

Discovery Report

FEMA Region X

City of Emmonak, Yukon Delta Watershed, Alaska

Discovery Meeting: June 16, 2015



FEMA

Prepared by



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I. Discovery and Risk MAP

The FEMA Risk Mapping, Assessment, and Planning, or Risk MAP program helps communities identify, assess, and reduce natural hazard risks. Through Risk MAP, FEMA provides information to enhance local mitigation plans, improve community outreach, and increase local resilience to hazards.

During Discovery, FEMA

- gathers information about local hazards and hazard risks;
- reviews mitigation plans to understand local mitigation capabilities, hazard risk assessments, and current or future mitigation activities;
- supports communities within the watershed to develop a vision for the watershed's future;
- collects information from communities about their hazard history, development plans, daily operations, and hazard management activities; and
- uses all information gathered to determine which areas of the watershed require mapping, risk assessment, or mitigation planning assistance through a Risk MAP project.

II. Watershed Description

The Yukon Delta Watershed is located along the west coast of Alaska abutting the Bering Sea. Yukon-Delta Watershed, with an area of 12,983 square miles, is home to the Yukon Delta National Wildlife Refuge. Almost all of the area in the watershed is at or near sea-level with an abundance of wetlands dotting the landscape. The sole National Flood Insurance Program (NFIP) participant in the Yukon Delta Watershed is the City of Emmonak and is the focus of this Discovery effort.

Map 1: Image of Yukon Delta Watershed Project Area Map (full size maps in appendix)



III. Project Description and Methodology

Discovery is the process of data collection, including information exchange between all governmental levels of stakeholders, spatial data presentation, and cooperative discussion with stakeholders to better understand the area, decide whether a flood risk project is appropriate, and if so, to collaborate on the project planning in detail.

Region X initiated a Discovery project on the Yukon Delta in the winter of 2015 for the Alaskan Native Village of Emmonak. Region X Discovery involved data collection, community interviews, a meeting with stakeholders in the watershed, and development of recommendations based on an analysis of data and information gathered throughout the process.

Figure 1. Data Sources for Region X Discovery (project-specific data sources in Appendix)

Alaska State Geospatial Data Clearinghouse	FEMA Regional Office	National Oceanic and Atmospheric Administration (NOAA)
Oregon Department of Transportation	FEMA Map Service Center	NOAA Fisheries Service
Idaho Department of Transportation	FEMA Publications	NOAA National Geophysical Data Center
Idaho State Geospatial Data Clearinghouse	FEMA Community Information System	U.S. Army Corps of Engineers National Levee Database
Washington State Department of Transportation	FEMA Coordinated Needs Management System (CNMS)	U.S. Census Bureau
Community data, where available	FEMA HAZUS	U. S. Census - TIGER
Local, Regional, State website search	FEMA RX Inventory	U.S. Department of Agriculture
Developed based on community interview/meeting	FEMA Legacy Data	U.S. Fish and Wildlife Service
STARR	Data.gov	U.S. Geologic Survey
ESRI	National Atlas of the United States	

The Region X Discovery data collection entailed a massive collection of tabular and spatial data for all communities from Federal and State sources, as well as information collected through interviews with each community. The tabular data file in the Appendix provides detailed information about the data and its use in Discovery for this specific watershed. Data was used primarily in two ways – tabular data was documented on a Community Fact Sheet, and spatial data was included in the Discovery Geodatabase, and is displayed on the Discovery maps, where appropriate. Full-sized Discovery maps are included in the appendix.

The second phase of the Region X Discovery effort involved a review of the collected data with community officials through a phone interview, and a request for additional

information. Prior to the interview, community officials received information about the Discovery process, and a Fact Sheet and Interview Reference Map for their community. The Community was asked to identify “Areas and Points of Concern” based on their local knowledge and analysis of the data shown on the map. The Areas and Points of Concern (mapping needs, desired mitigation projects, etc.) were documented in the Discovery Geodatabase and discussed during the Discovery Meeting.

Figure 2. Fact Sheet, page 1, for the City of Emmonak (tabular data in appendix)

Region X Discovery Factsheet: Yukon Delta Watershed

Wade-Hampton Census Area

Emmonak, City of

CID: 020125

LOMCs: 0

CRS: No

Status:

Current Map Date:

Reg-Level:

Participating

9/25/2009

C

CAC Date: 7/21/2009

CAV Date: 12/9/2008

Demographics (U.S. Census, Year 2010 Data Collection)

Total Population (Year 2010):

762

Median Age:

24.4

65 Years and Over (%):

7.2

Native American (%):

96.7

Language Other than English (%):

50.0

High school graduate or higher (%):

76.6

Bachelors degree or higher (%):

5.4

Industrial (U.S. Census, Year 2010 Data Collection)

Population in Labor Force:

249

Median income (Household):

\$55,000

Top Industry: 41.4%

Educational Services, Health Care and Social Assistance

Presidentially Declared Disasters - Wade-Hampton, Census Area of (FEMA Declarations Data.gov)

Disaster Types:

Flood, Severe Winter Storm, Avalanches, Severe Freezing

Most Recent Disaster:

Flooding

Most Recent Disaster Date:

4/27/2002-5/30/2002

National Flood Insurance Program (FEMA Community Information Systems)

Total Premiums:

\$3,534

Total Coverage:

\$2,449,300

Number of Policies:

9

A-Zone:

0

No of BCX Claims:

21

No of Variances:

0

No of Rep Losses:

0

Levees and Flood Control Structures (USACE)

None Identified

Environmentally Sensitive, Tribal, and Coastal Areas (Fish and Wildlife Service, FEMA)

Endangered/Critical Species:

Short-tailed Albatross | Threatened Species: Spectacled Eider; Steller's Eider

Wetlands/Shorelines:

Yukon River; Kwiguk Pass; Emmonak Slough

Tribal Communities:

Emmonak Village

Coastal Areas:

None

Mitigation and Grants (State of Alaska, FEMA Hazard Mitigation Grants Data.gov)

Community Hazard Mitigation Plan:

City of Emmonak, Alaska Local Hazards Mitigation Plan (March 9, 2008)

Community Grants:

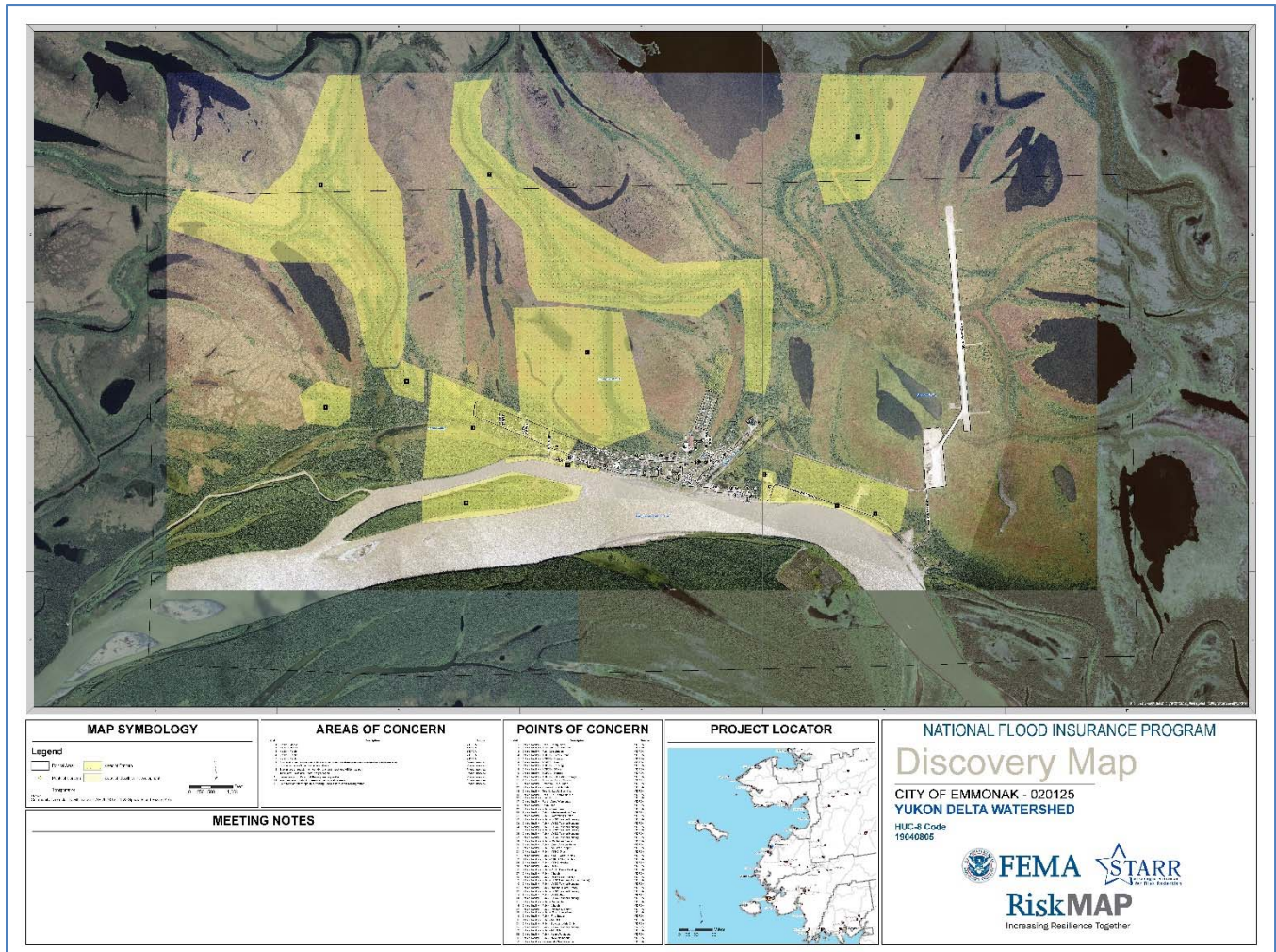
None

Map 2. Image of Interview Reference Map for the City of Emmonak



The third step was to hold a watershed-wide Discovery Meeting and facilitate discussion and data analysis of study needs, mitigation project needs, desired compliance support, and local flood risk awareness efforts. The discussion was stimulated using the Discovery Geodatabase display of relevant data. Attendees cooperatively identified possible solutions for the Areas and Points of Concern shown on the Discovery Meeting Map. Solutions included recommendations of mitigation projects, compliance issues, and ideas on how to improve the local flood risk communication programs.

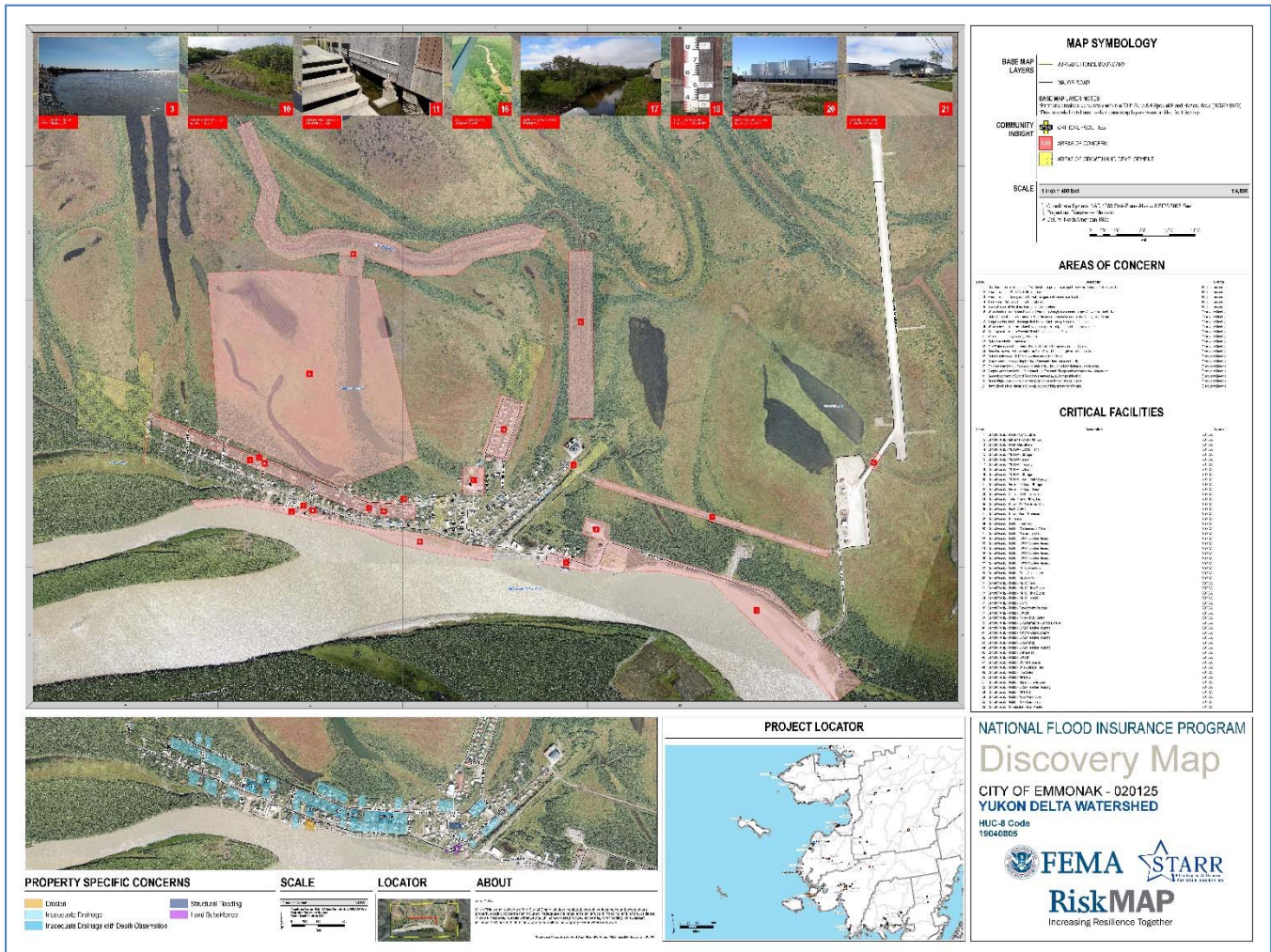
Map 3. Image of the City of Emmonak Discovery Meeting Map



The fourth phase of the Discovery effort involved an analysis of the data and information collected and discussed at the meeting, and recommendations as to the future relationship and activities between FEMA and the watershed communities. The Final Discovery Map indicates desired study areas and mitigation project locations, and the Discovery Report documents the results of data collection and conversation. LiDAR, a form of detailed topography, will eventually be flown to provide detailed contours of the area. Also, should funding be available, a First Order Approximation (FOA) analysis will be run to display flood risk. FOA uses best available terrain data and automated techniques to estimate flood hazard boundaries and may be upgraded for future regulatory and non-regulatory products. FEMA will work with the City of Emmonak, the State of Alaska, and other State and Federal

Agencies to develop a LiDAR footprint. If a Risk MAP project is to be initiated in this watershed, Discovery will be concluded with the finalization of a project scope and a signed Partnership Agreement, which indicates that all affected stakeholders agree to the terms of a funded project, including communication and data responsibilities.

Map 4. Image of the City of Emmonak Watershed Final Discovery Map



IV. Risk MAP Needs

The results of the data collection and interviews were thoroughly discussed at the Discovery Meeting. The following sections include issues and situations that exist in the City of Emmonak that can be considered Risk MAP Needs, to be addressed with Risk MAP projects. Details and background on all issues can be found in the interview notes, meeting notes, and other files included in the appendix.

i. Floodplain Studies

The City of Emmonak's Flood Insurance Study and Flood Insurance Rate Maps (FIRMs) were last updated in 2009. Emmonak is completely within a Zone AH Special Flood Hazard Area with an elevation of 20 feet (NGVD). The last community meeting in the watershed was a Final CCO Meeting held in December of 2008.

According to the City of Emmonak Flood Insurance Study (Revised: September 25, 2009):

The U.S. Army Corps of Engineers established a high water mark at elevation 19.4 feet NGVD. Although this elevation is not a technically determined 1% annual chance flood elevation, it does present the flood of record based on conversations with the residents of Emmonak. The regulatory flood elevation for establishing the minimum first floor elevation for buildings within Emmonak is 20.4 feet above NGVD or 1 foot higher than the 1989 flood elevation (Reference 2). The city is mapped entirely as Zone AH with a rounded whole foot elevation of 20 feet NGVD.

The Final Discovery Map should be referenced to view spatial data that may be indicative of study needs. Dating back to 1984, the City documented ten significant flooding events in their Hazard Mitigation Plan with multiple severe flooding events in each decade since. A number of these events required Governor Disaster Emergencies and/or Presidential Disaster Declarations.

Flooding in Emmonak is caused by rainfall-runoff, snowmelt, ice jams, and flash flooding. The primary area of concern to the City is from ice jam floods due to the volume and velocity of water released upstream after the ice dam's breach. Ice jam flooding typically occurs in the late spring and early summer due to the melting of snow and ice.

Table 1: City of Emmonak Most Recent FIRMs and FIS

Borough	Community	Latest FIRM	Latest FIS	Detailed
Wade Hampton Census Area	Emmonak, City of	2009-09-25	2009-09-25	Y

Figure 3. 1995 Flooding of the City of Emmonak (from FAA)

(http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/systemops/fs/alaskan/alaska/fai/arpt_photo_arc/ykdelta/)



Figure 4. 2012 Flooding of the City of Emmonak (from Flickr)

(<http://www.flickr.com/photos/24538909@No2/3570040071/>)



Detailed topography (LiDAR) will eventually be flown in and around the City of Emmonak to enhance existing available data. FEMA will work with the City of Emmonak, the State of Alaska, and other State and Federal Agencies to develop a LiDAR footprint. As of July 2015, a proposed Lidar footprint has not been established.

No areas were identified by community officials as needing a detailed riverine study or approximate study for an updated Flood Insurance Rate Map (FIRM). The 1% chance flood

elevation that is being used represents an elevation that exceeds the ground elevations; new topography would not change how the floodplain extents would be mapped. There also is not enough new information that would justify changing the 1% chance flood elevation that is currently being regulated to.

There is likely a need for a determination of a larger, rarer storm than the 1% chance flood. The intent of mapping a larger flood event would serve to identify evacuation sites located outside of areas that may become inundated.

Figure 3 shows the airport during the 1995 flood event. From discussions with the city, this would be the evacuation route. It would be good to understand how the runway elevation relates to the likelihood of a flood exceeding that elevation.

ii. Mitigation Projects

Emmonak has a FEMA approved Hazard Mitigation Plan. The plan, titled *City of Emmonak, Alaska Local Hazards Mitigation Plan* is dated June 15, 2014 and is solely for the city limits. In the Hazard Mitigation Plan, the City profiled the following hazards: Earthquakes, Erosion, Flood, and Ground Failure (Avalanche, Landslide / Debris Flow, Permafrost, and Subsidence). Tsunami / Seiche, Volcano, Severe Weather, and Wildland / Urban Interface Fires were not profiled. Of the hazards profiled, the City deemed all but erosion to have an infrastructure vulnerability of 100 percent.

According to the Hazard Mitigation Plan, the City would like to implement the following mitigation actions:

1. Reduce the risk of flood damage
2. Reduce the risk of erosion damage
3. Reduce the risk of severe weather damage

The City expressed similar desire to implement action to reduce the risk of flood and erosion damage during the Community Information Exchange phone interview on May 28, 2015 and during the in person Discovery Meeting on June 16, 2015.

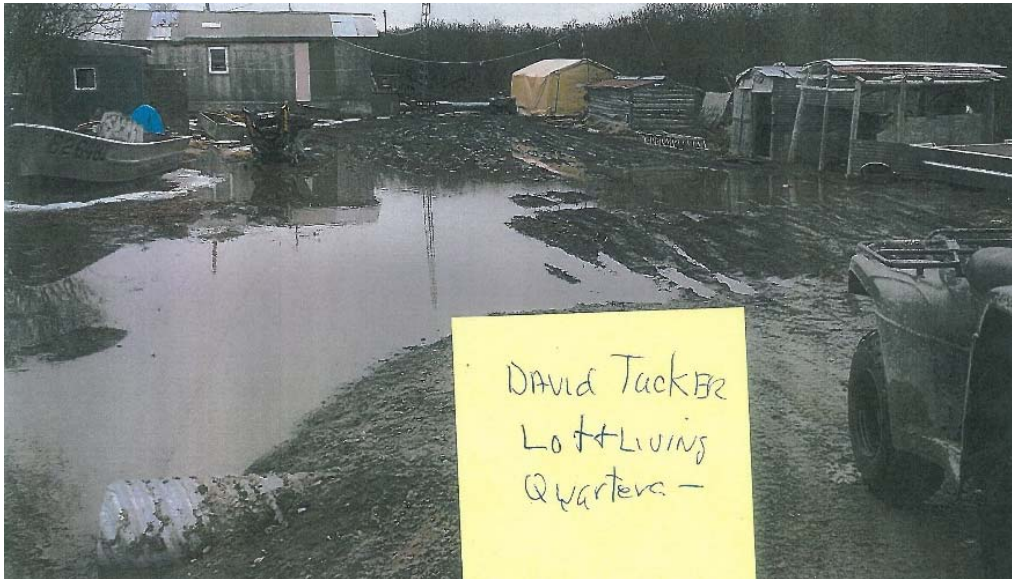
Several potential desired mitigation projects were identified by the community, including:

Constructing Drainage Paths:

The City has received numerous complaints and documented several occurrences where flood waters will overtop the river bank, wash over existing streets, and pond on lots for long durations that can be for many months before water completely drains or evaporates. Existing culverts are ineffective as they do not distribute water away from individual's homes and their property. Furthermore, ponding water creates a health hazard and breeding ground for mosquitos. City officials and homeowners documented nearly 80 lots across the city that experience drainage issues. During the Discovery process, eight homes provided ponding depth estimates between eight and twenty-four inches deep. The City would like to construct drainage paths in between lots or between lots and the existing roads to divert water

away from structures to the Akcuar Slough. Using Lidar, possible drainage path options can be reviewed as well as determining the level of effort necessary to be successful (amount of excavation, size of rock, channel length). The preliminary analysis may help in starting discussions with parties that may be able to assist on these types of efforts, such as the US Army Corps of Engineers and the Nome Department of Transportation. The City of Emmonak views inadequate drainage as its number one priority.

Figure 5. Inadequate Drainage within the City of Emmonak



Riverbank Erosion Localized Prevention and Larger Channel Migration Issues:

The city is located on Kwiguk Pass, which is a vast tributary to the Yukon River. For years, the riverbank has continually eroded away after each spring thaw as debris, ice, and excess water continue to pound the shoreline. Emmonak has previously placed rip-rap to secure areas of the riverbank but erosion continues further upstream as the banks are left exposed to the elements. According to the Hazard Mitigation Plan and the 2003 Emmonak Bank Protection Feasibility Study, infrastructure within 300 feet of the riverbank would be vulnerable to the effects of erosion. Currently, the City is most concerned with losing its Women's Shelter due to erosion. The USACE – Alaska District also has a report on this subject at:

http://206.174.16.211/Erosion_Info/Priority%20Communities/Emmonak_Final%20Report.pdf

Figure 6. USACE 2007 report figure on rip rap shore protection

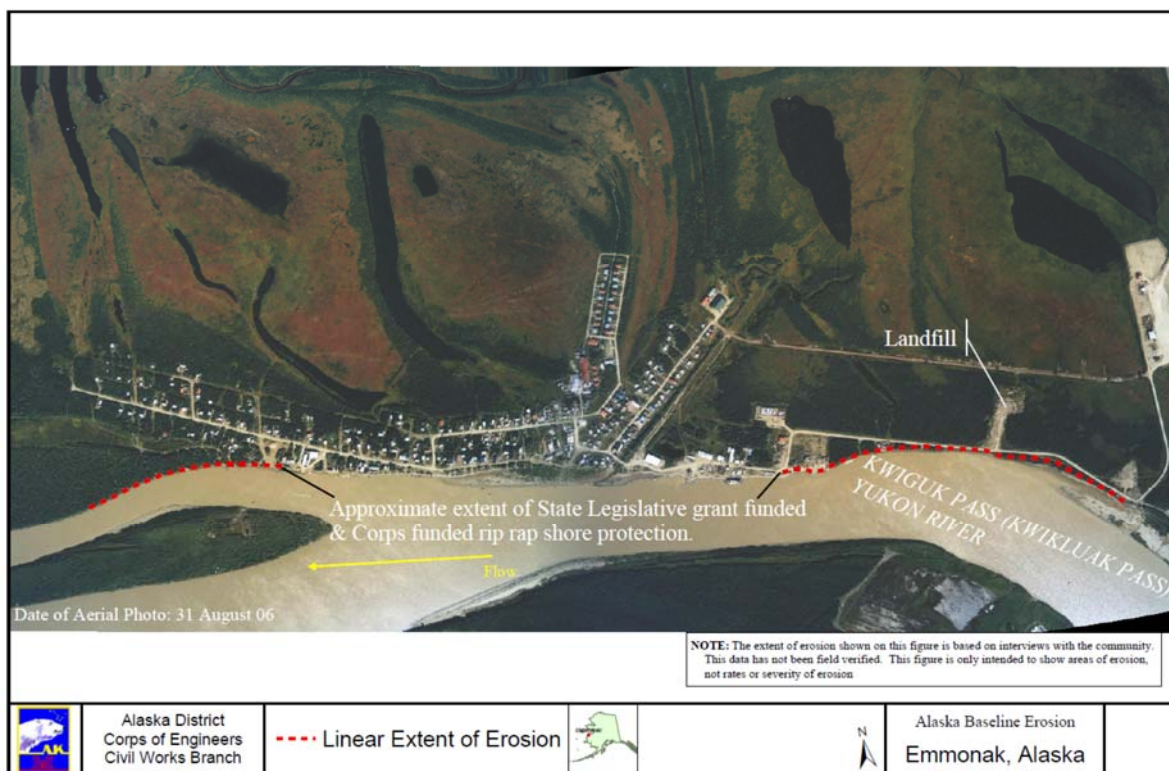


Figure 7. Erosion Vulnerabilities and Protection within the City of Emmonak



Long Term, the City is most concerned that Kwiguk Pass, which diverts from the Yukon River approximately two miles upstream, could become the primary channel as the Yukon River could shift course to a northern route. There are many challenges with trying to identify where a large river may migrate in a flat estuary area. Figure 8 below depicts the many current flow paths the river is taking as they are easily identifiable by the green vegetation.

Figure 8. Lower Yukon Delta (from USACE)
(http://206.174.16.211/USACE_Public/?enter_Public=Enter+Site)



Figure 9. Even away from the main channel, there are many signs of the river's past flow paths on the landscape on the Lower Yukon River



Historic orthophotos can provide a glimpse of past and potential future migration flow paths, but it is likely that the entire area is vulnerable to channel migration. Orthophotos can also help identify how far the channel typically migrates during a large flood event.

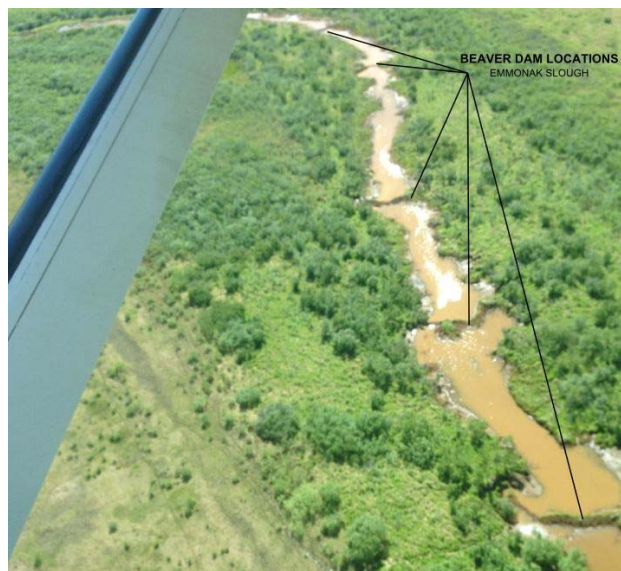
The City of Emmonak could benefit from an assessment identifying any structures that are built to withstand this type of migration through town, and what steps could be taken to improve any existing structures, (such as the school which could serve as a possible shelter if this type of event occurred). The USACE – Alaska District would likely be a very useful partner in this discussion.

Concerns regarding the Emmonak Slough:

The Emmonak Slough travels from Kwiguk Pass in a north / northeast direction along the east side of many structures in the city. The slough turns westward north of the city and drains into the Bering Sea. The Emmonak Slough poses a multitude of hazards to the City of Emmonak:

1. A culvert allowing water to pass underneath Airport Road near the hospital has been previously overtopped. Water, according to City officials, circulated upstream of the culvert and was unable to pass in at least one event.
2. During high water events, low lying land on the west bank of the Emmonak Slough (where the slough flows directly north) will allow water to flood the city as water races from north to south flooding properties along Delta Street and Subdivision Road.
3. Further downstream of the Emmonak Slough, beavers have created at least five dams that prevent wastewater from Qanilgumcak Lake to properly drain downstream. The dams force the flow of wastewater back towards residents. The City is interested in removing or displacing the existing dams.

Figure 10. Beaver Dams along the Emmonak Slough



Flooding and Washing Away of Roadways:

Flooding in Emmonak is widespread. Multiple areas within the city will flood simultaneously due to the low lying terrain throughout the region. Flood waters jump southern banks along the Kwiguk Pass and from the north and east along the Emmonak Slough. When a flood event occurs, the City would like to minimize risk by employing the following mitigation projects:

1. Airport Road: Flooding has previously washed away many segments of the road making it impossible to connect the city with the airfield. The City relies on the airfield as a major supply source as well as an evacuation route. The City would like to ensure future washouts do not occur along this route by providing adequate culverts allowing water to flow through freely.

Figure 11. Airport Road problems documented in USACE 2007 report.



Photo 1: Airport Way Washout and Exposed Culvert, May 2005.

2. Fifth Street: A culvert is needed to disperse water away from the road. Fifth Street becomes virtually impassible throughout most of the spring and summer months due to ponding and muddy conditions.
3. Seventh Street: Similar to Fifth Street, a culvert is needed to disperse water away from the road as standing water will cover the road for a long period of time. Seventh Street is virtually impassible throughout most of the spring and summer months due to ponding and muddy conditions.
4. Study culvert located south of Sixth Street: The City would like to study the culvert located south of Sixth Street that may be allowing water from the Kwiguk Pass to easily travel into the city and result in flooded residential properties.

Figure 12. Seventh Street (June 2015)



iii. Compliance

Data collected from CIS indicated that the City of Emmonak does not have any variances to their floodplain management ordinances. As a member of the National Flood Insurance Program, they are expected to be regulating to at least the minimum criteria required by FEMA. The most recent FEMA Community Assistance Contact was in July of 2009. The most recent FEMA Community Assistance Visit was in December of 2008. The City is receptive to receive additional trainings and guidance in regards to floodplain management.

iv. Communications

During the Community Information Exchange as well as the in-person Discovery Meeting, the City of Emmonak indicated that they would like to work with the State of Alaska and FEMA to better improve their flood risk communication program. Further documentation in the Hazard Mitigation Plan suggests that the City would be receptive to using staff time to educate the public and to further enforce new construction towards NFIP requirements as well as requiring a setback from Kwiguk Pass to prevent further loss from erosion. Besides concerns regarding flood risk and erosion, the City would like to promote winter weather awareness programs, expand on warning and alert systems, and install a siren for severe weather or disaster situations.

According to the 2010 Census, Emmonak has 762 residents. The median age of residents is 24.4 years old with 7.2 percent of the population over the age of 65. Over 96 percent of the

population is Native American with 50 percent speaking a language other than English. According to city officials, Yup'ik is the primary secondary language. Regarding education, 76.6 percent of residents in Emmonak are high school graduates and 5.4 percent of those residents obtained a bachelor's degree or higher. Of 762 residents, 249 are in the labor force with a median household income of \$55,000. The primary industry at 41.4 percent is educational services, health care, and social assistance. A large portion of the population is employed through Kwik'Pak Fisheries which processes local fish catches and then distributes shipments across the world. Outreach efforts with the city require additional planning. Inquiring on whether a translator is needed, preparing for unpredictable weather by budgeting extra time for travel to and from the community, and properly reviewing accommodations and resources required before travel is suggested.

Future communication that relays future flood studies or mitigation efforts should be addressed with the City Manager. The position is the main point of contact for floodplain management as well as other governmental and non-governmental agencies.

V. Close

Local officials in Emmonak are interested in the Discovery process and Risk MAP program. They welcome FEMA and the State of Alaska to provide training and technical assistance in making Emmonak more resilient to flood, erosion, and other hazardous events. They identified several areas of mitigation interest in which they could use additional FEMA support. Additionally, the local officials in the community would benefit from multi-hazard risk assessment products available through the Risk MAP process.

VI. Appendix – Discovery Files

The Discovery Report appendices are stored digitally under their respective folders on the flash drive that accompanies the Discovery Report.

Appendix A – Project Team Contact Information

Appendix B – Stakeholder Contact Information

- Community Stakeholder Contact Information

Appendix C – Discovery Interviews

- Community Information Factsheets
- Community Information Exchange Notes
- Community Information Exchange Interview Reference Maps
- Presentation

Appendix D – Discovery Meeting

- Discovery Meeting Materials
- Provided Materials – FEMA
- Provided Materials – State of Alaska
- Provided Materials – City of Emmonak

Appendix E – Discovery Report

- Areas of Mitigation Interest
- Community Location Map
- Discovery Geodatabase
- Final Discovery Map
- Project Area Map