

City of Gardiner

Flooding Impacts & Community Risk Assessment

Final Report | February 2026



HALEY WARD.



Acknowledgements

Project Context

Following several severe floods in 2023—one in early May and one in late December—the City of Gardiner decided to undertake an assessment of the vulnerability of its community’s infrastructure. While residents, business/property owners, workers, and local officials have long known and contended with the City’s flooding issues, it was deemed advisable to formalize and investigate the severity of this risk.

The City of Gardiner, enrolled in the Community Resiliency Partnership (CRP) with the State of Maine, applied for and was awarded a \$50,000 Community Action Grant (CAG) from the Governor’s Office of Policy Innovation and the Future (GOPIF). Subsequently, a “Work Group” of residents, business owners, and City staff was formed in 2024 to support the effort. After issuing a Request for Proposals (RFP), the City selected and contracted with Haley Ward, Inc. to complete the assessment over the course of approximately 14 months.

The following assessment examines how the City’s environmental conditions and situation are likely to affect Gardiner’s community, first

by looking at the City’s assets, then by providing context and general recommendations for those assets within the main floodplain where the historic downtown is affected. By identifying areas of greatest exposure and sensitivity, the assessment is intended to provide decisionmakers with a resource for further action.

The findings here are intended to support resilience planning, prioritization, adaptation strategies, and to help ensure that Gardiner’s residents, businesses, and community spaces can withstand and adapt to the impacts of a changing climate.

Two public events were held in support of the project, a kick-off meeting on April 17, 2025 and a findings presentation on October 16, 2025. A final document was prepared in February of 2026 with a final presentation to City Council on May 6, 2026.

Below are listed the main contributors to this effort. Asterisks (*) are listed next to the project’s main points of contact.

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- Alex Smith** - *Pistil & Page*, Local Business Owner
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A photograph of a flooded area, likely a parking lot or street, with water reflecting the sky and surrounding structures. In the background, there are several buildings, including a large white one with a flat roof, and many bare trees. A street lamp is visible in the foreground on the left. The overall scene is overcast and somber.

Section 01

Project Overview

Executive Summary

The City of Gardiner faces increasing vulnerability to flooding hazards due to its location at the intersection of the Kennebec River and Cobbosseecontee Stream. While this riverfront setting has historically shaped the City’s development and economic vitality, it also places critical infrastructure, downtown areas, and public spaces at heightened risk. Rising sea levels, coupled with more frequent and intense storm events, are elevating baseline water levels as well as increasing the likelihood and potential severity of river flooding.

The history of flood events in Gardiner is extensive. The well over 200-year written record can be corroborated and compared against an incredible wealth of river gauge measurements, first-hand accounts, extensive photography, hydrological reports, and high-resolution topographic data. The evidence speaks plainly: Gardiner has experienced some of the most significant river flooding impacts seen for downtown areas throughout the State of Maine, past and present. This study therefore focuses almost exclusively on the hazards and vulnerabilities posed by fluvial flooding—inundation caused by river systems—and offers guidance toward future mitigation and action.

River Flooding in Gardiner

Recent storm events have demonstrated the growing impacts of these vulnerabilities in the local community. In particular, on May 1st, 2023, a significant flood event made news headlines with damage reported to transportation infrastructure throughout the State of Maine. Then, on **December 19th, 2023**, the Kennebec River swelled to a crest height of over 19 feet and significantly impacted the downtown area, leaving many properties with significant damage and underscoring concerns for future flooding. The storm disrupted downtown businesses, damaged storefronts and private property, and caused the temporary closure of a staple grocery and pharmacy center. For many, this recalled memories of the flood of 1987, one of the City’s worst, in which the Kennebec rose to over 24 feet.

In the coming decades, sea level rise is likely to further compound these risks by increasing the baseline water height, which may result in deeper inundation events and more frequent nuisance flooding. According to the State-adopted projections, it is advisable to “Commit to Manage” +1.5 feet of sea level rise by 2050 and +4.0 feet by 2100. This study

therefore augments the FEMA projected “Base Flood Elevation” for 100-year floods of 24 feet with these numbers for future inundation projections in the Depth Tables ([pages 68-73](#)), and compares those against high resolution topographic data and infrastructure information.

Findings & About this Report

This study concludes that the City’s downtown businesses are perhaps its most valuable asset—providing livelihoods, living space, and a community hub for its residents and the surrounding region. Unfortunately, this business district is at extremely high risk and is unlikely to be feasible to migrate or relocate. Therefore, the primary recommendation is for the City to support the property owners as they floodproof their at-risk structures, elevate utilities as needed, and relocate living space. This report is structured such that it follows the course of the project’s progression: starting with an overview of the [process \(pages 8-14\)](#), through the [environmental hazards analysis \(pages 18-28\)](#), and finishing with the [asset vulnerabilities \(pages 32-50\)](#), [assessments \(pages 54-60\)](#), and extra [resources \(pages 66-86\)](#).

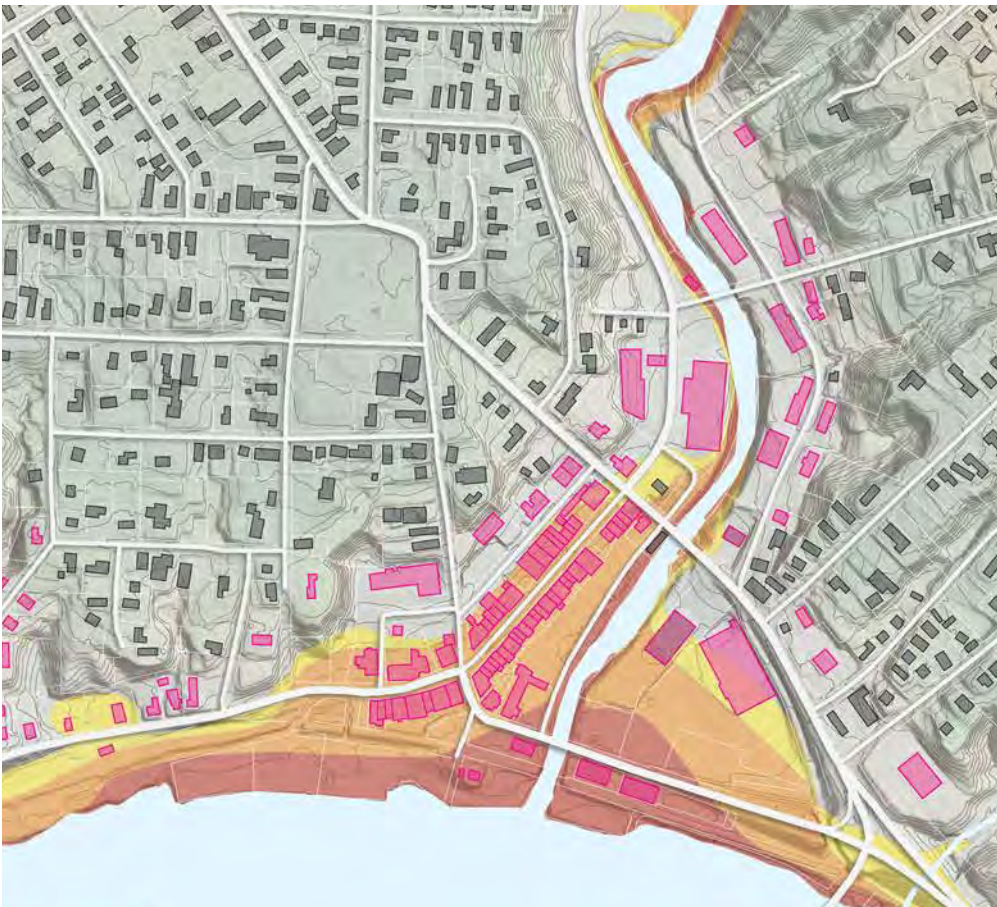




Project Framework

Phase 1: Existing Conditions Analysis & Hazard Assessment

The first phase of the project focused on an in-depth analysis of the existing vulnerabilities and flooding hazards that currently impact Gardiner according to available data. Analysis of infrastructure, buildings, hydrographic data, high-resolution topography, and the historical record were performed to establish the City’s baseline risk. The team manually edited and groundtruthed several key layers/components and further developed data models to improve the infrastructure assessment.



Phase 2: Community Input & Stakeholder Engagement

Once this first look at baseline risk was created, the project team incorporated input through public engagement and individual interviews to ensure that the technical analysis reflected local knowledge and stakeholder perspectives. In addition to information sharing and presenting findings, the events served as the primary way that feedback was brought into the prioritization. The assessment and recommendations found in Section 04 are a direct result of this work.



Phase 3: Community Impact & Risk Assessment

The final risk assessment integrates environmental hazards, asset vulnerability, and community priority into a single rating system across the nine City-owned assets identified at the project’s outset. The purpose is to help communicate a recommended path forward despite their obvious dissimilarities. In addition to these, this project shifted to include every substantially impacted structure in the downtown floodplain. Basic recommendations for each are also included.





WINSOR
HOUSE

FRIGIDAIRE

NEW CLOTHES SLOSBERG'S FOOT WEAR

EASTMAN'S BOOK STORE

EASTMAN BOOK STORE

DAY CO

Methods

Geospatial Analysis

The assessment was primarily performed using a data-driven, geospatial model. This was developed in coordination with the project’s Working Group and improved using site walks, LiDAR, and aerial imagery. At the outset, the project team performed a review of available data, reports, and prior studies, including:

- Datasets from federal, state, and regional agencies;
- Municipal data, maps, records, and photos;
- Hydrographic data from USGS and NOAA; and
- Identification of critical historical and anecdotal evidence requiring primary document research and community input.

A comprehensive geospatial model and data repository for the city was developed by the consulting team to support the subsequent analyses of infrastructure and environmental systems.

This data was compiled and edited to best represent:

- Building footprints, improved using LiDAR and high resolution aeriels;
- Transportation infrastructure, including roads, culverts, and bridges;
- Utility networks;
- Parcel boundaries by ownership;
- High-resolution topography and flowlines;
- Hydrography, waterways, and other environmental features; and
- 3D surface information for visualization.

Using this geospatial foundation, a series of interviews and site visits were performed to evaluate the ground conditions of the data—especially to establish a baseline for how each item related to the environmental risks most recently posed by the flood on December 19,

2023. Prior technical reports, plans, and other documents were also reviewed. And although each city asset was investigated, the primary concern quickly shifted to the structures in the downtown floodplain. These were represented by building footprints that had to be manually edited, vetted, and joined directly with parcel information.

After the intial public engagment event, it became immediately apparent that the most beneficial use of consultant effort for those who experienced the highest impacts would be to provide good science communication to demystify flood risks—that is, assisting locals to understand how the “maximum heights of water” might individually affect their locations of interest based on the known hazards. This would allow each to act on their own to mitigate risks.

An advanced hydrological flow model (HEC-RAS) was therefore abandoned in favor of detailing the likely maximum inundation risk for all structures in the main floodplain based on the historical record, FEMA projections, and sea level rise scenarios, given a “bathtub” model where a structure’s lowest floor height above the datum in the floodplain is the primary hazard indicator. Flood crests were compared to the high-resolution topographic data and informed by the USGS gauges present on site. Heights were benchmarked against the North American Vertical Datum of 1988. Inundation risks were then based off of heights derived from LiDAR data in the areas immediately surrounding each structure’s footprint—the Lowest Adjacent Grade (LAG)—and compared against the Base Flood Elevation (BFE) and several other risk levels (based on an extensive review of the historical record, *see timeline*). Using zonal statistics summaries of the digital terrain model, we were able to estimate the height of the Base Flood Elevation and other risk levels for each structure for several scenarios.

Our team responded to stakeholder input by focusing on answering the following question: “How high and how often is water likely to get on my building?” A new goal for the project was therefore prioritized: transfer existing known flood risk information directly to each structure.



Input & Iteration

Community engagement and concept iteration were central components of the assessment, ensuring that technical analysis was informed by local knowledge, stakeholder perspectives, and community priorities. Engagement activities were designed in support of three primary objectives, to:

- Raise awareness of the assessment and its role in future planning and infrastructure decision-making;
- Capture local and experiential knowledge that may not be reflected in existing datasets; and
- Provide opportunities for subject-matter experts and key stakeholders to contribute to how vulnerability would be evaluated and prioritized.

The project team worked with the Working Group to support outreach, communications, and event coordination, helping to ensure participation across the community, especially by those affected by the river flooding.

An early **Kick-Off Event** was held on April 17th in 2025 to introduce the project and establish a shared understanding of the assessment framework. This event provided an opportunity to:

- Present the project goals, scope, and overall approach;
- Identify areas of concern and locally observed



- problem areas using large-format maps;
- Gather input on the types of information residents and stakeholders felt were most important to include; and
 - Respond to questions and feedback on the assessment framework.

Following this, a series of activities provided iterative refinement for the assessment and its concepts. These sessions complemented the engagement and desktop reviews:

- **Site walks** with the consulting team’s engineer were performed to assess and provide perspective on the City’s community assets;
- **Historical research** was performed with the assistance from the local archivist to compile a list of recorded flood events; and
- **Focus group** exercises were conducted with the Work Group, Department Heads, and Director of Public Works to more fully understand the city assets, preparedness, and stormwater drainage and sewage systems respectively.

After a complete assessment was performed for the downtown floodplain, the consulting group then hosted a **Final Event** on October 16th in 2025 to share the results. These results were offered in a presentation and then opened for comment in poster format along a wall gallery. Local experience was found to be comparable to the model.



Risk Assessment

The risk assessment split “**hazard**” as an objective measure of inundation (and its relative physical effects) against the more subjective “**vulnerability**” of how the severity of that damage might cause a negative impact upon the community. This reflects a common schema found in these types of assessments: “likelihood of failure” (similar to hazard), and “cost of failure” (similar to vulnerability). However, incorporating stakeholder input was also deemed desirable, so our team designed a number of survey methods to gathering these opinions. We had different groups assign a relative “**rank**” for community assets based on the following factors: urgency, need, want, and cost of failure. The results of the surveys were averaged into several scores, based on a ordinal ranking system #1-#9. See Section 04 for more detail.

The final “**Overall Priority**” was therefore derived from this three-tiered scheme:

- **Hazard Score**, representing likelihood of detrimental flood damage;
- **Vulnerability Score**, representing impacts of failure; and
- **Rank**, recording the relative community and stakeholder priorities.

These were then used to help organize the recommendations for the City’s next steps and future actions.



Results

Primary Takeaways

The City of Gardiner has a severe fluvial flooding hazard, the impacts for which are primarily to be found in the floodplain near the downtown area where the Cobbosseecontee Stream empties into the Kennebec. Although there are other tertiary concerns that could be addressed—seasonal ice scour damage on the waterfront, some localized stormwater drainage capacity issues, and sewer system overflow concerns exacerbated by inflow and infiltration—the risks caused by river flooding are by far the highest concern for City- and private-property planning. Given the hydrological situation found at this area of interest, the primary hazards are from extreme water crest heights and the damages from the resulting inundation (water damage, debris, hydrostatic pressure, pollutants, and infrastructure dysfunction). Although hydrodynamics (current, washouts, and sheering forces) from localized stormwater and seasonal floods on the Cobbosseecontee do present some hazards for the City, the inundation dangers posed by the Kennebec are clearly on a different magnitude of risk.

Given this outlook, the main components contributing to heightened inundation are rainfall events on the Kennebec, tide cycles, and sea level rise. In certain cases, ice jams at Swan Island have historically contributed to flood heights where a deep dam of ice restricts water. With a regular program of ice-breaking, however, this factor is likely not a substantial risk. Although the watershed has produced significant floods in each season of the year, there is added risk when spring snowmelt is compounded by heavy rainfall. The watershed is on track to continue to become wetter in the coming century with increased precipitation. The City’s main risk is the instability of its downtown area during these times of crisis. Private property is in great need of floodproofing and mitigation measures, and yet its historic nature mean these measures are not easily achieved. Although the pump station and library are the most at risk City-owned assets, Water Street structures and Hannaford grocery store are at greatest risk and deserve the highest attention.



For the City as a whole: provide residents and property owners with clear communication guidelines.

Even with the extensive records of flooding in Gardiner and the known risks and impacts, memory of flood damage and the urgency felt by individuals to act upon these risks can quickly abate between floods. Nuisance flooding affects a smaller number of individuals, and large-scale flooding normally occurs only one or two times for each generation of property owners. This means that each major flood that occurs is often met with reactive, unprepared actions rather than predetermined contingency plans and preparation.

Each property owner must of course prepare themselves; it is not feasible to request that the City take on extensive flood measures to attempt to directly protect private holdings. **The City** can, however, as a result of this study, decide to **invest in improving the resources available to its residents** so their individual ability to respond can be improved. This means locals should be able to: 1) have a way to better understand their individual risks, 2) respond to floods in real-time more effectively, and 3) have a pathway for improving and preparing their properties for future floods. This report attempts to provide a baseline level of assistance for the first item—how to estimate the Base Flood Elevation (BFE) for individuals’ structures.



For City assets: prioritize improving resilience and preparedness for the Pump Station and the Library.

The **Pump Station** provides crucial service to not just the downtown area, but also to neighboring towns. Sewage is conveyed from this location southward to the treatment facility in South Gardiner. Although the water heights do pose some inundation threat to the station itself, of more concern is the station’s power, accessibility, and functionality during severe weather events. Similarly, the amount of localized stormwater infiltration into the sewer system regularly threaten to overflow storage capacity and pollute the Kennebec. As this was also prioritized by the community, we recommend this asset be prioritized first for the City’s investment of capital into its owned assets.

Although the **Public Library** is largely above the Base Flood Elevation (BFE), it houses a unique archive in the basement, likely below the BFE. This archive includes many primary source documents of both statewide and local importance that need further protection. In the short term, this protection could be achieved by providing extra redundancy and contingency planning: a dedicated generator capable of powering the elevator for removing the archive if necessary, and/or a sump pump for provide extra time for removal in extreme events. Long term, however, the archive should likely be elevated or relocated within several decades.







Section 02 Flood Hazards

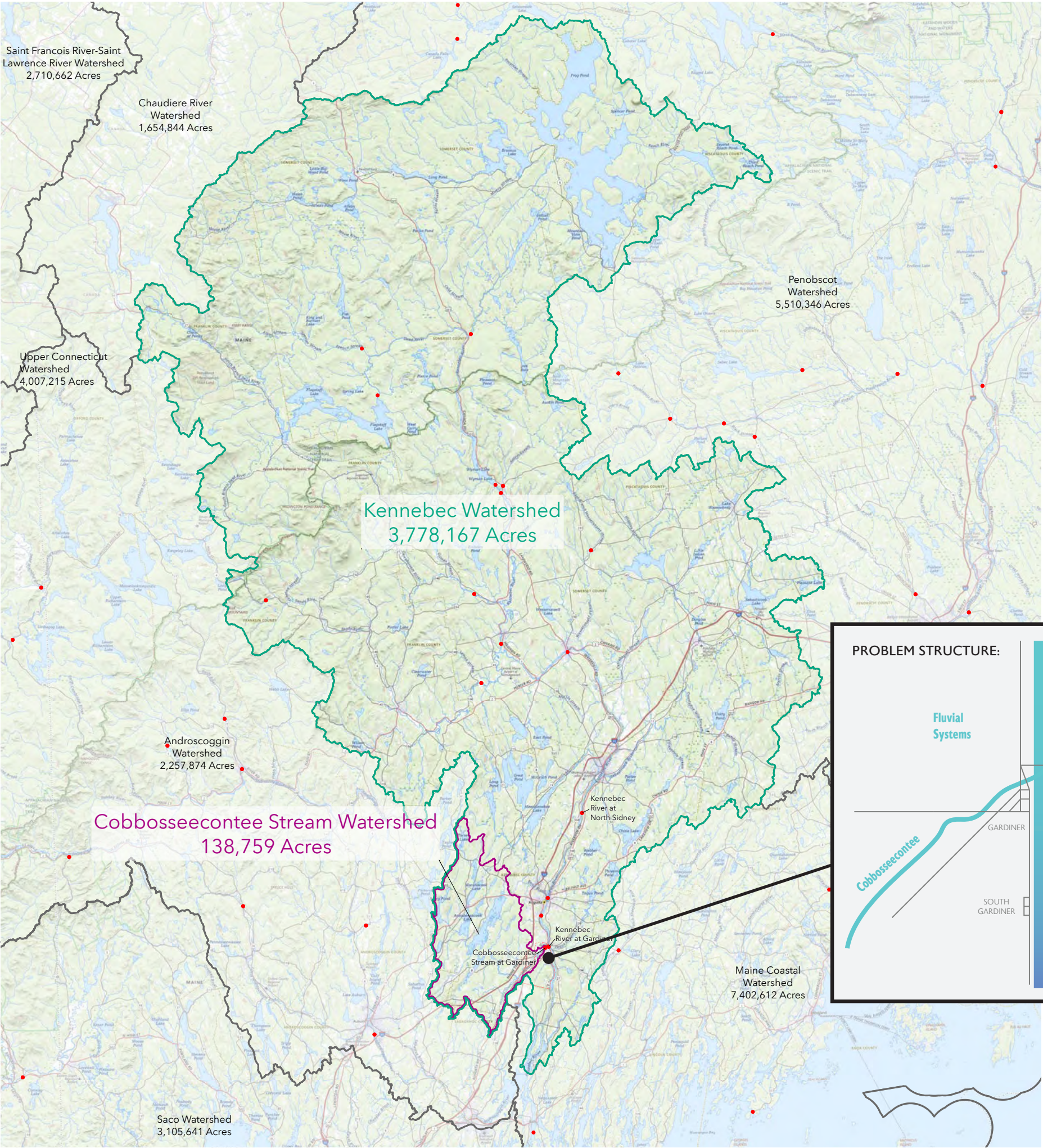
Flood Hazards Overview

Hydrological Context

The Kennebec River is the dominant hydrological feature in Gardiner. The river runs 170 miles, rising in Moosehead Lake in west-central Maine and flowing southward past Augusta before entering Merrymeeting Bay at Richmond. The river drains 5,869 square miles and discharges an average of 5.9 billion gallons per day at a rate of 9,000 cubic feet per second. The USGS Station (01049505) is the local gauge, with hydrological data available back to 2000. Another gauge upstream in Sidney provides more information back to 1980.

The Cobbosseecontee Stream leaves the outlet of Cobbosseecontee Lake in Manchester and flows approximately 20 miles in a U-shape before entering the Kennebec River at Gardiner. The watershed drains 217 square miles, with a USGS Station (01049500) conveniently located in Gardiner. The stream is influenced by precipitation and snowmelt, experiencing higher flows in spring and lower flows in summer and fall. Its flow is affected by local dams, however the management of water release from these is not likely a significant factor to flood water height when the Kennebec is in flood stage. This stream flows in excess of 1,000 cubic feet per second (CFS) only in flood stage, and only exceeds 3,000 CFS in high flood stage. Although this flow does contribute to flooding events, this stream’s effluence is several orders of magnitude smaller than the much greater flood volumes conveyed by the Kennebec—e.g. >200,000 CFS in the flood of 1987.

Gardiner sits nearly at the bottom of the Kennebec’s outlet. Along with Hallowell, it is low enough on the watershed to receive some of the watershed’s peak flood stage heights and raw freshwater discharge while also being influenced by tidal action. Given a diurnal range of approximately 5 feet, this normal tidal cycle has the potential to greatly influence the outcome of flooding events depending on the timing. Although influenced by the marine system with a regular measured ebb and flood tide, the river is primarily freshwater at this location.



Understanding Flood Risk

Some of our main tools for describing flood risk are the hypothetical/projected flood height thresholds: the “100-year flood” and “500-year flood” intervals. They are meant to set the likelihood of certain levels of floods at a more human scale. This means you would expect only one flood of a specific theoretical height per century, and/or one flood at another elevation every five centuries. Today we use more common terms that represent annual chance. We would now say each height has a 1% chance (1 in 100) annually or a 0.2% chance (1 in 500) annually.

The “100-year flood” is therefore commonly used to estimate the risk of a structure’s inundation—often it is compared with the life of a mortgage—it is for this reason it directly affects flood insurance rates. These hypothetical floods have what is called a **Base Flood Elevation** (BFE)—this is the projected height a flood would reach for that time period. For Gardiner’s floodplain, the BFE for a 100-year flood is 24 feet. Although never recorded, the BFE for a 500-year flood can be coarsely estimated at 30 feet based on a 125% multiplier suggested by FEMA documentation.

History of River Flooding in Gardiner

There have already been at least two “100-year floods” in Gardiner, spanning about 200 hundred years: one in 1936 and one in 1987. Some might ask, “Aren’t 1936 and 1987 only 50 years apart, meaning that they’re more like 50-year floods?” The answer is that we have fairly detailed records and research going back 200 years, which is the known period of record. We use this total number of years to calculate our observed frequency because we also consider the absence of floods to be meaningful data points. We assume that other significant floods of a similar magnitude would also have been recorded. The language in many newspapers and primary documents commonly says, “noted as the worst flood since ____.”

Given the evidence we have, we know that two floods exceeded the 24’ BFE from 1825 to 2025; though there were many other severe floods recorded during that time. We do have to admit the possibility that a flood (like 1896) may also have reached this level, or another went unrecorded. The crest heights of the largest known and observed floods are estimated as follows:

- #1 — **1936**, measured crest height of 26.4 feet.
- #2 — **1987**, measured crest height of 24.7 feet.
- #3 — **1896**, estimated height of 18-22 feet.
- #4 — **1846**, estimated height of 21 feet.
- #5 — **2023**, measured crest height of 19.2 feet.
- #6 — **1826**, estimated height of 19 feet.
- #7 — **1970**, estimated height of 16-20 feet.

- #8-12 — **1917, 1920, 1920, 1922** — x4 floods, unknown heights, so-called “100-year,” but likely not based on modern metrics.
- #13 — **1954**, estimated height of 15-16 feet.

Regarding “Percent Likelihood” and “Annual Chance”

An important point to remember is that any given year’s flood probability is not directly influenced by the events of the year before. These systems are chaotic—they are not completely random, but they are also not predictable. Some estimates can be made from observing patterns like we’ve done, but these events cannot be predicted year to year with certainty. Having a 100-year flood occurrence, for instance, does not mean you are then in the clear for a certain span of time. Because weather patterns tend to be tied to annual seasons, we can, at best, say that the odds represent an annual likelihood. A good general metaphor for comparison would be that “flipping a coin” represents a “50% chance” to get heads or tails each time you flip. Each year is like its own coin flip, and it is always possible to flip “heads” multiple times in a row.

Regarding Climate

The best information we have from [Climate Toolbox](#) and other local assessments claim the Kennebec will continue to get rainier. This may alter current Base Flood Elevation estimates by FEMA for this locale. A new flooding study by FEMA of the Kennebec valley is nearing completion. The new BFE from this upcoming study, if different from the one used here, can be incorporated in the inundation tables for more accurate estimates. Similarly, sea level rise is projected to increase significantly in the coming decades. The State-adopted standards are to “Commit to Manage” increased average ocean heights. The heights adopted by the State of Maine are based on +1.5 feet of sea level rise by 2050 (25 years from this writing), and +4.0 feet by 2100 (75 years from this writing). These increases mean that BFE will also increase due to a higher baseline water height.

Dams

The Kennebec River watershed is one of the most heavily modified drainage systems in Maine, containing hundreds of individual structures according to the Maine Dams dataset. Within the Cobbosseecontee Stream sub-watershed alone there are approximately 20 dams—ranging from small historic timber-crib remains to active hydroelectric facilities—which regulate water levels and sediment transport. While each of these structures influences local flow characteristics, a comprehensive hydraulic integration of every minor

impoundment exceeds the scope of this report, which focused instead on vulnerable community infrastructure. To maintain a practical baseline, this assessment bypassed costly and extensive HEC-RAS modeling for the Kennebec and Cobbosseecontee systems in favor of using the 2011 FEMA Flood Insurance Study (FIS) 24-foot Base Flood Elevations (BFEs) in a bathtub model.

It is worth noting, however, that the removal of the Edwards Dam in 1999 fundamentally changed the lower Kennebec River’s behavior. For over 160 years, the dam acted like a massive brake, slowing water flow and trapping sediment in a 17-mile artificial lake. Since its removal, the river has returned to its natural, free-flowing state, which allows water to move unencumbered in this lower section and enables tidal action to reach further inland. FEMA recognized this permanent shift in 2011, updating its flood maps to account for these modern hydraulics. Because the river no longer has an impoundment to dampen flow, current flood risks are calculated using this more active, post-dam baseline. By relying on these established BFEs, we ensure that our infrastructure recommendations are grounded in the most recent regulatory standards (2011)—specifically those updated after the 1999 removal of the Edwards Dam—without an exhaustive inventory of the large watershed’s complex dam history.

Please see the Appendix for a map of the dams in the region, the Edwards Dam is highlighted with a yellow box.

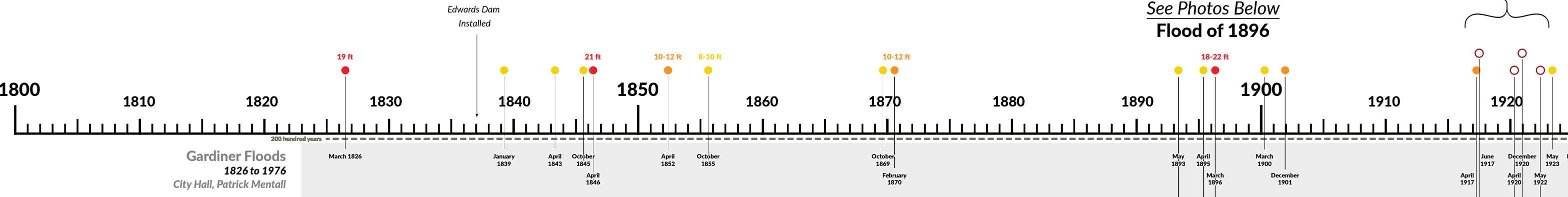
Timeline

The purpose of the visual on the following page is to collate and communicate the known floods, but also to establish relative frequencies for comparison. There are many floods that have been detrimental but do not rise to the level of 1% chance and/or 0.2% chance. The timeline shows the frequency and severity of floods for Gardiner, spanning 200 years, it includes: 1) the date of occurrence, 2) their heights, 3) the severity/impact of those heights, 4) the data sources, and 5) photos of the most significant floods.

Cross Sections

Following the timeline are two cross-section profiles that show the same frequencies and heights in relation to existing structures. These profiles were generated using interpolated heights from a surface model, derived from LiDAR first-return data. The locations of these cross sections as well as a more detailed visualization of inundation can be seen in the Section 04 Risk Assessment’s 3D Map.

Measuring the Floods



This was likely the largest flood of the 19th century. It may or may not have exceeded the "100 year flood" mark..

See the photograph in the lower left.

These floods were recorded to be "100-yr floods." The crest height of these, however, cannot be verified for the Kennebec and the base flood elevation (BFE) was likely not set at 24' as it is today.

See Photos Below Flood of 1896

How do I read this timeline?

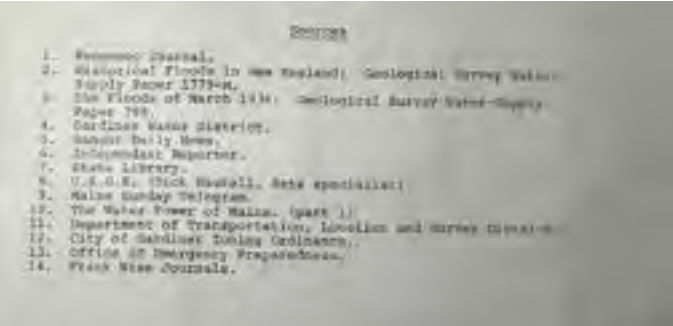
Each dot represents a recorded flood.

- Nuisance or seasonal flood.
No height and/or minimal damage reported.
- Damaging flood. ~15% annual chance.
Between 12 and 16 feet in height.
- Severe flood.~5% annual chance.
Between 16 and 24 feet in height.
- 100-year flood. ~1% annual chance.
Between 24 and 30 feet in height.
- Unconfirmed/misattributed "100-year" flood.
No height or other corroborating evidence, though still likely severe.
- No 500-year floods (>30 feet of elevation) are on record.

How do we know historical floods happened?

A list was compiled in 1976 from a variety of sources. The City of Gardiner, under the management of Paul Hermann, undertook a survey of all known floods up to that point. This compiled list is shown above by the months and years listed in the gray box.

See the sources they list, pictured below.

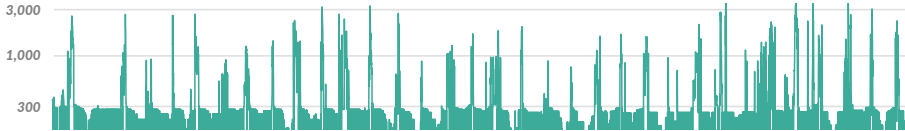


What is a stream gauge?

A device to measure a river's volume and flow. A stream gauge is a device used to measure the flow and water level of rivers and streams. In the United States, these are managed by the U.S. Geological Survey (USGS) and help track how much water is moving through a river at a given time. A chart called a **hydrograph** can be made to show the relative flow of a river over time and are helpful for analyzing river systems. See the hydrographs to the right.

Pictured left is #01049505 for the Kennebec in Gardiner.

Cobbosseecontee Stream 1890 to Present Cubic Feet per Second (CFS)



1896



Source: Historical photos provided by Dawn Thistle, Archivist, Gardiner Public Library.

1936



Source: Historical photos provided by Dawn Thistle, Archivist, Gardiner Public Library.



1987



Source: Historical photos provided by Dawn Thistle, Archivist, Gardiner Public Library.

This is the flood of record; it was caused by both a large rain event and ice jams.

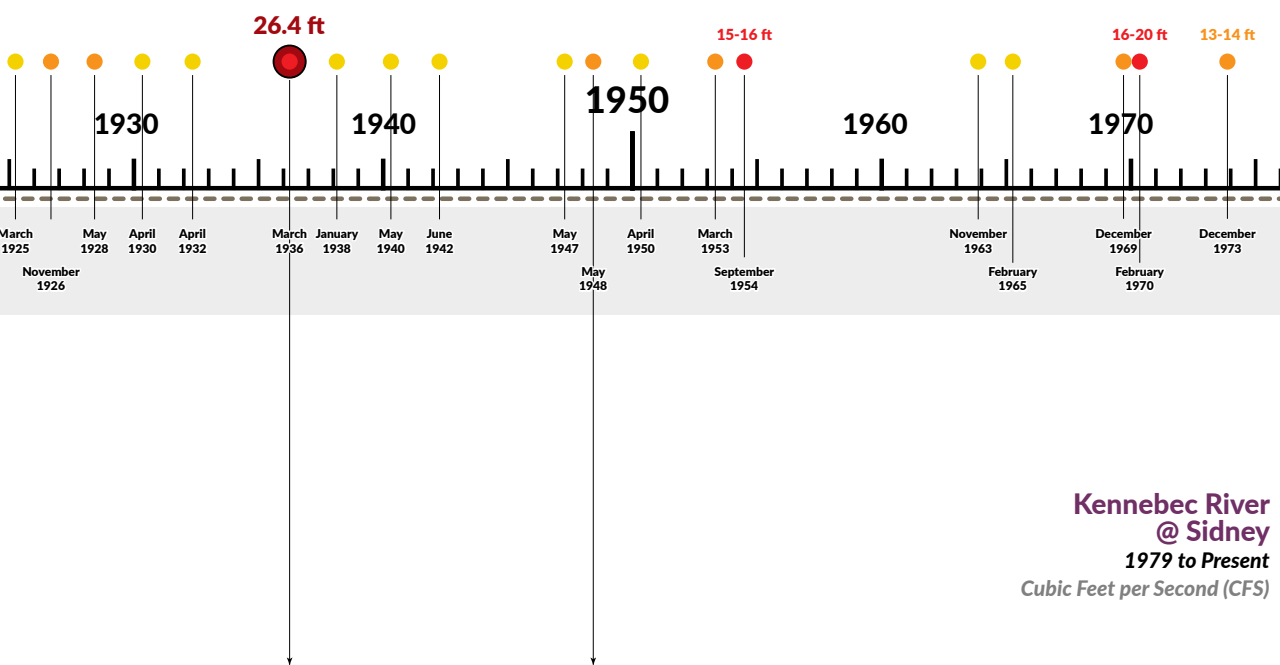
See the photographs in the lower left.

This flood exceeded the base flood elevation and was considered catastrophic statewide. Although it was 1.7 feet lower than the flood of record, it still meets the criteria of a “100-year flood.”

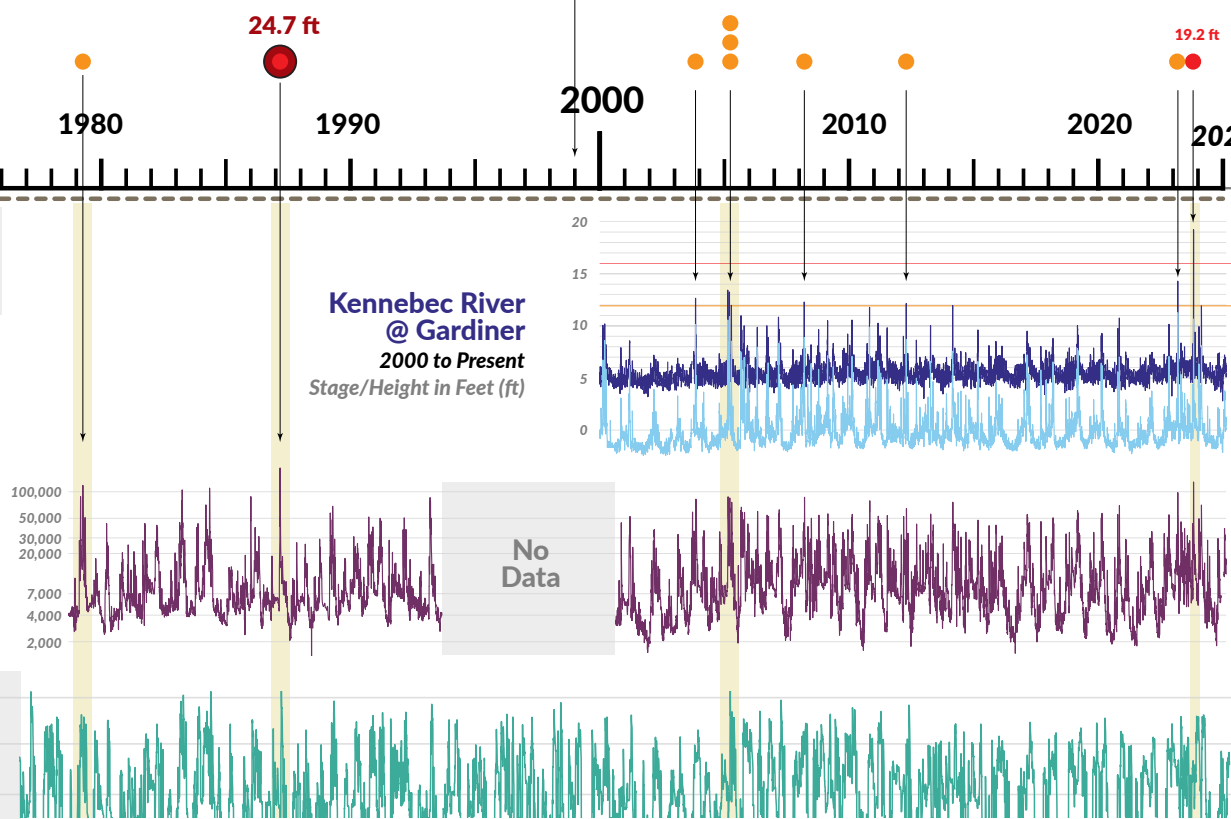
Please see the inundation map and detailed hydrograph of this event for more information. You may also look up your property to see how it our analysis estimates its level of inundation.



See Photos Below
Flood of 1936



See Photos Below
Flood of 1987



See Photos Below
Flood of 2023

What does all of this information show?

How we measure floods and estimate impact.

Even though the sources aren't consistent, we can still get a good estimate of the frequency of flood events and how severe they are. To do this, we draw from historical sources and river gauges. Based on an interpretation of modern elevation data, we set several thresholds to get a general figure how frequently each level of flood has occurred in the past 200 years.

The Kennebec is mostly to blame for bad floods.

The Cobbossee feels like a threat, but the historical record shows that the Kennebec is the most common cause for extreme floods; and a comparison of the hydrographs show that the Cobbossee regularly discharges similar volumes of water across different types of flood events. Although added water from the Cobbosee may make the problem worse in some cases, the Kennebec is directly to blame for the most impactful, damaging events.

Damaging floods have a high chance annually.

Over the course of two hundred years there have been two floods that crested above 24 feet of elevation: the flood of 1936 and the flood of 1987. This is in line with the predicted “100-year” base flood elevation, meaning there is approximately a 1% chance annually, or 1 in 100. There have been, however, been approximately 30 damaging floods within the same time span, each with different degrees of intensity. This equates to a 15% chance that there will be a damaging flood in any given year, about a 1 in 7 chance.



ed by Dawn Thistle, Archivist, Gardiner Public Library.



Source: Historical photos (color) from Digital Maine Repository, attributed to Maine Geological Survey.

2023



Source: Melissa Lindley.



Compiled by Haley Ward
for the 2025 vulnerability
assessment.

Project Number: 10476.001
Project Manager: Ben Meader
Client: City of Gardiner
Client Contact: Melissa Lindley
Date: 4/17/2025



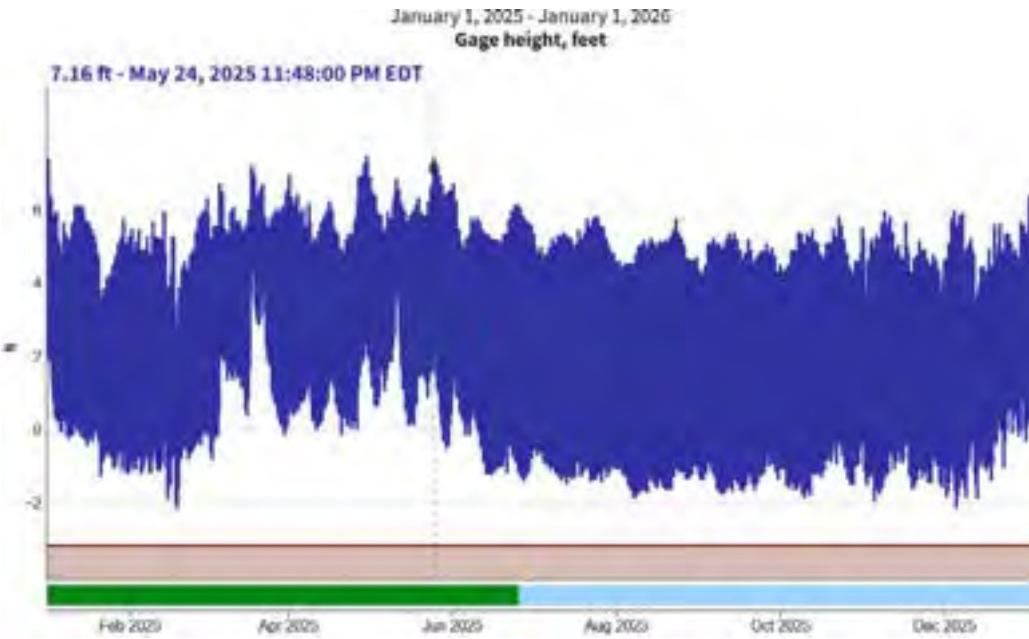
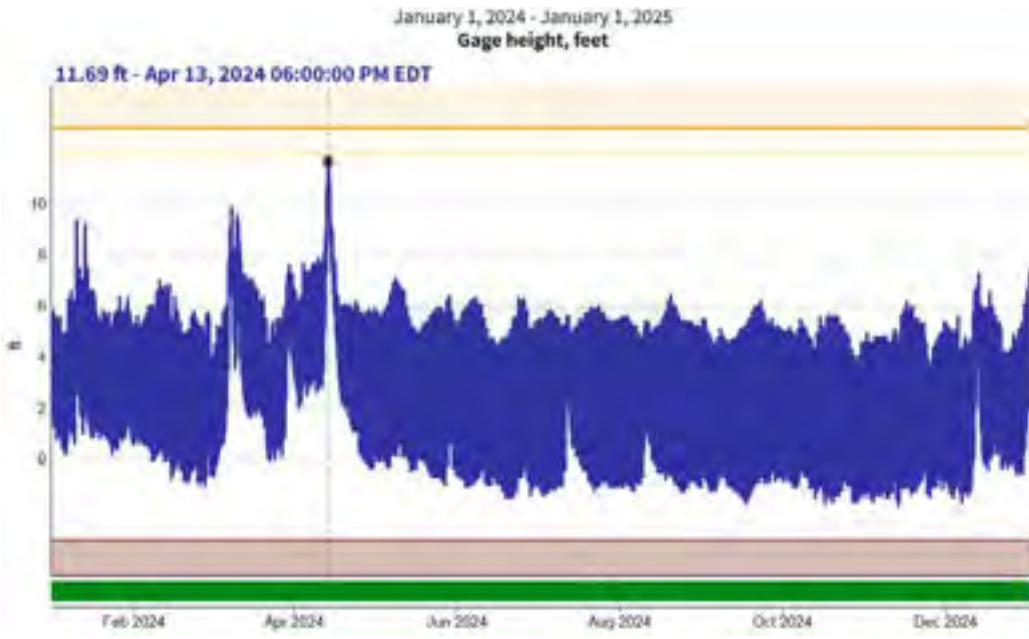
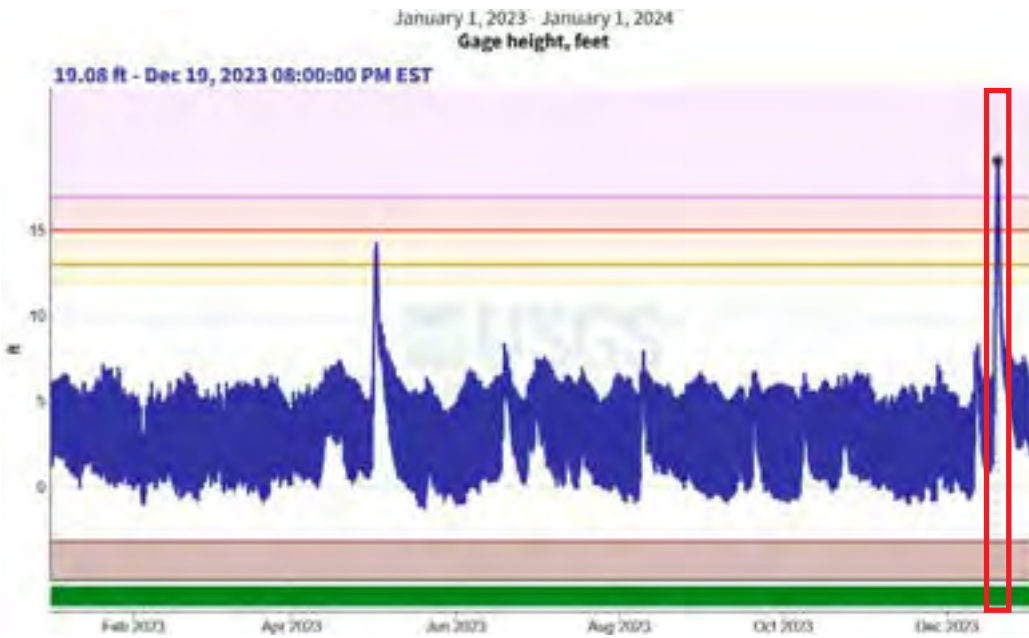
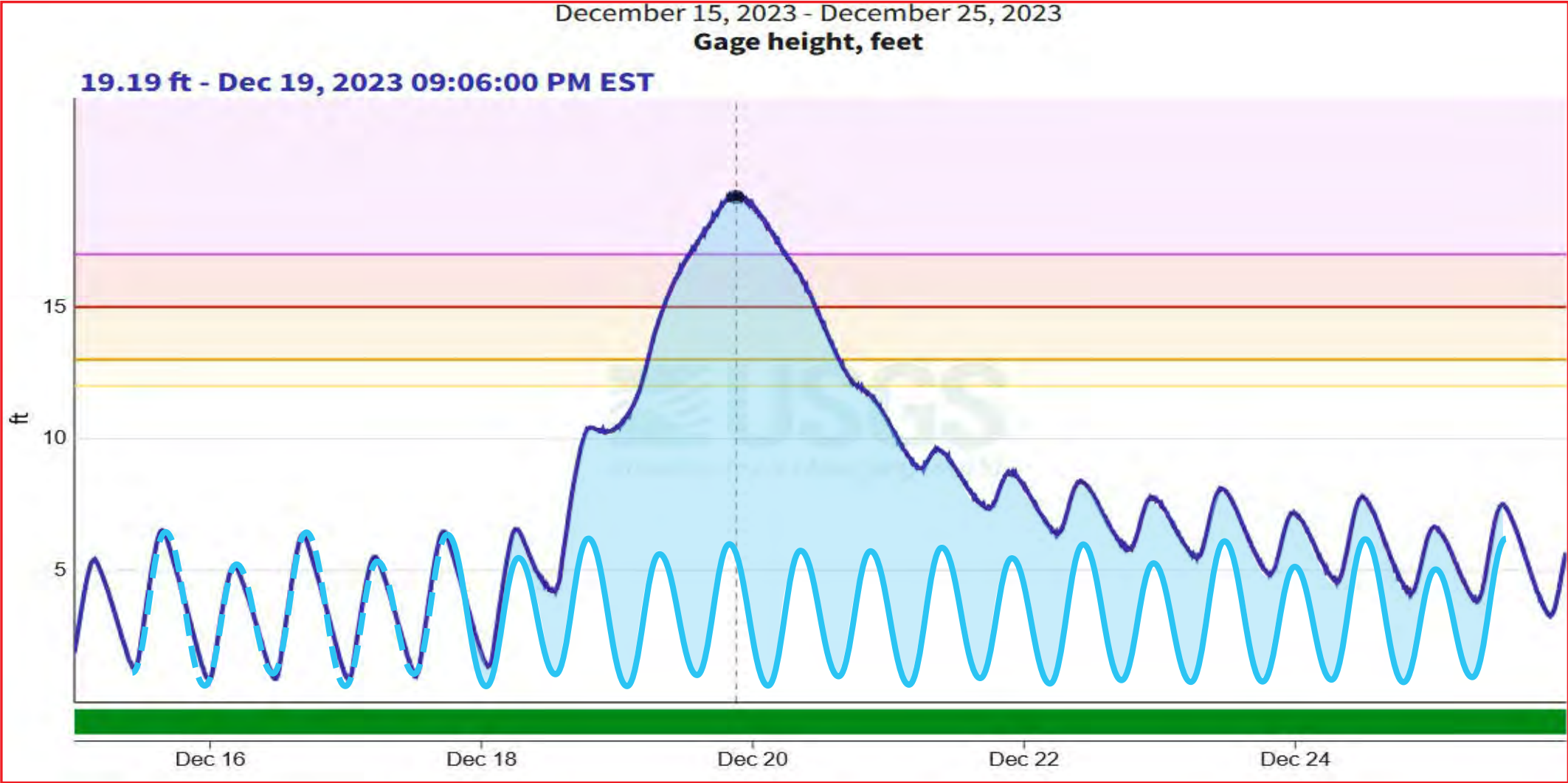
River Metrics & Details

Hydrographs

This page shows several relevant charts for understanding the Kennebec, called “hydrographs.” A hydrograph is a chart that shows “relative volume” on the y-axis and “time” on the x-axis. They are used to help plot data for understanding the flow patterns of a river at a fixed location. These hydrographs are all taken from the same location, the USGS River Gauge in Gardiner. Although volume is often recorded as cubic feet per second (CFS), at this location the river’s volume is instead measured by height in feet. The current at this location can be variable as it is tidally influenced, and therefore the height of the water doesn’t always directly relate to the freshwater discharge rate.

For this system, the charts to the right show the past three years of river data. The dark blue/purple line is wide and jagged because the river’s height varies twice per day by approximately 5-6 feet because of the tide. These hydrographs show three floods: one significant flood in May of 2023, one major one in December of 2023, and one minor one in the spring of 2024.

The major flood, as previously mentioned, was estimated to be the fifth highest measured; it is highlighted on the annual chart in red and shown in detail below. The flood crested at approximately 9 p.m. on December 19th at 19.2 feet, a little over an hour after high tide. The predicted tides are shown below in light blue, and the measured water height is measured below in dark blue/purple.



Tidal Action

Although the Kennebec is primarily a freshwater system in Gardiner, the system has a distinct and strong tidal pattern, the diurnal range is between 5.96 feet and 6.53 feet. The timing of this pattern with flood events directly impacts the peak flood stage. In the most recent event, the timing likely put the maximum crest height lower than it could have been.



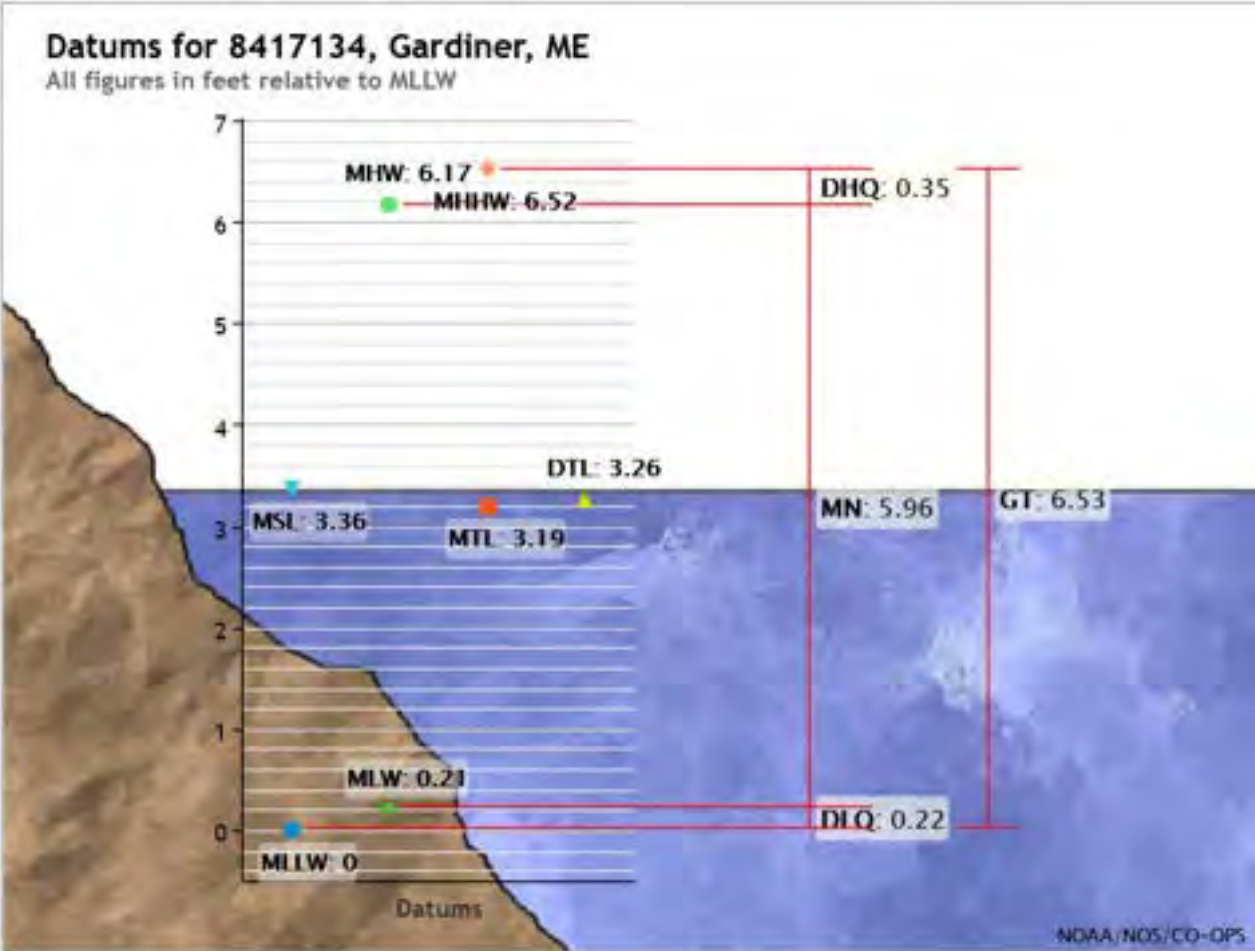
December 2023 Flood | Emily Duggan/Kennebec Journal



December 2023 Flood | Anna Chadwick/Morning Sentinel

According to the tidal currents model from the Northeast Regional Association of Coastal Ocean Observing Systems (NERACOOS) for the Gulf of Maine, and based on direct observation, the flood tide (meaning the incoming tide in this case, not “flood stage”) will often produce slow, northward currents at this location.

The slackwater between the Kennebec’s discharge and the tidal current can occur as high upriver as Augusta. The ebb tide current is much stronger, as would be suspected.



Elevations on Mean Lower Low Water

Station: 8417134, Gardiner, ME
Status: Accepted (Nov 08 2005)
Units: Feet
Control Station: 8418150 Portland, ME
T.M.: 75
Epoch: 1983-2001
Datum: MLLW

Datum	Value	Description
MHHW	6.52	Mean Higher-High Water
MHW	6.17	Mean High Water
MTL	3.19	Mean Tide Level
MSL	3.36	Mean Sea Level
DTL	3.26	Mean Diurnal Tide Level
MLW	0.21	Mean Low Water
MLLW	0.00	Mean Lower-Low Water

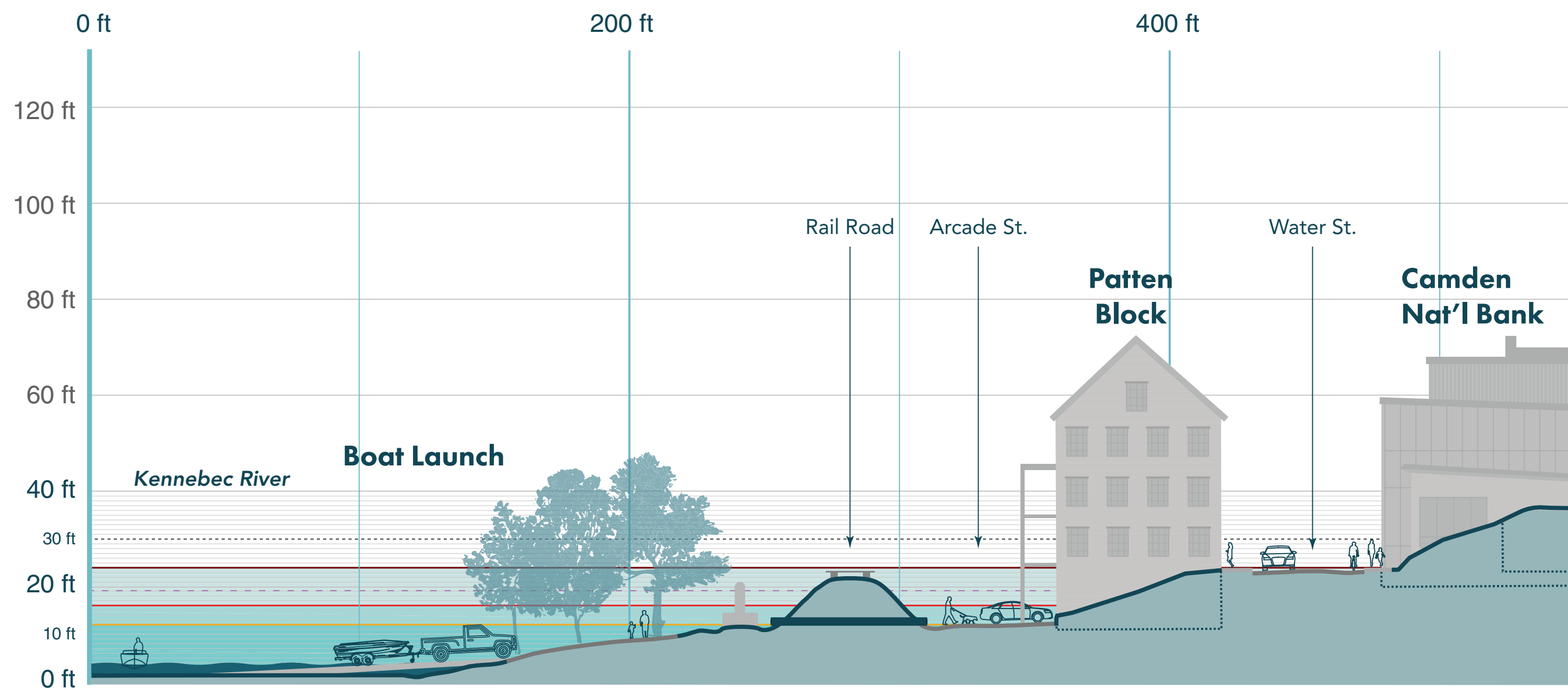
Inundation Levels - Kennebec River

(Looking South)

What does “zero” mean here?

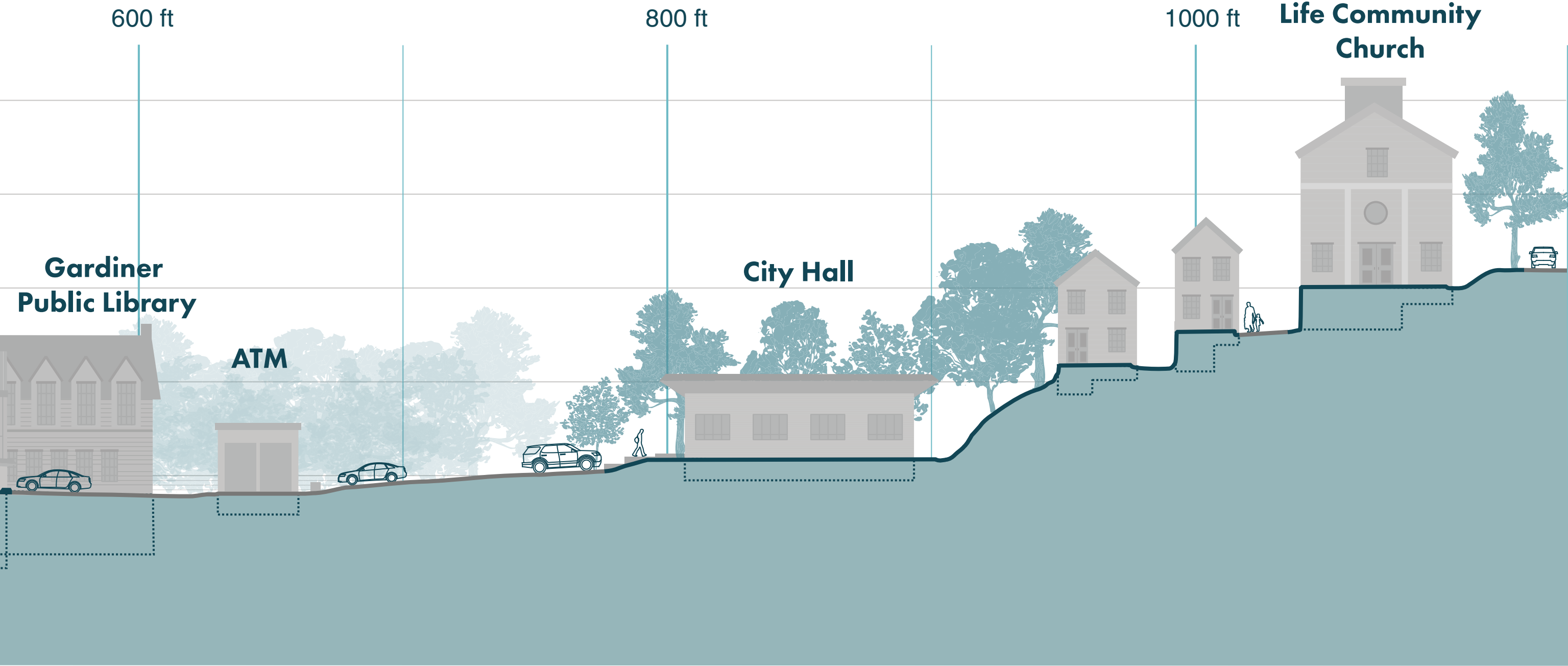
Tides are normally locally measured with their own “datum” or baseline reference point. In local measurements of tide—which vary substantially from location to location—we use statistical averages of high, low, and mean tides to provide reference points for different epochs (periods of time).

For this case, however, and for the USGS river gauges in question, we adjust all measurements and reference “0” off of something called the North American Vertical Datum of 1988 (NAVD88). It represents a fixed baseline for a much broader North American region. The stream gauges that record these flood heights, as well as the FEMA BFEs, all make reference to this datum.



Legend

- 500 Year Flood - 30ft (0.2% chance annually)
- Base Flood Elevation (BFE) - 24 ft (1% chance annually)
- - - - December 2023 Flood - 19.2 ft
- Severe Flood - 16 ft (5% chance annually)
- Damaging Flood - 12ft (15% chance annually)



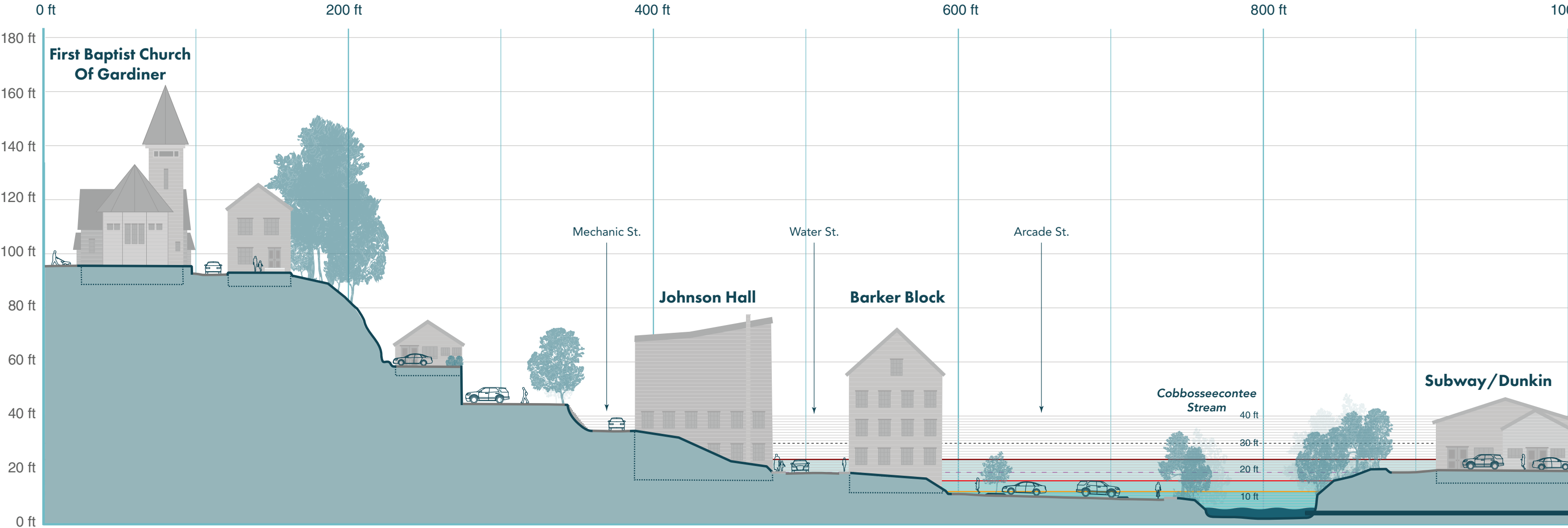
Inundation Levels - Kennebec River

(Looking West)

What does “zero” mean here?

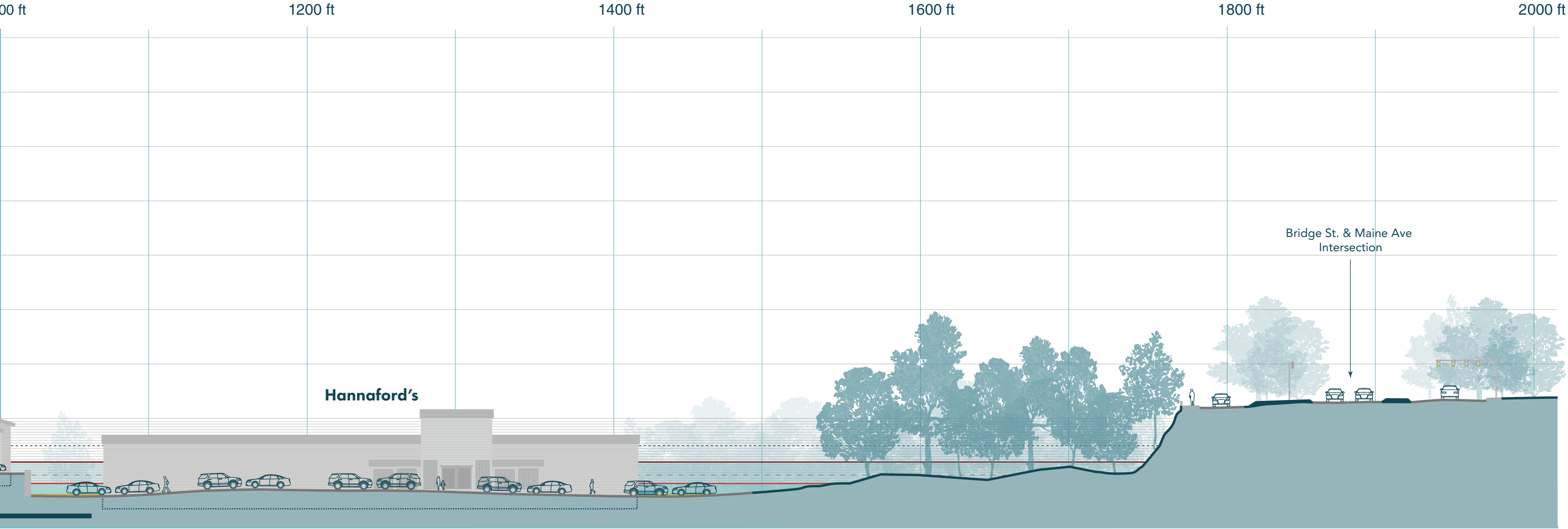
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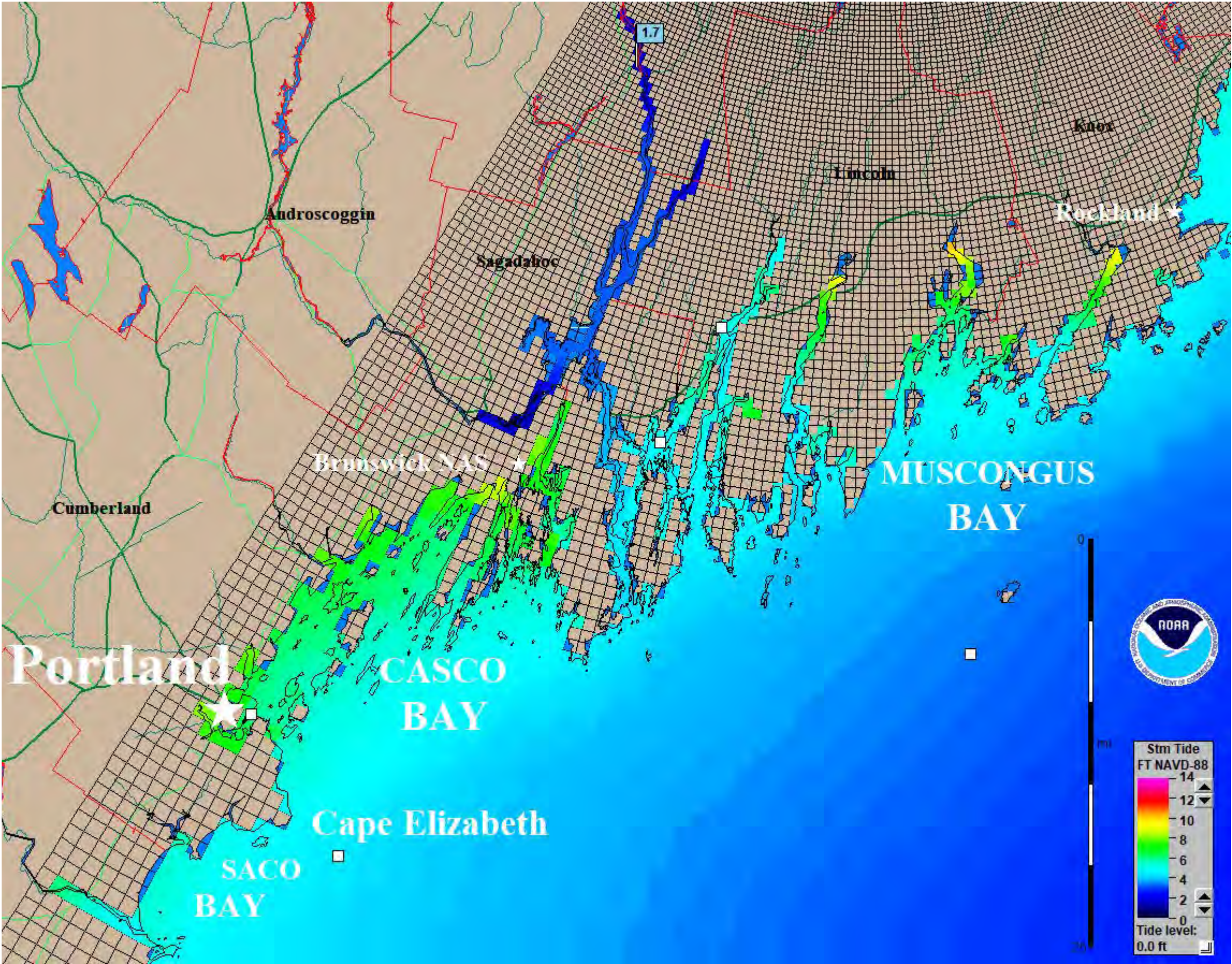
Marine Factors

Storm Surge

Our team utilized the SLOSH model (Sea, Lake, and Overland Surges from Hurricanes) to identify potential storm surge heights as they vary geographically to better understand Gardiner’s apparent risk. No notable flooding was reported when much of the rest of coastal Maine experienced severe surges in January of 2024.

Because storm surges are highly variable and related directly to large storm systems, we employed “Maximum of Maximums” (MOM) projections rather than the more focused Maximum Envelope of Water (MEOW) parameters. While a MEOW map estimation provides the “worst-case” flood for a storm with a specific speed and direction, the MOM aggregates a multiplicity of potential scenarios into a single composite—i.e. a summary of the worst-case scenarios of the MEOWs. This represents the physical “ceiling” of inundation risk given a chosen storm category, regardless of the storm’s specific approach and magnitude.

The results show that storm surges—in an aggregation of MOMs for Category 1 hurricanes—would only affect Gardiner with a comparatively small storm surge, adding 1.7 feet to a normal tide, not a significant threat comparatively. Furthermore, storm surges are normally the result of wind run up and/or extreme barometric pressure depressions; these occur as a storm system passes through. Fluvial flooding for Gardiner tends to be delayed, happening after major rain events. The City is located at the very bottom of the watershed—this means the time it takes for precipitation to accumulate is longer than the duration of the storm itself.



Sea Level Rise

Tracking of sea levels with tide gauges and satellites has demonstrated conclusively that sea levels have risen over the last century. Sea level rise in Maine has accelerated over the last 30 years due to ocean warming, melting ice sheets, and ocean current shifts, and is expected to continue accelerating in the coming decades.

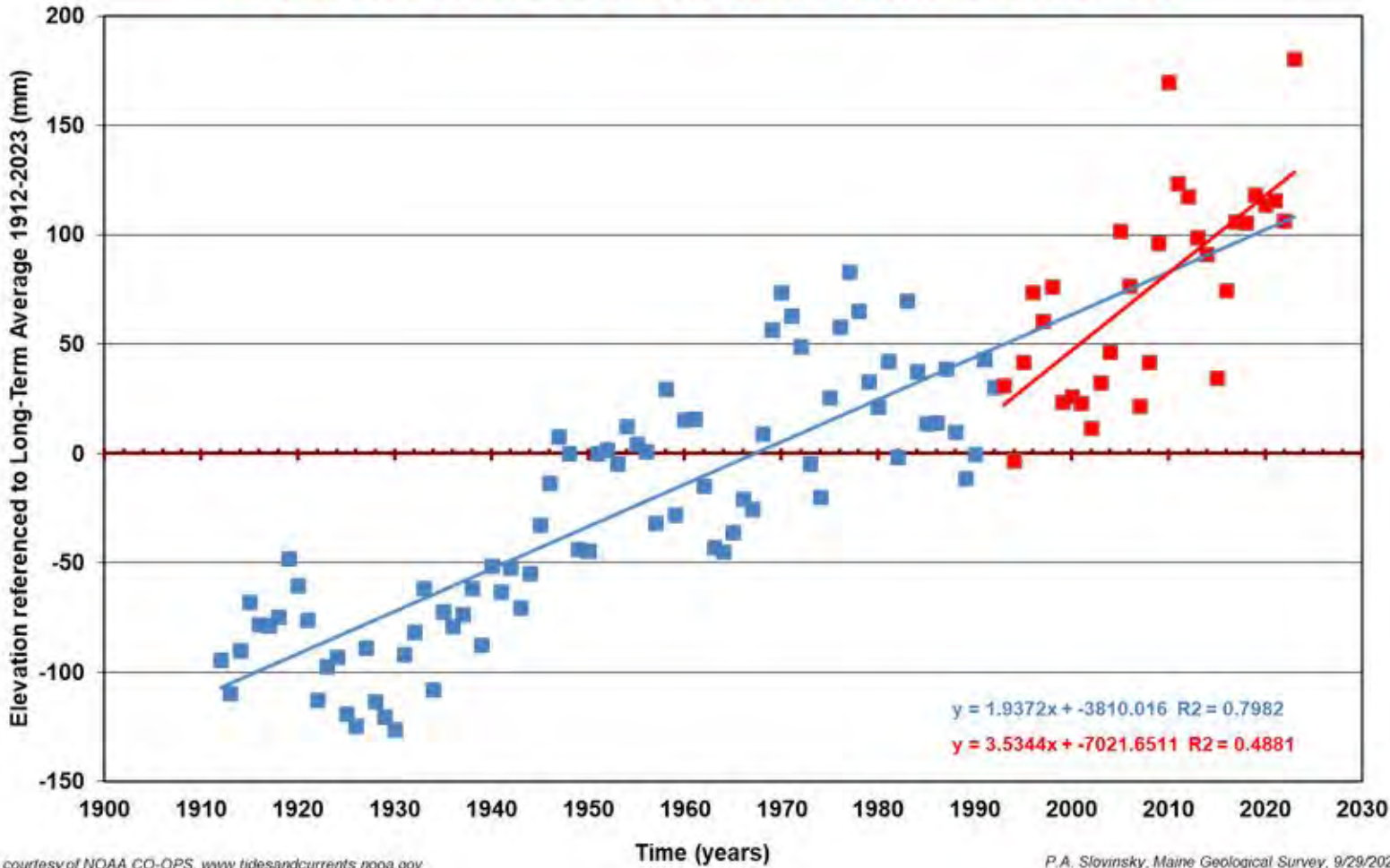
A chart of the average ocean heights in Portland (see below) shows seas have already risen over 8 inches since the early 1900s. Projections for sea level rise vary by timeline, geography, and model severity. Using NASA's Sea Level Rise Scenario Tool (see lower right), we estimated the “intermediate” projections

geographically for Gardiner (see upper right) at 2050 (+1.19) and 2100 (+3.65). However, to align with the State-adopted figures for what we should “Commit to Manage” for sea level rise, our team has conservatively decided to adopt the following projections of **+1.5 feet** by **2050** and **+4.0 feet** by **2100**. Therefore, although the primary risks reported in Section 04 are principally driven by river flooding risk, the numbers are augmented by an expectation that those Base Flood Elevations (BFEs) will be higher in the coming decades, altered by a higher Mean Sea Level (MSL).

As more years progress, updated figures for these projections should be incorporated. For projections, reference the tables in Section 05.

Annual Sea Levels, NOAA Station 8418150, PORTLAND 1912-2023

1912-2023 average: 1.94 ± 0.09 mm per year or 0.64 ft (7.63 in) per century
1993-2023 average: 3.53 ± 0.74 mm per year or 1.16 ft (13.91 in) per century



Data courtesy of NOAA CO-OPS, www.tidesandcurrents.noaa.gov

P.A. Slovinsky, Maine Geological Survey, 9/29/2023

Data drawn from Maine Geological Survey.

	Portland <i>Median (likely range)</i>		Bar Harbor <i>Median (likely range)</i>		Eastport <i>Median (likely range)</i>	
	Intermediate	High	Intermediate	High	Intermediate	High
2020	0.3 (0.2-0.5)	0.3 (0.2-0.5)	0.4 (0.3-0.5)	0.4 (0.3-0.5)	0.4 (0.3-0.5)	0.4 (0.3-0.5)
2030	0.6 (0.4-0.8)	0.6 (0.4-0.8)	0.6 (0.4-0.8)	0.6 (0.4-0.9)	0.6 (0.4-0.8)	0.6 (0.4-0.9)
2040	0.8 (0.6-1.1)	0.9 (0.6-1.3)	0.9 (0.7-1.2)	1.0 (0.7-1.4)	0.9 (0.6-1.1)	1.0 (0.7-1.4)
2050	1.1 (0.8-1.4)	1.4 (1.0-1.9)	1.2 (0.9-1.5)	1.5 (1.0-2.0)	1.2 (0.9-1.5)	1.4 (1.0-2.0)
2060	1.5 (1.1-1.9)	2.0 (1.5-2.7)	1.5 (1.2-2.0)	2.1 (1.5-2.8)	1.5 (1.1-1.9)	2.1 (1.5-2.8)
2070	1.8 (1.4-2.3)	2.9 (2.1-3.6)	1.9 (1.5-2.4)	2.9 (2.2-3.7)	1.9 (1.4-2.4)	2.9 (2.1-3.7)
2080	2.3 (1.8-2.8)	3.8 (2.8-4.8)	2.4 (1.9-3.0)	3.9 (2.8-4.9)	2.3 (1.8-2.9)	3.8 (2.7-4.9)
2090	2.9 (2.2-3.5)	4.9 (3.5-6.1)	3.0 (2.3-3.6)	4.9 (3.5-6.2)	2.9 (2.2-3.6)	4.8 (3.4-6.1)
2100	3.5 (2.6-4.2)	5.9 (4.3-7.4)	3.6 (2.7-4.4)	6.0 (4.3-7.5)	3.6 (2.6-4.3)	5.9 (4.2-7.3)
	4.2 (3.0-5.2)	7.1 (5.1-8.7)	4.4 (3.1-5.4)	7.2 (5.2-8.9)	4.2 (3.0-5.3)	7.0 (5.0-8.7)
2120	4.8 (3.4-6.5)	8.2 (5.8-10.3)	5.0 (3.5-6.7)	8.3 (5.9-10.5)	4.9 (3.4-6.6)	8.1 (5.8-10.3)
2130	5.4 (3.8-8.2)	9.2 (6.4-12.3)	5.6 (4.0-8.4)	9.3 (6.5-12.4)	5.5 (3.8-8.3)	9.1 (6.3-12.2)
2140	6.0 (4.1-10.3)	10.0 (6.9-14.5)	6.2 (4.3-10.6)	10.2 (7.0-14.6)	6.0 (4.2-10.4)	9.9 (6.8-14.4)
2150	6.5 (4.5-12.8)	10.7 (7.5-16.7)	6.7 (4.7-13.1)	10.9 (7.6-16.9)	6.6 (4.5-13.0)	10.6 (7.3-16.6)

Gardiner

Interm. / High

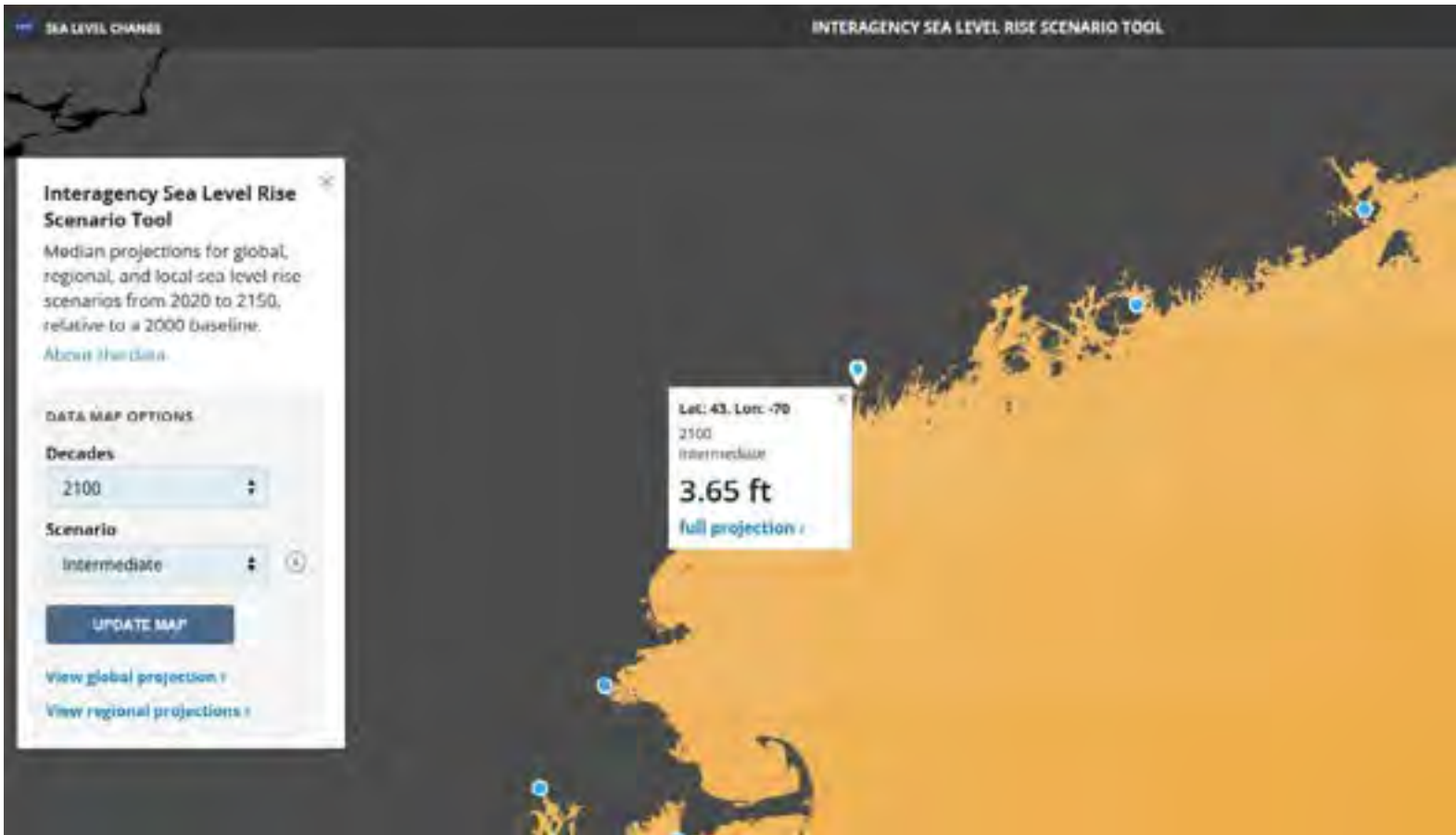
1.19, 1.50

1.95, 2.99

3.85, 6.17

Data drawn from the Maine Climate Council's
“Scientific Assessment of Climate Change and Its Effects on Maine.”
https://www.maine.gov/future/sites/maine.gov/future/files/inline-files/STS_2024_digital.pdf

Data drawn from NASA
Interagency Sea Level Rise Scenario Tool.





BEVERAGE &
REDEMPTION

ATM

A photograph of a flooded street in a town. The water is murky and reflects the sky. In the background, there are several buildings, including a brick one on the left and a white one with a steeple in the center. Bare trees are visible along the street. The sky is overcast and grey. The image has a blue tint.

Section 03

Community Vulnerability

City Assets Overview

Description

Most of the assets listed here were decided upon at the outset of the project by the City during the RFP process. Many of these assets were also listed in the original grant proposal and are therefore included for completeness. Early in the project, however, we established that these assets were so dissimilar that comparing each on the same scale may prove difficult for developing consistent recommendations. We also concluded that the most heavily impacted parts of this floodplain were not “City-owned” but could still be considered “City assets.” These included: 1) the downtown district, in particular the Water Street businesses, and 2) Hannaford’s supermarket. Both of these are crucial

for Gardiner’s livelihood and well-being. Gardiner serves as a service center for many neighboring towns as well. Therefore we decided to take a more holistic approach with evaluating the City’s assets and went through numerous methodologies (see *Section 04*) before arriving at this final system. Each asset was given a separate card and evaluated directly for its relative environmental hazard (the physical risks), but also evaluated for its vulnerability (the impact of failure). These are qualitative judgements based on site visits, research, and discussion with our lead personnel. Vulnerability, for instance, relates less to “how much” water is physically inundating the asset, and more relates to the impacts caused by that asset’s inundation. The following pages are dedicated to directly addressing each of the nine assets identified for this study.

Scoring System

The scoring system went through numerous iterations and is more fully explained in the beginning of Section 04. Each asset receives one of four grades for **Hazard** and **Vulnerability** each. These are marked as: n, z, Z, ZZ and n, v, V, VV, indicating non-concern, low, medium, and high ratings, respectively resulting in a simple numerical value: 1, 2, 3, or 4. The “**risk**” score is the product of these two ratings as is common practice in other conditional assessments.

These “**risk scores**” are listed at the bottom of each asset's page along with the “**rank**” given to them from the public surveys. These are then used in combination to arrive at an “**Overall Priority**” in Section 04.



December 2023 Flood | Kevin Miller / Maine Public

RISK SCORING SCHEMA					
(RS) = ("Hazard Score" x "Vulnerability Score")					
HAZARD	HIGH (ZZ, 4)	4	8	12	16
	MED (Z, 3)	3	6	9	12
	LOW (z, 2)	2	4	6	8
	NONE (n, 1)	1	2	3	4
HAZARD: What is the physical likelihood of damage to the asset?		NONE (n, 1)	LOW (v, 2)	MED (V, 3)	HIGH (VV, 4)
VULNERABILITY: What is the implication and/or severity resulting from that damage?		VULNERABILITY			



A | Gardiner Public Library



B | Maine Ave Pump Station



C | Public Boat Launch



D | Pedestrian Footbridge



E | Arcade St. Parking Lot



F | Waterfront Park



G | Gardiner Dog Park



H | Water Street Businesses



I | Hannaford's Supermarket

A | Gardiner Public Library

Description

The Gardiner Public Library, one of the oldest libraries in the state of Maine, is located at the southern end of Water Street and is listed on the National Register of Historic Places. The library was built in 1881 and designed by Henry Richards. The library serves Gardiner, Litchfield, Randolph, Pittston, and West Gardiner and contains valuable spaces, resources, and assets for the City and its neighboring towns.

The most critical asset of the Library is the impressive collection of historical archives in its basement. Archives are stored on shelves with rolling casters which can be transported to an access elevator. However, due to the basement location, relocating the archives without using this elevator would be difficult in a flooding event. If the building were to lose power during a storm, the archives could not be readily removed from the basement without significant physical labor, putting this valuable asset at risk.

The basement was redone 10 years ago to minimize flood impacts (with raised outlets, etc.), but the structure is not yet fully floodproofed.



Gardiner Main Street



Google Earth, 2025

MED (Z, 3)	HIGH (VV, 4)	12
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Environmental Hazards (Z,3)

Although the Library is considerably elevated from the river, meaning the flood hazard for the building’s Lowest Adjacent Grade (LAG) would be considered low, the Lowest Floor Elevation (LFE) in the basement is likely below the Base Flood Elevation (BFE), posing a threat to the archives. This means the surface water inundation would require extremely rare flood heights to impact the structure, but the basement is still at risk from other stormwater runoff in localized downpours or groundwater flooding. We therefore score this hazard level as “medium.”

Vulnerability (VV,4)

Due to the highly valuable and unique assets stored on site, this asset is considered highly vulnerable. The Library currently has informal contingencies and no double-redundancy backup plans to address severe flood inundation. The Library should develop multiple redundant action plans and/or options to keep its archives safe if they are to remain in the current location. Estimating the location of the BFE within the basement is advised as a first step. We therefore score this asset as having high vulnerability.

Risk (12/16) Rank (#3 of 9)

The Gardiner Public Library is overall considered at relatively high risk due to the potential cost of loss and damage to its irreplaceable archives; these historical assets are critical to the City of Gardiner and Maine’s history. Longterm, they may be worth relocating.

The community ranked this 3rd of the 9 listed assets.



(See 3D map for full extent)

B | Maine Ave Pump Station

Description

Gardiner's Wastewater Pump Station, located off of Maine Avenue and just above the Kennebec River, serves as the central sewage pumping station for Gardiner and the neighboring towns of Farmingdale and Randolph. The sewage pumped through this station is transported further downriver to the City of Gardiner Wastewater Treatment Plant on River Avenue. The site also hosts major holding tanks which are occasionally burdened nearly to excess in storm events due to inflow and infiltration into the system.



Google Earth, 2025



Google Earth, 2025

Environmental Hazards (Z,3)

The pump station has two components that are sensitive to environmental hazards. These hazards are: 1) the sewage holding tanks at the pump station are vulnerable to stormwater accumulation during extreme pluvial events and susceptible to overflow, and 2) the pump station is vulnerable to severe flood events, mostly due to potential lack of accessibility and being susceptible to power outages that would affect its operation. These are scored as medium hazards.

Vulnerability (VV,4)

The holding tanks at the Pump Station receive and store sewage from Gardiner, Farmingdale, and Randolph. Although sewage and stormwater systems are managed separately, inflow and infiltration adds stormwater volume to the sewage system. If too much stormwater accumulates in the system, the holding tanks may overflow and leak into the Kennebec River. This has happened in the past. Due to its location along the Kennebec, the pump station also has a limited but possible chance of isolation if the river floods reach critical levels. In the event of a power outage, the pump station would rely on a generator; if this fails, it would be unable to pump waste to the treatment plant. Although the site's LAG is approximately 2 feet above the BFE, it will require planning for the higher base water heights expected in future decades. Because it is a critical piece of infrastructure, it is therefore listed as highly vulnerable.

Risk (12/16) Rank (#1 of 9)

The Pump Station is a critical asset to the City of Gardiner and neighboring towns. Damages to the facility or temporary loss of function would be highly detrimental and unsafe. Due to its indispensable services and the high cost of damage or loss of function, the pump station has a high risk score.

The community ranked this 1st of the 9 listed assets.

MED (Z, 3)	HIGH (VV, 4)	12
------------	--------------	----



(See 3D map for full extent)

C | Public Boat Launch

Description

The Public Boat Launch & Docks, adjacent to the Waterfront Park along the Kennebec River, offers parking for trailers, a boat/kayak ramp, docks, and slips. The Boat Launch is a valuable recreational asset for the City of Gardiner and its visitors, and it also serves as a critical piece of infrastructure for water access.

Photo from Main Street Maine



Harbormaster, City of Gardiner



Google Earth, 2025

LOW (z, 2)	MED (V, 3)	6
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Environmental Hazards (z,2)

In a flooding event, these assets do have the potential to sustain damage, though if properly planned for, this hazard can be managed. Dock and slip space is rented along the riverfront, so there is the possibility of these floating assets (both public and private) to sustain flooding inundation or damaging hydrodynamics. In some cases, these assets could perhaps be completely submerged or lost as debris downstream. The ramp is unlikely to sustain direct damage from floodwaters, though it does require regular maintenance; it could perhaps be impacted by sea-level rise over the next several decades and result in needing to regrade or redesign its function. However, generally the hazard for this asset is scored relatively low, especially when compared to other assets.

Vulnerability (V,3)

This is one of only a few major public access points to the water, and the only with floating dock space on the lower Kennebec. The loss of the function of this space and the potential damage to it therefore cause us to score this as having a medium level of vulnerability.

Risk (6/16) Rank (#6 of 9)

This is considered a low-to-moderate risk asset.

The community ranked this 6th of the 9 listed assets.



(See 3D map for full extent)

D | Pedestrian Footbridge

Description

The Pedestrian Footbridge extends over the Cobbosseecontee Stream parallel to Maine Avenue. The footbridge is an important connector for the southern portion of the Kennebec River Rail Trail, a scenic 6.5-mile, paved trail that passes through Augusta, Farmingdale, Gardiner, and Hallowell. The footbridge connects the Hannaford parking lot to Arcade Street, providing pedestrians with easy and safe access from the Rail Trail to the downtown area. The Pedestrian Footbridge is an important asset for Gardiner’s pedestrian accessibility, and contributions to the City’s quality of life.



Mainelming



Google Earth, 2025

MED (Z, 3)	LOW (v, 2)	6
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Environmental Hazards (Z,3)

The Pedestrian Footbridge is highly prone to river flooding and is susceptible to damage by debris carried by the Cobbosseecontee's current in flooding events. Although this bridge is at a very low elevation and highly likely to be inundated, it is only scored as a medium level of hazard because the structure itself can withstand complete inundation without likely sustaining major damage.

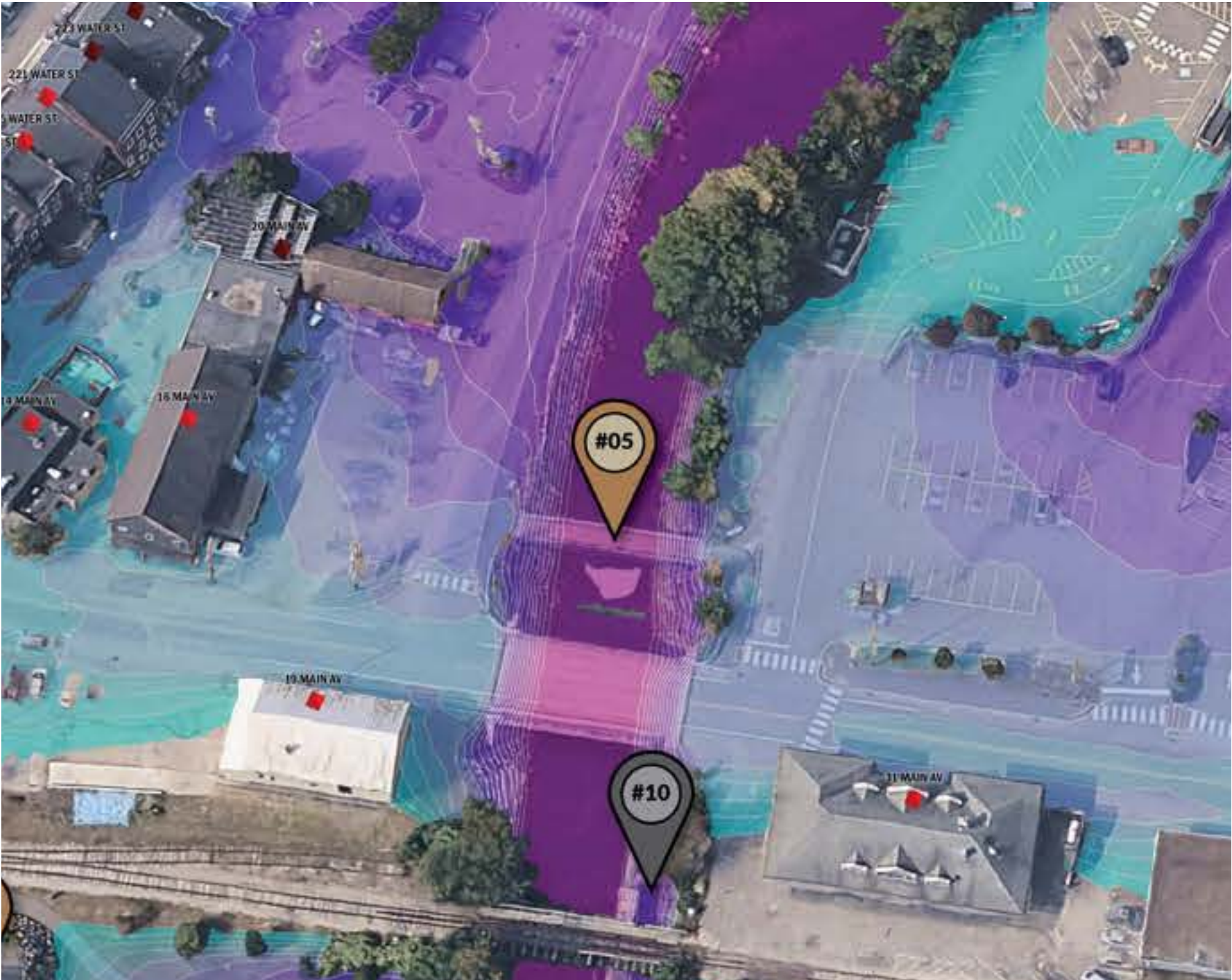
Vulnerability (v,2)

The Pedestrian Footbridge, even if destroyed, does not pose a major threat to the community. There is another way for pedestrians to cross the river via a sidewalk, albeit less convenient. This impact of losing this asset is therefore scored low in terms of community vulnerability.

Risk (6/16) Rank (#8 of 9)

If the Pedestrian Footbridge is damaged or destroyed, Gardiner will lose a convenient pedestrian crossing and a vital asset for quality of life. But due to its construction and the redundancy of other nearby bridges, it is considered low-to-medium overall risk.

The community ranked this 8th of the 9 listed assets.



(See 3D map for full extent)

E | Arcade St. Parking Lot

Description

Located between the eastern row of Water Street buildings and Arcade Street, this lot provides parking capacity and utility access for business owners and tenants of Water Street. It also provides overflow parking for downtown visitors.

City of Gardiner



Google Earth, 2025



Google Earth, 2025

Environmental Hazards (z,2)

The Arcade Street Parking Lot is especially susceptible to river flooding, even seasonal or moderate floods. It is located immediately adjacent to the Cobbosseecontee Stream. Because the majority of the assets on the asphalt are mobile, it is considered as having a low level of environmental hazard, even when inundated. Debris and other flotsam can be planned for. The redesign of this parking lot can be constructed to be resilient to nuisance flooding events.

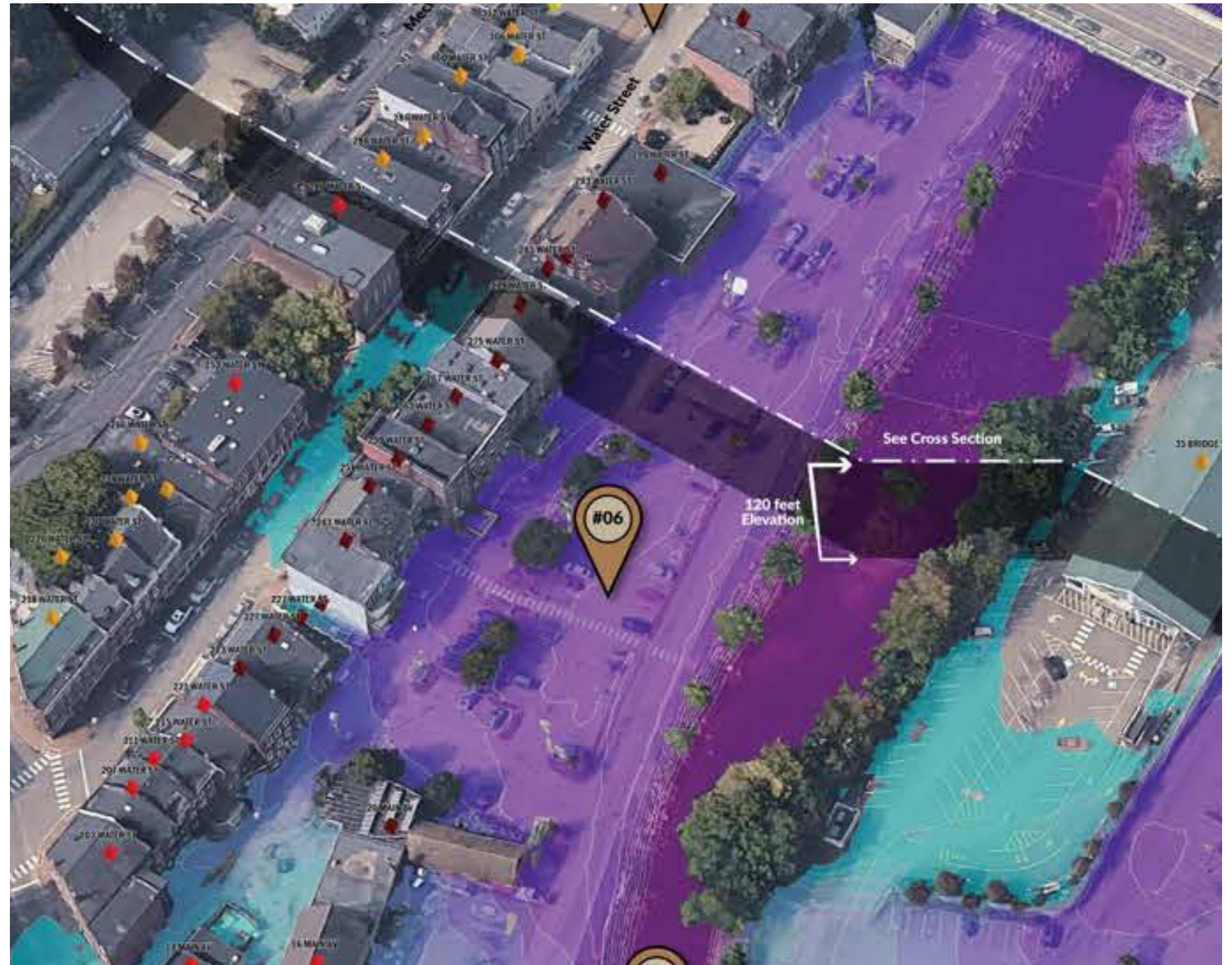
Vulnerability (v,2)

Although the Parking Lot does provide short- and long-term vehicular storage and important access for Water Street residents, business owners, and visitors, the lot itself was considered a low score for community vulnerability. Its use, when inundated, must simply be repurposed for the duration of the event. With preparation and planning, most structures have multiple access points and/or evacuation routes if necessary, allowing users to navigate a diverse set of scenarios.

Risk (4/16) Rank (#5 of 9)

In the event of a severe storm and flooding event, Arcade Street can be inundated with floodwaters, restricting some access to Water Street buildings and potentially damaging or bearing away parked vehicles, disposal bins, etc. As a result, debris pollution is a risk, as is the threat of some property damage. However this is generally considered a low risk to the community with basic planning efforts.

The community ranked this 5th of the 9 listed assets.



(See 3D map for full extent)

F | Waterfront Park

Description

Gardiner's Waterfront Park, located on the Kennebec River and adjacent to the historic downtown, is a central hub for Gardiner's recreational activities and events. Open from dawn to dusk year round, Gardiner's residents and visitors come to the park for its scenic view of the Kennebec, water-related recreational activities, free concerts in summer months, art installations, and community-wide events. The Waterfront Park is as an extension of the historic downtown that gathers people to experience an important part of Gardiner's character. The boardwalk, built on old cribworks, invites visitors to walk along the river with benches to take in the view. Large expanses of grassed areas host community events. Shaded sections provide meeting spots for small group gatherings.



Google Earth, 2025



Gardiner Main Street

MED (Z, 3)	MED (V, 3)	9
------------	------------	---

Environmental Hazards (Z,3)

Historic land uses (bulk petroleum storage) of what is now known as the Waterfront Park suggest that the ground surface and subsurface may have been impacted by petroleum and unremediated brownfields. This may pose health and safety concerns due to potential seepage in flooding events. Pluvial or river flooding events may force contaminants to leach into the Kennebec River, polluting the waters. In addition, the waterfront is often covered in silt during a flood, which can be a nuisance to the area and costly to clean up or maintain. Lastly, ice scour often directly damages the boardwalk and its seawall. Due to these conditions, this asset’s environmental hazard level is scored at “medium.”

Vulnerability (V,3)

Except for temporary loss of recreational use, impacts to the Waterfront Park in a flooding event pose limited concerns for direct damage and physical safety. Since there are no major structures located immediately near the park, damages are minimal. However, the cost in human resources for cleanup can be high. Also, due to the potential for contaminant leakage and the degrading boardwalk infrastructure, susceptible to ice scour, this site is scored at a medium vulnerability for the community.

Risk (9/16) Rank (#7 of 9)

The Waterfront Park poses a pollution hazard in the event of flooding, and provides the City with a high level of economic and cultural value. It is therefore considered at a medium-high overall risk.

The community ranked this 7th of the 9 listed assets.



(See 3D map for full extent)

G | Gardiner Dog Park

Description

Located along the Cobbosseecontee Stream, upstream of the historic downtown area, the Gardiner Dog Park is a community-operated recreational space for dogs and their owners.

Google Earth, 2025



Gardiner Maine Street



Gardiner Main Street

NONE (n, 1)	NONE (n, 1)	1
-------------	-------------	---

Environmental Hazards (n,1)

The Dog Park is on a steep slope which may be susceptible to some erosion from stormwater and extreme Cobbossee flooding events, but it is not directly impacted by the Kennebec River’s floodplain. This area is therefore considered to have a negligible environmental hazard.

Vulnerability (n,1)

If the Dog Park were to become damaged, the impacts would include a temporary loss of a community asset and recreational space that contributes to Gardiner’s quality of life. However, there are no infrastructure assets beyond fencing and site grading at the Dog Park. Therefore this asset is considered to have a negligible community vulnerability.

Risk (1/16) Rank (#9 of 9)

Due the negligible vulnerability and hazards of this asset, its limited threat to health and safety in the event of a flood, this asset is considered to be a non-concern.

The community ranked this 9th of the 9 listed assets.



(See 3D map for full extent)

H | Water Street & Businesses

Description

Water Street is central to Gardiner's character and economic vitality. It is considered the heart of the city with its variety of restaurants, retail stores, pubs, breweries, cafes, shops, and art spaces.

As the economic and cultural hub of Gardiner, Water Street provides residents and visitors with public spaces to work, live, shop, eat, gather, celebrate, and learn. In the fall, Water Street closes down to host the annual Swine and Stein Brewfest, and during the holidays, Water Street lights up for the Parade of Lights.

Water Street's businesses and scenic location along the Kennebec attract regional visitors from who support the local economy.

Gardiner Main Street



Photo of 1987 Flood on Water Street



HIGH (ZZ, 4)	HIGH (VV, 4)	16
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Environmental Hazards (ZZ,4)

Due to its proximity to the Kennebec and Cobbosseecontee, Water Street structures are highly susceptible to river flooding. There have been numerous historic floods which have severely inundated the street and its businesses (see top image on previous page and historical timeline). Due to the elevation and past reported floods, this asset is considered as being in a high-hazard area.

Vulnerability (VV,4)

As the central economic and cultural hub for the City of Gardiner, Water Street is considered a highly-vulnerable area—especially as flooding has resulted in prolonged electrical outages that limit normal lifestyle functions for the community. Flooding in this area can release debris and pollutants, damage utility assets, and cause environmental health and physical safety concerns.

Risk (16/16) Rank (#2 of 9)

Damage to property and loss of business vitality as a result of severe flooding will be highly detrimental to the local economy, quality of life, and the resilience of the community longterm. Many of the businesses along Water Street are small, local businesses. Adverse affects from severe storms such as inundation, loss of utility function, damage to long-term storage, and structural damages are costly to manage for individual property owners, both for repairs and longterm floodproofing. This community asset is considered to be at very high risk.

The community ranked this 2nd of the 9 listed assets.



(See 3D map for full extent)

I | Hannaford Supermarket

Description

Located between Bridge Street and Maine Avenue, Hannaford supermarket is a critical asset to the City of Gardiner. This Hannaford location serves as a primary grocery store and pharmacy for many of Gardiner and the surrounding area's residents. In December 2023, this site experienced severe flooding and damage. The store was inundated and the parking lot was completely flooded. The store was closed for over three months following these extensive damages.

Kennebec Journal, 2024



Spectrum News, 2023



Google Earth, 2025

HIGH (ZZ, 4)	HIGH (VV, 4)	16
--------------	--------------	----

Environmental Hazards (ZZ,4)

The Hannaford location is highly susceptible to river flooding as experienced with the flooding event of December 2023. The site is built upon an old “pond” used for timbering operations. The parking lot dips slightly which allows floodwaters to easily pool at the site, and even to begin flooding via stormwater backing up drainage infrastructure. This community asset is therefore considered to be subject to critical hazards and is ranked as a high hazard asset.

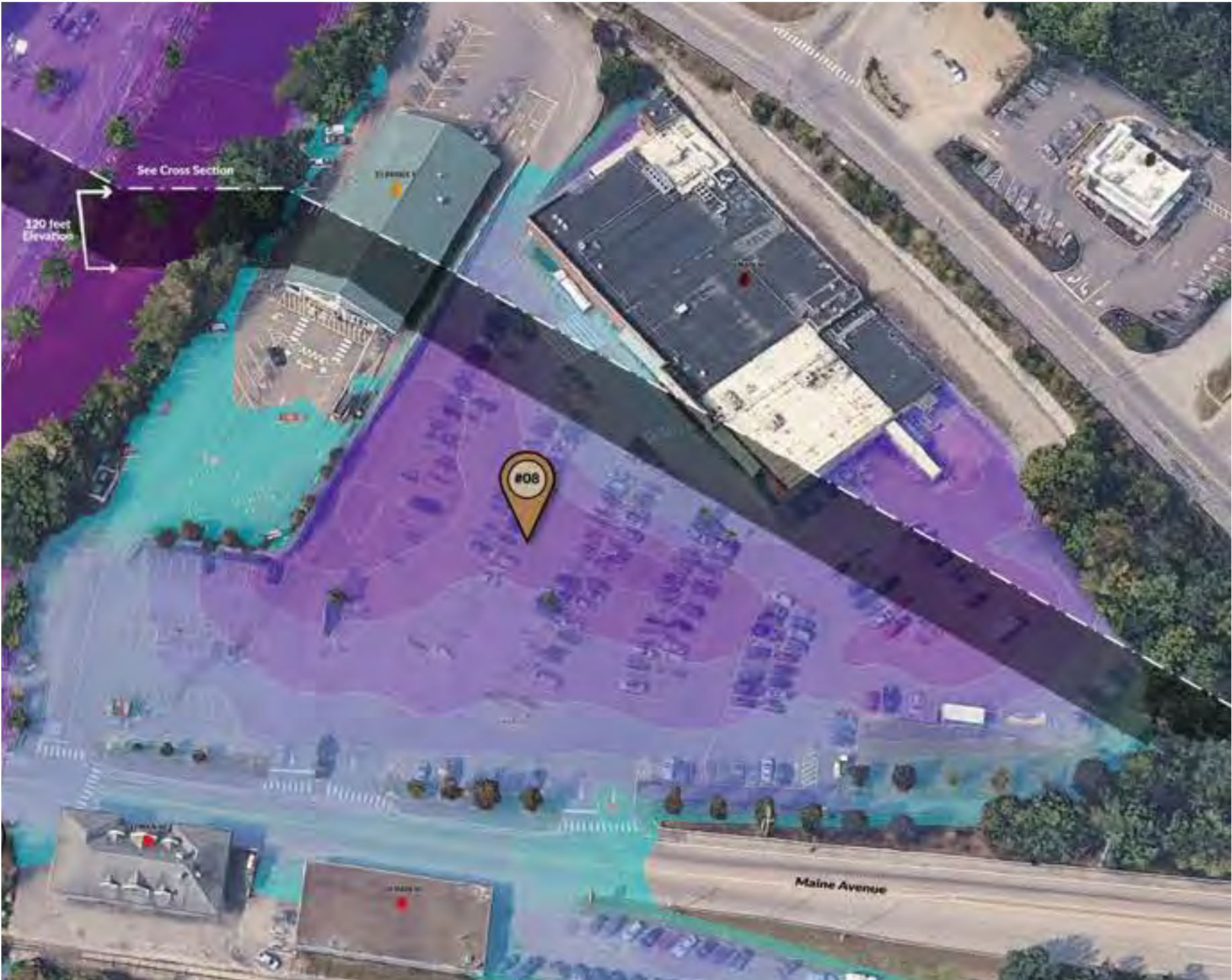
Vulnerability (VV,4)

Due to its central function as a place of daily food, medicine, and home supplies, and because there are not many conceivable solutions for feasibly elevating its lowest floor, this site is considered highly vulnerable.

Risk (16/16) Rank (#4 of 9)

Following the damages of the 2023 flood, Hannaford is considered a critically-at-risk asset for Gardiner’s community. Flooding of this area not only releases debris, but loss of its access poses health and safety concerns for residents.

The community ranked this 4th of the 9 listed assets.



(See 3D map for full extent)





Section 04

Risk Assessment

City Assets: Assessment & Prioritization

Overview

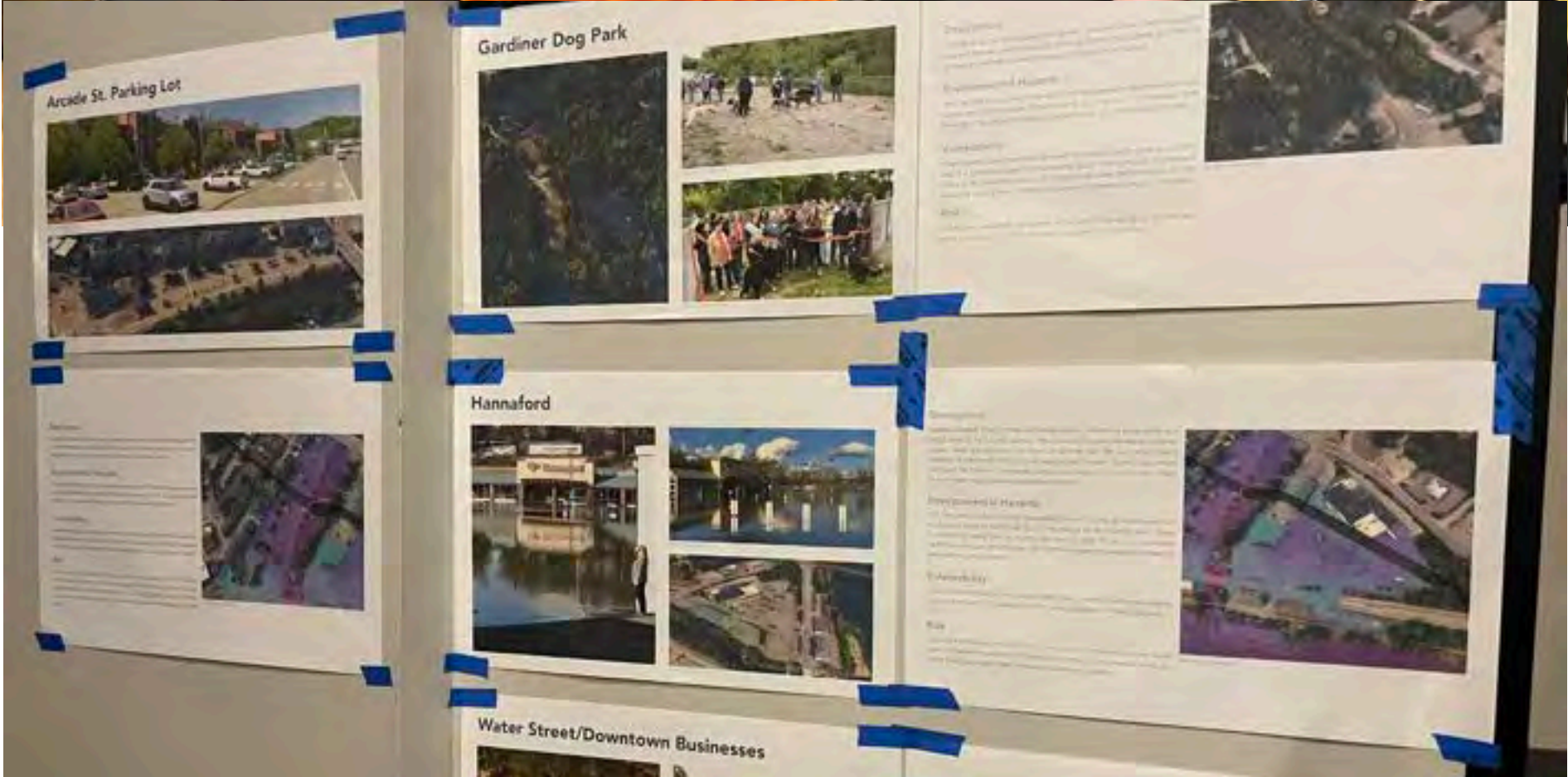
Many iterations on a comprehensive ranking system were attempted for this process. The one selected here was developed to balance more “objective” environmental threats, “subjective” measures of the impacts of those threats, and “priorities” of the community about which assets were most important. Prior to the system below, several methods were attempted: pairwise ranking, approval-based scoring, and weighted sums. This system uses ordinal scoring for each category, then combines the vulnerability and hazard using multiplication. It then weights the product against the community’s priority.

How the Numbers Work

Ranks from non-concern to high for each category are given 1 through 4 for each ordinal score: hazard and vulnerability. These were produced by the consultant after a site visit, desktop review, and flood impact analysis for each asset. Once each score is given, these are multiplied to create a “Risk” score from 1 to 16 (see opposite page, lower right).

Separately, the Work Group and community were surveyed for their input to rank the assets in question based on several different metrics, “urgency,” “want,” and “need” (see example survey in the lower right). These were averaged together and then re-ranked in descending order 1 through 9 to arrive at overall ranks for each group, from most important to least. These were then averaged and re-ranked in descending order to create a “Stakeholder Rank.” This rank served as the weighting system. #1 was given a weighting multiplied of 100%, #2 at 90%, and so on decreasing by 10% down to #9 at 20%. These weights were multiplied against the “Risk Score” to arrive at a “Weighted Score.”

Using this Weighted Score, an “Overall Priority” was created by re-ranking once more, 1 through 9. These priorities helped to inform the recommendations concerning which assets should be prioritized for immediate action.



CITY-OWNED ASSETS	INDEX	ASSET DESCRIPTION	WORK GROUP RANK	PUBLIC SURVEY RANK	STAKEHOLDER RANK #1-9	STAKEHOLDER RANK WEIGHT (SRW)	FLOOD HAZARD SCORE (ZS)	VULNERABILITY SCORE (VS)	RISK SCORE (RS)=(ZS*VS)	WEIGHTED SCORE (WS)=(RS*SRW)	OVERALL PRIORITY RANK #1-9	ASSESSMENT RATING	RATING DESCRIPTION	ASSESSMENT RATING RATIONALES
	A	Gardiner Public Library	3	4	3	80%	MED (Z, 3)	HIGH (VV, 4)	12	9.6	4	Z.VV (4)	Medium Hazard/High Vulnerability Priority 4 of 9	History of impact and within 100-yr range; above nuisance floods. Archive of Statewide importance at risk; no redundant contingency. Rated consistently #3/#4 in stakeholder surveys.
	B	Pump Station	1	1	1	100%	MED (Z, 3)	HIGH (VV, 4)	12	12.0	2	Z.VV (2)	Medium Hazard/High Vulnerability Priority 2 of 9	Within 500-yr range, within 100-yr by 2100. Indispensable for City and service area; overflow risk. Consistently ranked as the #1 priority by stakeholders.
	C	Public Boat Launch & Dock	4	7	6	50%	LOW (z, 2)	MED (V, 3)	6	3.0	6	z.V (6)	Low Hazard/Medium Vulnerability Priority 6 of 9	Deep during flood stage, but assets float/withstand inundation. Risk to property (berthed crafts) and docks during flood event. Ranked in the middle by stakeholders.
	D	Pedestrian Footbridge	8	8	8	30%	MED (Z, 3)	LOW (v, 2)	6	1.8	8	Z.v (8)	Medium Hazard/Low Vulnerability Priority 8 of 9	Deep during flood stage; may encounter floats/debris or strong currents. Unlikely to be destroyed, but still at risk. Ranked low by stakeholders.
	E	Arcade Parking Lot	5	5	5	60%	LOW (z, 2)	LOW (v, 2)	4	2.4	7	z.v (7)	Low Hazard/Low Vulnerability Priority 7 of 9	Frequently flooded, but impervious surface, structures removable. Unlikely to be incapacitated, but still requires regular repair. Ranked low by stakeholders.
	F	Waterfront Park	7	6	7	40%	MED (Z, 3)	MED (V, 3)	9	3.6	5	Z.V (5)	Medium Hazard/Medium Vulnerability Priority 5 of 9	Deep during flood stage; requires repair; possible river pollutants. Unlikely to be destroyed, but still at risk. Ranked in the middle by stakeholders.
	G	Dog Walking Park	9	9	9	20%	NONE (n, 1)	NONE (n, 1)	1	0.2	9	n.n (9)	No Hazard/No Vulnerability Priority 9 of 9	Not in an area of flood risk. Landscape not likely to be impacted by fluvial flooding. Consistently ranked lowest by stakeholders.
	H	Water Street Businesses	2	3	2	90%	HIGH (ZZ, 4)	HIGH (VV, 4)	16	14.4	1	ZZ.VV (1)	High Hazard/High Vulnerability Priority 1 of 9	Area of repeated, well-documented, deep inundation with damage. Historic district; property owners not well-equipped to respond. Consistently ranked among the highest by stakeholders.
PRIVATELY OWNED	I	Hannaford	6	2	4	70%	HIGH (ZZ, 4)	HIGH (VV, 4)	16	11.2	3	ZZ.VV (3)	High Hazard/High Vulnerability Priority 3 of 9	Area of repeated, well-documented, deep inundation with damage. Crucial community/regional resource; lack of floodproof options. Consistently ranked among the highest by stakeholders.

GARDINER ASSET PRIORITIZATION MATRIX

Full (optional):

Name (optional):

Community Role: (Circle One or Multiple): Local Resident, Day Worker, Business Owner, Visitor, City Council, City Leader/Department Head, City Staff, Other:

INDEX	ASSET DESCRIPTION	1 to 9	1 to 9	1 to 9	Comments
		Priority of Action (Optional)	Owner Responsibility (Optional)	Community Value (Optional)	Any feedback about each individual asset
A	Gardiner Public Library				
B	Pump Station				
C	Public Boat Launch Dock				
D	Pedestrian Footbridge				
E	Arcade Parking Lot				
F	Waterfront Park				
G	Dog Walking Park				
H	Water Street Businesses				
I	Hannaford				

RISK SCORING SCHEMA					
(RS) = ("Hazard Score" x "Vulnerability Score")					
HAZARD	HIGH (ZZ, 4)	4	8	12	16
	MED (Z, 3)	3	6	9	12
	LOW (z, 2)	2	4	6	8
	NONE (n, 1)	1	2	3	4
HAZARD: What is the physical likelihood of damage to the asset?		NONE (n, 1)	LOW (v, 2)	MED (V, 3)	HIGH (VV, 4)
VULNERABILITY: What is the implication and/or severity resulting from that damage?		VULNERABILITY			

City Recommendations



1. Provide support for property owners' efforts. (Overall Priorities #1, #3)

Personal property risk is among the most important issues to address. The primary recommendation is that the **City should further formalize flood response resources,** perhaps starting with a directive to address this in the comprehensive plan. This is so that more detailed planning can be developed in support of an array of potential needs.

- **1.1** - Complete the Maine Flood Resiliency Checklist and address gaps. See the Appendix for more details.
- **1.2** - Provide an annual meeting or other regular touchpoint for property owners directly in the floodplain to share information about how to address flood mitigation, strategies, response preparedness, and self-assessments.
- **1.3** - Expand web presence/maintenance of flood resources directly on the City website to keep a contemporary record of best practices and ongoing efforts.

2. Invest in Maine Ave Pump Station resiliency. (Overall Priority #2)

The secondary recommendation is to make the City's Maine Avenue Pump Station and the associated lines of its **sewer system resilient** to future flood hazards, including hazards not directly associated with flood inundation.

- **2.1** - After working with Gardiner Sewer District to digest the implications of the inflow and infiltration study, consider substantial investments to improve the ability of the wastewater system to withstand high rainfall events without becoming overburdened with stormwater.
- **2.2** - Although not immediately critical, consider floodproofing the pump station to be resilient to 100-year flood elevations, especially according to the projected sea level rise adjusted estimates for 2100.
- **2.3** - Invest in a dedicated fail-safe and floodproof power supply so this station is functional during outages.

3. Secure the archives. (Overall Priority #4)

The third recommendation is to **secure the valuable archives** found in the basement of Gardiner Public Library, especially so that flood events do not rely upon extraordinary volunteer support to mitigate water damage to irreplaceable documents.

- **3.1** - Invest in a dedicated power supply so that the elevator in this building works during outages.
- **3.2** - Although not immediately critical, consider further floodproofing for the basement to mitigate infiltration, whether from river, groundwater, or runoff.
- **3.3** - Invest in system redundancy to ensure adequate time to evacuate the archives, if necessary. This could include a sump pump, dedicated on-call emergency task force, or other low-cost measures.
- **3.4** - Consider relocating the archives longterm.



4. Plan to improve the Waterfront Park. (Overall Priorities #5, #6)

Although inundation is unavoidable, Waterfront Park is a crucial economic and cultural asset to the City. Create a **Capital Investment Plan (CIP) that wetproofs the waterfront and lifecycles infrastructure** found on site.

- **4.1** - Develop a phased approach for incremental improvements, perhaps developing an official Waterfront Master Plan and/or adopting and enacting the plans proposed by Sebago Technics, or Kleinschmidt, etc. Any plans should be budgeted for in the CIP.
- **4.2** - Before substantial improvements are undertaken, investigate and assess the environmental hazards posed by historical pollutants on the site that put the adjacent river at risk.
- **4.3** - If reconstructing the boardwalk, consider a full engineering assessment of the historical cribworks and a feasibility study for replacing this understructure.



5. Plan and fund stormwater improvements. (Overall Priority #7)

Given the character of flooding from the Kennebec, no amount of stormwater improvements—aside from major and likely unfeasible works (dikes and flood gates)—will prevent extensive inundation in major flooding events. However, modest investments to **improve existing stormwater infrastructure** should be prioritized for addressing other hazards and to help mitigate minor flooding events.

- **5.1** - Address backwatering issue in stormwater drains, particularly with the Hannaford parking lot and the culvert between Patten Block and the railroad tracks. This could involve flapgates, check valves, or other devices.
- **5.2** - Address several erosion and culvert sizing issues by budgeting for proactive and accelerated repairs and replacements, or calling for engineering studies to properly size culverts and roadways with known issues.



6. Improve flood-response communications. (Most Common Public Comment)

Although the City has some measures in place for notifying its residents regarding flood events, and the fire department lists emergency response to floods as one of its prerogatives on the website, the **City should improve its communication of flood risk, response, and management** to its citizenry in the coming years.

- **6.1** - Assign and make capacity for a City liaison to coordinate with MEMA, the fire department, public works, residents, and business owners regarding all alerts, inquiries, and general flood risk communication and awareness.
- **6.2** - Work with Hallowell, Augusta, and other Kennebec Valley communities to identify ways to improve inter-regional communication and assistance for flood readiness, response, and information sharing (flood mitigation, preparedness measures, floodplain management, zoning strategies, recordkeeping, etc.).

Private Assets: Lowest Floor Assessment Scheme

Relationship to Base Flood Elevation (BFE)

The system proposed here is in relation to the **100-year flood risk as it applies to the lowest floor only**. As most recommendations for living area, new construction, or substantive property modifications call for a height of at least one foot above the **Base Flood Elevation (BFE)**, the following are several high-level recommendations based on the structure’s relationship to that height.

It should be noted that the BFE represents a hypothetical risk and is not constant. What currently serves as the BFE may indeed by altered in future by suspected increases in rainfall, changes in watershed hydrology/storage capacity, and/or sea level rise (this is a tidal system). Similarly, many may wish to assess their risk based on more frequent metrics—i.e. addressing the flood risk at lesser and yet still damaging flood heights. Therefore, substituting the BFE for other heights seen in the Inundation Estimates tables in Section 05 may be more pertinent.

Types of Recommendations

The types of recommendations here are generalized to all assets included on the Lowest Floor only. This means the structure itself, the utilities, appliances, living areas, and any permanent storage. Because many of these structures are historical buildings with masonry construction, recommendations may require a licensed engineer, architect, plumber, electrician, or other professional to evaluate.

Generally, it is recommended to use Planning and Mitigation tactics for your property if the Lowest Floor Elevation is at least one foot above the BFE. If the BFE is less than approximately one half of the story, it may be appropriate to use floodproofing techniques (*Wetproofing*, *Dryproofing*). Above this, it is most appropriate to use Elevation and Relocation tactics, depending on the nature of the assets.

Modification Strategy

REPURPOSE/RELOCATE

Preliminary suggestion is to completely relocate all primary uses for this structure to higher floors.

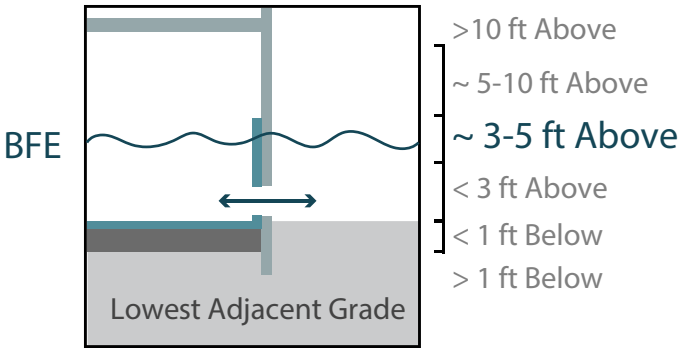
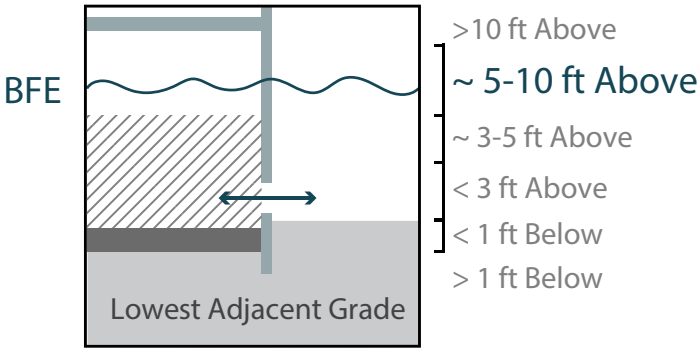
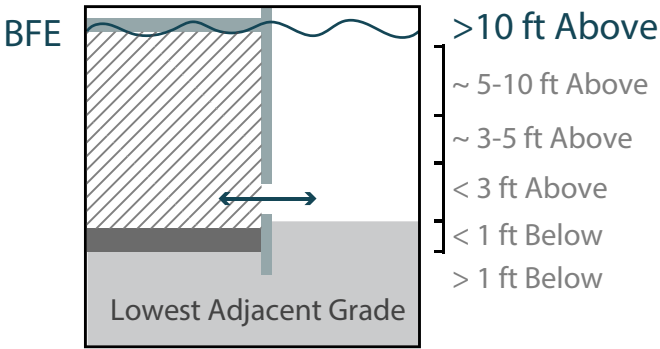
ELEVATE

Preliminary suggestion is to elevate tertiary uses to dedicated shelving, ceiling, rafters, or higher floors (utilities, storage, etc.).

WETPROOF

Preliminary suggestion is to wetproof all assets below the BFE; the structure should also be altered to relieve hydrostatic pressure.

BFE vs. LAG Above/Below



Next Steps

See “Elevate,” “Wetproof,” and “Dryproof” for ideas on how to repurpose your space.

See “Elevate”

See “Wetproof”

Modification Strategy

DRYPROOF

Preliminary suggestion is to dryproof the structure up to the BFE; the structure must be altered to withstand hydrostatic pressure.

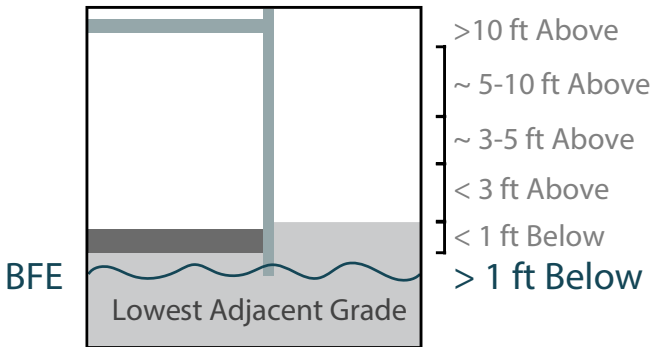
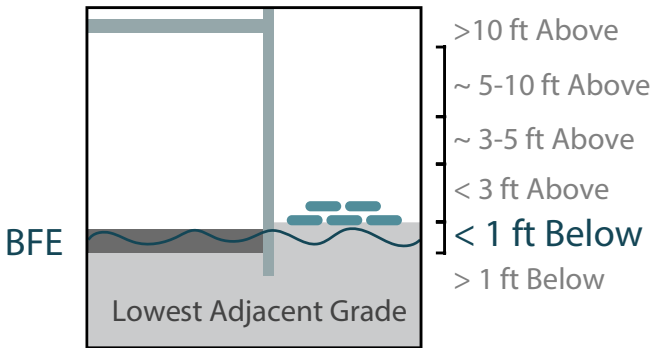
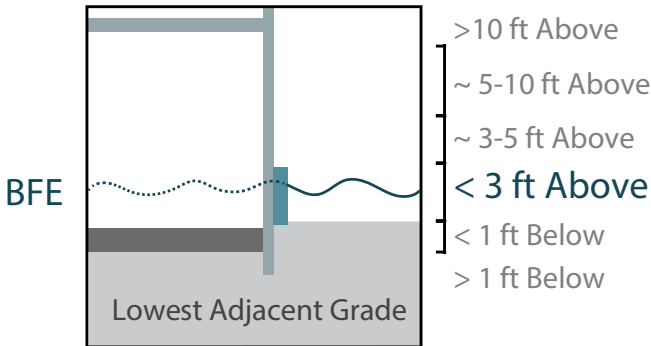
MITIGATION

Preliminary suggestion is to adopt mitigating measures; have a plan in place for how you expect to deal with floodwaters.

PLANNING

Preliminary suggestion is to look ahead to 2050 and/or 2100 for new BFE heights based on tidal influence. Plan for future strategies.

BFE vs. LAG Above/Below



Next Steps

See
"Dryproof"



Property Owner Risks & Recommendations

3D Map Overview

The map included on this page and the following were generated for reference only. These are not authoritative assessments for each property; they should instead be considered general recommendations based on a data analysis using the best information available without an on-the-ground site visit.

The map displays recommendations for structures only. Each structure in the floodplain has a “footprint” that was improved using high-resolution imagery, LiDAR, and some on-the-ground site walks. These footprints were compared against the high-resolution topographic information for the area to establish the Lowest Adjacent Grade (LAG) for each—the lowest height of land immediately adjacent to the building’s footprint. This LAG was then compared against the Base Flood Elevation (BFE). The difference between the two informs the strategy recommended.

Note: each strategy may or may not be affected by the Lowest Floor Elevation (LFE)—this is when the actual floor in the lowest level is different than the LAG. If this is true for your property—meaning your basement is below or above the ground—then you should augment the base numbers provided. See “Assessing Inundation Risk.”

The map is an oblique view looking west and is split into two sections. The first page is the western part of the floodplain, and the second page is the eastern part directly adjacent to the river. Also found on this map are the lines representing cross section visuals found previously in the report.

Modification Strategy

REPURPOSE/RELOCATE

Preliminary suggestion is to completely relocate all primary uses for this structure to higher floors.

ELEVATE

Preliminary suggestion is to elevate tertiary uses to dedicated shelving, ceiling, rafters, or higher floors (utilities, storage, etc.).

WETPROOF

Preliminary suggestion is to wetproof all assets below the BFE; the structure should also be altered to relieve hydrostatic pressure.

DRYPROOF

Preliminary suggestion is to dryproof the structure up to the BFE; the structure must be altered to withstand hydrostatic pressure.

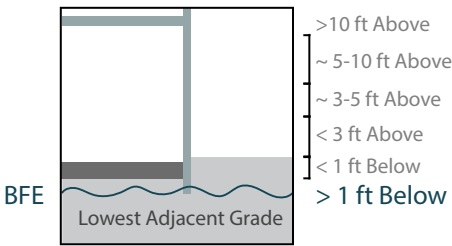
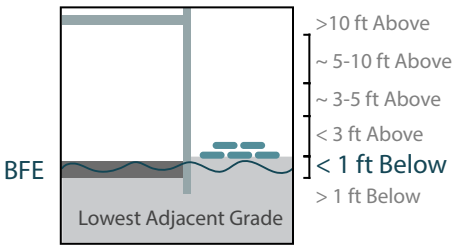
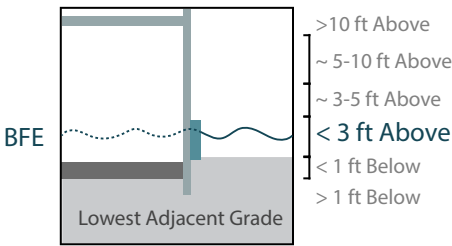
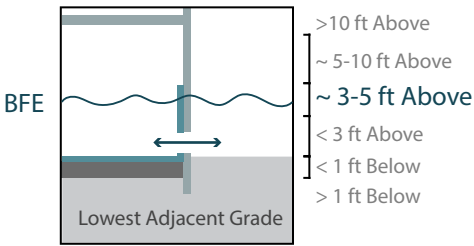
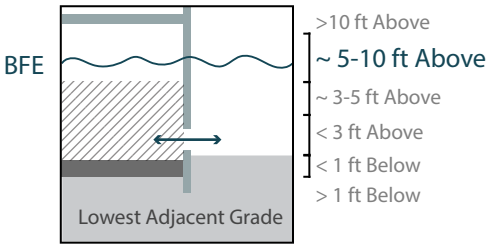
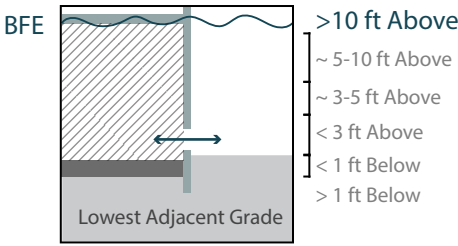
MITIGATION

Preliminary suggestion is to adopt mitigating measures; have a plan in place for how you expect to deal with floodwaters.

PLANNING

Preliminary suggestion is to look ahead to 2050 and/or 2100 for new BFE heights based on tidal influence. Plan for future strategies.

BFE vs. LAG Above/Below





POINTS OF INTEREST

- #01 – Gardiner Public Library
- #02 – Waterfront Park
- #03 – Public Boat Landing/Trailerable Boat Launch
- #04 – Wastewater Pump Station
- #05 – Pedestrian Footbridge
- #06 – Arcade Parking Lot
- #07 – Dog Park
- #08 – Hannaford's (Privately-Owned Asset)
- #09 – Downtown Businesses (Privately-Owned Assets)
- #10 – USGS Station #01049505, Kennebec
- #11 – USGS Station #01049500, Cobbosseecontee
- #12 – Gardiner City Hall

FEATURES

-  **REPURPOSE/RELOCATE** – BFE >10ft above LAG
-  **ELEVATE** – BFE ~5-10ft above LAG
-  **WETPROOF** – BFE ~3-5ft above LAG
-  **DRYPROOF** – BFE ~0-3ft above LAG
-  **MITIGATION** – BFE <1ft below LAG
-  **PLANNING** – BFE >1ft below LAG
Some future flood impacts projected.
-  **NO ACTION** – BFE >1ft below LAG
No projected flood impacts projected.

DECEMBER 2023 FLOOD

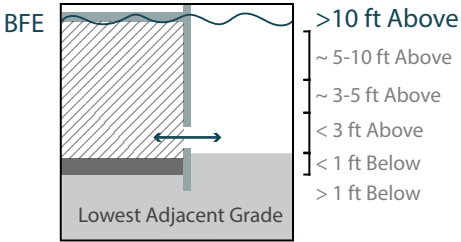
-  **MAX. CREST** – Approx. Extent <=1ft
1-foot contour intervals interpolated from LIDAR.
Adjusted based on gauge reading difference from NAVD88.
- MAX. DEPTH** – Approx. Extent ~19.2 ft

Modification Strategy

BFE vs. LAG Above/Below

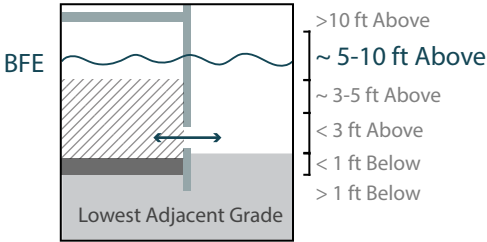
REPURPOSE/RELOCATE

Preliminary suggestion is to completely relocate all primary uses for this structure to higher floors.



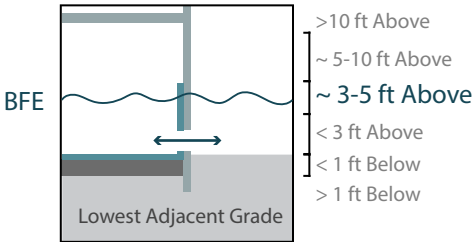
ELEVATE

Preliminary suggestion is to elevate tertiary uses to dedicated shelving, ceiling, rafters, or higher floors (utilities, storage, etc.).



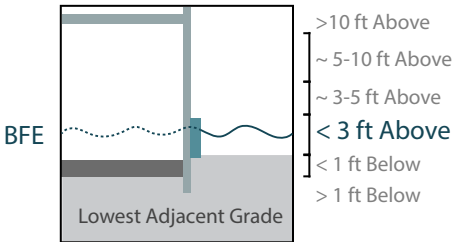
WETPROOF

Preliminary suggestion is to wetproof all assets below the BFE; the structure should also be altered to relieve hydrostatic pressure.



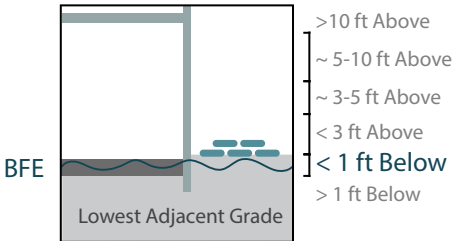
DRYPROOF

Preliminary suggestion is to dryproof the structure up to the BFE; the structure must be altered to withstand hydrostatic pressure.



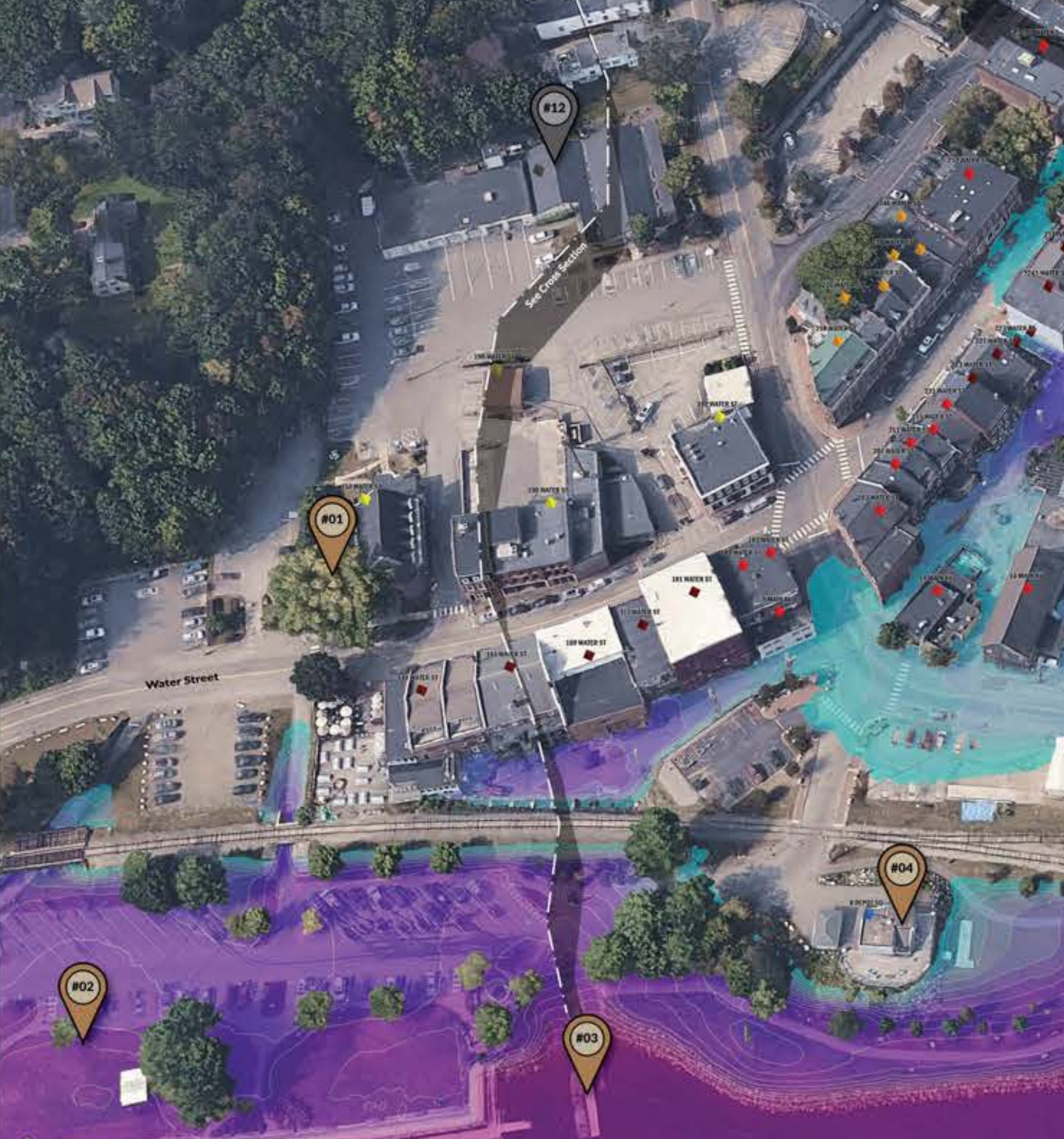
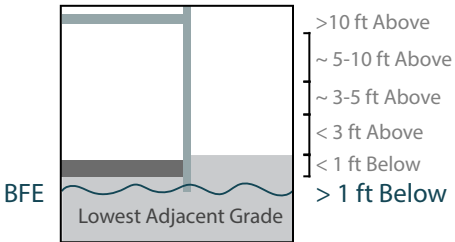
MITIGATION

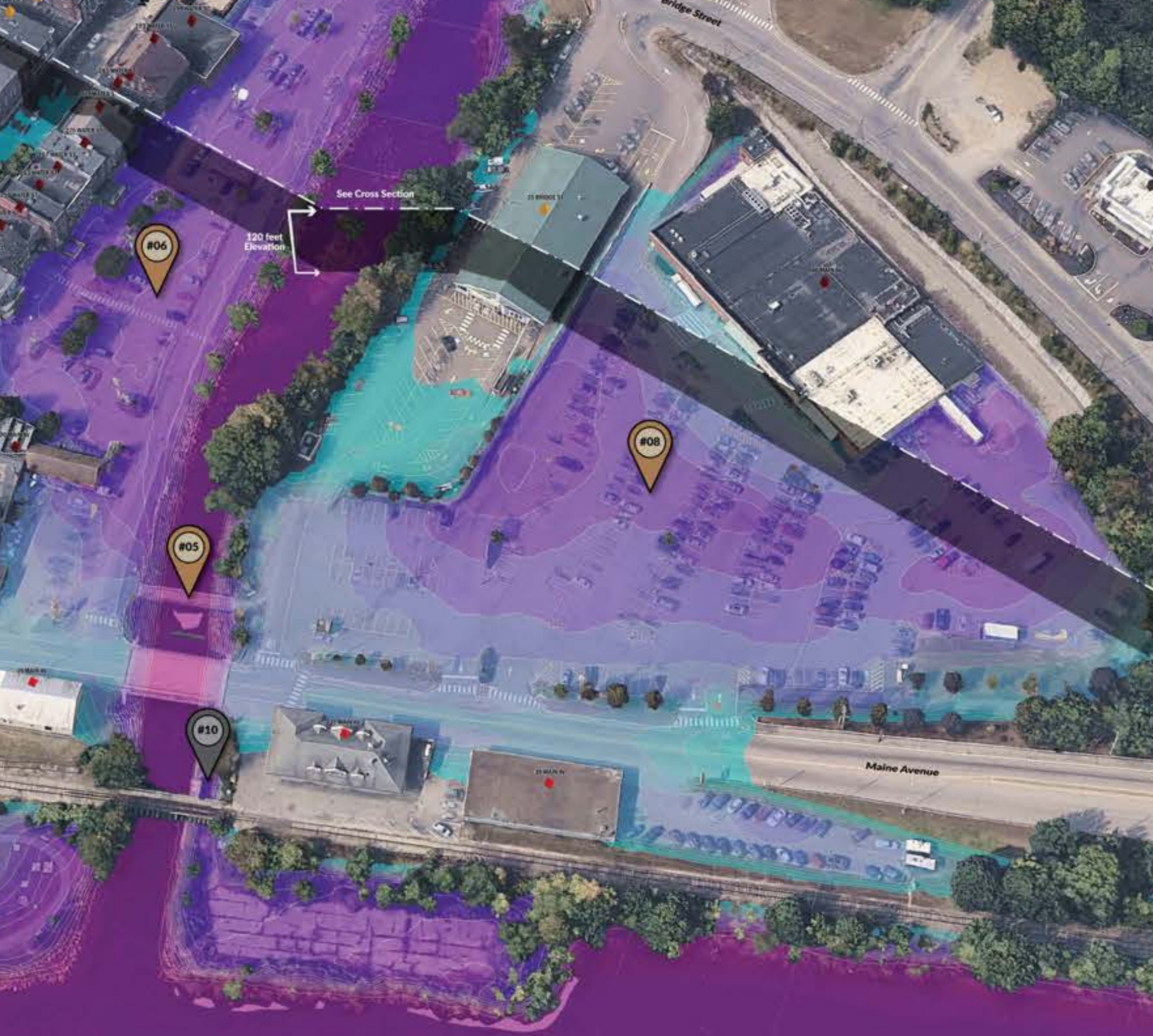
Preliminary suggestion is to adopt mitigating measures; have a plan in place for how you expect to deal with floodwaters.



PLANNING

Preliminary suggestion is to look ahead to 2050 and/or 2100 for new BFE heights based on tidal influence. Plan for future strategies.





POINTS OF INTEREST

- #01 – Gardiner Public Library
- #02 – Waterfront Park
- #03 – Public Boat Landing/Trailerable Boat Launch
- #04 – Wastewater Pump Station
- #05 – Pedestrian Footbridge
- #06 – Arcade Parking Lot
- #07 – Dog Park
- #08 – Hannaford's (Privately-Owned Asset)
- #09 – Downtown Businesses (Privately-Owned Assets)
- #10 – USGS Station #01049505, Kennebec
- #11 – USGS Station #01049500, Cobbosseecontee
- #12 – Gardiner City Hall

FEATURES

-  **REPURPOSE/RELOCATE** – BFE >10ft above LAG
-  **ELEVATE** – BFE ~5-10ft above LAG
-  **WETPROOF** – BFE ~3-5ft above LAG
-  **DRYPROOF** – BFE ~0-3ft above LAG
-  **MITIGATION** – BFE <1ft below LAG
-  **PLANNING** – BFE >1ft below LAG
Some future flood impacts projected.
-  **NO ACTION** – BFE >1ft below LAG
No projected flood impacts projected.

DECEMBER 2023 FLOOD

-  **MAX. CREST** – Approx. Extent <=1ft
1-foot contour intervals interpolated from LIDAR.
Adjusted based on gauge reading difference from NAVD88.
- MAX. DEPTH** – Approx. Extent ~19.2 ft



A blue-tinted photograph of a flooded area. In the foreground, several bare trees stand in the water. In the middle ground, a small structure with a triangular roof is partially submerged. The background shows a distant shoreline with more trees. The overall scene is somber and reflects a natural resource affected by flooding.

Section 05 **Resources**

Assessing Inundation Risk

Purpose

This section is meant to assist individuals who would like to estimate the level of risk for their own properties. It should be noted that this method is not exact—no direct surveys have been taken to support this information, though you may corroborate our estimates with an elevation certificate. The information here is derived from LiDAR data and a geospatial analysis. While the information may be helpful in assessing your own personal risk, it is not a substitute for on-site survey, analysis, and engineering.

Most modifications to living spaces and assets requiring protection assume 1 foot elevation above the Base Flood Elevation (BFE). In Gardiner’s floodplain ordinances, 1 foot above the BFE is the most common prerequisite for construction. Therefore, if you are performing preliminary analysis on each of your assets, it would be advantageous to find the approximate height of your BFE directly in your structure. The decisions for adapting your structure may involve wetproofing/dryproofing, whereas the decisions for adapting your uses and interior assets may be between elevating or relocating certain items to another floor.

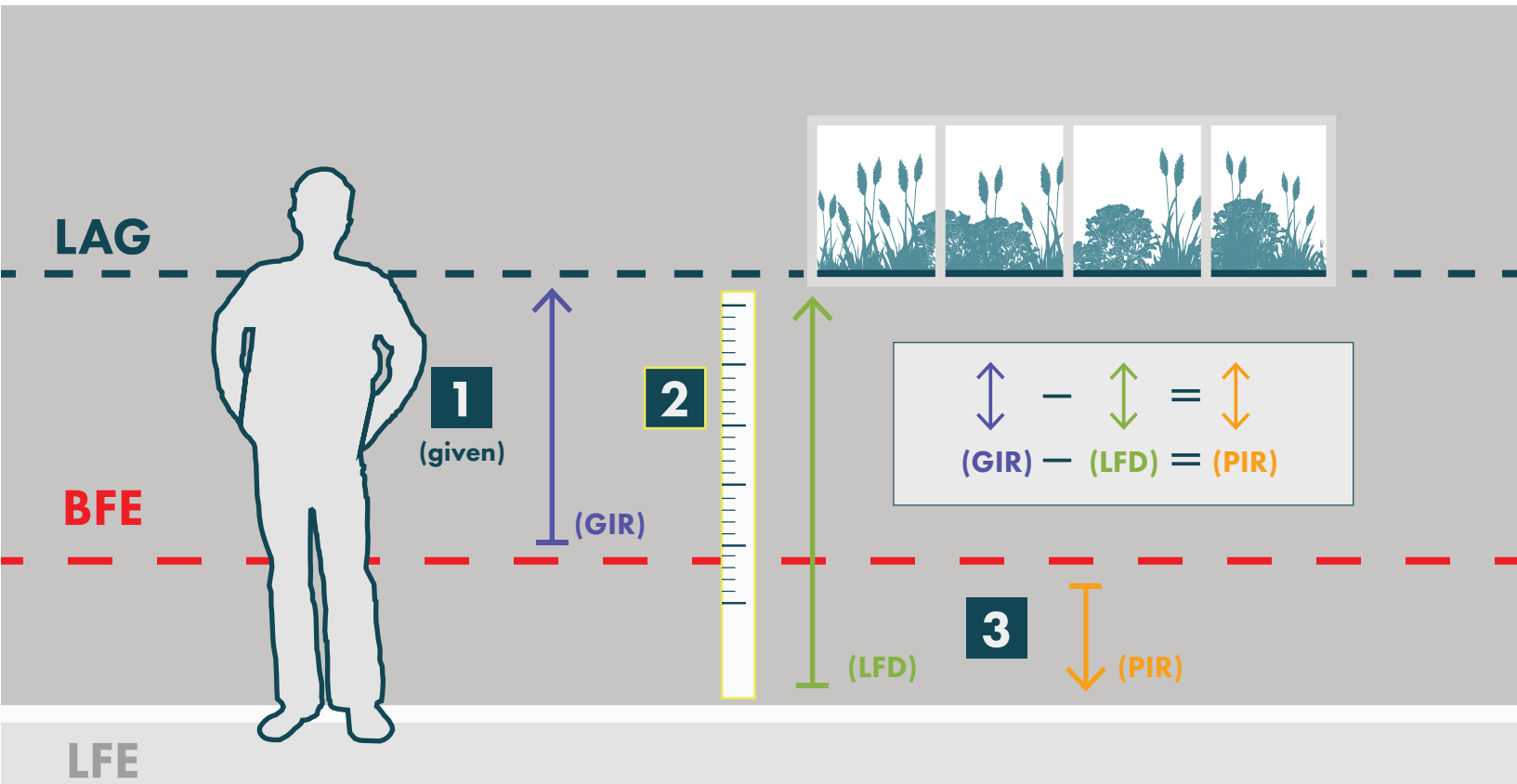
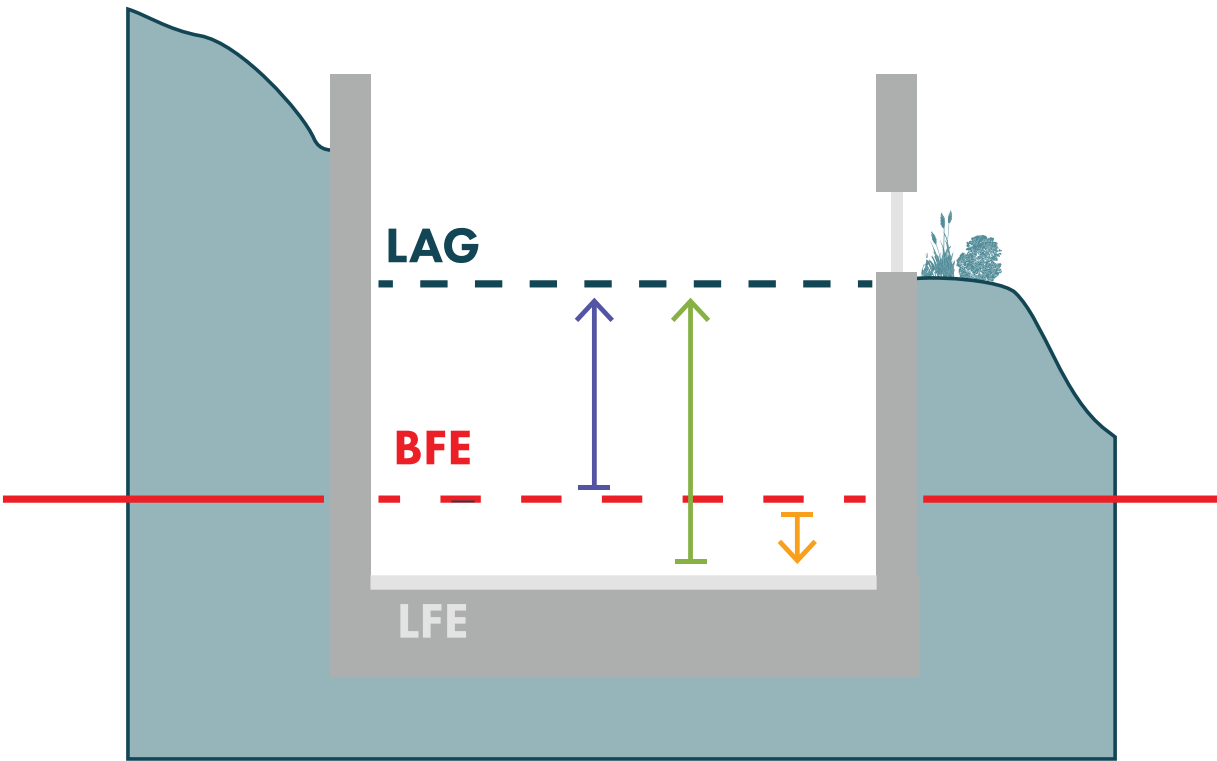
Once the BFE is established, you can then proceed accordingly. If the BFE is quite low in the lowest floor, you may opt to simply elevate certain assets (electrical, furnace, storage, etc.). If the BFE is high on the lowest floor, it may be more prudent to relocate assets and repurpose the lowest floor.

Estimate BFE

1. The first step is to find the estimated risk.
The table on the subsequent pages provide estimates for the “given” **Grade Inundation Risk (GIR)** for each structure by subtracting the *Lowest Adjacent Grade (LAG)* of the footprint from the *Base Flood Elevation (BFE)* according to FEMA in 2011. If this number is positive, the ground height directly outside your building is “above” the 100-year flood risk. If it is negative, it is “below.” These are color coded in the table to key to the suggested strategies.
2. The next step is to measure the Lowest Floor Depth (LFD) so you can transfer this **GIR** figure and estimate where the BFE actually maps on to the wall of your building. The *Lowest Floor Elevation (LFE)* is often below the LAG; if it is above- or at-grade, then simply use the GIR for your planning purposes. If the LFE is below the LAG, measure or estimate the difference between them, giving you the **Lowest Floor Depth (LFD)**.
3. Take the **GIR** and subtract the **LFD** to get the **Property Inundation Risk (PIR)**. If this number is negative it means the floor (LFE) is below the max flood height (BFE). Positive means the floor is above. Mark the BFE by measuring up from the floor with the negative number. To calculate other risks, insert the corresponding figures. Acquire an elevation certificate for the most accurate estimates.

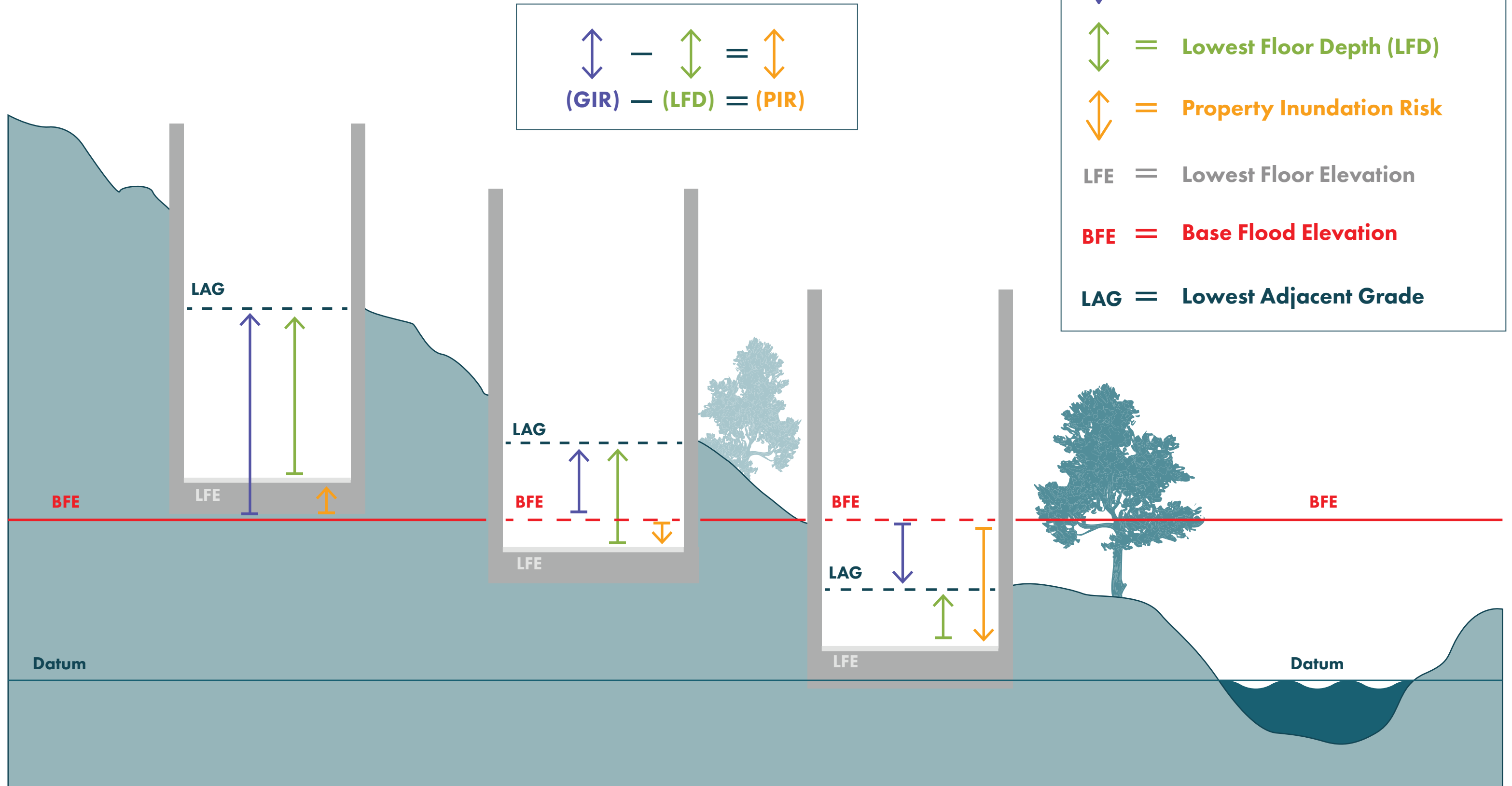
Inundation Estimator | Measurement Walkthrough

(Not to scale)



Inundation Estimator | Inundation Risk Measurement Walkthrough

(Not to scale)



These diagrams use arrows to signify positive ("up") and negative ("down") values.

Inundation Estimates

Table 1 of 3

**REPURPOSE/
RELOCATE** — BFE >10ft above LAG

ELEVATE — BFE ~5-10ft above LAG

WETPROOF — BFE ~3-5ft above LAG

DRYPROOF — BFE ~0-3ft above LAG

MITIGATION — BFE <1ft below LAG

PLANNING — BFE >1ft below LAG
Some future flood impacts projected.

NO ACTION — BFE >1ft below LAG
No projected flood impacts projected.

NOTE: These tables are estimates only. Many structures in this floodplain have an elevation certificate, performed by an on-the-ground professional survey. These figures can be substituted for LAG_ft and recalculated. The color-coded figures represent the estimated inundation given different scenarios, where a positive number means that each building's "Lowest Adjacent Grade" (LAG) is above that scenario (dry) and a negative number means that the LAG is below that scenario (wet) and therefore at risk of inundation. The color-coded recommendations are suggested as general approaches for the Lowest Floor Elevation only. The scenarios for the inundation estimates are based on the percent flood height chance from the historical record, as well as future sea level rise:

500 —> 0.2% is 500-year (30 feet high)
BFE —> 1% is 100-year (24 feet high)
SVR —> 5% "severe, 20-year" (16 feet high)
DMG —> 15% "damaging, 7-year" (12 feet high)

State-adopted sea level rise scenarios —> +1.5 feet by 2050 and +4.0 feet by 2100.

An example of a comparison between our estimates (derived from LiDAR, infrastructure data, and geospatial analysis) and the values from an elevation certificate are available on page 70 where we performed a comparison for Gardiner Public Library. There were two different LAGs provided on this elevation certificate (outlined in black): one for the LAG of the finished structure, and one for the LAG for the structure including decks, stairways, and other external elements. Cross referencing our estimate against these certificate found the estimates to be +/- 0.8-1.2 feet of the elevation certificate (see Appendix for the Library's certificate).

INUNDATION ESTIMATES			Flood Height by % Annual Chance			
Building/Structure in Floodplain			0.20%	1%	5%	15%
CardNo	Address	LAG_ft	500	BFE	SVR	DMG
2514	20 MAIN AV	10.67	30	24	16	12
2496	275 WATER ST	10.91	30	24	16	12
2498	263 WATER ST	11.17	30	24	16	12
2497	267 WATER ST	11.23	30	24	16	12
2499	259 WATER ST	11.23	30	24	16	12
100963	243 WATER ST	11.25	30	24	16	12
2500	251 WATER ST	11.32	30	24	16	12
2484	3 BRIDGE ST	11.35	30	24	16	12
2492	299 WATER ST	11.62	30	24	16	12
2495	279 WATER ST	11.63	30	24	16	12
2491	293 WATER ST	11.76	30	24	16	12
2651	40 MAIN AV	11.92	30	24	16	12
2503	235 WATER ST	11.97	30	24	16	12
2533	169 WATER ST	11.99	30	24	16	12
2494	285 WATER ST	12	30	24	16	12
2493	289 WATER ST	12.12	30	24	16	12
2534	161 WATER ST	12.27	30	24	16	12
2504	227 WATER ST	12.52	30	24	16	12
2488	327 WATER ST	12.69	30	24	16	12
2532	177 WATER ST	12.7	30	24	16	12
2505	223 WATER ST	12.92	30	24	16	12
101103	149 WATER ST	13.33	30	24	16	12
2487	335 WATER ST	13.44	30	24	16	12
2531	181 WATER ST	13.59	30	24	16	12
2489	325 WATER ST	13.64	30	24	16	12
2485	343 WATER ST	13.74	30	24	16	12
2486	339 WATER ST	13.74	30	24	16	12
2506	221 WATER ST	14.12	30	24	16	12
2507	215 WATER ST	14.28	30	24	16	12
2257	16 MAIN AV	14.65	30	24	16	12
2522	31 MAIN AV	14.75	30	24	16	12
2508	211 WATER ST	14.82	30	24	16	12
2521	39 MAIN AV	14.92	30	24	16	12
2510	207 WATER ST	14.93	30	24	16	12

Based on Historical Record, to 2011				Based on Sea Level Rise, to 2050				Based on Sea Level Rise, to 2100			
0.20%	1%	5%	15%	0.20%	1%	5%	15%	0.20%	1%	5%	15%
2011_HZ00	2011_HZ01	2011_HZ05	2011_HZ15	2050_HZ00	2050_HZ01	2050_HZ05	2050_HZ15	2100_HZ00	2100_HZ01	2100_HZ05	2100_HZ15
-19.33	-13.33	-5.33	-1.33	-20.83	-14.83	-6.83	-2.83	-23.33	-17.33	-9.33	-5.33
-19.09	-13.09	-5.09	-1.09	-20.59	-14.59	-6.59	-2.59	-23.09	-17.09	-9.09	-5.09
-18.83	-12.83	-4.83	-0.83	-20.33	-14.33	-6.33	-2.33	-22.83	-16.83	-8.83	-4.83
-18.77	-12.77	-4.77	-0.77	-20.27	-14.27	-6.27	-2.27	-22.77	-16.77	-8.77	-4.77
-18.77	-12.77	-4.77	-0.77	-20.27	-14.27	-6.27	-2.27	-22.77	-16.77	-8.77	-4.77
-18.75	-12.75	-4.75	-0.75	-20.25	-14.25	-6.25	-2.25	-22.75	-16.75	-8.75	-4.75
-18.68	-12.68	-4.68	-0.68	-20.18	-14.18	-6.18	-2.18	-22.68	-16.68	-8.68	-4.68
-18.65	-12.65	-4.65	-0.65	-20.15	-14.15	-6.15	-2.15	-22.65	-16.65	-8.65	-4.65
-18.38	-12.38	-4.38	-0.38	-19.88	-13.88	-5.88	-1.88	-22.38	-16.38	-8.38	-4.38
-18.37	-12.37	-4.37	-0.37	-19.87	-13.87	-5.87	-1.87	-22.37	-16.37	-8.37	-4.37
-18.24	-12.24	-4.24	-0.24	-19.74	-13.74	-5.74	-1.74	-22.24	-16.24	-8.24	-4.24
-18.08	-12.08	-4.08	-0.08	-19.58	-13.58	-5.58	-1.58	-22.08	-16.08	-8.08	-4.08
-18.03	-12.03	-4.03	-0.03	-19.53	-13.53	-5.53	-1.53	-22.03	-16.03	-8.03	-4.03
-18.01	-12.01	-4.01	-0.01	-19.51	-13.51	-5.51	-1.51	-22.01	-16.01	-8.01	-4.01
-18	-12	-4	0	-19.5	-13.5	-5.5	-1.5	-22	-16	-8	-4
-17.88	-11.88	-3.88	0.12	-19.38	-13.38	-5.38	-1.38	-21.88	-15.88	-7.88	-3.88
-17.73	-11.73	-3.73	0.27	-19.23	-13.23	-5.23	-1.23	-21.73	-15.73	-7.73	-3.73
-17.48	-11.48	-3.48	0.52	-18.98	-12.98	-4.98	-0.98	-21.48	-15.48	-7.48	-3.48
-17.31	-11.31	-3.31	0.69	-18.81	-12.81	-4.81	-0.81	-21.31	-15.31	-7.31	-3.31
-17.3	-11.3	-3.3	0.7	-18.8	-12.8	-4.8	-0.8	-21.3	-15.3	-7.3	-3.3
-17.08	-11.08	-3.08	0.92	-18.58	-12.58	-4.58	-0.58	-21.08	-15.08	-7.08	-3.08
-16.67	-10.67	-2.67	1.33	-18.17	-12.17	-4.17	-0.17	-20.67	-14.67	-6.67	-2.67
-16.56	-10.56	-2.56	1.44	-18.06	-12.06	-4.06	-0.06	-20.56	-14.56	-6.56	-2.56
-16.41	-10.41	-2.41	1.59	-17.91	-11.91	-3.91	0.09	-20.41	-14.41	-6.41	-2.41
-16.36	-10.36	-2.36	1.64	-17.86	-11.86	-3.86	0.14	-20.36	-14.36	-6.36	-2.36
-16.26	-10.26	-2.26	1.74	-17.76	-11.76	-3.76	0.24	-20.26	-14.26	-6.26	-2.26
-16.26	-10.26	-2.26	1.74	-17.76	-11.76	-3.76	0.24	-20.26	-14.26	-6.26	-2.26
-15.88	-9.88	-1.88	2.12	-17.38	-11.38	-3.38	0.62	-19.88	-13.88	-5.88	-1.88
-15.72	-9.72	-1.72	2.28	-17.22	-11.22	-3.22	0.78	-19.72	-13.72	-5.72	-1.72
-15.35	-9.35	-1.35	2.65	-16.85	-10.85	-2.85	1.15	-19.35	-13.35	-5.35	-1.35
-15.25	-9.25	-1.25	2.75	-16.75	-10.75	-2.75	1.25	-19.25	-13.25	-5.25	-1.25
-15.18	-9.18	-1.18	2.82	-16.68	-10.68	-2.68	1.32	-19.18	-13.18	-5.18	-1.18
-15.08	-9.08	-1.08	2.92	-16.58	-10.58	-2.58	1.42	-19.08	-13.08	-5.08	-1.08
-15.07	-9.07	-1.07	2.93	-16.57	-10.57	-2.57	1.43	-19.07	-13.07	-5.07	-1.07

Inundation Estimates

Table 2 of 3

**REPURPOSE/
RELOCATE** — BFE >10ft above LAG

ELEVATE — BFE ~5-10ft above LAG

WETPROOF — BFE ~3-5ft above LAG

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2511	203 WATER ST	15.19	30	24	16	12
2527	9 MAIN AV	15.78	30	24	16	12
2530	189 WATER ST	16.24	30	24	16	12
2509	14 MAIN AV	16.52	30	24	16	12
2529	193 WATER ST	17.98	30	24	16	12
2400	252 WATER ST	18.33	30	24	16	12
2402	280 WATER ST	18.38	30	24	16	12
2399	246 WATER ST	19.25	30	24	16	12
2398	242 WATER ST	19.4	30	24	16	12
2256	35 BRIDGE ST	19.54	30	24	16	12
2397	234 WATER ST	19.66	30	24	16	12
2396	230 WATER ST	19.8	30	24	16	12
2403	286 WATER ST	19.86	30	24	16	12
2395	226 WATER ST	20.02	30	24	16	12
2394	218 WATER ST	20.07	30	24	16	12
2405	300 WATER ST	20.34	30	24	16	12
2407	306 WATER ST	20.59	30	24	16	12
2408	312 WATER ST	20.77	30	24	16	12
1756	45 RIVER AV	20.79	30	24	16	12
2409	316 WATER ST	21.27	30	24	16	12
2433	192 WATER ST	21.56	30	24	16	12
2449	39 WATER ST	22.38	30	24	16	12
2432	190 WATER ST	22.49	30	24	16	12
2429	152 WATER ST	23.88	30	24	16	12
2429	152 WATER ST	24.7	30	24	16	12
2429	152 WATER ST	22.7	30	24	16	12
2410	348 WATER ST	24.49	30	24	16	12
1766	26 WATER ST	25.11	30	24	16	12
1767	46 WATER ST	26.43	30	24	16	12
2523	8 DEPOT SQ	26.6	30	24	16	12
2393	1 BRUNSWICK AV	28.14	30	24	16	12
2384	421 WATER ST	28.91	30	24	16	12
2456	405 WATER ST	29.22	30	24	16	12

Based on Historical Record, to 2011				Based on Sea Level Rise, to 2050				Based on Sea Level Rise, to 2100			
0.20%	1%	5%	15%	0.20%	1%	5%	15%	0.20%	1%	5%	15%
2011_HZ00	2011_HZ01	2011_HZ05	2011_HZ15	2050_HZ00	2050_HZ01	2050_HZ05	2050_HZ15	2100_HZ00	2100_HZ01	2100_HZ05	2100_HZ15
-15	-9	-1	3	-16.5	-10.5	-2.5	1.5	-19	-13	-5	-1
-14.81	-8.81	-0.81	3.19	-16.31	-10.31	-2.31	1.69	-18.81	-12.81	-4.81	-0.81
-14.22	-8.22	-0.22	3.78	-15.72	-9.72	-1.72	2.28	-18.22	-12.22	-4.22	-0.22
-13.76	-7.76	0.24	4.24	-15.26	-9.26	-1.26	2.74	-17.76	-11.76	-3.76	0.24
-13.48	-7.48	0.52	4.52	-14.98	-8.98	-0.98	3.02	-17.48	-11.48	-3.48	0.52
-12.02	-6.02	1.98	5.98	-13.52	-7.52	0.48	4.48	-16.02	-10.02	-2.02	1.98
-11.67	-5.67	2.33	6.33	-13.17	-7.17	0.83	4.83	-15.67	-9.67	-1.67	2.33
-11.62	-5.62	2.38	6.38	-13.12	-7.12	0.88	4.88	-15.62	-9.62	-1.62	2.38
-10.75	-4.75	3.25	7.25	-12.25	-6.25	1.75	5.75	-14.75	-8.75	-0.75	3.25
-10.6	-4.6	3.4	7.4	-12.1	-6.1	1.9	5.9	-14.6	-8.6	-0.6	3.4
-10.46	-4.46	3.54	7.54	-11.96	-5.96	2.04	6.04	-14.46	-8.46	-0.46	3.54
-10.34	-4.34	3.66	7.66	-11.84	-5.84	2.16	6.16	-14.34	-8.34	-0.34	3.66
-10.2	-4.2	3.8	7.8	-11.7	-5.7	2.3	6.3	-14.2	-8.2	-0.2	3.8
-10.14	-4.14	3.86	7.86	-11.64	-5.64	2.36	6.36	-14.14	-8.14	-0.14	3.86
-9.98	-3.98	4.02	8.02	-11.48	-5.48	2.52	6.52	-13.98	-7.98	0.02	4.02
-9.93	-3.93	4.07	8.07	-11.43	-5.43	2.57	6.57	-13.93	-7.93	0.07	4.07
-9.66	-3.66	4.34	8.34	-11.16	-5.16	2.84	6.84	-13.66	-7.66	0.34	4.34
-9.41	-3.41	4.59	8.59	-10.91	-4.91	3.09	7.09	-13.41	-7.41	0.59	4.59
-9.23	-3.23	4.77	8.77	-10.73	-4.73	3.27	7.27	-13.23	-7.23	0.77	4.77
-9.21	-3.21	4.79	8.79	-10.71	-4.71	3.29	7.29	-13.21	-7.21	0.79	4.79
-8.73	-2.73	5.27	9.27	-10.23	-4.23	3.77	7.77	-12.73	-6.73	1.27	5.27
-8.44	-2.44	5.56	9.56	-9.94	-3.94	4.06	8.06	-12.44	-6.44	1.56	5.56
-7.62	-1.62	6.38	10.38	-9.12	-3.12	4.88	8.88	-11.62	-5.62	2.38	6.38
-7.51	-1.51	6.49	10.49	-9.01	-3.01	4.99	8.99	-11.51	-5.51	2.49	6.49
-6.12	-0.12	7.88	11.88	-7.62	-1.62	6.38	10.38	-10.12	-4.12	3.88	7.88
-6.92	-0.92	7.08	11.08	-8.42	-2.42	5.58	9.58	-10.92	-4.92	3.08	7.08
-4.92	1.08	9.08	13.08	-6.42	-0.42	7.58	11.58	-8.92	-2.92	5.08	9.08
-5.51	0.49	8.49	12.49	-7.01	-1.01	6.99	10.99	-9.51	-3.51	4.49	8.49
-4.89	1.11	9.11	13.11	-6.39	-0.39	7.61	11.61	-8.89	-2.89	5.11	9.11
-3.57	2.43	10.43	14.43	-5.07	0.93	8.93	12.93	-7.57	-1.57	6.43	10.43
-3.4	2.6	10.6	14.6	-4.9	1.1	9.1	13.1	-7.4	-1.4	6.6	10.6
-1.86	4.14	12.14	16.14	-3.36	2.64	10.64	14.64	-5.86	0.14	8.14	12.14
-1.09	4.91	12.91	16.91	-2.59	3.41	11.41	15.41	-5.09	0.91	8.91	12.91
-0.78	5.22	13.22	17.22	-2.28	3.72	11.72	15.72	-4.78	1.22	9.22	13.22

Inundation Estimates

Table 3 of 3



INUNDATION ESTIMATES			Flood Height by % Annual Chance			
Building/Structure in Floodplain			0.20%	1%	5%	15%
CardNo	Address	LAG_ft	500	BFE	SVR	DMG
2248	90 MAIN AV	32.14	30	24	16	12
2460	30 BRIDGE ST	32.17	30	24	16	12
2387	408 WATER ST	35.31	30	24	16	12
2338	16 BRUNSWICK AV	35.85	30	24	16	12
2411	20 MECHANIC ST	36.56	30	24	16	12
2461	25 WINTER ST	37.03	30	24	16	12
100983	46 SUMMER ST	37.96	30	24	16	12
1621	56 WATER ST	39.12	30	24	16	12

NOTE: These tables are estimates only. Many structures in this floodplain have an elevation certificate, performed by an on-the-ground professional survey. These figures can be substituted for LAG_ft and recalculated. The color-coded figures represent the estimated inundation given different scenarios, where a positive number means that each building’s “Lowest Adjacent Grade” (LAG) is above that scenario (dry) and a negative number means that the LAG is below that scenario (wet) and therefore at risk of inundation. The color-coded recommendations are suggested as general approaches for the Lowest Floor Elevation only. The scenarios for the inundation estimates are based on the percent flood height chance from the historical record, as well as future sea level rise:

- 500 —> 0.2% is 500-year (30 feet high)
 - BFE —> 1% is 100-year (24 feet high)
 - SVR —> 5% “severe, 20-year” (16 feet high)
 - DMG —> 15% “damaging, 7-year” (12 feet high)
- State-adopted sea level rise scenarios —> +1.5 feet by 2050 and +4.0 feet by 2100.

An example of a comparison between our estimates (derived from LiDAR, infrastructure data, and geospatial analysis) and the values from an elevation certificate are available on page 70 where we performed a comparison for Gardiner Public Library. There were two different LAGs provided on this elevation certificate (outlined in black): one for the LAG of the finished structure, and one for the LAG for the structure including decks, stairways, and other external elements. Cross referencing our estimate against these certificate found the estimates to be +/- 0.8-1.2 feet of the elevation certificate (see Appendix for the Library’s certificate).

Based on Historical Record, to 2011				Based on Sea Level Rise, to 2050				Based on Sea Level Rise, to 2100			
0.20%	1%	5%	15%	0.20%	1%	5%	15%	0.20%	1%	5%	15%
2011_HZ00	2011_HZ01	2011_HZ05	2011_HZ15	2050_HZ00	2050_HZ01	2050_HZ05	2050_HZ15	2100_HZ00	2100_HZ01	2100_HZ05	2100_HZ15
2.14	8.14	16.14	20.14	0.64	6.64	14.64	18.64	-1.86	4.14	12.14	16.14
2.17	8.17	16.17	20.17	0.67	6.67	14.67	18.67	-1.83	4.17	12.17	16.17
5.31	11.31	19.31	23.31	3.81	9.81	17.81	21.81	1.31	7.31	15.31	19.31
5.85	11.85	19.85	23.85	4.35	10.35	18.35	22.35	1.85	7.85	15.85	19.85
6.56	12.56	20.56	24.56	5.06	11.06	19.06	23.06	2.56	8.56	16.56	20.56
7.03	13.03	21.03	25.03	5.53	11.53	19.53	23.53	3.03	9.03	17.03	21.03
7.96	13.96	21.96	25.96	6.46	12.46	20.46	24.46	3.96	9.96	17.96	21.96
9.12	15.12	23.12	27.12	7.62	13.62	21.62	25.62	5.12	11.12	19.12	23.12

Strategies Overview

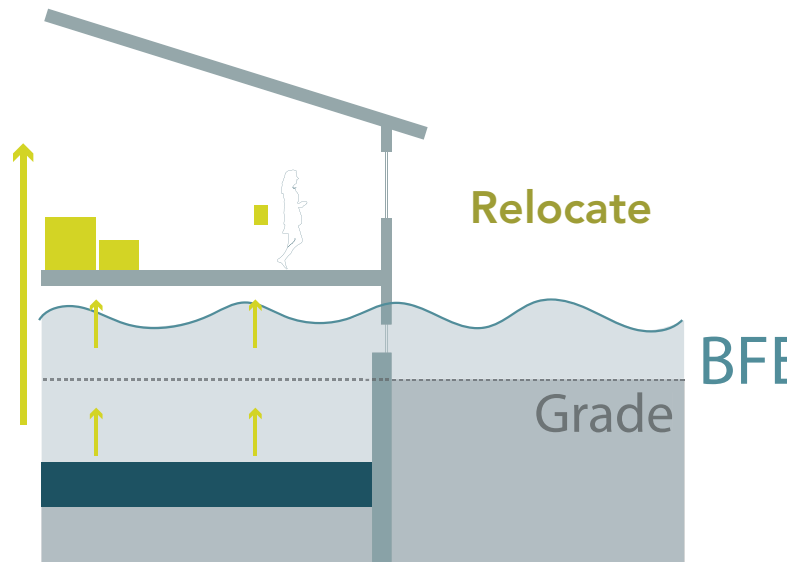
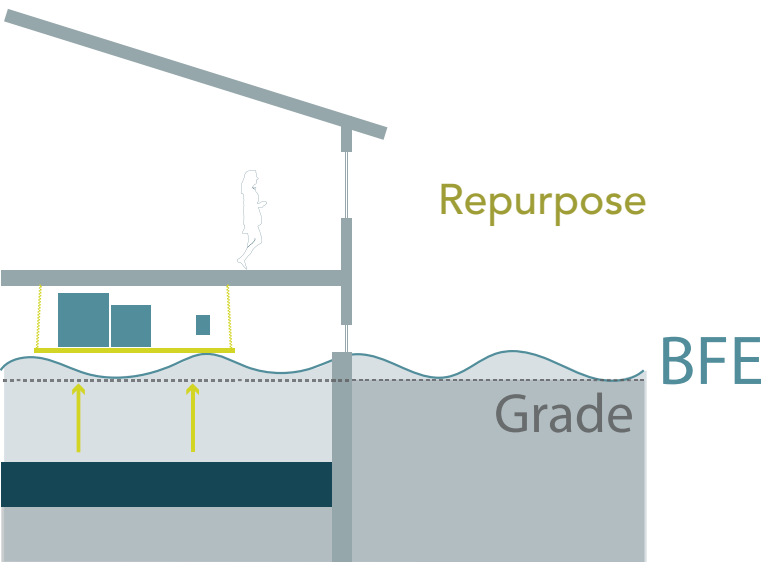
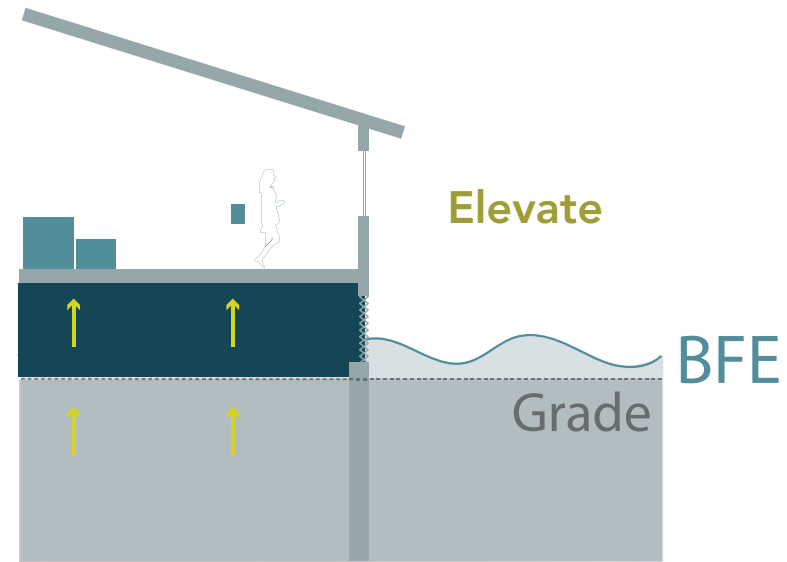
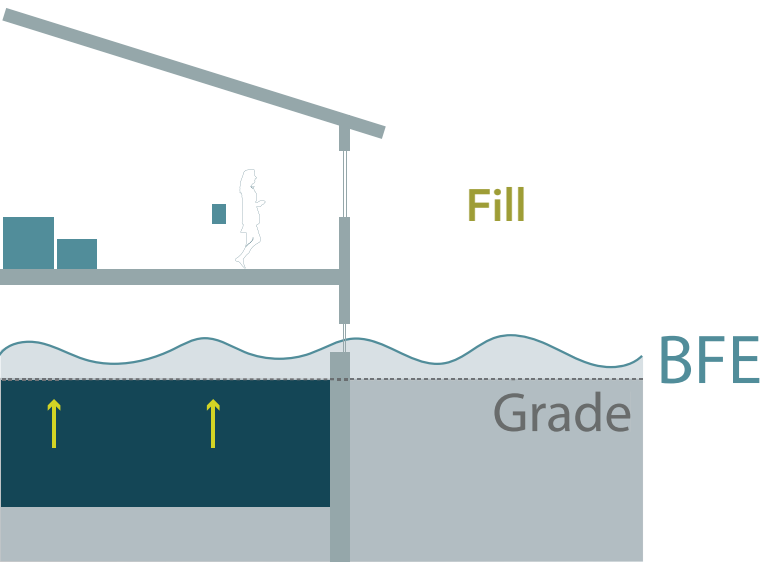
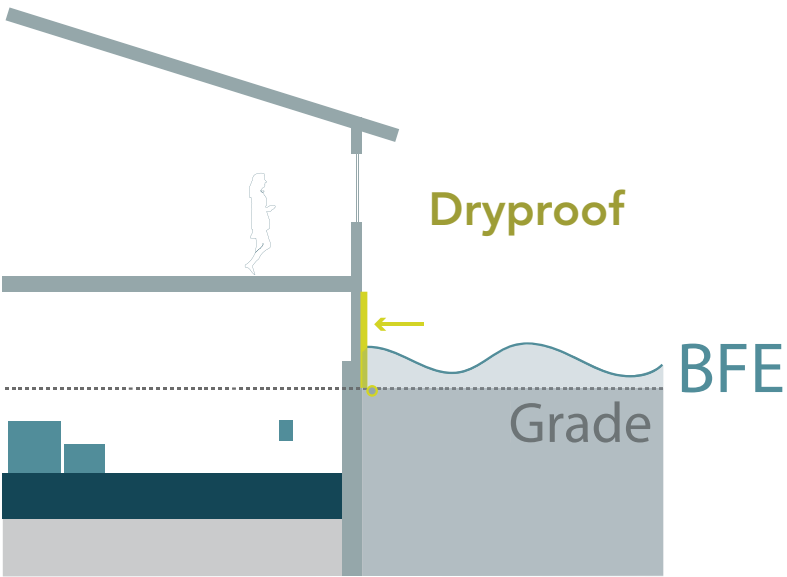
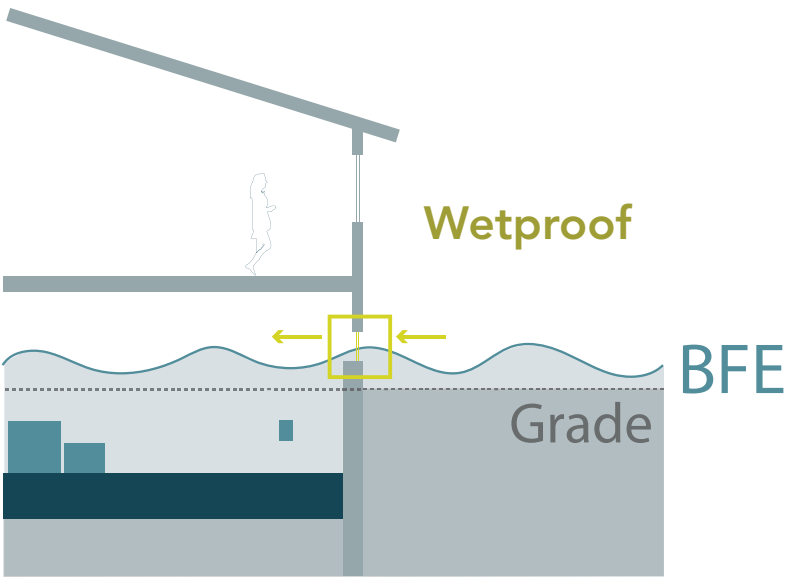
How Do I Choose What to Do?

Trying to figure out where to start can be intimidating. It is difficult to know what level of risk you may be taking by planning no action, and it may be still more difficult to assess how much to invest in making alterations to mitigate that risk. The first recommendation is to establish your own particular risk. This means running through the preliminary inundation risk tables and estimates before proceeding, you can find these on the previous pages “Assessing Inundation Risk.” Securing an elevation certificate is even better.

Once complete, you should look to each space and its physical height relationship to the current 100-year Base Flood Elevation (1%). You can augment this by adding 1.5 feet to incorporate sea level rise projections for 2050, and you can add 4.0 feet to incorporate sea level rise projections for 2100. If your structure is very low and requires substantial repurposing, it may be helpful to substitute those numbers with the other estimated flood frequencies (i.e. 5%, 15% annual risks) to gauge how usable the space is for other purposes. For instance, a space with a high BFE may not be usable as living space, but based on other flood frequencies, you may be able to use that space for temporary storage, car parking, etc.

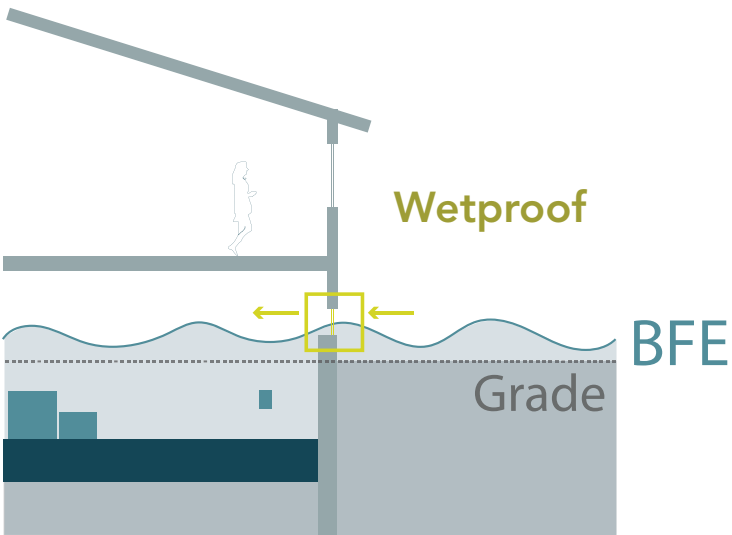
The strategies listed here are some of the concepts that will be helpful when discussing your needs with an engineer, architect, plumber, electrician, code enforcement officer, or other specialist. In general, you should not attempt to structurally modify your building without the assistance of a licensed professional. While some basic modifications may be simple DIY projects (raising shelving, relocating appliances, etc.), others may endanger the structural integrity of your building (constructing flood vents, reinforcing or tiling walls to withstand water pressure, elevating/relocating utilities, etc.).

If the BFE is at or below your Lowest Floor Elevation (LFE), then it may be advisable to simply use planning and mitigation measures. These can take many forms: sandbagging, raising assets in place, creating contingency plans, etc. Living space and permanent structure modifications, however, should be prepared at at least 1 foot above the BFE.



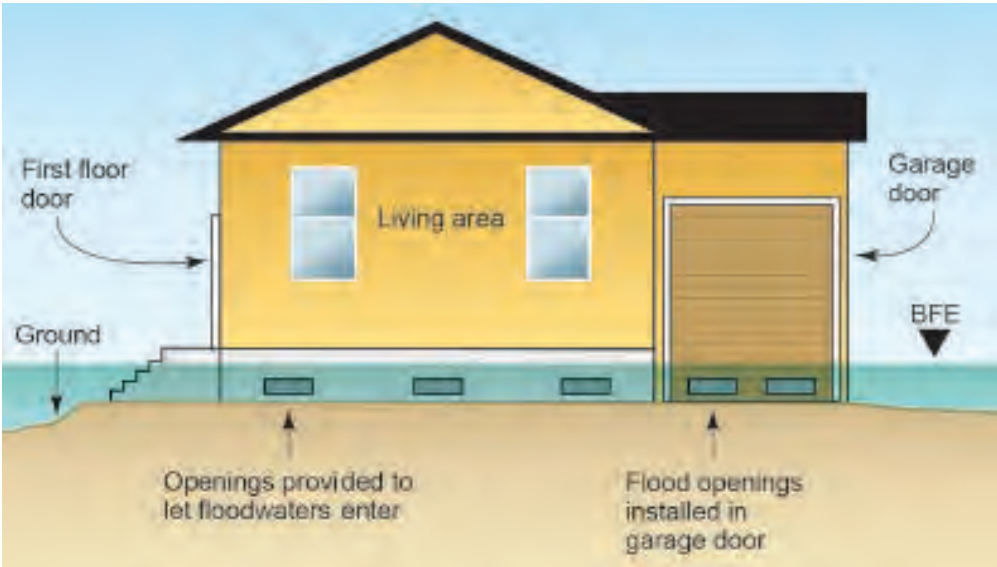


Wetproof Strategies



What is Wetproofing?

This method allows a portion of the structure that is below the BFE to flood with adaptations that minimize impacts. The building is retrofitted with openings and drainage to allow water to enter and exit, relieving the structure from hydrostatic pressure. Wetproofing is used in spaces that are typically unoccupied (garages, basements, crawlspaces, etc).



FEMA P-1037, 2015

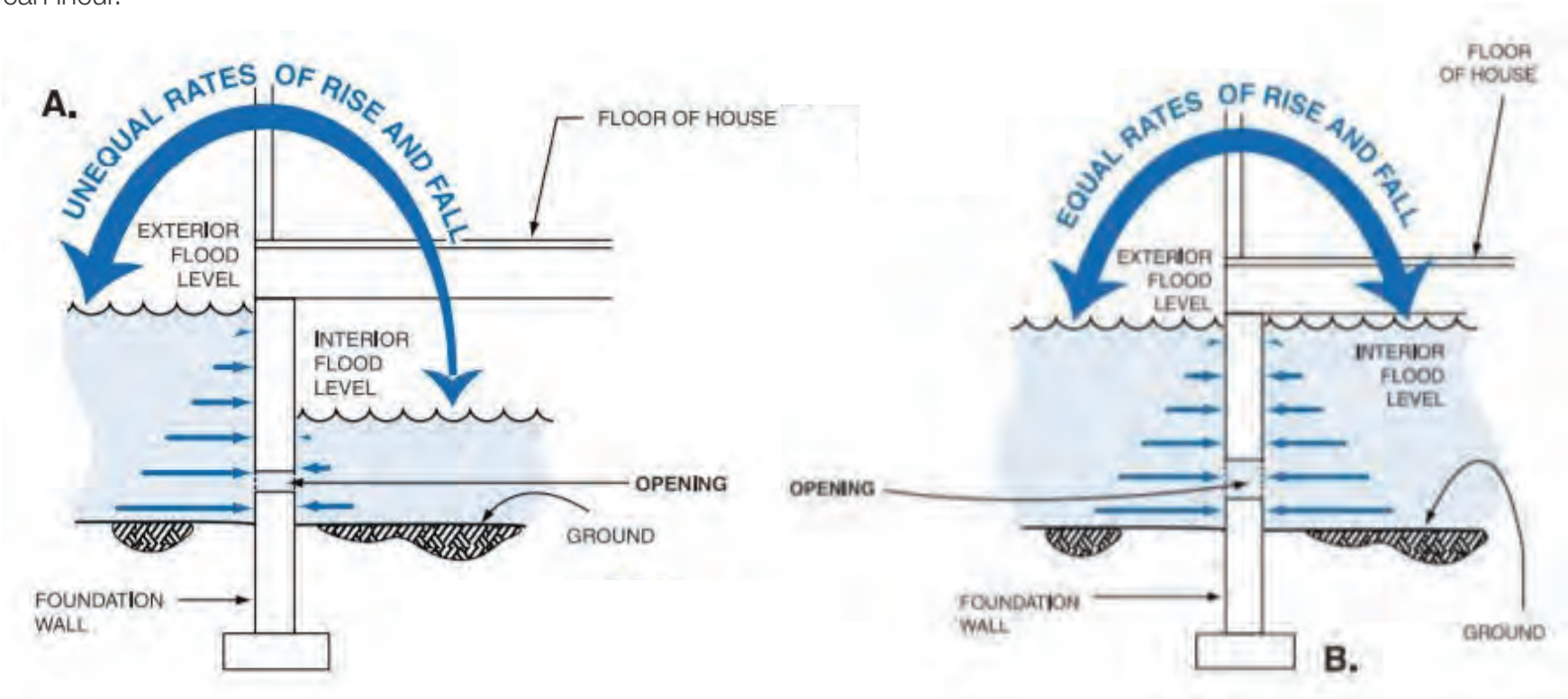
Why Should I Wetproof?

When water accumulates and cannot drain properly, the building’s structure will experience hydrostatic pressure—a physical force from the weight of the water against the wall. This can be so forceful that it causes the foundational walls to crack, bow inward, or even collapse.

Allowing water to flow through the building will alleviate the buildup of such pressures and minimize structural damage. The recommended threshold to wetproof a building is when floodwaters, usually defined by the Base Flood Elevation (BFE), are expected to rise above 3 feet from lowest level of the asset.

What is Hydrostatic Pressure?

Pressure exerted on the structure of a building due to the accumulation of standing water above and below ground. When pressures are not balanced on either side of the structure, damages and structure instability can incur.



Flood Openings

Prevent structural collapse from the pressures of standing water by allowing water in. Examples of flood openings include:

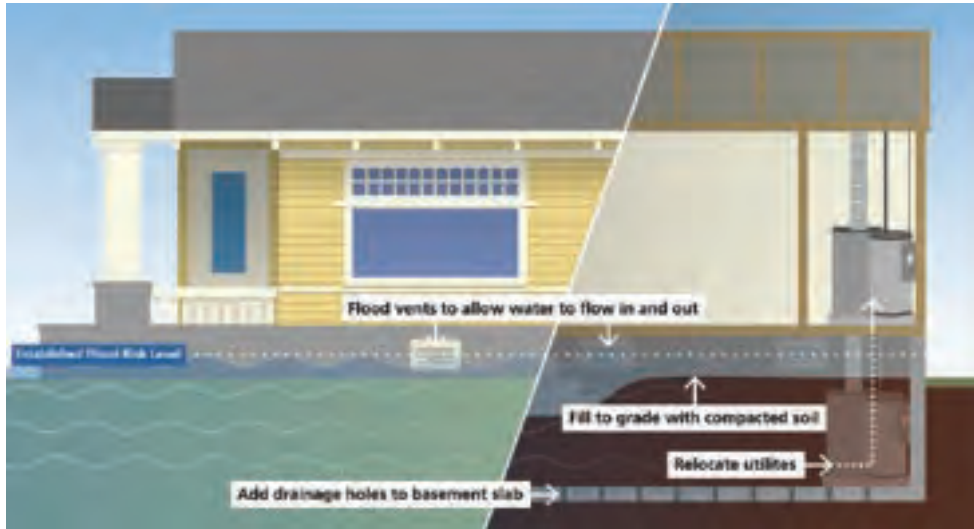
- First floor door.
- Garage door.
- Flood vents.
- Garage and basement openings.



Local 4 News/WHBF-TV

Elevate Utilities

Even with wetproofing measures, this may not be adequate to protect your structure. You may need to protect utilities from damage by elevating them on a platform or moving them to higher floors. Generally, all critical utilities and assets should be elevated to at least one foot above the BFE.



NPS Flood Adaptation Guidelines 2021

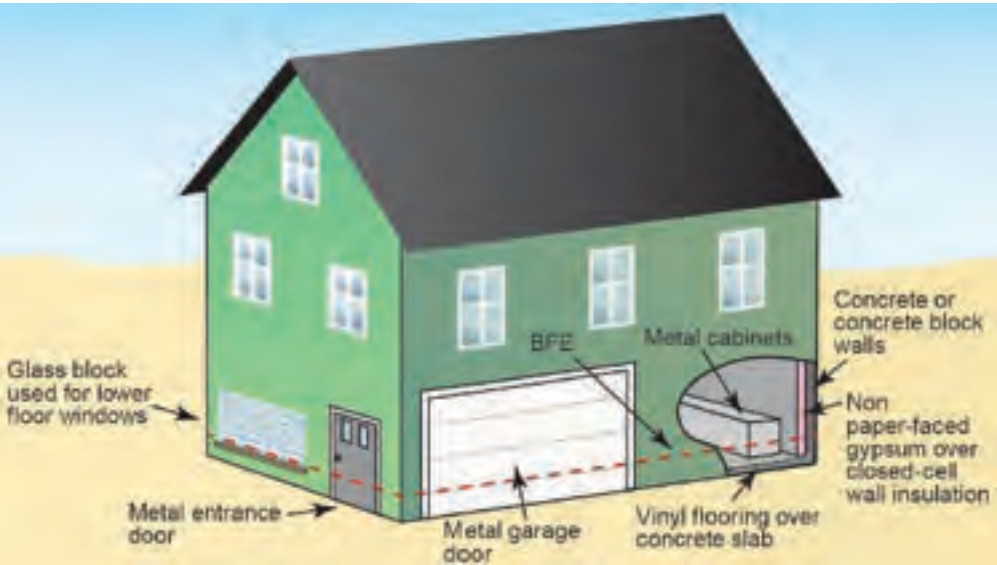


Flood Damage-Resistant Materials

To minimize non-structural water damage, flood damage resistant materials can be implemented below the BFE.

Materials include:

- Metal entrance & garage door.
- Vinyl or tiled flooring.
- Concrete or concrete block walls.
- Non paper-faced gypsum over closed-cell wall insulation.
- Glass block for lower floor windows.

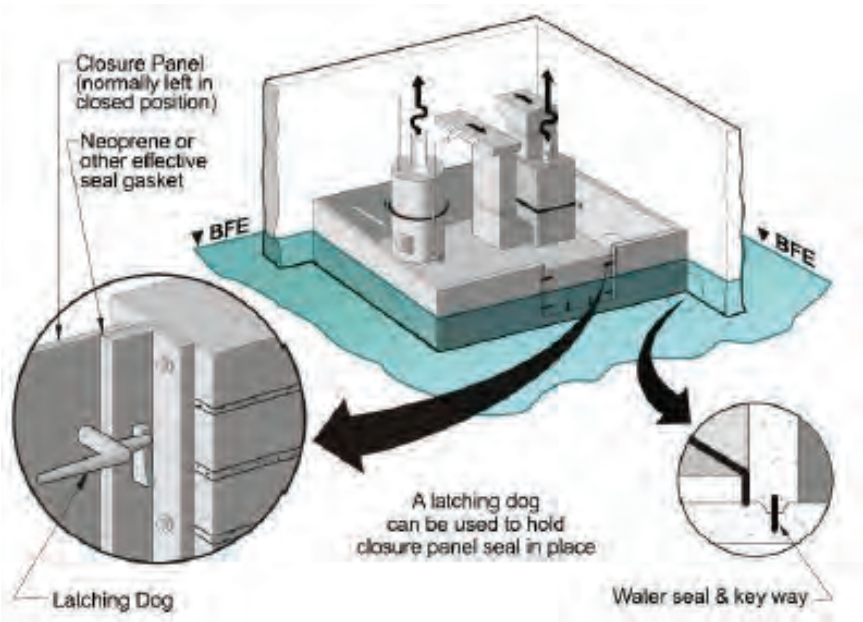


FEMA P-1037, 2015

Floodproof Utilities

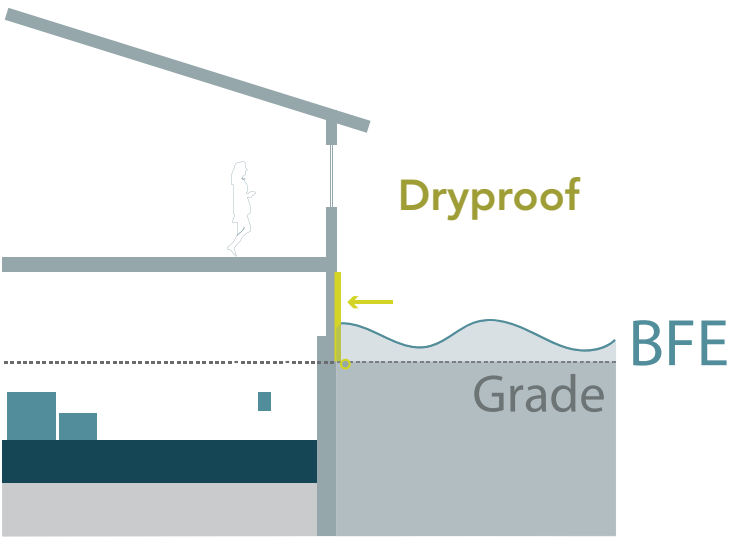
In this strategy, utility systems are built to resist damage from flooding. One example would be placing equipment behind floodwalls or inside a watertight, passive utility enclosure.

Although many small tasks may be done by a homeowner (elevating shelving, small appliances, outlets, etc.), major utility relocation (large appliances, wiring, HVAC systems, etc.) is best done by an electrician, plumber, or other professional.



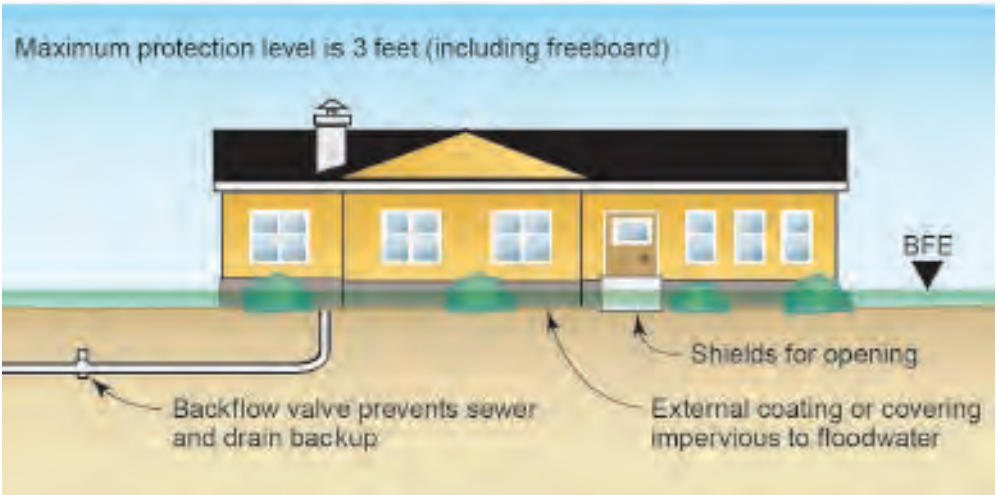
FEMA P-1037, 2015

Dryproof Strategies



What is Dryproofing?

The building's structure, utilities, and equipment are made to be sealed and watertight. All elements must be impermeable by floodwater and structural components are designed to resist flood loads and hydrostatic pressure. Exterior surfaces must be impervious to water and all openings (windows, doors, and utility openings) below the BFE must be designed to be temporarily or permanently sealed.



FEMA P-1037, 2015

Why Should I Dryproof?

Dryproofing completely prevents floodwater from getting inside. It protects interior assets from water damage and mold while protecting structural components from deterioration.

Dryproofing treatments are most effective when all utilities are elevated above the BFE and when proper drainage is installed (flap valves or passive backflow prevention devices installed on the structure and in wastewater and stormwater systems).

Dryproofing Limitations

Due to hydrostatic pressure and structural stress, this treatment is only recommended when load-bearing masonry buildings or frame buildings with masonry foundations can be properly evaluated by a structural engineer.

BFE must be below the top of the foundation (and/or the masonry walls) and be properly designed (or reinforced) to withstand floodwaters. This is not a good solution for wood construction.

- Dryproofing treatment requires regular maintenance, monitoring, and repair to perform effectively in repetitive flood events. May require permits/engineering.
- Not recommended if expected flooding is higher than 3 feet due to hydrostatic pressures.
- Any building opening and/or component (including utilities) below the BFE must be able to withstand hydrostatic forces.



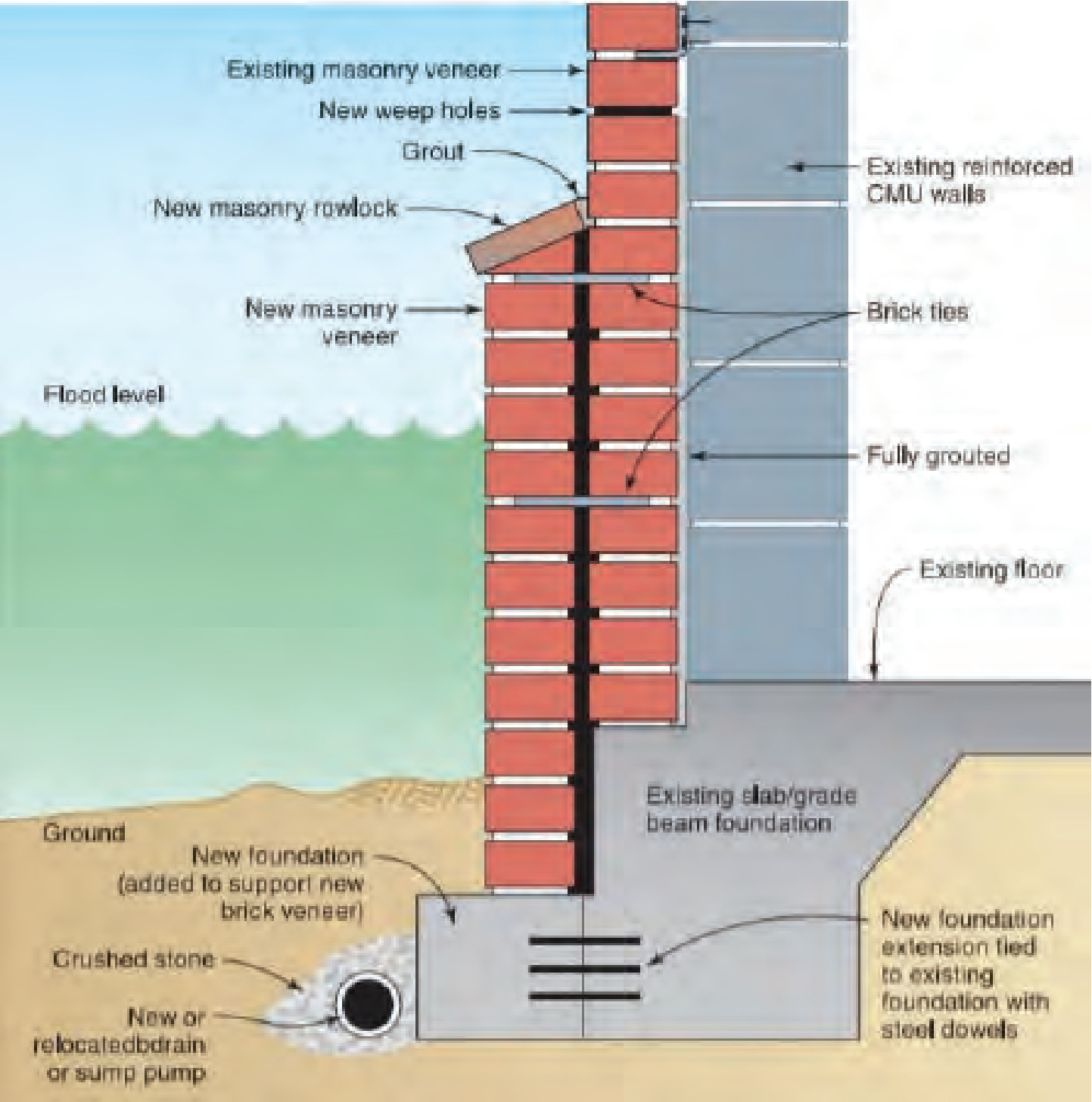
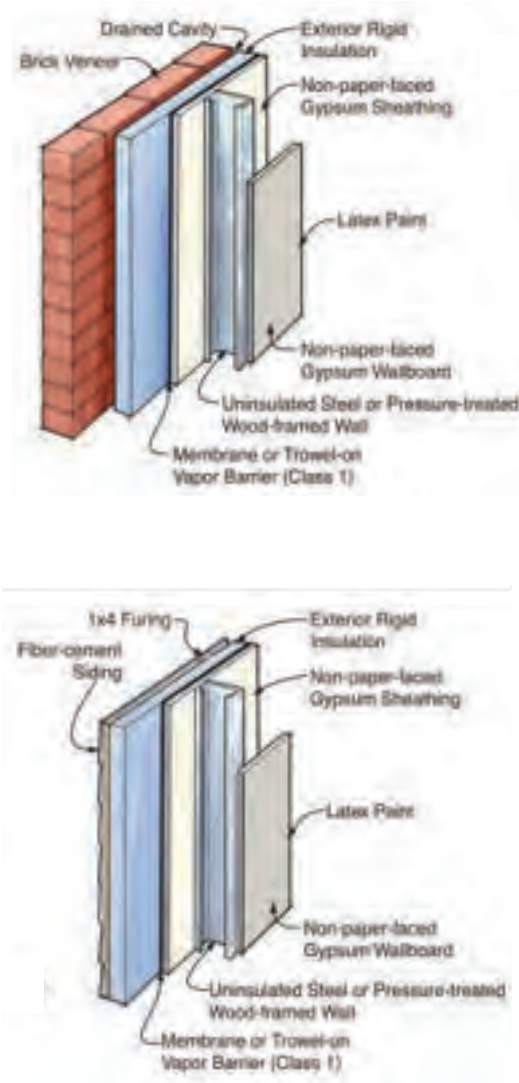
FEMA P-936, 2013

Passive Dryproofings, Coverings, & Coatings

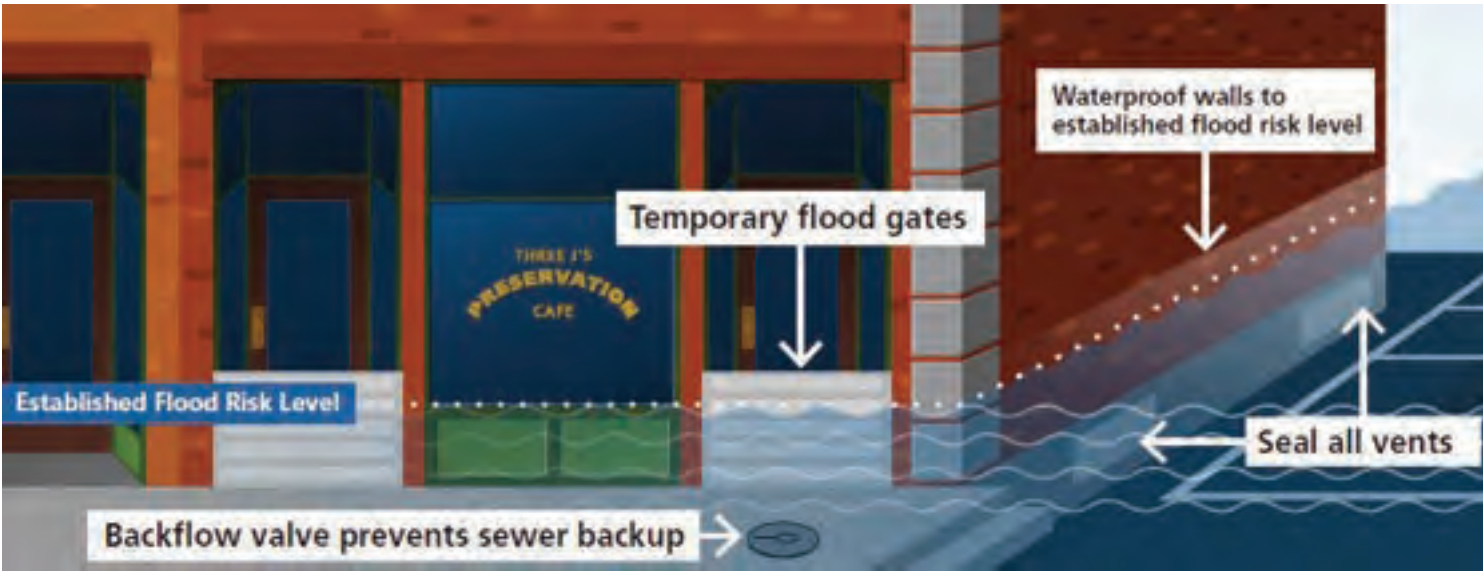
This dryproofing strategy involves the installation of a barrier around a building to protect it from flood damage. The coating or covering must be impervious to floodwater, certified, and built to a maximum of 3 feet above grade. To reduce flood damage to the greatest extent possible, floodproof to the BFE or above.

Site Drainages

Adequate drainage is necessary for all dryproofing strategies. Proper drainage systems must be installed around the foundation and footings of the building to avoid potential damage to the structure. Backflow valves are necessary to prevent sewer and drain backups. Installing one or more sump pumps is highly recommended as a backup to effectively control water on the site and, depending on the environs, reduce hydrostatic pressure.

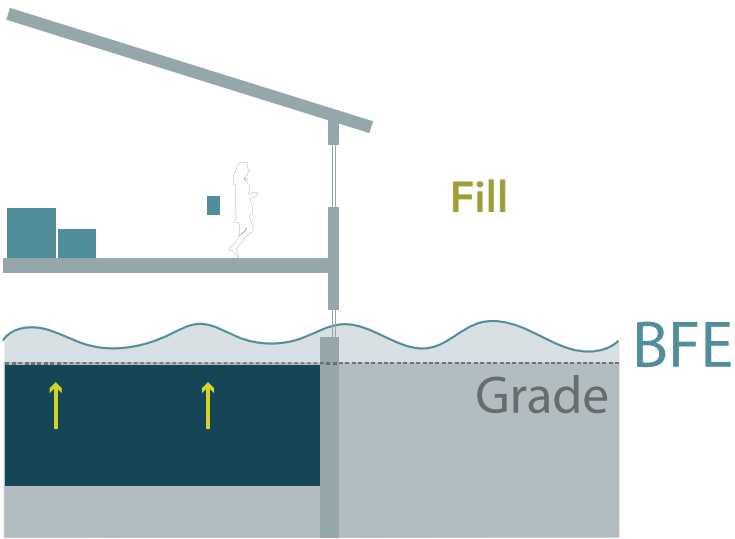


FEMA P-551, 2007



NPS Flood Adaptation Guidelines, 2021

Filling Strategies



Why Should I Fill?

This strategy is used when either flood frequency or potential severity outweigh the needs or uses for the lowest floor. If hydrostatic pressure is regular from nuisance flooding, filling this space simply provides the structure with more stability. If hydrodynamic forces (water motion acting upon the structure) are likely to be dangerous or present an extreme differential, then filling the space limits the impact of those forces.

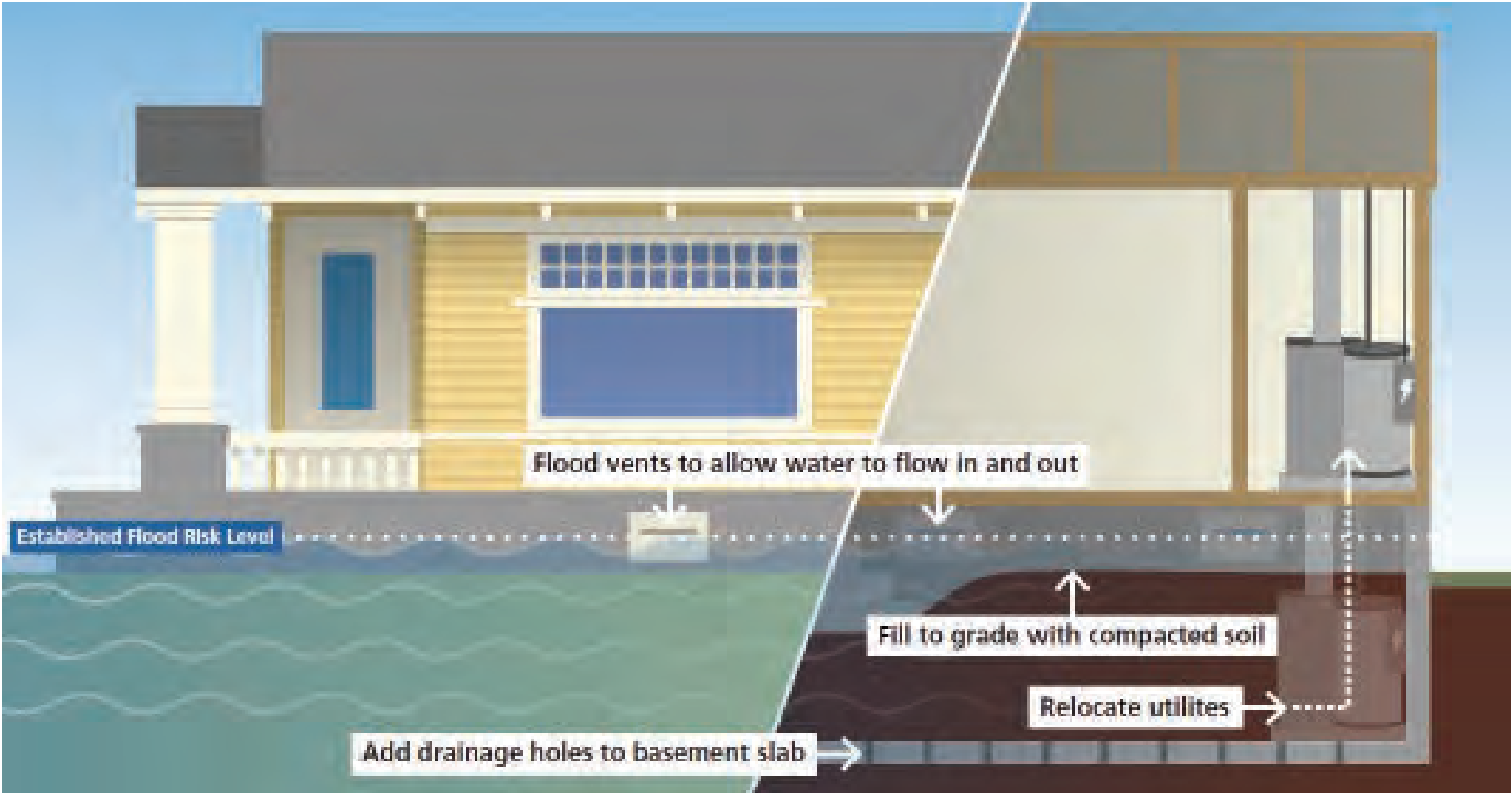
Filling Limitations

- Due to structural limitations, this treatment can only be used on buildings with basements constructed of masonry.
- Compacting equipment must have proper access and clearance to the basement level to fulfill the needs of the treatment and be removed upon completion.
- This treatment will result in a loss of usable square footage.

What is Filling?

This strategy involves filling the lowest floor when it is located below the Base Flood Elevation (BFE). Sections of basement walls that remain above ground are normally retrofitted with flood openings to allow waters to automatically enter and exit. Basement utility systems and critical assets must be elevated or relocated to another level to protect from flood damage.

Fill material includes compacted gravel, soil, sand, or cement. The basement is normally filled to at least the same level as the ground adjacent to and surrounding the building. Since fill materials tend to settle overtime, the filled level must be routinely checked and properly modified to maintain the adequate fill height.

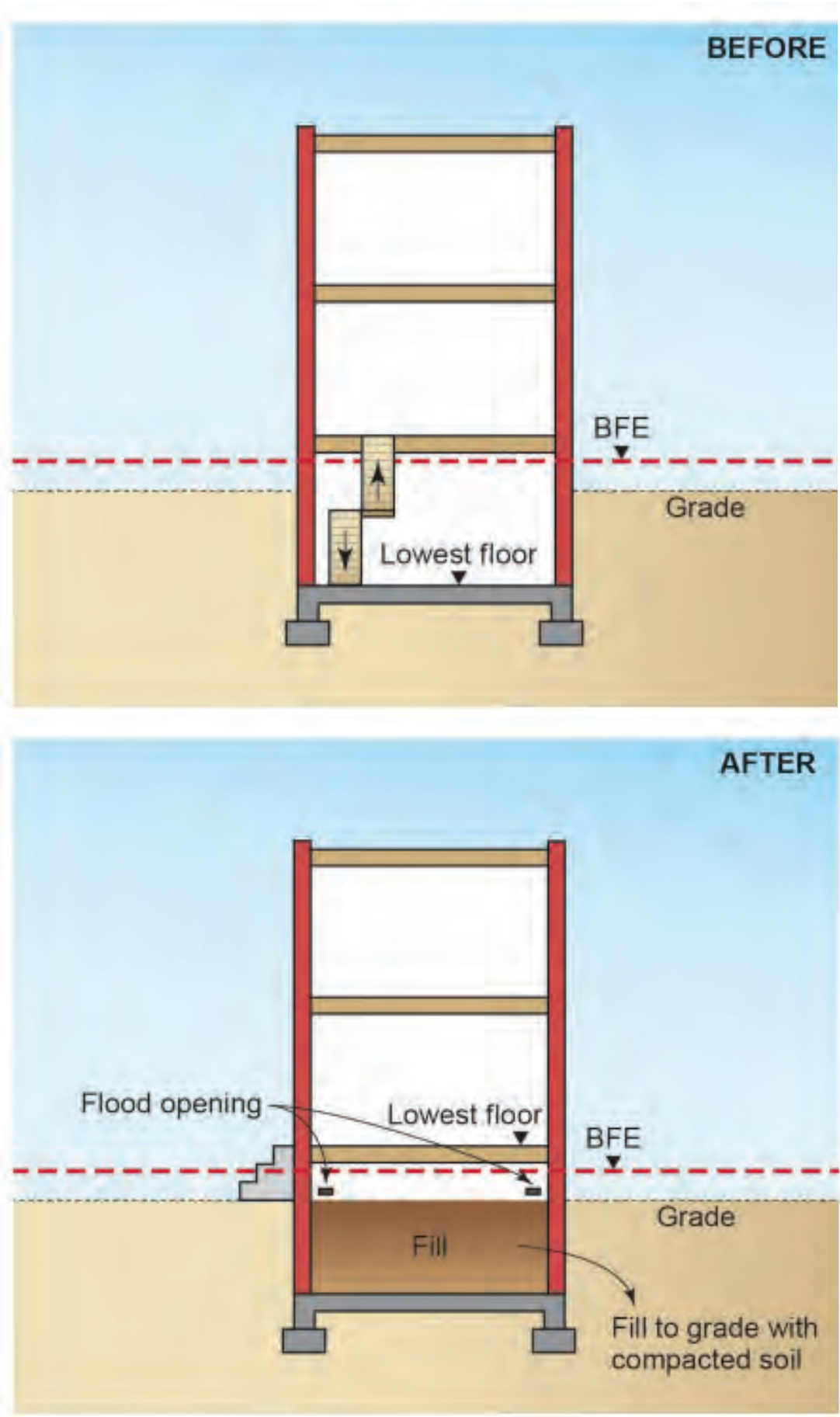


NPS Flood Adaptation Guidelines 2021



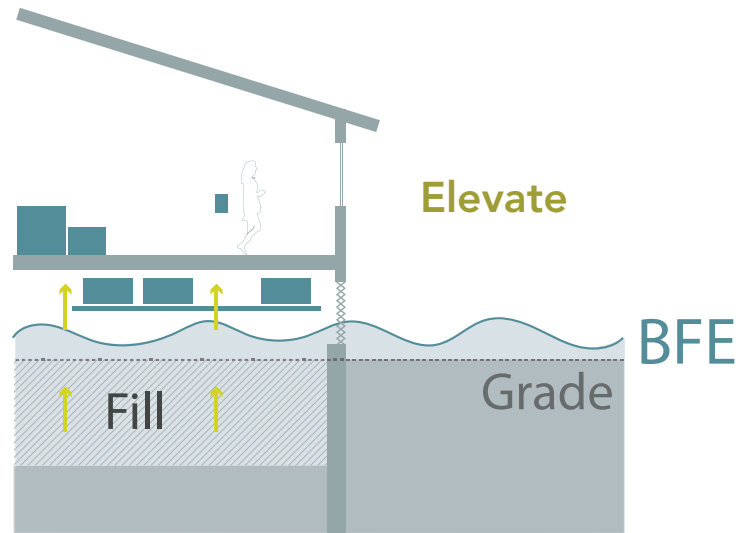
NPS Flood Adaptation Guidelines 2021

Example of a building in the process of filling the lowest level. Shows access points for equipment to fill the level which will be removed upon completion.



FEMA P-1037, 2015

Elevating Strategies



Elevate: BFE is approximately 5-10ft ABOVE the LAG.

What is Elevating?

This strategy involves raising assets or the actual structure itself.

Elevating assets can be done piecemeal or in conjunction with other modifications (dryproofing, wetproofing, filling, or repurposing). Raising utilities, appliances, furniture, and other vulnerable assets can protect them from water damage with minimal cost. For this strategy to be effective, all critical assets should be raised above the expected BFE height on stable, water resistant structures.

Elevating the structure can be done by jacking, lifting, or moving the building to perform modifications. This can include moving the structure from its existing foundation on to a higher foundation, elevating internal floors, or elevating the understructure of the existing building with an improved foundation.

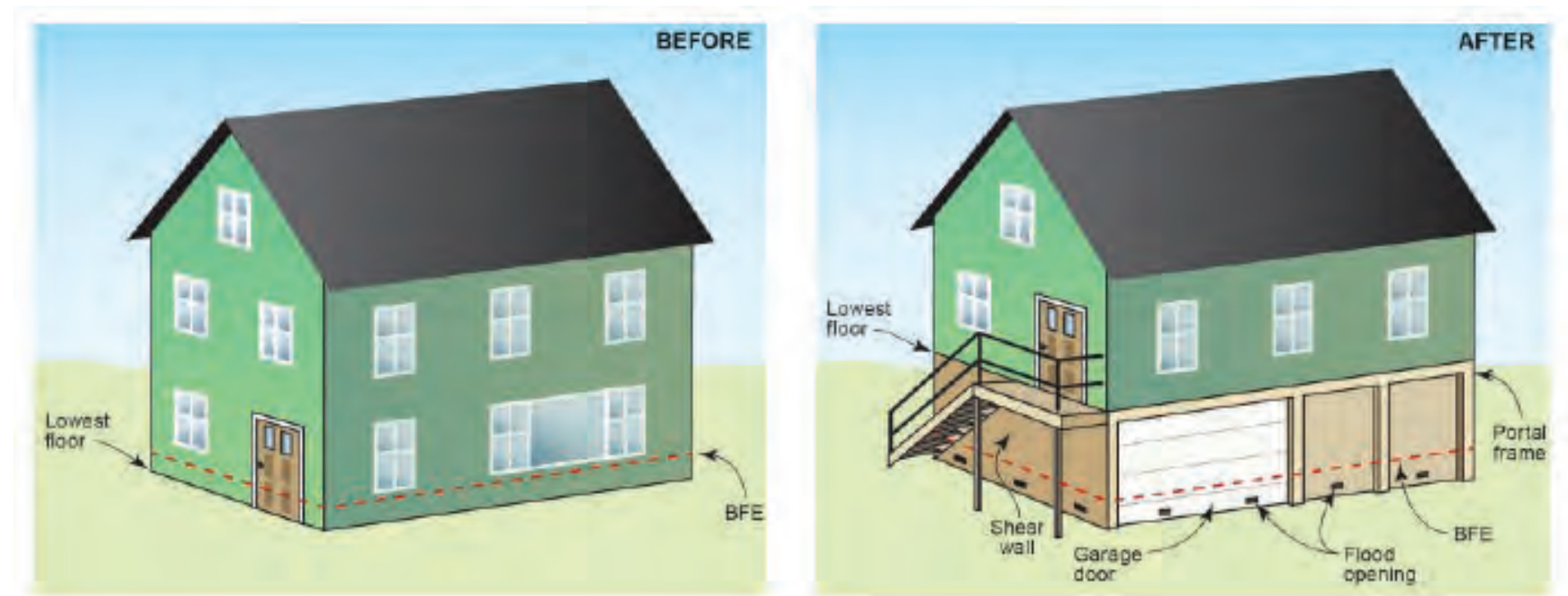
Why Elevate?

Elevating assets is most effective when the only significant risk is posed uniquely to those items in question. In the case of longterm storage, for instance: if the lowest floor is not being used as living space, the structure is well floodproofed, and therefore endures no significant structural risk, then elevating this storage alone to put the assets above the BFE may be an adequate and affordable option.

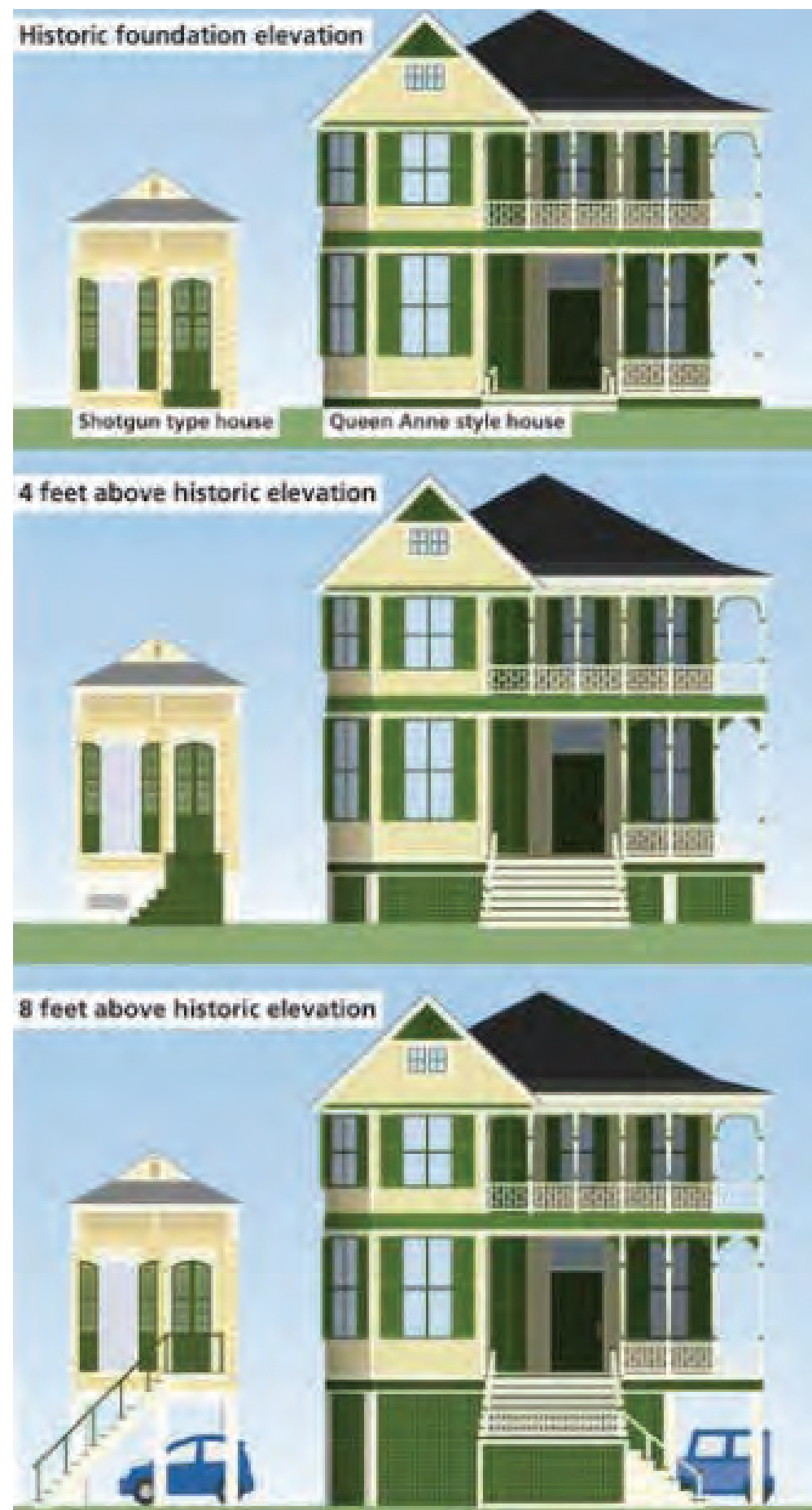
Elevating structures is most effective if and when the structures may be easily manipulated by jacks, cranes, or machinery and likely do not require substantial elevation to be made more secure. Temporary, smaller, and wood construction that need to be raised a small amount to become secure may be more beneficial than other methods.

Limitations to Elevating Structures

- The building must be structurally stable to be raised onto a new foundation.
- There must be a structural system that can support the building on temporary cribbing while a new foundation is constructed.
- This is likely not financially viable for masonry buildings, connected buildings, or buildings with multiple stories.
- In some cases, site constraints may prevent a structure from being elevated.



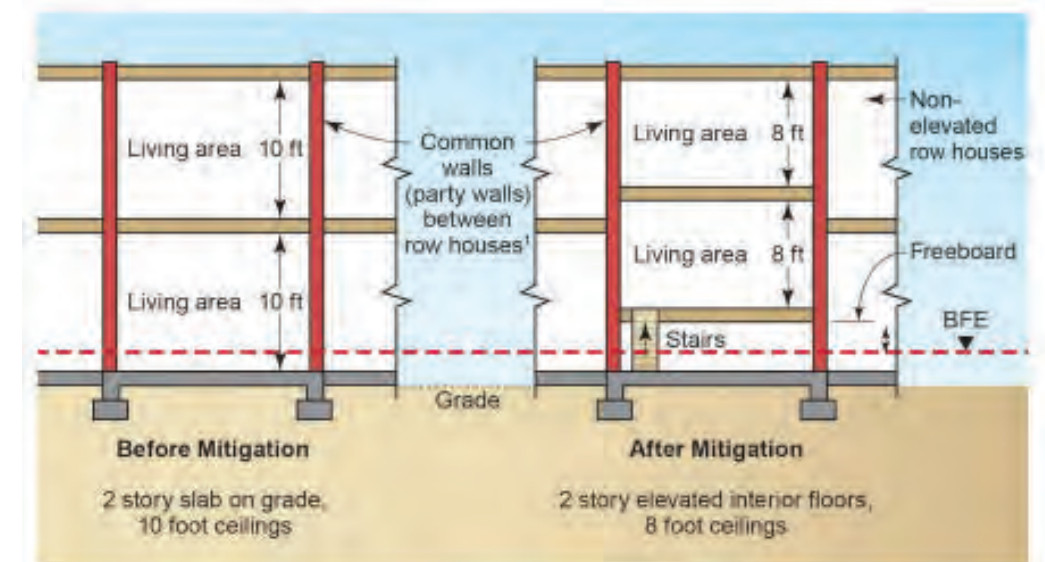
FEMA P-1037, 2015



NPS Flood Adaptation Guidelines 2021



NPS Flood Adaptation Guidelines 2021



FEMA P-1037, 2015



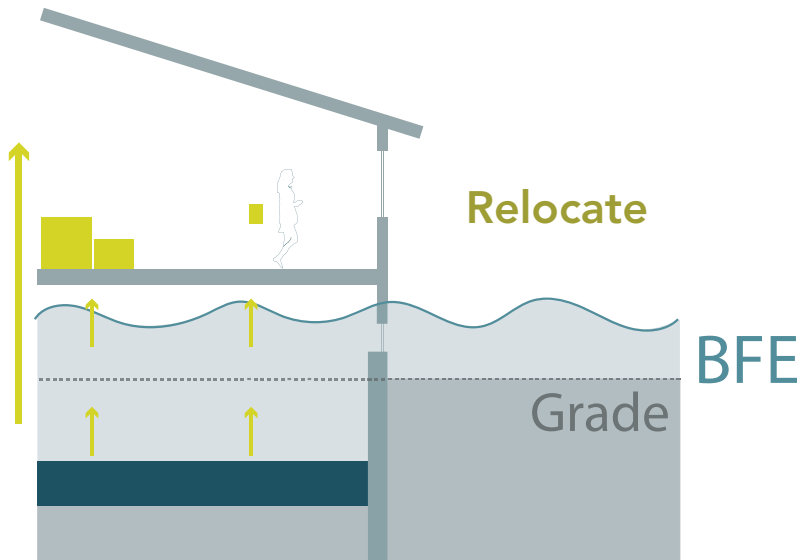
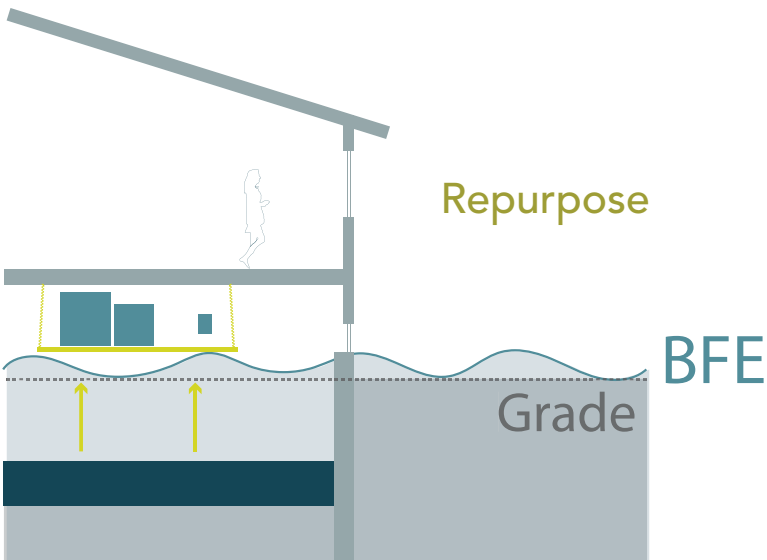
Chicago History Museum, IChi-059709

This illustration demonstrates a merchant block in Chicago (1857) where all buildings were elevated at one time as part of a larger plan to elevate the downtown area by four feet. Elevating masonry buildings can be difficult but has been done historically.

Repurposing/Relocation Strategies



FEMA, 2013



What is Repurposing/Relocating?

Although these methods may seem like surrendering hope for the at-risk space inside your structure, they are the easiest and most assured way to prevent damage and physical harm. This can be as simple as changing the furnishings, appliances, and usage of a space, to as involved as a complete remodel or retrofit.

As mentioned previously, if the tasks involve small changes, many of these can be performed directly by the property owner. If the changes require significant effort—moving a furnace, large appliances, living space amenities, plumbing, electrical panels, etc.—then it may require the help of movers or other professionals.

Why Repurpose?

Repurposing a space is the most actionable and easiest thing to do as a property owner, business owner, or tenant. It requires a change of lifestyle, behavior, and some effort to move and/or remodel a space. Although it may feel difficult to undertake at first, transforming a living space into a floodproof space often does not require complete abandonment—though it will require that the space no longer be used for permanent habitation.

For instance: if the Base Flood Elevation (BFE) is known and marked on the interior wall with a height that is low and manageable, then many partial uses may be able to remain within the space. Shelving for longterm storage, utilities, and living area fixtures could, perhaps, still be placed above this line with a high degree of confidence. Similarly, floodproofing below this line may allow for temporary storage, garage/shed usage, or recreational purposes deemed to be an allowable level of risk.

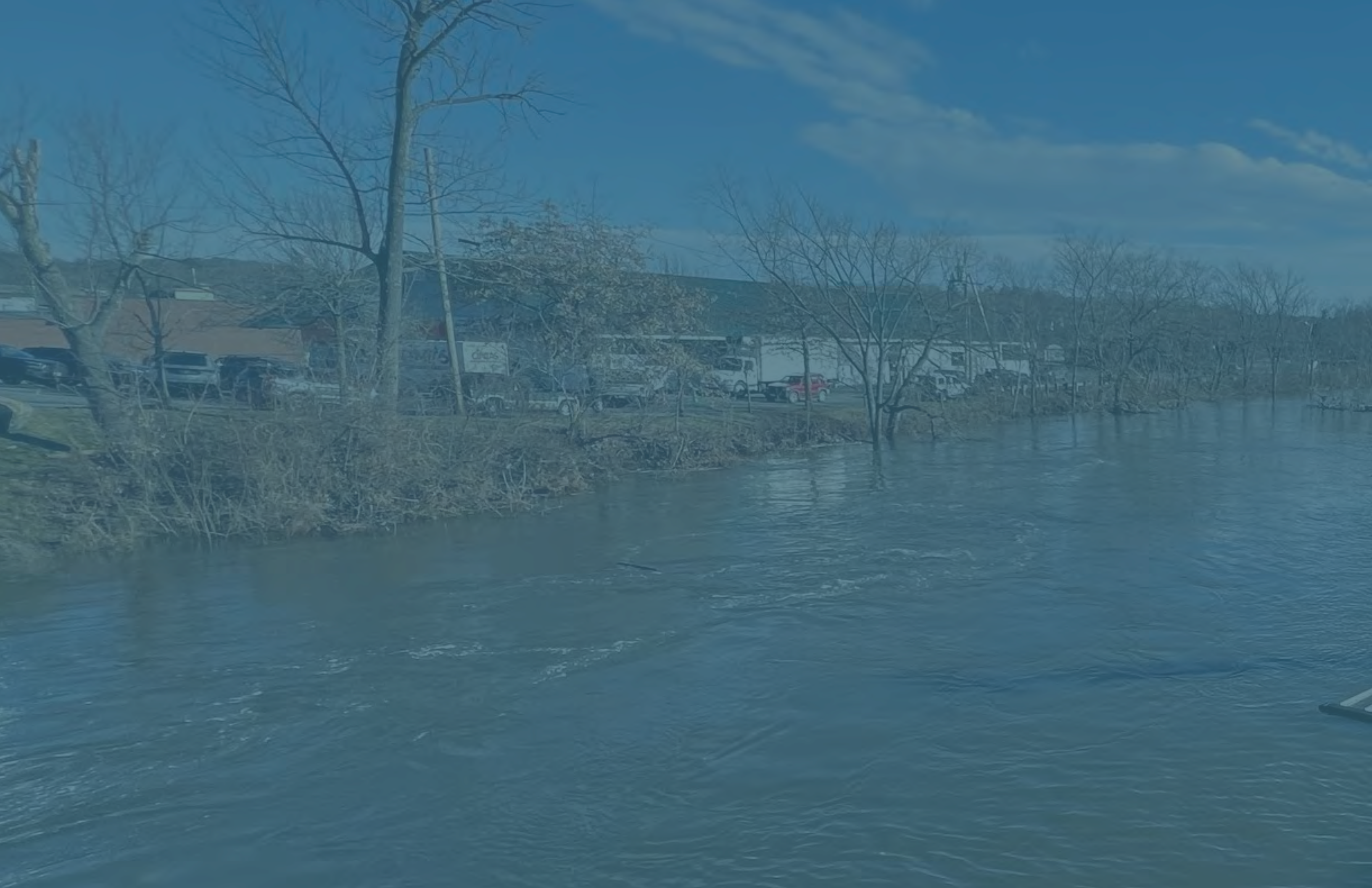
Why Relocate?

This strategy applies when floodwaters reach a level where the aforementioned strategies will not adequately protect the building or its utilities, appliances, furnishings, and other assets.

Relocation may be seen as the last resort by some property owners because it is the most disruptive option. However, facing the need to completely relocate your use of a particular space could be the first, necessary step you take to ensure that you are prepared for future flooding events.

Unless the structure is completely structurally compromised by flood risk, this option simply means that the suggested pathway forward is to relocate the use of this space entirely to higher floors or other buildings. Each use must of course be evaluated individually.





A photograph of a flooded residential street. The water is murky and reflects the sky. In the background, there are several houses with dark roofs and multiple chimneys. Power lines and poles are visible along the street. The sky is overcast with grey clouds. The overall tone of the image is somber and blue-tinted.

Section 06 **Appendix**

Further Reading

Photos, Articles, Historical Records of Floods

The best records for photos of Gardiner across all floods is the archives in the basement of the Gardiner Public Library. A sampling of relevant sources online is listed below.

Grow, M. (2023, January 11). Up and down the Kennebec Valley: Kennebec River floods – Part 1. The Town Line Newspaper. <https://townline.org/up-and-down-the-kennebec-valley-kennebec-river-floods-part-1/>

Maine Memory Network. (n.d.). Lower Water Street, Hallowell, 1896. <https://www.mainememory.net/record/31106>

Maine Memory Network. (n.d.). Water Street, Hallowell, 1896. <https://www.mainememory.net/record/31074>

Historic Hallowell. (n.d.). Hallowell Floods. Maine Memory Network. <https://historichallowell.mainememory.net/page/1978/display.html>

University of Maine. (n.d.). General Maine History Photographs. Gardiner, Maine, Flood of 1936. https://digitalcommons.library.umaine.edu/spec_photos/2218/

National Weather Service. (n.d.). Flooding in Maine. <https://www.weather.gov/safety/flood-states-me>

National Weather Service. (n.d.). Historic Flood March 1936. Northeast River Forecast Center. https://www.weather.gov/nerfc/hf_march_1936

Page, K. (2024, December 10) Ice made historic floods worse—Island Institute. <https://www.islandinstitute.org/working-waterfront/ice-made-historic-floods-worse/>

Central Maine News (2017, March 31). Massive Flood Of 1987 Could Happen Again. <https://www.centralmaine.com/2017/03/31/massive-flood-of-1987-could-happen-again/>

Central Maine News. (2023, December 19). Photos: See The Flooding And Devastation Around Central Maine From Monday’s Storm. <https://www.centralmaine.com/2023/12/19/photos-see-the-flooding-and-devastation-around-central-maine-from-mondays-storm/>

Miller, J. (2023, December 21). As Raging Kennebec River Subsides, The Messy Cleanup Begins In Riverfront Business Districts. Maine Public. <https://www.mainepublic.org/business-and-economy/2023-12-21/as-raging-kennebec-river-subsides-the-messy-cleanup-begins-in-riverfront-business-districts>

Olsen, S. (2023, December 19). This Could Have Been the Second Worst Flooding the State Has Ever Seen, USGS Data Suggest. <https://www.newscentermaine.com/article/weather/severe-weather/us-geological-survey-flood-damage-storm/97-df244642-8d79-473b-808f-a4e2744d7d36>

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Flooding Adaptation Resources

Federal Emergency Management Agency. (2010, December). Home builder’s guide to coastal construction: Technical fact sheet series (FEMA 499). https://www.fema.gov/sites/default/files/2020-08/fema499_2010_edition.pdf

Federal Emergency Management Agency. (2015, September). Reducing flood risk to residential buildings that cannot be elevated. FEMA P-1037. https://www.fema.gov/sites/default/files/2020-07/fema_P1037_reducing_flood_risk_residential_buildings_cannot_be_elevated_2015.pdf

Federal Emergency Management Agency. (2007, March). Selecting Appropriate Mitigation Measures for Floodprone Structures (FEMA 551). https://www.fema.gov/sites/default/files/2020-08/fema_551.pdf

National Park Service. (2021). Flood Adaptation Guidelines. <https://www.nps.gov/orgs/1739/upload/flood-adaptation-guidelines-2021.pdf>

Kennebec River & Cobbosseecontee Stream Information

U.S. Geological Survey. (n.d.). USGS 01049500 Cobbosseecontee Stream at Gardiner, ME. National Water Information System. <https://waterdata.usgs.gov/monitoring-location/USGS-01049500/>

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Cobbosseecontee Watershed, Maine. Fish History, Water Quality, Hydrology and Aquatic Restoration Overview. (2012, February 1). Cobbosseecontee Watershed. <http://cybrary.fomb.org/pages/20120201-CobbH20shed2.pdf>

Local Planning Documents

City of Gardiner, Gardiner Main Street, & DuBois & King Inc. (2021). Heart Of Gardiner Downtown Plan. https://www.gardinermaine.gov/files/assets/public/v/1/econ-dev/documents/20211203_heartofgardiner_futureofdowntownfinal.pdf

Kennebec County Emergency Management Agency. (2021). Kennebec County Hazard Mitigation Plan: 2021 Update. https://www.chinamaine.org/images/PDFs/KCEMA_PLAN_FINAL_2021.pdf_FEMA_REVIEW.pdf

Sherwin, A. (2017). Maine Flood Resilience Checklist. https://digitalmaine.com/cgi/viewcontent.cgi?article=1520&context=mgs_publications

General Reference: Resiliency Planning

The following documents were referenced for use throughout the planning process. The State’s guidelines on climate science, resiliency planning, and similar efforts are clear. This reading may be helpful for context; climate science referenced in planning documents and assessments are anchored in peer-reviewed academic studies:

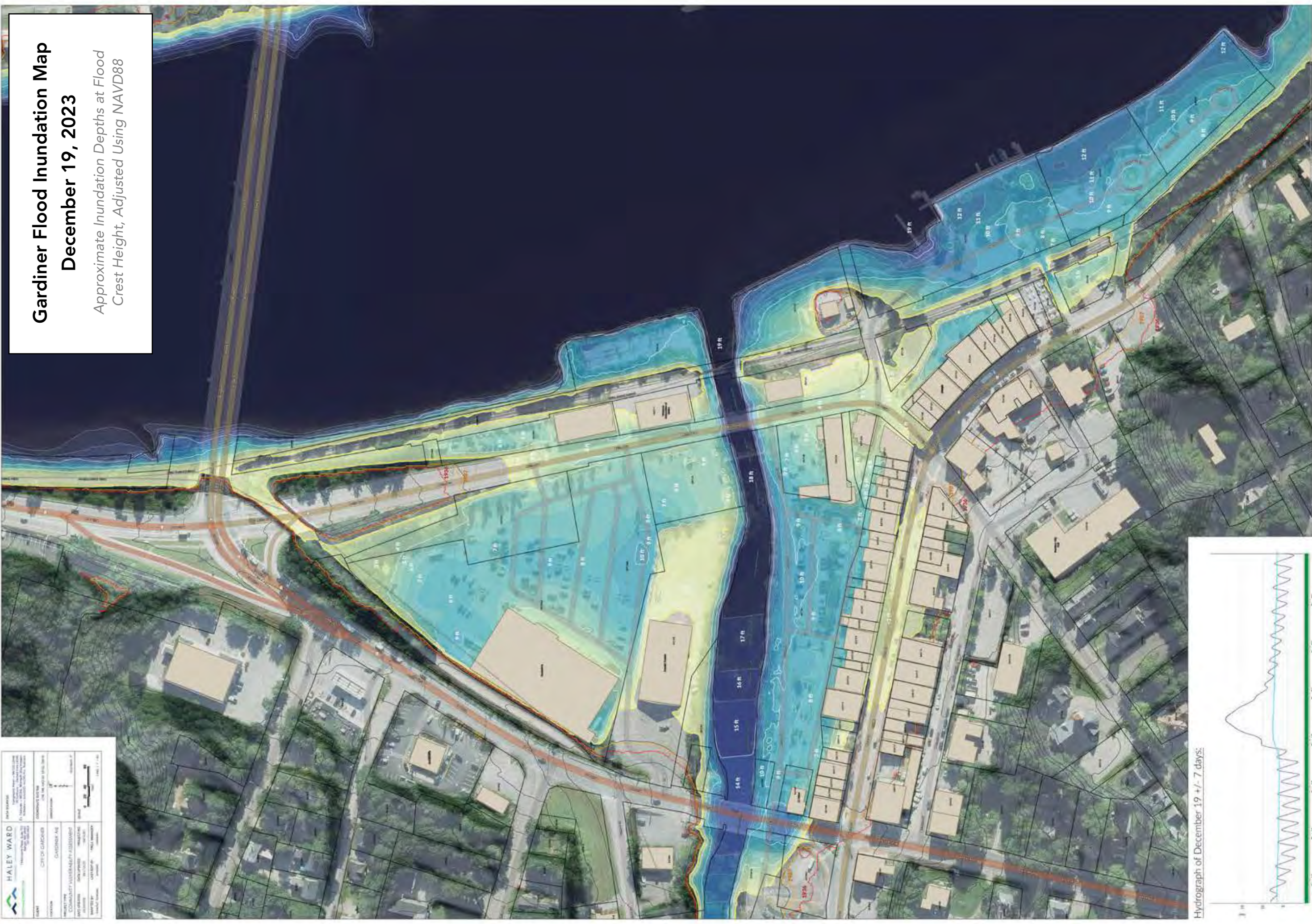
- [Scientific Assessment of Climate Change and Its Effects in Maine \(2024\)](#)
- [Maine Won’t Wait \(2024 Update\)](#)
- [Maine Climate Council Annual Report \(2025\)](#)
- [Maine’s Climate Action Plan: A Guide \(2025\)](#)
- [A Plan for Infrastructure Resilience \(2025\)](#)

General Reference Web Pages & Dashboards

The following links are helpful places to start if you’re looking for specific reference information—like tidal datums, storm surge information, or interactive maps.

- [Maine Climate Impact Dashboard \(GOPIF\)](#)
- [Maine Sea Level Rise Dashboard \(Maine Geological Survey\)](#)
- [Tides and Currents \(NOAA\)—a tide, current, and marine information dashboard. Select search icon in upper left and then “Advanced” for many more data points and local forecasts/projections.](#)
- [Sea Level Rise/Storm Surge Dashboard \(Maine Geological Survey\)](#)
- [Sea Level Rise/Storm Surge - Frequently Asked Questions \(Maine Geological Survey\)](#)
- [Interagency Sea Level Rise Scenario Tool \(NASA\)](#)
- [cli-MATE MRCC Online Data and Tool Portal \(Historical Wind Summaries, Purdue\)](#)
- [MARACOOS OCEANSMAP \(Sea Currents, Temperature, Modeling\)](#)



[illegible][illegible][illegible]

Gardiner Flood Inundation Map
December 19, 2023
Approximate Inundation Depths at Flood Crest Height, Adjusted Using NAVD88

The map displays flood inundation depths across a residential area. Depth contours are labeled in feet, ranging from 8 ft to 19 ft. The highest inundation depths (17 ft to 19 ft) are concentrated along a central waterway or canal. Depths decrease as they move away from this central feature, with areas further out reaching down to 8 ft. Buildings and streets are visible throughout the landscape, with some areas showing more significant flooding than others.

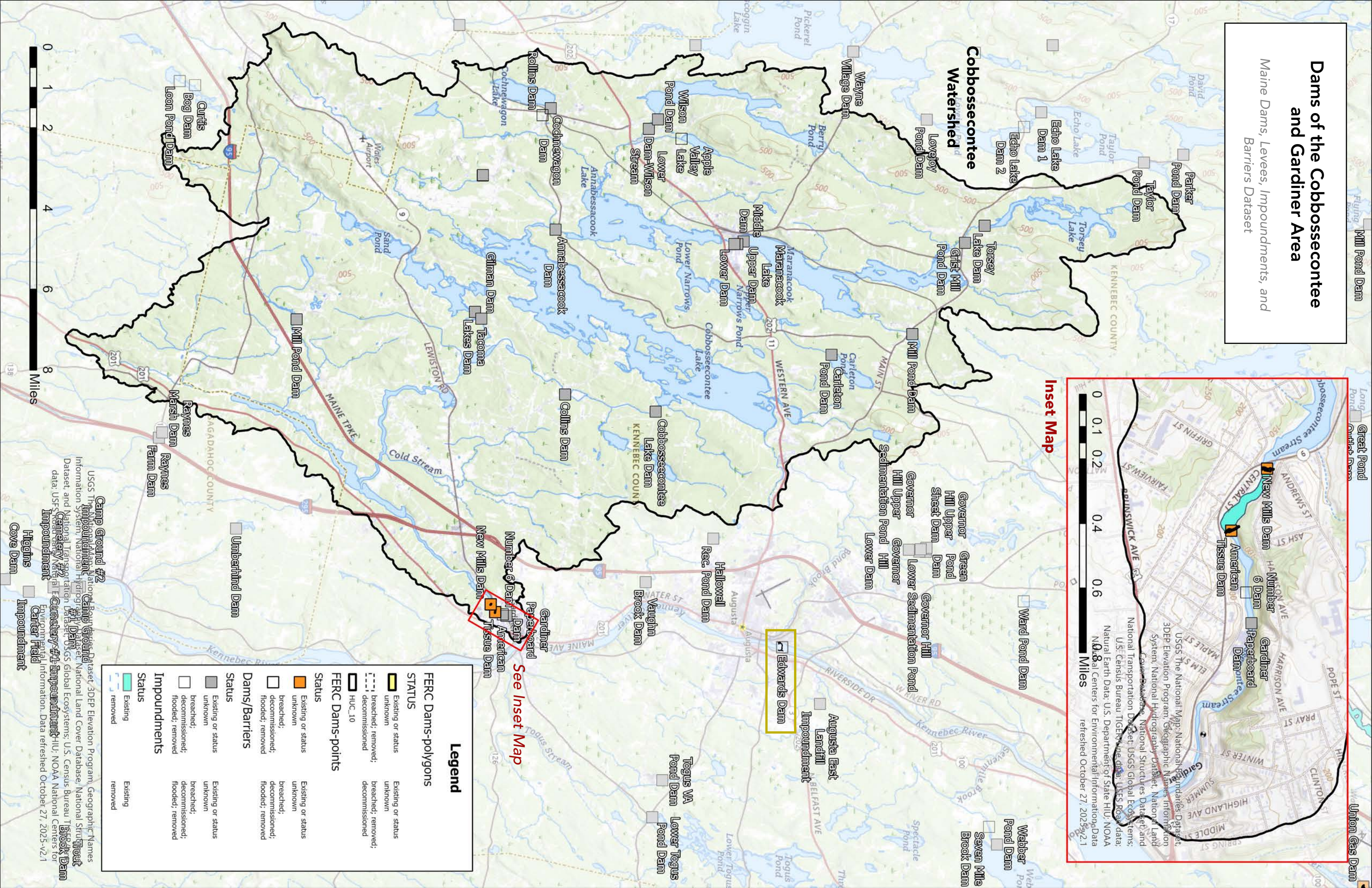
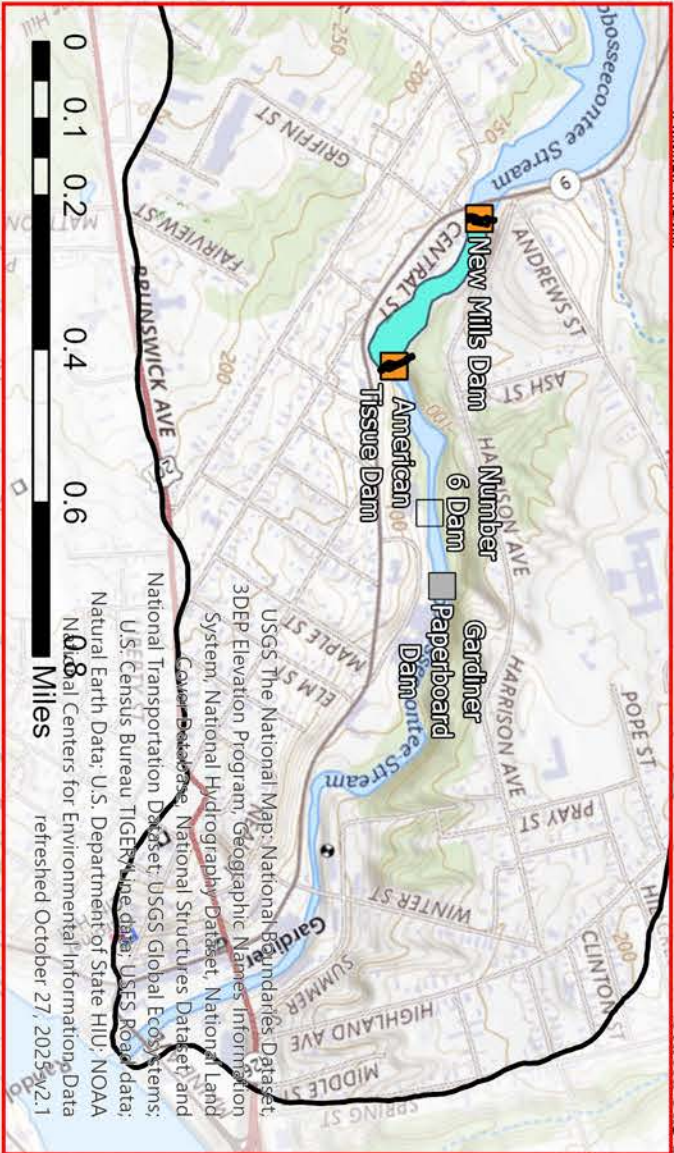
HALEY WARD	CITY OF GARDINER	CLARKSON AVE
PROJECT NAME	COMMUNITY VULNERABILITY ASSESSMENT	
DRAWN BY	JANUARY 2024	
DATE	12/19/2023	
SCALE	1" = 100'	

Hydrograph of December 19 +/- 7 days:

The hydrograph shows a sharp peak in water level, reaching approximately 19 feet above the baseline, followed by a rapid decline and subsequent smaller fluctuations. The x-axis represents time, and the y-axis represents water level elevation.

Dams of the Cobboscoctee
and Gardiner Area

Maine Dams, Levees, Impoundments, and
Barriers Dataset



Legend

FERC Dams-polypgons

STATUS

	Existing or status unknown
	breached; removed; decommissioned

FERC Dams-points

Status

	Existing or status unknown
	breached; decommissioned; flooded; removed

Dams/Barriers

Status

	Existing or status unknown
	breached; decommissioned; flooded; removed

Impoundments

Status

	Existing
	removed

See Inset Map

Edwards Dam



ILLUSTRATED BY J. H. BROWN, N.Y.

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1. High School
2. Ward School
3. Armory Hall
4. Fire Engine House
5. R. R. Depot
6. Hudson Steamboat Wharf
7. Oak Grove Cemetery
8. Soldiers Monument
9. High St. Burial Ground
10. Knickerbocker School
11. High St. Grammar School
12. Alms House

BIRD'S EYE VIEW OF
GARDINER
 AND PITTSSTON.
 KENNEBEC CO. MAINE.
 1878

- CHURCHES
- A. Congregational
 - B. Baptist
 - C. Free Baptist
 - D. Free Will Baptist
 - E. Church of Christ
 - F. Episcopal
 - G. Methodist
 - H. R. Catholic
 - J. Presbyterian
 - K. Methodist in Pittston
 - L. School House

ELEVATION CERTIFICATE

Important: Follow the instructions on pages 1-9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A - PROPERTY INFORMATION						FOR INSURANCE COMPANY USE	
A1. Building Owner's Name Gardiner Library Association						Policy Number:	
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 152 Water Street						Company NAIC Number:	
City Gardiner		State Maine		ZIP Code 04345			
A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) Tax Map 34, Lot 148							
A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) <u>Non-Residential</u>							
A5. Latitude/Longitude: Lat. <u>44.228766</u> Long. <u>-69.770842</u> Horizontal Datum: ☐ NAD 1927 ☒ NAD 1983							
A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.							
A7. Building Diagram Number <u>2A</u>							
A8. For a building with a crawlspace or enclosure(s):							
a) Square footage of crawlspace or enclosure(s) _____ sq ft							
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade _____							
c) Total net area of flood openings in A8.b _____ sq in							
d) Engineered flood openings? ☐ Yes ☐ No							
A9. For a building with an attached garage:							
a) Square footage of attached garage _____ sq ft							
b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade _____							
c) Total net area of flood openings in A9.b _____ sq in							
d) Engineered flood openings? ☐ Yes ☐ No							
SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION							
B1. NFIP Community Name & Community Number City of Gardiner 230068				B2. County Name Kennebec County		B3. State Maine	
B4. Map/Panel Number 23011C0657	B5. Suffix D	B6. FIRM Index Date 06-16-2011	B7. FIRM Panel Effective/ Revised Date 06-16-2011	B8. Flood Zone(s) AE	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth) 23.7		
B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9: ☒ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: _____							
B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: _____							
B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☒ No Designation Date: _____ ☐ CBRS ☐ OPA							

ELEVATION CERTIFICATE

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE	
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 152 Water Street			Policy Number:	
City Gardiner	State Maine	ZIP Code 04345	Company NAIC Number	
SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)				
C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☒ Finished Construction *A new Elevation Certificate will be required when construction of the building is complete.				
C2. Elevations - Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/AO. Complete Items C2.a-h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters. Benchmark Utilized: PE1181 Vertical Datum: NAVD1988 Elevation 26.75				
Indicate elevation datum used for the elevations in items a) through h) below. ☐ NGVD 1929 ☒ NAVD 1988 ☐ Other/Source: _____				
Datum used for building elevations must be the same as that used for the BFE.				
Check the measurement used.				
a) Top of bottom floor (including basement, crawlspace, or enclosure floor)	19.3	☒ feet	☐ meters	
b) Top of the next higher floor	27.8	☒ feet	☐ meters	
c) Bottom of the lowest horizontal structural member (V Zones only)		☐ feet	☐ meters	
d) Attached garage (top of slab)		☐ feet	☐ meters	
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments)	19.7	☒ feet	☐ meters	
f) Lowest adjacent (finished) grade next to building (I AG)	24.7	☒ feet	☐ meters	
g) Highest adjacent (finished) grade next to building (HAG)	27.7	☒ feet	☐ meters	
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	22.7	☒ feet	☐ meters	
SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION				
This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.				
Were latitude and longitude in Section A provided by a licensed land surveyor? ☒ Yes ☐ No ☐ Check here if attachments.				
Certifier's Name Shawn M. Tyler		License Number 2519		
Title Owner				
Company Name Dirigo Surveying				
Address 165 South Road				
City Winthrop		State Maine	ZIP Code 04364	
Signature Shawn M Tyler		Date 03-26-2018	Telephone (207) 923-3443	Ext.
Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.				
Comments (including type of equipment and location, per C2(e), if applicable) Hot water heater is located at 19.7, Furnace is located at 21.0				

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE	
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 152 Water Street			Policy Number:	
City Gardiner	State Maine	ZIP Code 04345	Company NAIC Number	
SECTION E – BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO AND ZONE A (WITHOUT BFE)				
For Zones AO and A (without BFE), complete Items E1–E5. If the Certificate is intended to support a LOMA or LOMR-F request, complete Sections A, B, and C. For Items E1–E4, use natural grade, if available. Check the measurement used. In Puerto Rico only, enter meters.				
E1. Provide elevation information for the following and check the appropriate boxes to show whether the elevation is above or below the highest adjacent grade (HAG) and the lowest adjacent grade (LAG).				
a) Top of bottom floor (including basement, crawlspace, or enclosure) is _____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.				
b) Top of bottom floor (including basement, crawlspace, or enclosure) is _____ ☐ feet ☐ meters ☐ above or ☐ below the LAG.				
E2. For Building Diagrams 6–9 with permanent flood openings provided in Section A Items 8 and/or 9 (see pages 1–2 of Instructions), the next higher floor (elevation C2.b in the diagrams) of the building is _____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.				
E3. Attached garage (top of slab) is _____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.				
E4. Top of platform of machinery and/or equipment servicing the building is _____ ☐ feet ☐ meters ☐ above or ☐ below the HAG.				
E5. Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community's floodplain management ordinance? ☐ Yes ☐ No ☐ Unknown. The local official must certify this information in Section G.				
SECTION F – PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION				
The property owner or owner's authorized representative who completes Sections A, B, and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. The statements in Sections A, B, and E are correct to the best of my knowledge.				
Property Owner or Owner's Authorized Representative's Name				
Address		City	State	ZIP Code
Signature		Date	Telephone	
Comments				
☐ Check here if attachments.				

ELEVATION CERTIFICATE

OMB No. 1660-0008
Expiration Date: November 30, 2018

IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE	
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 152 Water Street			Policy Number:	
City Gardiner	State Maine	ZIP Code 04345	Company NAIC Number	
SECTION G – COMMUNITY INFORMATION (OPTIONAL)				
The local official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below. Check the measurement used in Items G8–G10. In Puerto Rico only, enter meters.				
G1. ☐ The information in Section C was taken from other documentation that has been signed and sealed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)				
G2. ☐ A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.				
G3. ☐ The following information (Items G4–G10) is provided for community floodplain management purposes.				
G4. Permit Number		G5. Date Permit Issued		G6. Date Certificate of Compliance/Occupancy Issued
G7. This permit has been issued for: ☐ New Construction ☐ Substantial Improvement				
G8. Elevation of as-built lowest floor (including basement) of the building: _____ ☐ feet ☐ meters Datum _____				
G9. BFE or (in Zone AO) depth of flooding at the building site: _____ ☐ feet ☐ meters Datum _____				
G10. Community's design flood elevation: _____ ☐ feet ☐ meters Datum _____				
Local Official's Name			Title	
Community Name			Telephone	
Signature			Date	
Comments (including type of equipment and location, per C2(e), if applicable)				
☐ Check here if attachments.				

