FLOOD CONTROL LEVEES IN CHEMUNG, SCHUYLER, AND STEUBEN COUNTIES
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This handout presents the current status of levee mapping and accreditation in the Southern Tier Central region (Chemung, Schuyler, and Steuben Counties, NY). It includes findings and recommendations based on currently available information, some of which is in draft form and may change. It is intended to inform local actions related to the evaluation, certification, and remediation of flood control levees (including flood walls). This handout includes:

Map of Levee Locations

Source: Levee locations from the National Levee Database, https://levees.sec.usace.army.mil/. Interactive map available at https://arcg.is/0yOCKm.

Mapping of Levees on Future FEMA Flood Insurance Rate Maps

Development in the Southern Tier Central (STC) region is protected by 55 miles of flood control levees, which include earthen embankments and flood walls. Most of these levees are depicted on the effective Flood Insurance Rate Maps (FIRMs) as accredited levees that provide flood protection from the base flood, which is the flood having 1% probability of being equaled or exceeded in any given year (also called the 1% flood, 100-year flood, or the base flood). This means that protected areas are not included in the regulated flood zones, called Special Flood Hazard Areas (SFHAs). When the floodplain maps are updated, the accreditation status of levees will be re-evaluated, which may change the representation of levee-protected areas.

Discovery

The Federal Emergency Management Agency (FEMA) and NYS Department of Environmental Conservation (NYSDEC) held Discovery Meetings in April 2024 as the initial stage of an anticipated project to update the FIRMs (also called FEMA floodplain maps) for all of Chemung and Steuben Counties, the western part of Schuyler County, and additional upstream areas in neighboring counties. This Risk Mapping, Assessment, and Planning (Risk MAP) project is long overdue. Most of the current effective maps were developed in the 1980s and may not represent current flood hazards. New maps are developed with improved mapping techniques and are published as digital maps that are easier to use than the old paper maps. FEMA anticipates developing a proposed scope of work for this mapping project in 2024, followed by funding in 2026 and completion of updated maps several years later. A similar process to update FIRMs for the remainder of Schuyler County will be initiated within the next year.

Levee Analysis and Mapping

Part of the process for updating the flood risk information shown on FIRMs involves re-evaluation of the protection provided by levees. To support the assessment of levees for the Risk MAP project, FEMA conducted Levee Analysis and Mapping Procedures (LAMP) meetings in February 2024 to discuss how the areas protected by the Chemung and Steuben County levees could be depicted on future floodplain maps.

The mapped flood zone for a levee-protected area will depend on the availability of documentation demonstrating that the levee can protect against the 1% flood and maintain a factor of safety. In order to accredit a levee and exclude the protected area from the Special Flood Hazard Area, FEMA asks that the levee sponsor or local community provide certified documentation demonstrating that all federal requirements are met. The US Army Corps of Engineers (USACE) also has authority to certify levees and is developing programs and procedures to support this process. (Details regarding the USACE levee assessment process and the potential costs for local partners are currently not clear to STC communities.)

If a levee is accredited, areas behind the levee will be shown on a newly-developed FIRM as a shaded Zone X area with a note indicating that the area is protected by a levee. Shaded Zone X is also used to designate 500-year floodplains and means that the area has a moderate flood risk, but is not included in the regulated Special Flood Hazard Area. We are only aware of two accredited levees in New York State: Village of Nichols (1.8 miles) and City of Amsterdam (0.6 miles).

If a levee is not accredited and does not have certified documentation regarding its condition, a “natural valley” mapping procedure will be used to delineate flood zones based on where the water would go if the levee did not exist. This would result in mapping of levee-protected areas as Special Flood Hazard Areas and thus subject to floodplain development requirements and mandatory flood insurance requirements (for

buildings with federally-backed mortgages). Alternate mapping techniques can be used for levees with some certified data that do not meet all of the criteria for full accreditation.

Levee Certification

The documentation required by FEMA to either accredit a levee or use mapping techniques that demonstrate partial protection is called levee certification. This documentation must be certified by a licensed professional engineer. It includes data demonstrating that the levee is both structurally sound and high enough to provide the required level of protection. FEMA does not conduct this certification, which they consider to be the responsibility of the local project sponsor. Although most of the levees in the STC region are operated and maintained by NYSDEC, they have indicated that the state will provide existing data to support levee certification, but they will not certify the levees.

Because the complexity and availability of existing data for levees varies, communities have encountered significantly different costs for levee certification. Based on STC's review of available information about certification costs, it is estimated that the average cost to hire engineering consultants to do this work is likely to exceed $250,000 per mile of levee. A significant part of this cost is for geotechnical analysis of subsurface materials based on borings into and adjacent to the levees. This estimate does not include the additional costs for remediation of any deficiencies that are identified. Based on this estimate, the cost to certify all of the flood control levees in the STC region could be about $15 million.

Levee Deficiencies

A levee can only be accredited by FEMA if certified documentation is available for the levee and if the certified data demonstrate that there are no deficiencies. Most of the levees in the region were constructed by the USACE, are maintained by the NYSDEC or USACE, and are routinely inspected. We do not anticipate that certification will identify structural deficiencies. However, many of the levees are more than 75 years old, so it would be prudent to evaluate their condition and confirm that they do indeed provide the anticipated level of protection and safety.

In order to be accredited by FEMA, a levee must have at least 3 feet of freeboard (more at bridges). This means that the top of the levee should be 3 or more feet above the base flood elevation (BFE; elevation of the 1% or 100-year flood). At the Chemung and Steuben County LAMP meetings, FEMA presented preliminary findings about the height of the region's levees. They used available levee crest elevations from the USACE National Levee Database and draft 100-year discharge data developed for the Discovery process to compare levee crest elevations and base flood elevations along each of the region's levees. These findings are summarized below. Most of the region's levees (including the Montour Falls levees, which were assessed previously) appear to have adequate freeboard to enable accreditation if levee certification data are provided. However, more than 4 miles of levees, primarily along tributary streams, may have crests that are below the base flood elevation. And another 10 miles may be freeboard-deficient, meaning that they are above the BFE, but lack the required freeboard.

It should be noted that these findings are preliminary. Some of the identified problems may be resolved by obtaining more accurate levee crest elevations, information about levee closure structures, or base flood elevations. For those levees that are above the BFE, but lack the required freeboard, freeboard deficient mapping procedures may enable development of acceptable FIRMS on which levee-protected areas are mapped as Zone D, areas of uncertain flood risk that are not included in the regulated Special Flood Hazard Area. However, the freeboard deficient mapping procedure will only be used if certified levee data demonstrate that the other accreditation requirements are met.

Cost of Not Certifying Levees

If levees are not accredited, then protected areas would be included in the Special Flood Hazard Area. This would affect requirements for flood insurance coverage, construction standards for new development, and construction standards for substantial improvements to existing development. The combined economic impacts of new flood insurance requirements and of development decisions that may be affected by flood zone changes are not known, but could be significant.

Mandatory flood insurance requirements would be a new expense for property owners and may be unaffordable for some. However, the increased insurance coverage could be beneficial if a levee is overtopped or fails.

Enforcement of floodplain development requirements in levee-protected areas could have a chilling effect on potential development and re-development projects, and consequently on economic development. In some areas, particularly locations near levees, the required building elevation or protection level could be quite high relative to the existing ground level. The logistical challenges and increased site development costs may rule out certain types of development because the economics no longer work. Other projects may be scaled back to keep costs under the substantial improvement threshold. Floodplain development requirements may be particularly undesirable for main streets and other commercial or industrial areas where the elevation of buildings is problematic (although non-residential buildings can sometimes be protected using dry floodproofing techniques instead of being elevated).

Next Steps

The communities that rely on the flood protection provided by levees have limited capacity for certifying their levees. STC intends to continue providing support and assistance with levee certification and accreditation issues. We have started to identify and evaluate potential sources of funding for the various tasks required to enable accreditation, including certification by professional engineers and remediation of levees for which deficiencies are identified. We plan to reach out to the USACE to learn more about their role in evaluating and remediating the levee systems that they maintain, the Section 3014 levee certification program, and other USACE programs that may be relevant. STC will also continue to facilitate information sharing and coordination between communities and agencies.

Recommendations for Levee Certification and Increasing Levee Height

STC proposes that local communities work with state and federal partners to pursue accreditation of most of the region's flood control levees. The following preliminary recommendations are based on levee information in the National Levee Database (NLD) and levee height analysis presented by FEMA at February 2024 Levee Analysis and Mapping Procedures (LAMP) meetings.

Elmira Area, Chemung County

North Elmira System

- Chemung River Reach – 3.0 miles
  Levee height: Entirely above BFE. Freeboard deficient for 700 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.
- Newtown & Diven Creeks Reach – 4.5 miles. Levee crest data incomplete.
  Levee height: Below BFE for 1,500 feet (upstream of Industrial Park). Freeboard deficient for an additional 7,900 feet.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.

South Elmira System

- Chemung River Reach – 4.0 miles
  Levee height: Entirely above BFE. Freeboard deficient for 5,900 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.
- Seeley Creek Reach – 3.0 miles
  Levee height: Entirely above BFE. Freeboard deficient for 9,000 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.

Horseheads, Chemung County

Town of Horseheads System (Ithaca Road Levee) – 0.9 miles.
Levee height: Entirely above BFE with adequate freeboard.
Recommendation: None. (Certification complete; accreditation under review by FEMA.)

Big Flats, Chemung County

Schweizer Dike – 0.8 miles. Protects one industrial facility. Not in NLD. Not accredited.
Levee height: Not assessed.
Recommendation: None. (Town is not currently interested in certification/accreditation.)

Montour Falls, Schuyler County

Catharine Creek - Montour Falls - Left Bank System

- Catharine Creek Diversion Channel Reach – 1.2 mile
  Levee height: Entirely above BFE with adequate freeboard.
  Recommendation: Certify.
- Shequaga Creek Reach – 0.7 miles
  Levee height: Entirely above BFE with adequate freeboard.
  Recommendation: Certify.

Catharine Creek - Montour Falls - Right Bank System – 0.3 miles. Protects 6 buildings.
Levee height: Entirely above BFE with adequate freeboard.
Recommendation: Assess cost-effectiveness of certifying.

Corning Area, Steuben County

Corning System

- Chemung River Reach – 2.3 miles
  Levee height: Entirely above BFE with adequate freeboard.
  Recommendation: Certify.
- Post Creek Reach – 0.3 miles
  Levee height: Entirely above BFE with adequate freeboard.
  Recommendation: Certify.
- Cutler Creek Reach – 0.7 miles
  Levee height: Entirely above BFE. Freeboard deficient for 100 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.

South Corning System – 3.4 miles
Levee height: Entirely above BFE with adequate freeboard.
Recommendation: Certify.

Painted Post System

- Cohocton & Chemung Rivers Reach – 1.6 miles
  Levee height: Entirely above BFE. Freeboard deficient for 800 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.
- Cutler Creek Reach – 0.6 miles
  Levee height: Entirely above BFE with adequate freeboard.
  Recommendation: Certify.
- Hodgman Creek Reach – 0.4 miles
  Levee height: Entirely above BFE. Freeboard deficient for 100 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.

Gang Mills – Town of Erwin System

- Cohocton River Reach – 1.3 miles
  Levee height: Entirely above BFE. Freeboard deficient for 500 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.
- Tioga River & Beartown Diversion Reach – 4.4 miles
  Levee height: Entirely above BFE with adequate freeboard.
  Recommendation: Certify.

Bath, Steuben County

Bath System – 2.9 miles
Levee height: Entirely above BFE with adequate freeboard.
Recommendation: Certify.

Avoca, Steuben County

Avoca System

- Cohocton River Reach – 1.6 miles
  Levee height: Entirely above BFE. Freeboard deficient for 4,100 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.
- Salmon Creek Reach – 0.8 miles
  Levee height: Entirely above BFE. Freeboard deficient for 3,000 feet.
  Recommendation: Certify. Freeboard deficient mapping procedure.

Addison, Steuben County

North Addison System

- Canisteo River Reach – 0.7 miles. Not accredited.

Levee height: Below BFE for 2,400 feet (upstream). Remainder is freeboard deficient.
Recommendation: Explore options for increasing levee height.

- Tuscarora Creek Reach – 0.4 miles. Not accredited.
  Levee height: Below BFE for 1,300 feet (upstream). Remainder is freeboard deficient.
  Recommendation: Explore options for increasing levee height.

South Addison System – 0.9 miles. Not accredited.
Levee height: Entirely below BFE.
Recommendation: Explore options for increasing levee height.

Canisteo, Steuben County

North Canisteo 1 System – 0.1 miles. Protects undeveloped land near debris basin. Not accredited.
Levee height: Entirely above BFE. Freeboard deficient for 325 feet.
Recommendation: None. (No buildings protected.)

North Canisteo 2 System

- Canisteo River Reach – 1.7 miles
  Levee height: Entirely above BFE with adequate freeboard.
  Recommendation: Certify.
- Bennetts & Purdy Creeks Reach – 1.6 miles
  Levee height: Below BFE for 6,000 feet. Remainder is freeboard deficient.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.

South Canisteo System – 0.2 miles. Protects rural area. Not accredited.
Levee height: Below BFE for 900 feet (most of levee). Remainder is freeboard deficient.
Recommendation: Assess cost-effectiveness of increasing levee height and certifying.

Hornell Area, Steuben County

Northwest Hornell System

- Canisteo River Reach – 1.9 miles
  Levee height: Entirely above BFE with adequate freeboard.
  Recommendation: Certify.
- Canacadea Creek Reach – 1.0 miles. Levee crest data incomplete.
  Levee height: Below BFE for 700 feet. Freeboard deficient for an additional 2,900 feet.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.

North Hornell System – 0.8 miles
Levee height: Entirely above BFE with adequate freeboard.
Recommendation: Certify.

Northeast Hornell System

- Canisteo River Reach – 0.3 miles
  Levee height: Entirely above BFE. Freeboard deficient for 1,400 feet (almost all).
  Recommendation: Certify. Freeboard deficient mapping procedure.
- Chauncey Run Reach – 0.4 miles
  Levee height: Below BFE for 200 feet. Freeboard deficient for an additional 1,800 feet.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.

West Hornell System

- Canisteo River Reach – 1.6 miles
  Levee height: Below BFE for 700 feet. Freeboard deficient for an additional 1,100 feet.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.
- Canacadea Creek Reach – 1.0 miles

Levee height: Below BFE for 2,200 feet. Freeboard deficient for an additional 2,800 feet (almost all).
Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.

- Crosby Creek Reach – 1.1 miles
  Levee height: Below BFE for 1,500 feet. Freeboard deficient for an additional 900 feet.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.

Southwest Hornell System

- Canisteo River Reach – 0.8 miles
  Levee height: Below BFE for 300 feet. Freeboard deficient for an additional 300 feet.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.
- Crosby Creek Reach – 0.6 miles
  Levee height: Below BFE for 500 feet. Freeboard deficient for an additional 2,000 feet (almost all).
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.

Southeast Hornell System

- Canisteo River Reach – 1.5 miles
  Levee height: Below BFE for 200 feet. Freeboard deficient for an additional 800 feet.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.
- Chauncey Run Reach – 0.4 miles
  Levee height: Below BFE for 700 feet. Remainder is freeboard deficient.
  Recommendation: Certify. Increase height to BFE or higher. Freeboard deficient mapping procedure.

Hornell – NYSDEC System – 0.2 miles. Protects undeveloped area. Not accredited.
Levee height: Not assessed.
Recommendation: None. (No buildings protected.)

Big Creek - North Hornell Levee – 0.3 miles. Not in NLD. Condition unknown. Accredited.
Levee height: Not assessed.
Recommendation: Evaluate levee condition. Certify if possible. If deficiencies are identified, consider repairs and/or increasing height.

TOTALS

Total levee length: 55 miles
Property value protected by levees: $8.8 billion
Recommend levee certification: 50 miles
Levee length that may be below BFE: 4.5 miles (generally recommend increasing height to BFE or higher for levees that are currently accredited and using FEMA's freeboard deficient mapping procedure if needed)
Additional length of levee that may be freeboard deficient: 10 miles (recommend using freeboard deficient mapping procedure)

Data sources:
Levee information and property value protected by levees were obtained from the National Levee Database (NLD), https://levees.sec.usace.army.mil/
Locations and estimated length of sections where the levee crest may be below BFE or may be freeboard deficient were determined from profiles in presentations made by FEMA at Local Levee Partnership Team Meetings on February 26-28, 2024. Presentations are available at: https://drive.google.com/drive/folders/1lQzZvMvMApydkkpDD6gwOtP3_tcL9mlT?usp=sharing

Terms Related to Levees and Floodplain Maps

Accredited levee system – A levee system that the Federal Emergency Management Agency (FEMA) has recognized as reducing the flood hazards posed by the base flood (1% or 100-year flood). The protected area is excluded from the regulated Special Flood Hazard Area and mapped as shaded Zone X, except for areas of residual flooding, such as ponding areas. This determination is based on the submittal of data certified by a professional engineer demonstrating that all requirements of 44 Code of Federal Regulations §65.10 have been met or certification by "a federal agency with responsibility for levee design," i.e. the USACE.

Base flood, also called 1% flood or 100-year flood – A flood having a 1% probability of being equaled or exceeded in any given year, as determined by hydrologic and hydraulic modeling. The land area covered by this flood is called the Special Flood Hazard Area and the water elevation is called the Base Flood Elevation.

Base Flood Elevation (BFE) – Elevation of the base flood at a particular location. This elevation is the basis for floodplain management requirements. In New York State, most buildings must be elevated or protected to a level two feet higher than the BFE.

Discovery – The Discovery process is the initial phase of a FEMA Risk Mapping, Assessment, and Planning (Risk MAP) project, during which FEMA coordinates with local stakeholders, collects information about flood risks, and develops a scope of work for the flood risk mapping project.

Flood Insurance Rate Map (FIRM) – The official map developed by FEMA to delineate flood zones for a community.

Flood Zone D – Area of possible but undetermined flood hazard, as depicted on a FIRM. Areas mapped as Zone D are not included in the regulated Special Flood Hazard Area. Mandatory flood insurance purchase requirements do not apply, but coverage is available and recommended.

Flood Zone X (shaded) – Areas with a moderate risk of flooding, as depicted on a FIRM. This flood zone may indicate an area where the annual flood risk is between 0.2% and 1% (500-year floodplain) or an area protected by an accredited levee. A shaded Flood Zone X is <u>not</u> a Special Flood Hazard Area and thus not subject to floodplain development requirements or mandatory flood insurance requirements.

Floodplain development standards - Standards for development in areas mapped as Special Flood Hazard Areas have been adopted by communities participating in the National Flood Insurance Program (as a condition for the availability of federal flood insurance) and are included in the NYS Residential and Building Codes. New development (and substantial improvements to existing buildings) must be protected from damage by the 1% annual probability (100-year) flood, usually by elevation of the finished floor and equipment. Development (including any man-made change to improved or unimproved real estate) should not cause adverse impacts to other property.

Freeboard – An allowance for uncertainty in a design water level. Levee freeboard is the vertical distance from the BFE (1% or 100-year flood elevation) to the top of the levee. This elevation provides a margin of safety for the base flood and compensates for uncertainty about future flood events. In order to be accredited by FEMA, riverine levees normally require a minimum freeboard of 3 feet along the length of the levee, with an additional 1 foot within 100 feet of structures (such as bridges) where flow is restricted, and an additional 0.5 feet at the upstream end of a levee.

Freeboard deficient levee – A section of levee that is higher than the BFE but below the freeboard requirements. FEMA may use a freeboard deficient mapping procedure to depict flood hazards in areas protected by a freeboard deficient levee for which other accreditation requirements are met. This procedure for mapping flood hazards associated with a non-accredited levee allows the height of the levee to be

considered even though it is not quite high enough. The protected area is designated on the FIRM as Zone D, which represents an area with possible, but undetermined, flood hazards.

Levee - "A man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding" (from Code of Federal Regulations §59.1). A levee may be an earthen embankment, a flood wall, or even an elevated road that is designed and constructed to function as a flood control levee.

Levee Analysis and Mapping Procedures (LAMP) – FEMA's analysis and mapping procedures for showing the flood hazard associated with a non-accredited levee on a Flood Insurance Rate Map.

Levee certification - Levee documentation demonstrating that the levee meets all requirements of 44 Code of Federal Regulations §65.10. These data must be based on investigations and review of the current levee condition conducted in accordance with sound engineering practices and certified by a licensed professional engineer or a federal agency with responsibility for levee design. The certification documentation must demonstrate that the levee meets federal design, construction, maintenance, and operations standards to provide protection from a flood with a 1% or greater annual probability of occurrence.

Mandatory flood insurance purchase requirements – If a building is located in a Special Flood Hazard Area, flood insurance is required as a prerequisite for receiving a federally-backed mortgage or other kinds of federal financial assistance related to the building.

Natural valley levee mapping procedure – Flood hazard mapping procedure for levee-protected areas in which flood zones are delineated as though the levee is not there. This mapping procedure is used to map flood hazards associated with non-accredited levee systems or reaches that are below the BFE (1% flood elevation) or lack the certified documentation required for the other non-accredited levee mapping procedures.

Non-accredited levee system – FEMA will not accredit a levee without certified documentation demonstrating that all requirements of 44 Code of Federal Regulations §65.10 have been met. A non-accredited levee is not shown on a FIRM as reducing the base flood hazards, so some or all of the protected areas are depicted as Special Flood Hazard Areas or Zone D (areas with possible, but undetermined, flood hazards).

Risk Mapping, Assessment, and Planning (Risk MAP) – FEMA program for preparing updated Flood Insurance Rate Maps and developing non-regulatory products to support flood risk management activities.

Special Flood Hazard Area (SFHA) - Area that is expected to be inundated by the flood event having a 1-percent probability of being equaled or exceeded any given year (the base flood). SFHAs are labeled as flood zones starting with A (Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, etc.). Areas mapped as SFHAs are subject to floodplain development requirements and mandatory flood insurance requirements.