RESILIENT LAND USE GUIDE FOR NH

CASE STUDY: CITY OF DOVER & TOWNS OF DURHAM AND LEE, NH

Three unique approaches to improve floodplain management and reduce future flood risk in a changing climate.

OVERVIEW

Dover and Durham are two of New Hampshire's inland coastal communities and home to several tidally influenced rivers that feed into the Great Bay estuary before eventually discharging to the Atlantic Ocean. Lee, while not considered a coastal community, does have several large river systems that flow toward the Bay, including the Oyster River and Lamprey River. As a result of their proximity to the coast, Dover and Durham have low-lying areas that are susceptible to coastal flooding from seasonal high tides, coastal storms, and sea-level rise. In Durham, those areas include the Oyster River and its tributaries; at the confluence of the Oyster River and Little Bay; and along the shores of both Little and Great Bay. In Dover, areas include the Bellamy River; the Piscataqua River; at the confluence of the Cochecho River and the Salmon Falls River; and along the shores of Little Bay. Lee does not have any tidally influenced rivers and therefore is not as vulnerable to potential coastal flooding impacts; however, there are significant portions of the Town located within the floodplain, including along the Oyster, Lamprey, Little, and North Rivers; Beaver and Rollins Brooks; and areas around Wheelwright Pond. As a result, Dover, Durham, and Lee have recognized that flood risk management is a critical tool in ensuring a resilient future and an essential part of climate adaptation planning.

Flooding in downtown Dover [Credit: City of Dover]

APPROACH TO ADOPTING MORE STRINGENT FLOODPLAIN REGULATIONS

In accordance with the National Flood Insurance Program (NFIP), which provides relief for residents in the form of flood insurance, all three communities have floodplain development regulations; however, proactive updates that go beyond the recommended compliance measures are needed to mitigate future damages and losses from changing conditions, such as sea level rise and more frequent extreme rainfall events. While Dover, Durham, and Lee took different approaches in revising their floodplain regulations, the result was the same – a more forward-thinking ordinance that seeks to reduce future risk from flooding.

FLOODPLAIN ORDINANCE UPDATE, CITY OF DOVER

In 2021, Dover, in partnership with the Strafford Regional Planning Commission (SRPC), embarked on an effort to conduct a regulatory audit of their existing floodplain regulations to ensure compliance with NFIP requirements, as well as propose higher standards that exceed minimum requirements to improve community resilience. This process also led the City to reconsider joining the Community Rating System. Using the model floodplain management regulations, developed by the NH Office of Strategic Initiatives (OSI), resulted in significant updates to increase resilience, including:

- **Prohibiting the construction of critical facilities in floodplain areas**. Ensures that key municipal assets, such as emergency operations (i.e., police and fire stations), hospitals, shelters, schools, nursing homes, etc., cannot be developed in flood prone areas. Additionally, any existing critical

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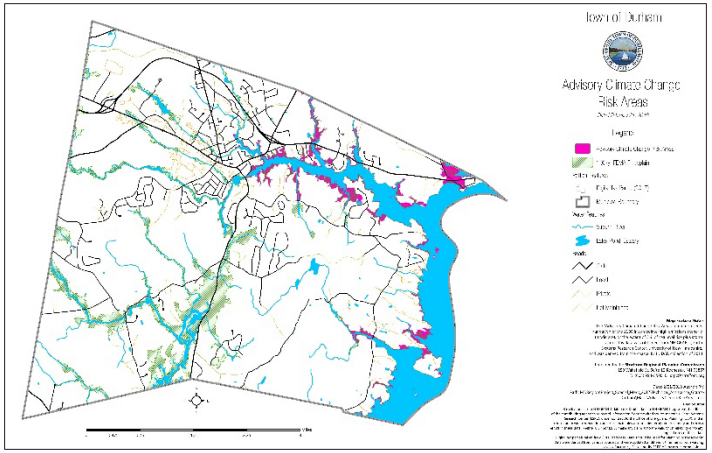
facility to be replaced or substantially improved must meet elevation or dry floodproofing standards. Lastly, all critical facilities must have at least one access road, which shall be no lower than six inches below the base flood elevation, connected to land outside the areas of special flood hazard and is capable of accommodating emergency services vehicles.

- **Prohibiting the storage of hazardous materials in floodplain areas**. Reduces the risk of a hazardous substance, pollutant, or harmful contaminant from spilling, leaking, or discharging into the environment, specifically a nearby surface water, during a flooding event.
- **Elevating the location of structural components in new development.** Requires new development to locate structural components, such as electric, heating, and plumbing, two feet above base flood elevation.
- **Adding flexible language for accessory structures.** Provides a cost-effective measure for residents and zoning officials to allow accessory structures to implement wet floodproofing practices instead of elevation or dry floodproofing, without requiring a variance.

FLOODPLAIN ORDINANCE UPDATE, TOWN OF DURHAM

In 2018, Durham, in partnership with SRPC, decided to incorporate sea level rise into their Flood Hazard Overlay District. Based on the results from a previously completed vulnerability study, which identified projected impacts from sea level rise and coastal storm surge, the Town chose a moderate level of projected rise of 3.9 feet. The projected sea level rise data represents inundation of the 2100 intermediate-high emission scenario and was added to a map to encourage applicants to proactively build to the same elevation requirements referenced in the FEMA flood areas. This resulted in an unprecedented revision of the Town's regulations, including:

- **Creating Advisory Climate Change Risk Areas**. This was an entirely new section of the ordinance that has non-binding regulatory measures and recommends that landowners, homeowners, developers, and other parties seeking to build in these vulnerable areas to review the provisions of the overlay district and apply them proactively to construction and development projects as applicable.



Map of Advisory Climate Risk Areas in Durham [Credit: SRPC]

This process also included a regulatory audit of the existing zoning ordinance. Using the model floodplain management regulations, developed by OSI, resulted in significant updates to increase resilience, including:

- **Increasing required structure elevation.** Elevation requirements were increased from the base flood elevation to require two feet of freeboard. This measure protects a structure's lowest floor measure from an additional two feet of potential flooding.

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The Town of Durham has worked on several projects related to flooding and the various risks from climate change. One project involved the development of maps depicting advisory climate change risk areas under different scenarios. Based on these maps, with the close guidance of SRPC, the Town amended its floodplain ordinance to raise the lowest level for improvements in the pertinent flood zones by two feet. We also included a provision alerting property owners to the presence of the risk areas encouraging them to take proper precautions. Both changes bring benefits to property owners in the community by providing an additional measure of protection against future flooding.

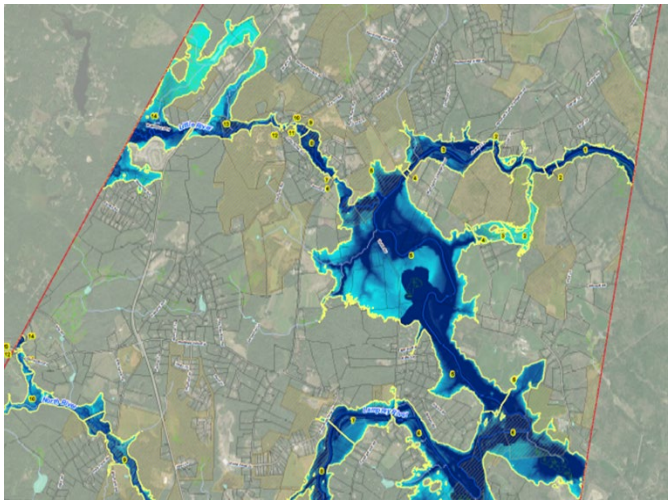
– Michael Behrendt, Town Planner, Town of Durham, NH

FLOODPLAIN MAPPING STUDY, TOWN OF LEE

In 2019, SRPC, in partnership with Geosyntec and the University of New Hampshire, prepared planning-level potential flood inundation maps using future projections for the mainstem of the Lamprey, North, Little, and Oyster Rivers. Projections included higher rainfall events and future land use changes. The maps included revised inundation boundaries, depth, and elevation. Data collected for the mapping analysis provided the Town, which has no base flood elevation information, with the following community benefits:

- **Channel characteristics** including waterway boundaries, elevations, and bank stations
- **Culvert characteristics** including diameter, material, and condition
- **Bridge characteristics** including span width and condition

As part of this effort, planning commission staff also prepared draft revisions to the Town's floodplain regulations that included a review of current design standards and inclusion of the potential inundation areas into the ordinance (as of October 2021, these revisions have not been incorporated).



Map Depicting Potential Flood Inundation (2050) [Credit: SRPC]

LESSONS LEARNED AND NEXT STEPS

During the update process, Dover considered developing an **extended flood hazard overlay district** – similar to what the City of Portsmouth created – that would require applicants that were not two feet above the base elevation from the furthest extent of the FEMA flood zone to build to the standards set forth in the ordinance. The City ultimately decided to not move forward with this approach because of a lack of spatial information.

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1. **Lack of spatial data**. Migrating inland, away from the coast, elevation levels become harder to determine, which led to the realization that more sophisticated modeling was needed. Without the spatial data required to map out extended flood levels, new developments would have to be analyzed for flood risk on a case-by-case basis, increasing both financial and labor burdens, and as such deemed not a feasible action at this time.
    a. For the City to reconsider, **predictive modeling level data is needed City-wide**.

The Town of Lee has yet to adopt the revisions SPRC recommended. This is largely a result of COVID19-related delays. **Additional technical assistance is needed** to work with the Planning Board to better understand the revisions to ensure they are placed on the FY2022 ballot for Town Meeting.

Additional outcomes include:

- Developing specific language that **balances flood risk management** and **cost-effective solutions** can **increase a community's flood resilience.**
- **Being first to adopt a new regulation in New Hampshire** provides a basis for future flood management action in the region.
- **Developing proactive measures** reduces the need for retroactive planning expenses like flood insurance and helps to **educate residents on risk reduction** before it is too late to adapt.

GUIDANCE FOR THESE REGULATIONS IN YOUR COMMUNITY

The first step to addressing your community's climate resilience is becoming aware of mitigation opportunities and sharing that knowledge with the public. Informed residents who are invited to engage in climate adaptation planning are more likely to understand and accept new projects and policies to better their community.

RESOURCES

- Strafford Regional Planning Commission: http://strafford.org/
- Dover Climate Adaptation Master Plan: https://www.dover.nh.gov/Assets/government/city-operations/2document/planning/master-plan/Climate/Climate_Adaptation_Chapter_Certified.pdf
- Dover Hazard Mitigation Plan: http://strafford.org/uploads/documents/plans/rpc/hazmitplan_dover_2018.pdf
- Durham Hazard Mitigation Plan: http://strafford.org/uploads/documents/plans/rpc/hazmitplan_durham_2017.pdf
- Lee Hazard Mitigation Plan: http://strafford.org/uploads/documents/plans/rpc/hazmitplan_lee_2019.pdf
- Lee Floodplain Study Estimated Floodplain: http://strafford.org/uploads/maps/lee_inundationmapping/floodplainmodeling_2050_24x36_rs.pdf
- NH Coastal Adaptation Workgroup: https://www.nhcaw.org/
- Piscataqua Region Estuaries Partnership: https://prepestuaries.org/resources/resources-for-towns/
- NH Office of Strategic Initiatives Model Floodplain Ordinances: https://www.nh.gov/osi/planning/programs/fmp/regulations.htm

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- NH Coastal Flood Risk Summary – Part 1: Science: https://scholars.unh.edu/cgi/viewcontent.cgi?article=1209&context=ersc
- NH Coastal Flood Risk Summary – Part 2: Guidance: https://scholars.unh.edu/cgi/viewcontent.cgi?article=1210&context=ersc
- FEMA Flood Maps and Guidance: https://www.nh.gov/osi/planning/programs/fmp/maps.htm

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