.41	18.48	FF HOME
4227	3477851.69	1594457.07	17.31	FF HOME
4228	3477929.63	1594454.16	16.85	FF HOME
4229	3478004.23	1594449.67	16.64	FF HOME
4230	3478079.39	1594444.97	17.28	FF HOME
4231	3478148.47	1594438.22	18.19	FF HOME
4232	3478228.78	1594435.91	18.52	FF HOME
4233	3478280.45	1594427.37	18.27	FF HOME
4234	3479745.47	1594649.98	37.71	FF HOME
4235	3479985.43	1594697.6	41.54	FF HOME
4236	3480050.43	1594633.93	48.97	FF HOME
4237	3480130.77	1594545.67	54.16	FF HOME
4238	3480242.25	1594442.8	57.56	FF HOME
4239	3480415.48	1594452.21	58.9	FF HOME
4240	3480443.94	1594458.94	58.66	FF HOME
4241	3480611.32	1594497.93	56.84	FF HOME
4242	3480729.36	1594548.59	59.89	FF HOME
4243	3480831.71	1594561.59	64.72	FF HOME
4244	3480953.22	1594586.93	68.46	FF HOME
4245	3481040.61	1594419.83	76.56	FF HOME
4246	3481161.84	1594413.68	82.13	FF HOME
4247	3480910.36	1594325.78	75.1	FF HOME
4248	3483579.08	1592953.99	80.78	GS LANDFILL
5002	3481699.68	1592218.64	16.38	FF HOME
5003	3481096.13	1592489.5	17.52	FF HOME
5004	3480949.16	1592555.91	17.24	FF HOME
5005	3480612.88	1592783.75	13.42	GS CEMETERY
5006	3480413.73	1592859.26	17.64	FF ARMORY
5007	3480326.57	1592952.54	16.89	FF TAPRAQ ROCK LLC/PUBLIC SAFETY
5008	3480255.81	1592901.43	19.21	FF LIBRARY
5009	3480186.08	1592944.9	17.93	FF HOME
5010	3480157.37	1592995.71	16.53	FF CHURCH
5011	3480064.74	1593019.9	16.69	FF HOME
5012	3479974.37	1593081.02	16.59	FF HOME
5013	3479956.18	1593061.5	16.44	FF HOME
5014	3479904.16	1593090.28	17.06	FF HOME
5015	3479911.68	1593121.27	13.86	FF HOME
5016	3479830.44	1593089.95	16.29	FF HOME
5017	3479748.32	1593099.7	17.53	FF HOME
5018	3479698.54	1593120.61	16.67	FF HOME
5019	3479670.58	1593116.43	17.68	FF HOME
5020	3479610.95	1593127.4	18.59	FF HOME
5021	3479630.56	1593168.51	16.07	FF HOME
5022	3479561.07	1593158.95	16.99	FF BUILDING
5023	3479486.67	1593099.42	16.37	FF NATIVE STORE STORAGE
5024	3479413.34	1593127.27	17.06	FF HOME
5025	3479394.61	1593174.19	18.21	FF HOME
5026	3479372.25	1593194.32	16.16	FF HOME

5027	3479413.13	1593244.42	16.96	FF HOME
5028	3479491.17	1593367.65	17.45	FF NATIVE STORE FUEL PUMP
5029	3479558.92	1593446.21	21.06	FF FUEL PUMP
5030	3479563.55	1593465.52	20.97	FF FUEL PUMP
5031	3479467.92	1593478.13	24.06	FF TOP FUEL CONTAINMENT
5032	3479467.41	1593475.86	21.25	FF BOTTOM FUEL CONTAINMENT
5033	3479331.28	1593234.17	16.68	FF HOME
5034	3479290.55	1593245.69	15.85	FF HOME
5035	3479262.4	1593251.57	16.2	FF ABANDONED
5036	3478881.01	1593671.12	20.74	FF CLINIC
5037	3478955.05	1593709.14	15.57	FF GARAGE
5038	3479226.03	1593690.5	24.03	FF FUEL CONT TOP
5039	3479226.1	1593692.88	21.05	FF FUEL CONT BOT
5040	3479162.45	1593708.03	21.38	FF POWER PLANT
5041	3479137.66	1593681.09	21.06	FF GARAGE
5042	3479146.33	1593619.72	20.99	FF AVEC HOUSING
5043	3478763.48	1593311.2	18.34	FF SCHOOL SHOP
5044	3478699.1	1593312.98	20.14	FF SCHOOL GENERATOR
5045	3478664.07	1593316.05	19.86	FF TEACHER HOUSING
5046	3478800.61	1593490.56	23.53	FF SCHOOL
5047	3478267.88	1593373.99	15.55	FF HOME
5048	3478175.66	1593384.46	17.12	FF HOME
5049	3478051.39	1593386.76	17.67	FF HOME
5050	3477982.95	1593388.03	21.42	FF HOME
5051	3477942.51	1593342.85	15.7	FF AT&T BLDG
5052	3477884.42	1593377.68	17.37	FF HOME
5053	3477663.48	1593421.42	18.06	FF ABANDONED SHOP
5054	3477618.97	1593416.17	16.9	FF ABANDONED GARAGE
5055	3477553.85	1593411.97	17.45	FF HOME
5056	3477251.14	1593504.67	18.55	FF HOME
5057	3477262.26	1593447.2	15.71	FF HOME
5058	3477394.79	1593498.97	17.11	FF HOME
5059	3477401.84	1593433.75	18.23	FF HOME
5060	3477542.79	1593473.35	18.48	FF ABANDONED STORE
5061	3477552.7	1593498.02	18.35	FF HOME
5062	3477604.6	1593494.85	17.7	FF ABANDONED HOME
5063	3477207.4	1593724.96	17.99	GS AIRPORT LIGHTING
5064	3478070.51	1596360.67	14.7	GS RUNWAY EDGE
5065	3477372.45	1594924.1	16.44	GS RUNWAY EDGE
5066	3476772.53	1593634.55	16.85	GS RUNWAY EDGE
5067	3478477.33	1593884.61	20.12	FF HOME
5068	3478393.78	1593780.93	19.66	FF HOME
5069	3478376.01	1593889.23	19.94	FF HOME
5070	3478276.89	1593894.34	20.05	FF HOME
5071	3478300.76	1593788.5	19.92	FF HOME
5072	3478225.89	1593799.15	19.62	FF HOME
5073	3478113.21	1593904.21	19.31	FF HOME
5074	3478077.93	1593789.38	19.89	FF HOME

5075	3477550.26	1594066.43	16.27	FF CITY SHOP
5076	3477539.57	1594172.88	21.32	FF ELDER CENTER
5077	3477811.08	1594189.72	24.08	FF HOME
5078	3477913.39	1594183.55	24.41	FF HOME
5079	3478031.38	1594177.67	24.95	FF HOME
5080	3478222.01	1594186.19	16.49	FF HOME
5081	3478325.96	1594334.42	18.4	FF HOME
5082	3478247.3	1594338.84	18.82	FF HOME
5083	3478172.22	1594343.38	18.69	FF HOME
5084	3478095.21	1594348.47	18.69	FF HOME
5085	3478022.39	1594352.7	18.4	FF HOME
5086	3477945.52	1594357.58	18.92	FF HOME
5087	3477873.26	1594362.04	19.14	FF HOME
5088	3477778.92	1594325.16	19.67	FF HOME
5089	3478391.59	1594425.65	17.41	FF HOME
5090	3480711.66	1594310.27	73.38	FF HOME
5091	3480629.08	1594304.46	70.89	FF HOME
5092	3480499.27	1594281.98	70.12	FF HOME
5093	3480376.27	1594260.96	69.3	FF HOME
5094	3480253.48	1594238.27	67.04	FF HOME
5095	3480083.71	1594267.63	63.29	FF STEBBINS COMMUNITY ASSOCIATION
5096	3479963.66	1594427.96	55.66	FF HOME
5097	3479883.6	1594533.58	48.78	FF HOME
5098	3480297.15	1594045	71.24	FF MORRIS COFFEY BLDG

401	63° 31' 21.37739" N	162° 17' 18.68744" W	9.69	PK
551	63° 31' 00.97447" N	162° 17' 16.01003" W	15.01	DRIVE ROD
4001	63° 31' 40.89578" N	162° 17' 43.81472" W	16.88	FF HOME
4002	63° 31' 37.12787" N	162° 17' 39.94811" W	16.1	FF HOME
4003	63° 31' 35.94945" N	162° 17' 38.49598" W	19.12	FF ABANDONED
4004	63° 31' 34.49712" N	162° 17' 38.04174" W	16.56	FF ABANDONED
4005	63° 31' 32.08332" N	162° 17' 34.83794" W	15.91	FF ABANDONED
4006	63° 31' 29.51644" N	162° 17' 32.48559" W	17.73	FF HOME
4007	63° 31' 30.37262" N	162° 17' 33.83387" W	17.47	FF HOME
4008	63° 31' 25.48371" N	162° 17' 28.77268" W	19.22	FF POST OFFICE / CITY OFFICE / STORE
4009	63° 31' 24.76219" N	162° 17' 28.74771" W	17.44	FF HOME
4010	63° 31' 24.34468" N	162° 17' 26.74854" W	15.85	FF HOME
4011	63° 31' 22.44904" N	162° 17' 25.12333" W	14.67	FF HOME
4012	63° 31' 22.13446" N	162° 17' 26.15646" W	16.29	FF HOME
4013	63° 31' 22.92341" N	162° 17' 27.74226" W	16.94	FF HOME
4014	63° 31' 22.00330" N	162° 17' 25.65838" W	16.17	FF HOME
4015	63° 31' 21.67860" N	162° 17' 26.18224" W	17.05	FF HOME
4016	63° 31' 21.66785" N	162° 17' 24.83581" W	19.64	FF HOME
4017	63° 31' 21.44916" N	162° 17' 24.75684" W	15.07	FF HOME
4018	63° 31' 20.25560" N	162° 17' 24.57003" W	17.15	FF HOME
4019	63° 31' 20.79943" N	162° 17' 24.76379" W	14.48	FF HOME
4020	63° 31' 19.49152" N	162° 17' 24.06436" W	22.18	FF CHURCH
4021	63° 31' 19.06570" N	162° 17' 24.19750" W	18.77	FF HOME
4022	63° 31' 16.67621" N	162° 17' 22.20323" W	16.41	FF HOME
4023	63° 31' 16.13596" N	162° 17' 22.26571" W	17.82	FF TELALASKA
4024	63° 31' 15.28828" N	162° 17' 22.14109" W	18.66	FF HEAD START
4025	63° 31' 15.13315" N	162° 17' 21.70118" W	16.92	FF HOME
4026	63° 31' 14.28506" N	162° 17' 22.05038" W	18.3	FF HOME
4027	63° 31' 14.05807" N	162° 17' 20.93105" W	18.11	FF ABANDONED
4028	63° 31' 14.08723" N	162° 17' 19.23936" W	16.93	FF ABANDONED
4029	63° 31' 14.05889" N	162° 17' 18.68371" W	16.93	FF HOME
4030	63° 31' 14.76585" N	162° 17' 19.73388" W	16.91	FF HOME
4031	63° 31' 14.87802" N	162° 17' 19.12620" W	17.36	FF HOME
4032	63° 31' 15.20145" N	162° 17' 19.43843" W	16.5	FF HOME
4033	63° 31' 15.39484" N	162° 17' 20.76672" W	16.11	FF HOME
4034	63° 31' 15.59830" N	162° 17' 19.03395" W	16.46	FF HOME
4035	63° 31' 12.18617" N	162° 17' 17.36048" W	20.78	FF WASHETERIA
4020	63° 31' 19.49152" N	162° 17' 24.06436" W	22.18	FF CHURCH
4036	63° 31' 12.08852" N	162° 17' 18.29159" W	21.03	FF WASHETERIA
4037	63° 31' 12.35407" N	162° 17' 19.08227" W	17.88	FF OLD WASHETERIA
4038	63° 31' 13.34111" N	162° 17' 16.37034" W	18.49	FF OLD WATER STORAGE TANK
4039	63° 31' 14.22465" N	162° 17' 14.25533" W	21.88	FF WATER TREATMENT PLANT
4040	63° 31' 14.78809" N	162° 17' 13.83681" W	22.09	FF WATER TREATMENT PLANT FUEL TANK
4041	63° 31' 15.27982" N	162° 17' 14.06949" W	21.75	FF WATER STORAGE TANK
4042	63° 31' 13.78829" N	162° 17' 13.17400" W	17.86	FF STEBBINS NATIVE CORPORATION
4176	63° 31' 08.20500" N	162° 17' 17.48488" W	21.96	FF TEACHER HOUSING

4177	63° 31' 08.45542" N	162° 17' 15.89256" W	19.08	FF TEACHER HOUSING ABANDONED
4178	63° 31' 08.64871" N	162° 17' 13.80102" W	18.2	FF TEACHER HOUSING
4179	63° 31' 08.93947" N	162° 17' 13.12276" W	18.07	FF TEACHER HOUSING
4180	63° 31' 09.11647" N	162° 17' 12.77977" W	18.02	FF TEACHER HOUSING
4181	63° 31' 08.89398" N	162° 17' 12.03617" W	17.94	FF TEACHER HOUSING
4182	63° 31' 09.82830" N	162° 17' 11.81528" W	15.92	FF TEACHER HOUSING
4183	63° 31' 10.09453" N	162° 17' 10.09306" W	18.27	FF TEACHER HOUSING
4184	63° 31' 10.52117" N	162° 17' 11.82460" W	15.04	FF TAPRAQ ROCK LLC
4185	63° 31' 10.17673" N	162° 17' 12.83910" W	12.64	FF SEWER LIFT STATION
4186	63° 31' 09.46898" N	162° 17' 09.46079" W	17.98	FF BLDG
4187	63° 31' 08.90966" N	162° 17' 10.13012" W	18.7	FF BLDG
4188	63° 31' 07.43420" N	162° 17' 13.67588" W	19.39	FF COUNSELING OFFICE
4189	63° 31' 07.47277" N	162° 17' 14.65290" W	18.17	FF HOME
4190	63° 31' 07.31148" N	162° 17' 15.89198" W	16.46	FF HOME
4191	63° 31' 06.47819" N	162° 17' 15.49635" W	16.82	FF HOME
4192	63° 31' 05.49444" N	162° 17' 15.50018" W	16.82	FF HOME
4193	63° 31' 04.70972" N	162° 17' 15.19376" W	16.36	FF HOME
4194	63° 31' 03.28992" N	162° 17' 15.13228" W	17.4	FF HOME
4195	63° 31' 02.61340" N	162° 17' 15.03483" W	16.98	FF HOME
4196	63° 31' 02.03263" N	162° 17' 14.98984" W	17.15	FF ABANDONED
4197	63° 31' 01.71462" N	162° 17' 14.87394" W	17.57	FF HOME
4198	63° 31' 00.83390" N	162° 17' 14.69735" W	17.54	FF HOME
4199	63° 31' 00.11932" N	162° 17' 14.72716" W	17.98	FF HOME
4200	63° 30' 59.91910" N	162° 17' 13.33580" W	18.9	FF HOME
4201	63° 30' 55.90384" N	162° 17' 08.80272" W	18.08	GS AIRPORT MAINTENANCE BUILDING
4202	63° 31' 03.45712" N	162° 16' 10.32756" W	14.07	GS RUNWAY EDGE
4203	63° 30' 56.74468" N	162° 16' 42.16731" W	16.21	GS RUNWAY EDGE
4204	63° 30' 50.56983" N	162° 17' 10.29962" W	16.17	GS RUNWAY EDGE
4205	63° 30' 57.56562" N	162° 17' 08.09096" W	18.97	FF HOME
4206	63° 30' 58.81949" N	162° 17' 06.90004" W	22.29	FF HOME
4207	63° 31' 00.47446" N	162° 17' 07.35026" W	19.88	FF HOME
4208	63° 31' 01.44787" N	162° 17' 07.53260" W	20.4	FF HOME
4209	63° 31' 01.76351" N	162° 17' 05.12034" W	21.43	FF HOME
4210	63° 31' 02.77218" N	162° 17' 05.25199" W	19.8	FF HOME
4211	63° 31' 02.76988" N	162° 17' 07.43681" W	19.91	FF HOME
4212	63° 31' 03.84667" N	162° 17' 07.52941" W	20.5	FF HOME
4213	63° 31' 03.75545" N	162° 17' 05.37753" W	19.66	FF HOME
4214	63° 31' 09.96742" N	162° 17' 06.21576" W	20.57	FF GCI
4215	63° 31' 10.65612" N	162° 17' 06.17180" W	13.63	FF GCI
4216	63° 31' 08.73182" N	162° 17' 03.09760" W	21.68	FF HOME
4217	63° 31' 07.67837" N	162° 17' 03.02361" W	22.03	FF HOME
4218	63° 31' 06.92068" N	162° 17' 02.64247" W	22.22	FF HOME
4219	63° 31' 05.06381" N	162° 17' 02.70774" W	22.33	FF HOME
4220	63° 31' 04.57725" N	162° 17' 02.47539" W	22.67	FF HOME
4221	63° 31' 03.60586" N	162° 17' 02.18468" W	22.36	FF HOME
4222	63° 31' 02.57619" N	162° 17' 01.87860" W	21.85	FF HOME
4223	63° 31' 01.98580" N	162° 17' 02.16852" W	17.27	FF HOME
4224	63° 31' 00.69916" N	162° 16' 55.16781" W	19.25	FF HOME

4225	63° 31' 00.54043" N	162° 16' 53.83356" W	18.24	FF HOME
4226	63° 31' 01.16455" N	162° 16' 52.87931" W	18.48	FF HOME
4227	63° 31' 02.17520" N	162° 16' 53.29372" W	17.31	FF HOME
4228	63° 31' 02.94240" N	162° 16' 53.36535" W	16.85	FF HOME
4229	63° 31' 03.67665" N	162° 16' 53.47157" W	16.64	FF HOME
4230	63° 31' 04.41632" N	162° 16' 53.58244" W	17.28	FF HOME
4231	63° 31' 05.09610" N	162° 16' 53.73792" W	18.19	FF HOME
4232	63° 31' 05.88662" N	162° 16' 53.79673" W	18.52	FF HOME
4233	63° 31' 06.39488" N	162° 16' 53.98999" W	18.27	FF HOME
4234	63° 31' 20.82716" N	162° 16' 49.22329" W	37.71	FF HOME
4235	63° 31' 23.19150" N	162° 16' 48.19640" W	41.54	FF HOME
4236	63° 31' 23.82866" N	162° 16' 49.60676" W	48.97	FF HOME
4237	63° 31' 24.61570" N	162° 16' 51.56086" W	54.16	FF HOME
4238	63° 31' 25.70873" N	162° 16' 53.84012" W	57.56	FF HOME
4239	63° 31' 27.41454" N	162° 16' 53.64938" W	58.9	FF HOME
4240	63° 31' 27.69499" N	162° 16' 53.50368" W	58.66	FF HOME
4241	63° 31' 29.34448" N	162° 16' 52.66010" W	56.84	FF HOME
4242	63° 31' 30.50878" N	162° 16' 51.55445" W	59.89	FF HOME
4243	63° 31' 31.51696" N	162° 16' 51.27769" W	64.72	FF HOME
4244	63° 31' 32.71420" N	162° 16' 50.73044" W	68.46	FF HOME
4245	63° 31' 33.56736" N	162° 16' 54.42413" W	76.56	FF HOME
4246	63° 31' 34.76052" N	162° 16' 54.57164" W	82.13	FF HOME
4247	63° 31' 32.28094" N	162° 16' 56.48564" W	75.1	FF HOME
4248	63° 31' 58.49306" N	162° 17' 27.00594" W	80.78	GS LANDFILL
5002	63° 31' 39.95796" N	162° 17' 43.03605" W	16.38	FF HOME
5003	63° 31' 34.02850" N	162° 17' 37.00099" W	17.52	FF HOME
5004	63° 31' 32.58463" N	162° 17' 35.52160" W	17.24	FF HOME
5005	63° 31' 29.28432" N	162° 17' 30.46314" W	13.42	GS CEMETERY
5006	63° 31' 27.32717" N	162° 17' 28.77783" W	17.64	FF ARMORY
5007	63° 31' 26.47323" N	162° 17' 26.71215" W	16.89	FF TAPRAQ ROCK LLC/PUBLIC SAFETY
5009	63° 31' 25.08984" N	162° 17' 26.86648" W	17.93	FF HOME
5010	63° 31' 24.80953" N	162° 17' 25.74323" W	16.53	FF CHURCH
5011	63° 31' 23.89864" N	162° 17' 25.20033" W	16.69	FF HOME
5012	63° 31' 23.01172" N	162° 17' 23.84352" W	16.59	FF HOME
5013	63° 31' 22.83175" N	162° 17' 24.27223" W	16.44	FF HOME
5014	63° 31' 22.32099" N	162° 17' 23.63233" W	17.06	FF HOME
5015	63° 31' 22.39642" N	162° 17' 22.94985" W	13.86	FF HOME
5016	63° 31' 21.59521" N	162° 17' 23.63233" W	16.29	FF HOME
5017	63° 31' 20.78716" N	162° 17' 23.40905" W	17.53	FF HOME
5018	63° 31' 20.29807" N	162° 17' 22.94308" W	16.67	FF HOME
5019	63° 31' 20.02261" N	162° 17' 23.03239" W	17.68	FF HOME
5020	63° 31' 19.43604" N	162° 17' 22.78462" W	18.59	FF HOME
5021	63° 31' 19.63098" N	162° 17' 21.88013" W	16.07	FF HOME
5022	63° 31' 18.94645" N	162° 17' 22.08398" W	16.99	FF BUILDING
5023	63° 31' 18.21134" N	162° 17' 23.38922" W	16.37	FF NATIVE STORE STORAGE
5024	63° 31' 17.49067" N	162° 17' 22.76775" W	17.06	FF HOME
5025	63° 31' 17.30836" N	162° 17' 21.73129" W	18.21	FF HOME
5026	63° 31' 17.08915" N	162° 17' 21.28526" W	16.16	FF HOME

5027	63° 31' 17.49386" N	162° 17' 20.18449" W	16.96	FF HOME
5028	63° 31' 18.26756" N	162° 17' 17.47507" W	17.45	FF NATIVE STORE FUEL PUMP
5029	63° 31' 18.93804" N	162° 17' 15.74940" W	21.06	FF FUEL PUMP
5030	63° 31' 18.98443" N	162° 17' 15.32400" W	20.97	FF FUEL PUMP
5031	63° 31' 18.04362" N	162° 17' 15.03654" W	24.06	FF TOP FUEL CONTAINMENT
5032	63° 31' 18.03844" N	162° 17' 15.08645" W	21.25	FF BOTTOM FUEL CONTAINMENT
5033	63° 31' 16.68755" N	162° 17' 20.40228" W	16.68	FF HOME
5034	63° 31' 16.28714" N	162° 17' 20.14424" W	15.85	FF HOME
5035	63° 31' 16.01023" N	162° 17' 20.01186" W	16.2	FF ABANDONED
5036	63° 31' 12.27422" N	162° 17' 10.72301" W	20.74	FF CLINIC
5037	63° 31' 13.00477" N	162° 17' 09.89205" W	15.57	FF GARAGE
5038	63° 31' 15.67161" N	162° 17' 10.32982" W	24.03	FF FUEL CONT TOP
5039	63° 31' 15.67246" N	162° 17' 10.27730" W	21.05	FF FUEL CONT BOT
5040	63° 31' 15.04651" N	162° 17' 09.93699" W	21.38	FF POWER PLANT
5041	63° 31' 14.80120" N	162° 17' 10.52852" W	21.06	FF GARAGE
5042	63° 31' 14.88389" N	162° 17' 11.88252" W	20.99	FF AVEC HOUSING
5043	63° 31' 11.10120" N	162° 17' 18.64736" W	18.34	FF SCHOOL SHOP
5044	63° 31' 10.46748" N	162° 17' 18.60183" W	20.14	FF SCHOOL GENERATOR
5045	63° 31' 10.12276" N	162° 17' 18.53069" W	19.86	FF TEACHER HOUSING
5046	63° 31' 11.47476" N	162° 17' 14.69641" W	23.53	FF SCHOOL
5047	63° 31' 06.22501" N	162° 17' 17.21369" W	15.55	FF HOME
5048	63° 31' 05.31763" N	162° 17' 16.97370" W	17.12	FF HOME
5049	63° 31' 04.09436" N	162° 17' 16.91079" W	17.67	FF HOME
5050	63° 31' 03.42066" N	162° 17' 16.87591" W	21.42	FF HOME
5051	63° 31' 03.02047" N	162° 17' 17.86803" W	15.7	FF AT&T BLDG
5052	63° 31' 02.45021" N	162° 17' 17.09426" W	17.37	FF HOME
5053	63° 31' 00.27704" N	162° 17' 16.10803" W	18.06	FF ABANDONED SHOP
5054	63° 30' 59.83866" N	162° 17' 16.21952" W	16.9	FF ABANDONED GARAGE
5055	63° 30' 59.19739" N	162° 17' 16.30562" W	17.45	FF HOME
5056	63° 30' 56.22138" N	162° 17' 14.23182" W	18.55	FF HOME
5057	63° 30' 56.32836" N	162° 17' 15.49997" W	15.71	FF HOME
5058	63° 30' 57.63527" N	162° 17' 14.37182" W	17.11	FF HOME
5059	63° 30' 57.70180" N	162° 17' 15.81039" W	18.23	FF HOME
5060	63° 30' 59.09116" N	162° 17' 14.95125" W	18.48	FF ABANDONED STORE
5061	63° 30' 59.18983" N	162° 17' 14.40845" W	18.35	FF HOME
5062	63° 30' 59.70064" N	162° 17' 14.48335" W	17.7	FF ABANDONED HOME
5063	63° 30' 55.80049" N	162° 17' 09.37115" W	17.99	GS AIRPORT LIGHTING
5064	63° 31' 04.41015" N	162° 16' 11.34503" W	14.7	GS RUNWAY EDGE
5065	63° 30' 57.47740" N	162° 16' 42.95104" W	16.44	GS RUNWAY EDGE
5066	63° 30' 51.51538" N	162° 17' 11.32128" W	16.85	GS RUNWAY EDGE
5061	63° 30' 59.18983" N	162° 17' 14.40845" W	18.35	FF HOME
5062	63° 30' 59.70064" N	162° 17' 14.48335" W	17.7	FF ABANDONED HOME
5063	63° 30' 55.80049" N	162° 17' 09.37115" W	17.99	GS AIRPORT LIGHTING
5064	63° 31' 04.41015" N	162° 16' 11.34503" W	14.7	GS RUNWAY EDGE
5065	63° 30' 57.47740" N	162° 16' 42.95104" W	16.44	GS RUNWAY EDGE
5066	63° 30' 51.51538" N	162° 17' 11.32128" W	16.85	GS RUNWAY EDGE
5067	63° 31' 08.30951" N	162° 17' 05.97616" W	20.12	FF HOME
5068	63° 31' 07.48239" N	162° 17' 08.25384" W	19.66	FF HOME

5069	63° 31' 07.31219" N	162° 17' 05.86444" W	19.94	FF HOME
5070	63° 31' 06.33664" N	162° 17' 05.74192" W	20.05	FF HOME
5071	63° 31' 06.56702" N	162° 17' 08.07790" W	19.92	FF HOME
5072	63° 31' 05.83043" N	162° 17' 07.83577" W	19.62	FF HOME
5073	63° 31' 04.72570" N	162° 17' 05.50832" W	19.31	FF HOME
5074	63° 31' 04.37335" N	162° 17' 08.03651" W	19.89	FF HOME
5075	63° 30' 59.19083" N	162° 17' 01.87666" W	16.27	FF CITY SHOP
5076	63° 30' 59.09020" N	162° 16' 59.52877" W	21.32	FF ELDER CENTER
5077	63° 31' 01.76389" N	162° 16' 59.18392" W	24.08	FF HOME
5078	63° 31' 02.77080" N	162° 16' 59.32996" W	24.41	FF HOME
5079	63° 31' 03.93207" N	162° 16' 59.47123" W	24.95	FF HOME
5080	63° 31' 05.80915" N	162° 16' 59.30198" W	16.49	FF HOME
5081	63° 31' 06.83898" N	162° 16' 56.04392" W	18.4	FF HOME
5082	63° 31' 06.06474" N	162° 16' 55.93871" W	18.82	FF HOME
5083	63° 31' 05.32578" N	162° 16' 55.83127" W	18.69	FF HOME
5084	63° 31' 04.56794" N	162° 16' 55.71154" W	18.69	FF HOME
5085	63° 31' 03.85121" N	162° 16' 55.61128" W	18.4	FF HOME
5086	63° 31' 03.09462" N	162° 16' 55.49614" W	18.92	FF HOME
5087	63° 31' 02.38350" N	162° 16' 55.39077" W	19.14	FF HOME
5088	63° 31' 01.45312" N	162° 16' 56.19481" W	19.67	FF HOME
5089	63° 31' 07.48901" N	162° 16' 54.03863" W	17.41	FF HOME
5090	63° 31' 30.32419" N	162° 16' 56.80845" W	73.38	FF HOME
5091	63° 31' 29.51095" N	162° 16' 56.92847" W	70.89	FF HOME
5092	63° 31' 28.23211" N	162° 16' 57.41157" W	70.12	FF HOME
5093	63° 31' 27.02023" N	162° 16' 57.86307" W	69.3	FF HOME
5094	63° 31' 25.81041" N	162° 16' 58.35164" W	67.04	FF HOME
5095	63° 31' 24.14039" N	162° 16' 57.68764" W	63.29	FF STEBBINS COMMUNITY ASSOCIATION
5096	63° 31' 22.96550" N	162° 16' 54.14036" W	55.66	FF HOME
5097	63° 31' 22.18194" N	162° 16' 51.80341" W	48.78	FF HOME
5098	63° 31' 26.23194" N	162° 17' 02.61782" W	71.24	FF MORRIS COFFEY BLDG