3. Coastal Shoreline Protection Measures (Sections 3.2 - 3.2.4)

Coastal shorelines, those areas where the water meets the land, are inherently dynamic environments. A given shoreline may be stable for many decades, erode significantly in one season, and then remain stable in its new configuration for many decades.[[1]](#endnote-2) Shorelines are shaped over time by winds, waves, tides and currents, as well as human activities. These forces interact to move sand, rock and other types of beach sediment from one place to another, causing shorelines to recede in one area and accrete, or expand, in another - a process called littoral transport, or “littoral drift.”

Chronic erosion occurs in locations where littoral sediment supplies are insufficient to balance wave and current forces, or in areas where sediment transport is blocked by erosion control structures such as jetties, groins, breakwaters and bulkheads. Chronic or excessive erosion can cause water pollution and water quality degradation as well as damage to vegetation, natural coastal features and built structures.

Flooding occurs when strong winds and/or high tides drive water inland over shoreline protective structures, beaches, wetlands and/or through inlets, channels, and tributaries. In addition, heavy precipitation events can cause river levels to rise in inland areas and travel downstream, adding to the rise in coastal water level. Increasing sea levels will result in more frequent and extensive storm flooding even on days with calmer winds or tides. Over the long term, this will mean permanent inundation in some areas. (See *Chapter Four: Management of Floodplain Development*).

Building structures too close to the shore places them at greater risk to erosion and flooding. This often leads to costly and problematic erosion control and shoreline armoring measures, placing undue economic and environmental strain on communities. Zoning amendments that establish setbacks, special use permit requirements and other local regulatory measures can reduce the risk of damage to structures and preserve natural features critical to the resilience of coastal systems. While such measures do not eliminate risk due to erosion and flooding, they can provide a measure of safety and an opportunity for other adaptive measures in the future.

**Coastal Ecosystems and Natural Protective Features**

Coastal ecosystems are comprised of natural features such as dunes, bluffs, beaches, wetlands and nearshore areas. Article 34 of Environmental Conservation Law, known as the Coastal Erosion Hazard Areas (CEHA) Law, refers to these features as “natural protective features” because of the natural erosion, storm and flood protection they can provide to coastal communities.

* Beaches protect inland areas from flooding and erosion by dissipating wave energy that would otherwise be expended against the toe or face of bluffs and dunes or that would send storm waters spilling onto upland property.
* Beaches and dunes act as a reservoir of sand and other unconsolidated sediments that wash along the shoreline and form protective offshore sandbars and shoals that dissipate offshore wave energy.[[2]](#endnote-3)
* Wide beaches with a gradual slope dissipate wave energy better than beaches that are steep or narrow.
* Dunes or bluffs located landward of a beach provide an additional layer of protection to uplands by absorbing wave energy.
* Coastal wetlands serve as a buffer to upland areas and provide flood protection and erosion control by absorbing flood waters and wave energy. (See *Chapter Two: Wetland and Watercourse Protection Measures*).

In addition to the functions listed above, natural protective features provide enhanced water quality, fish and wildlife habitat, and recreational opportunities. In developed areas or where development is desirable, zoning amendments and other local regulatory measures can help preserve natural protective features and their many benefits. Undeveloped areas with intact natural protective features and extensive fish and wildlife habitat and/or public recreation areas may be best protected through measures such as conservation area designation, conservation easements, and/or conservation zoning (See *Chapter One: Basic Land Use Tools for Resiliency*).

**Coastal Erosion Hazard Areas (CEHA) Law**

Article 34 of Environmental Conservation Law, known as the Coastal Erosion Hazard Areas (CEHA) Law, seeks to protect New York’s built and natural shoreline environment from coastal hazards such as erosion and flooding. The CEHA law distinguishes between “natural protective feature areas” or NPFAs - areas that possess natural protective features including nearshore areas, beaches, dunes, and bluffs - and “structural hazard areas.” The phrase “structural hazard areas” in this case refers to areas that are located landward of natural protective feature areas and that are receding at a long-term average annual recession rate of one foot or more per year. NPFAs are delineated on CEHA maps. Only beaches, bluffs, dunes, and nearshore areas are mapped and regulated.

Human activities such as development or modification of beaches, dunes, or bluffs can decrease, or completely remove the ability of these natural protective features to reduce erosion. CEHA restricts the siting of shoreline structures in areas designated under Article 34 to maintain the integrity of natural protective features and to reduce risk to shoreline communities. As coastal erosion increases and water levels rise, communities may wish to implement similar restrictions for non-CEHA shorelines using the authority granted by the State zoning enabling statutes, the New York State Constitution Article IX, or the Municipal Home Rule Law §10. Additional information on coastal erosion protection measures for both CEHA and non-CEHA areas is provided in sections 3.1-3.1.3 of this chapter.

RESOURCES

*Coastal Risk Reduction and Resilience*, USACE, September 2013[[3]](#endnote-4)

Scenic Hudson, *Protecting the Pathways: A Climate Change Adaptation Framework for Hudson River Estuary Tidal Wetlands*. May 2016[[4]](#endnote-5)

The Nature Conservancy, Coastal Resilience[[5]](#endnote-6)

New York State Department of Environmental Conservation, Coastal Management[[6]](#endnote-7)

3.2 Coastal Setbacks

A coastal setback is a minimum distance that a built structure (not including structural shoreline protection measures such as groins and breakwalls) must be placed from a water’s edge or other linear coastal feature.[[7]](#endnote-8) Deciding how long a setback should be is a significant decision. It can determine the likelihood of erosion or storm-related damage to a structure, and in turn, the structure’s lifetime. Setbacks can also prevent or reduce the need for costly structural shoreline protection measures and allow for the natural landward migration of beaches, dunes and wetlands that would otherwise be lost along with the natural shoreline protection they provide (see introduction to this chapter). Well-designed coastal setbacks permit appropriate development outside of hazardous areas and preserve the flood and erosion protections provided by natural features.

*Adaptation Tool Kit: Sea Level Rise and Coastal Land Use,* prepared by the Georgetown Climate Center in 2011, describes three types of coastal setbacks: fixed, tiered, and erosion-based.[[8]](#endnote-9) These approaches differ in their methods for determining setback distance on a given lot. They can also be adapted and integrated to balance multiple considerations, as in the case of the erosion and lot depth-based setback (Section 3.2.4), which we are treating as a fourth type of coastal setback. The following is a brief description of the setback approaches presented in this chapter.

|  |  |
| --- | --- |
|  | Setback Approaches Presented in this Chapter |
| Technique | Description |
| Fixed Setback (Section 3.2.1)  | A simple, though sometimes insufficient, measure of protection for shoreline structures and natural features where setback distance is based on the upland use, the seaward natural feature type, or some other consideration. |
| Tiered Setback (Section 3.2.2) | A more-flexible alternative to a fixed setback where the setback distance varies according to a variable such as the size of the building lot. |
| Erosion-based Setback (Section 3.2.3) | A science-based approach that uses erosion rate and the projected life expectancy of a given structure to determine the appropriate setback. |
| Erosion and Lot Depth-Based Setback(Section 3.2.4) | An approach that considers both average lot depths and coastal erosion rates to determine coastal setbacks. |

When drafting a local law to establish a coastal setback and determining the appropriate setback distance, municipalities should, at a minimum, to do the following:

* Identify the coastal feature that structures and uses are to be set back from. Features that are particularly unstable or sensitive to development will require larger setbacks. As a practical matter, municipalities should also consider how setbacks will be measured and how local code enforcement officials can determine compliance with setback standards.
* Consider the type(s) of upland use, whether they represent critical community assets, their vulnerability to coastal hazards, and their potential to negatively impact natural features such as dunes, bluffs, and shoreline vegetation.
* Account for projected changes in water levels and/or erosion rates. Setbacks that do not account for changing water levels and/or erosion put communities at increased risk and could result in costly shoreline armoring projects that cause beaches and other natural features to diminish and eventually disappear.
* Allow for the landward migration of natural coastal features. As beaches erode and water levels rise, wetlands, dunes and beaches naturally shift further inland. Setbacks that maintain enough space to accommodate this landward migration of natural features and preserve their critical risk-reduction, wildlife habitat, water quality and public access benefits.
* Estimate the number of lots that may become unbuildable and the number of structures that may become nonconforming due to a setback and consider how this fits into the community’s vision for its waterfront. See *Chapter One: Basic Land Use Tools for Resiliency* Section 1.3 Nonconformance and Section 1.5 Subdivision Regulations.

As indicated by the bullets above, the first step to establish a coastal setback is to identify the coastal feature that setbacks will be measured from. Municipalities often measure setbacks from the ordinary or mean high water mark. Mean high water line/mark is a feature used by the United State Army Corps of Engineers and other jurisdictions and is one of several base elevations used as a reference from which to reckon heights or depths.[[9]](#endnote-10) However, mean high water marks may shift over time, making them less reliable as long-term points from which to measure setbacks. The reach of waves and flood waters during a storm event may extend considerably farther landward than the ordinary or mean high water mark, especially in the context of stronger storms and sea level rise. Furthermore, the width of natural coastal features (e.g. beaches, dunes and bluffs) landward of the ordinary or mean high water mark varies considerably, as does the relative ability of these features to impede storm waves and flood waters.[[10]](#endnote-11),[[11]](#endnote-12)

Setbacks that are measured from the ordinary or mean high water mark may provide additional resiliency benefits when their length is extended to place structures well behind more reliable indicators of shoreline stability, such as the landward edge of natural coastal features or the first line of stable natural vegetation. Setbacks could also simply be measured from these features instead. Healthy natural coastal features can provide erosion and storm surge protection, benefits that are lost when structures are placed on or in front of them. The first line of stable natural vegetation is considered a particularly reliable indicator of shoreline stability, as it effectively marks the boundary between stable, vegetated upland areas and the dynamic sand, rock or tidal marsh shore. These features are typically observable both on the ground and using satellite imagery, however it should be noted that the first line of stable vegetation may shift landward over time in response to beach nourishment activities or water level changes. It may also be impacted by both natural actions (e.g., storm surge) and man-made activities such as excavation or clearcutting.

**Mean High Water Mark:** The US Army Corps of Engineers defines “mean high water mark” with respect to ocean and coastal waters, as “the line on the shore established by the average of all high tides. It is established by survey based on available tidal data (preferably averaged over a period of 18.6 years because of the variations in tide). In the absence of such data, less precise methods to determine the mean high water mark are used, such as physical markings, lines of vegetation or comparison of the area in question with an area having similar physical characteristics for which tidal data are readily available.”[[12]](#endnote-13)

Historically, the mean high water line has been used as a proxy for the divide between private property and public trust lands. Generally, the dry sand areas are private property and the wet sand areas are public trust lands held by the state for public benefit, and for all members of the public to enjoy through a wide variety of public recreational uses.[[13]](#endnote-14) Setbacks that fail to account for rising water levels and the landward migration of natural features (e.g. wetlands, beaches and dunes), as well as structural shoreline management measures that impede this migration, can result in the diminishment and eventual loss of valuable public trust lands and the many benefits they provide (see Section 3.4 below).

When drafting a local law to establish a coastal or shoreline setback, the municipal attorney must draft the local law to include a provision superseding the State zoning enabling statutes in Town Law or Village Law (as appropriate), citing the authority to adopt local laws under the New York State Constitution Article IX and Municipal Home Rule Law § 10. Cities can only enact a local law superseding an inconsistent state statute if it is done as part of the city charter amendment process and follows favorable vote in a referendum. (The State statute must be one that may be amended by local law.)[[14]](#endnote-15) Additional guidance regarding supersession of State statutes can be found in the Department of State publication, *Adopting Local Laws in New York State*.37

A well-designed coastal setback is one of the best tools available to municipalities to increase the long-term resilience of coastal communities. Because shorelines are naturally dynamic, setbacks may need to be reassessed periodically to determine whether they still reflect current conditions and risks. To maximize their benefits for coastal resilience, setbacks can be paired with vegetative buffers (see Section 3.3.1) and maximum disturbance areas (see Section 3.3.2) as well as policies that promote natural and nature-based alternatives to structural measures for shoreline protection and management (see Sections 3.4-3.4.2).



This graphic depicts a theoretical 75’ coastal setback measured from the first line of stable natural vegetation.

RESOURCES

Adaptation Tool Kit: Sea Level Rise and Coastal Land Use. Georgetown Climate Center (2011)[[15]](#endnote-16)

*Rolling Easements*. Climate Ready Estuaries, EPA (2011)[[16]](#endnote-17)

3.2.1 Fixed Setback

The local model law presented here establishes fixed setbacks from natural coastal features based on both the type of natural feature and the proposed upland use. When crafting a local law using fixed setbacks, the challenge is to identify a distance that will provide adequate protection of existing structures while considering the impact setbacks may have on the ability to locate new structures. For example, a fixed setback that allows permitting of new construction at a relatively short distance from a shoreline experiencing erosion and/or rising water levels could place those structures in jeopardy over the coming years. A large fixed setback that does not consider existing development patterns and lot sizes can result in unbuildable lots and nonconforming structures, especially where shorelines and building lots vary in their configuration.

When determining setback distance, municipalities should consider the characteristics of their shoreline, including the type, spatial pattern and intensity of development as well as the type, sensitivity, and protection afforded by natural coastal features. The larger the setback distance, generally, the more protection it provides for coastal ecosystems and communities. For largely undeveloped shorelines, it may be sufficient to preserve the existing vegetation as a buffer area. In built up areas with little natural shoreline, applicants may be required to plant vegetative buffers (Section 3.3.2).[[17]](#endnote-18) Well-designed setbacks will permit appropriate development while providing effective shoreline protection.

When drafting a local law that would establish setbacks from natural features, the municipal attorney must include a provision superseding the State zoning enabling statutes in Town Law or Village Law (as appropriate), citing the authority to adopt local laws under the New York State Constitution Article IX and Municipal Home Rule Law § 10. Additional guidance regarding supersession of State statutes can be found in the Department of State publication, *Adopting Local Laws in New York State*.[[18]](#endnote-19)

USAGE

The setback standards can be added to the zoning law in a section on general provisions or additional land use regulations, or they can be incorporated into a more detailed overlay district addressing coastal erosion hazard areas or coastal floodplains. The setbacks should also be added to the schedule of dimensional regulations that apply to the district(s).

ADAPTED FROM THE FOLLOWING SOURCE

Superior Charter Township (MI) Zoning Ordinance, Article 14 Special Development Provisions, Section 14.05 Natural Features Protection[[19]](#endnote-20) and Article 17 Definitions[[20]](#endnote-21)

LANGUAGE

Section X. Setbacks from Watercourses and Wetlands.

A. The standards of this section shall apply to all parcels proposed for development requiring review and approval of a site plan, subdivision plat, or planned unit development under this law or other [*city/town/village*] law. The standards of this subsection shall also apply to development of a private road under [*insert number and name of municipal section regulating private roads*].

B. The following minimum setbacks from wetlands and watercourses shall be required for the purpose of protecting groundwater recharge and inflow areas, protecting the quality of receiving surface waters, and minimizing erosion and siltation:

(1) Setback from watercourses. A minimum open space setback of [*insert number of feet*, *Superior Charter Township uses fifty*] feet shall be maintained from the ordinary high-water mark [*consider using a more reliable, alternative feature*] of any waterway or any body of surface water having definite banks, a bed and visible evidence of a continued flow or continued occurrence of water.

(2) Setback from wetlands. A minimum open space setback of [*insert number of feet, such as one hundred fifty*] feet shall be maintained from the boundary or edge of any wetland, as defined and regulated in [*insert number and name of municipal section regulating wetlands*]. Where a residential development subject to this section includes common open space areas, the boundaries of individual single-family residential lots shall be located entirely outside of required wetland setback areas.

C. Standards for such open space setback areas. The following standards shall apply to all open space setback areas required under this Section:

(1) Detention basins and similar stormwater management facilities may be constructed within a required setback, provided that appropriate replacement plantings are provided and maintained.

(2) Docks and similar waterfront structures may be constructed within a required setback, subject to [*city/town/village*] law and state regulations.

(3) Trails, paths, boardwalks, dune walkovers and similar passive recreational improvements may be constructed within a required setback, provided that appropriate measures are taken to minimize soil erosion.

(4) The following activities shall be restricted within any open space setback area required under this Section:

(a) Removal of trees and other vegetation shall be limited to removal of invasive or poisonous species and dead or diseased trees, and minimal land clearing and grubbing for activities permitted by this Section.

(b) Fences may be placed within required setback areas, provided that no fence shall impede surface drainage or water flow.

(c) No road, driveway, sidewalk or similar improvement shall be located in a required open space setback, except to cross in a more or less perpendicular direction for the purpose of providing access to the property from an adjacent street right-of-way.

(5) The following activities shall be prohibited within any open space setback area required under this Section:

(a) Drainage by ditching, underdrains, or other systems.

(b) Deposition of any materials, including soil, compost, gravel, garbage, concrete or asphalt debris, and other fill materials.

(c) Removal of soils or minerals.

(d) Construction or relocation of any parking lot, ground sign, dwelling, building, or other permanent structure.

(6) Before development, land clearing, filling, or any property alteration, the developer or builder shall provide and maintain suitable barriers such as snow fencing, cyclone fencing etc., to protect open space setback areas required under this subsection.

3.2.2 Tiered Setback

A zoning law which intends to protect coastal ecosystems and built structures along a shoreline may establish a coastal setback that varies with particular factors, such as lot size and shoreline type. This approach, known as a tiered setback, gives municipalities the flexibility to match setback requirements to local shoreline conditions, including both the natural and built environment. Such an approach may adequately protect shoreline communities while avoiding problems that can result from a one-size-fits-all setback policy.

When determining setback distance, municipalities should consider the characteristics of their shoreline, such as the type and intensity of shoreline development as well as the environmental sensitivity and risk reduction benefits of coastal ecosystems. The Town of East Hampton, from whose code this model is adapted, undertook a comprehensive assessment of its shorelines and used the information collected to determine the appropriate setback for its different sections, or “reaches,” of shoreline (see the discussion in Section 3.4.3 of this chapter on the use of shoreline reach analysis to designate overlay zones). This model law includes language rather specific to East Hampton shorelines, however it was retained to provide readers with an example of how regulations can be tailored to specific stretches of shoreline. This approach may be especially beneficial for communities whose shorelines vary in their natural characteristics and development patterns.

Lot size is an important aspect of shoreline development to consider when determining a setback. For smaller lots, setbacks can render a significant amount of the lot unbuildable. Larger lots, on the other hand, can accommodate larger setbacks and vegetative buffers (see Section 3.2 of this chapter) without precluding construction activities. East Hampton’s solution was to establish a tiered setback where the setback distance increases with lot size.

Some existing structures may become nonconforming following amendments to zoning setbacks. The municipality should examine its existing zoning law to see if any changes may be necessary to address reconstruction or expansion of nonconforming structures in areas where significant erosion and sea level rise is occurring.

When drafting a local law that would establish setbacks from natural features, the municipal attorney must draft the local law to include a provision superseding the State zoning enabling statutes in Town Law or Village Law (as appropriate), citing the authority to adopt local laws under the New York State Constitution Article IX and Municipal Home Rule Law § 10. Additional guidance regarding supersession of State statutes can be found in the Department of State publication, *Adopting Local Laws in New York State*.[[21]](#endnote-22)

These setbacks may also be incorporated into a more detailed law addressing shoreline erosion and/or rising water levels. Consider also incorporating setbacks related to wetlands and watercourses (see *Chapter 2: Wetland and Watercourse Protection Measures*).

USAGE

The setback standards can be added to the zoning law in a section on general provisions or additional land use regulations, or they can be incorporated into a more detailed overlay district addressing coastal erosion hazard areas or coastal floodplains. In either case they should be accompanied by a supersession clause to provide local authority for establishing coastal setbacks.

Add the setbacks to the schedule of dimensional regulations that apply to the district(s).

ADAPTED FROM THE FOLLOWING SOURCE

Town of East Hampton (NY) Municipal Code, Chapter 255 Zoning, Article IV Protection of Natural Resources, Section 255-4-40[[22]](#endnote-23) and Section 255-4-45,[[23]](#endnote-24) and Article I General Provisions, Section 255-1-20[[24]](#endnote-25)

LANGUAGE

Section X. Setbacks from natural features

A. Definitions.

(1) Bluff. A bank or cliff with a precipitous or steeply sloped face lying landward of a beach or body of water and having a bluff line at least two feet higher than its base or toe. A bluff may extend across all or part of a parcel. For the purposes of this chapter, a bluff shall not be considered to encompass barrier sand dunes.

(2) Bluff line. The natural land contour running along the top of a bluff beyond which to landward the natural land contours resume a gradual slope.

(3) Coastal structure. Every coastal erosion control structure plus all caissons, catwalks, docks, floating docks, floats, piers, pilings, wharves and other fabrications designed to give access to or through, permit work on or in or facilitate the use of any wetland, barrier dune, bluff or water body. Moorings shall not be included in this definition. Compare "coastal erosion control structure."

(4) Dune crest. The highest line or ridge along the top of the barrier dune.

(5) Lot area. The total horizontal area contained within and enclosed by the outer boundary lines of any lot; provided, however, that, for any purpose for which it must be calculated under the provisions of this chapter, "lot area" shall not include the following:

(a) That portion of a lot which is underwater land.

(b) That portion of a lot which lies in, on or under any street, right-of-way, common driveway easement or access easement.

(c) That portion of a lot which is burdened by a private easement prohibiting the erection of buildings.

(d) That portion of a lot which lies seaward of the bluff line or primary dune crest, except in those areas designated in § 255-4-40C where lot area shall exclude that portion of the lot that is seaward from the base of bluff.

(e) That portion of a lot which is beach, wetland or watercourse, as defined herein.

(6) Pervious driveway. A driveway or walkway composed of cinders, gravel, stone, shells, chips or similar material, with or without a marl base, which is at least partially permeable to rainwater and snowmelt.

(7) Reconstruction. The removal and replacement, in place and in kind, of all or a substantial part of a preexisting building or structure. The rebuilding in place and in kind of all or a substantial part of a building or structure which has been damaged or destroyed shall be included in this definition. If the cost of the work in question exceeds fifty percent of the full replacement cost of the structure as estimated by the Building Inspector, it shall be deemed to involve a substantial part" of the building or structure. [*Consider providing an appeals procedure*.]

B. Coastal setbacks and other restrictions. The following minimum setbacks or other restrictions shall apply to all lots, lands, uses, activities, and structures within the [*city*/*town/village*]. Where a structure, activity or use is subject to one or more of the setbacks set forth in this article, it shall comply with each such applicable setback. These setbacks or other restrictions shall apply whether or not the particular lot, land, use, activity, or structure requires a [*insert the type of local permit required, such as a natural resources special use permit*] for approval but are subject to certain exceptions set forth in Paragraph C below.

(1) Seaward face of bluff or dune. No building or other structure shall be erected, constructed, placed, enlarged or reconstructed on a bluff or seaward of the bluff line or dune crest.

(2) [*Insert name of body of water, such as* *Atlantic Ocean/Lake Erie/Lake Ontario*]; generally. Along the [*Insert name of body of water*], no building or other structure shall be erected, constructed, placed, enlarged or reconstructed within [*insert number of feet, such as 100*] feet of the bluff line or dune crest or, where no bluff line or dune crest exists, within [*insert number of feet, such as 100*] feet of the landward boundary of the beach.

(3) [*Insert name of body of water, such as* *Atlantic Ocean/Lake Erie/Lake Ontario*]; specifically. For properties including [*specify area, such as Highway \_\_\_\_\_\_from \_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_*], due to the unusual geologic conditions existing thereon, including the presence of a predominately steep and vegetated bluff rising immediately from the base of the bluff (rather than the bluff line), no building or other structure shall be erected, constructed, placed, enlarged or reconstructed within [*insert number of feet, such as 150*] feet of the bluff line or dune crest or, where no bluff line or dune crest exists, within [*insert number of feet, such as 150*] feet of the landward boundary of the beach.

(4) Outer bays and harbors. Along the shorelines of [*insert name of harbor/bay/sound/creek*], no building or other structure shall be erected, constructed, placed, enlarged or reconstructed within the following distances of the bluff line or dune crest or, where no bluff line or dune crest exists, within the following distances of the landward boundary of the beach:

(a) On lots having a lot area of less than [*insert number of square feet, such as 30,000*] square feet: [*insert number of feet, such as 75*] feet.

(b) On lots having a lot area of less than [*insert number of square feet, such as 30,000*] but greater than or equal to [insert number of square feet, such as 80,000] square feet: [*insert number of feet, such as 100*] feet.

(d) On lots having a lot area of [*insert number of square feet, such as 80,000*] square feet or more: [*insert number of feet, such as 150*] feet.

(e) Notwithstanding the foregoing, on lots having a lot area of less than [*insert number of square feet, such as 80,000*] square feet, an addition to a legally preexisting structure that is situated landward of the existing structure, the required setback shall be [insert *number of feet, such as 50*] feet.

(5) Inner harbors. Along the shorelines of [*insert name of creek, harbor, lake]* and the tributaries thereto, no building or other structure shall be erected, constructed, placed, enlarged or reconstructed within the following distances of the bluff line or dune crest or, where no bluff line or dune crest exists, within the following distances of the landward boundary of the beach:

(a) On lots having a lot area of less than [*insert number of square feet, such as 40,000*] square feet: [*insert number of feet, such as 50*] feet.

(b) On lots having a lot area of [*insert number of square feet, such as 40,000*] square feet or more: *[insert number of feet, such as 100]* feet.

(6) Clearing. The clearing of vegetation or the establishment of turf, lawn or landscaping shall not be undertaken within [*insert number of feet, such as 50*] feet of the bluff line or dune crest or, where no bluff line or dune crest exists, the landward boundary of the beach.

(7) Sewage disposal devices. No sewage disposal device or structure shall be constructed, placed, or installed within one hundred fifty feet of the upland boundary of a wetland or waterway. Sewage disposal devices shall include but not be limited to septic systems, sanitary rest rooms, and holding tanks.

C. Exceptions to setbacks. The following structures, uses, and activities shall not be required to conform to the minimum setbacks from natural features or other prohibitions which are specified in this section, to the extent set forth below:

(1) Coastal structures. The wetland, bluff line, and dune crest setbacks contained in Paragraph B hereof shall not apply to any coastal structure for which a natural resources special permit is issued pursuant to [*insert section number of natural resources section*] hereof.

(2) Pervious residential driveways. The wetland setbacks contained in Paragraph B hereof shall not apply to a pervious driveway or walkway serving residential property. Any such driveway or walkway shall, however, be set back as great a distance as practicable from the upland boundary of all wetlands.

(3) Subdivision access. The wetland setbacks contained in Paragraph B hereof shall not apply to a street or common driveway serving lots in a subdivision approved by the Planning Board, provided that the Planning Board makes an express finding in its resolution approving the subdivision that, pursuant to this subparagraph, there is no feasible way to provide the lots served by the street or common driveway with suitable access if the wetland setbacks contained in Paragraph B hereof are required to be met, and provided further that a natural resources special permit is obtained for the street or common driveway pursuant to [*insert section number of natural resources section*] hereof. Wherever such setback relief is granted by the Planning Board, it shall be the minimum relief necessary to provide safe and reasonable access to the lots in question.

(4) Marinas and other uses in the [*insert name of commercial district along the waterfront, such as the* *Waterfront District*]. The wetland setbacks contained hereof shall not apply to any structure on a lot in the [*insert name of waterfront district*] District or to any structure which is part of a lawfully existing marina or recreational marina in any district, provided that the structure is either water-dependent in that it is used for the servicing of boats, the unloading of fish, or the like, or for some other reason cannot feasibly be located landward of the otherwise applicable setback line.

(5) Reconstruction of nonconforming structures. The reconstruction of legally pre-existing nonconforming buildings and structures shall be exempt from the setback requirements of this section only as set forth below:

(a) Reconstruction of a nonconforming building or structure shall require the issuance of a [*insert name of required special use permit, if applicable*] permit if required pursuant to [*insert section on special use permits, if applicable*].

(b) Reconstruction of a nonconforming building or structure is exempt from compliance with the bluff line or dune crest setback requirements of this section if such reconstruction is the result of accidental cause, including fire. “Accidental cause” shall not include flooding or erosion.

3.2.3 Erosion-Based Setback

The 2019 New York State Hazard Mitigation Plan reports that shorelines in the Northeast, including New York State, are estimated to be receding at an average rate of 1.18 inches per year.[[25]](#endnote-26) However, the rate of erosion at a given location may be far greater than this regional average. Erosion rate is highly influenced by the immediate environment, including local geology and the presence of inlets or engineered structures. Erosion rates vary widely by location, season and year, often in dynamic and unpredictable ways. A major storm could erode a coastal shoreline inland 100 feet or more in a day, only to be followed by accretion (buildup of sediment) over the next decade.[[26]](#endnote-27)

Coastal erosion increases the risk of flooding to nearby coastal communities. A 2009 joint study by the Woods Hole Sea Grant, Barnstable County (MA) Cape Cod Commission and Cape Cod Cooperative Extension, and the University of Hawaii Sea Grant[[27]](#endnote-28) determined that making coastal or waterfront buildings and occupants more resilient to coastal hazards required consideration of a building’s elevation and siting, and that both considerations needed to account for present and future floodplain and storm-related conditions. This includes projected increases in base flooding elevation, inundation limits and coastal erosion.



Image at right: Eroding bluffs such as the one pictured here provide less protection from storms and put nearby structures at risk.

The 2009 study was the basis for a *Model Coastal Floodplain Development Bylaw* that features setbacks based on erosion rates. An erosion-based setback is a science-based approach that relates setback requirements to erosion projections and sea level rise. Erosion‐based setbacks calculate setback distance based on the average erosion rate for the area and the projected life of the proposed structure. For example, if a given shoreline is receding at an average rate of 1 foot/year and the projected life expectancy of a structure is 100 years, the calculation 1 foot X 100 years results in 100 feet, the minimum distance a structure should be set back to ensure a reasonable level of protection over the next 100 years. This method of determining setbacks recognizes that shorelines are naturally dynamic and shifting, but that a basic understanding of the influence of erosion on a given area can help determine where structures may be safely placed for the foreseeable future.

Calculated erosion rates may be available for some locations, but oftentimes a municipality or applicant will need to hire an expert to determine erosion rates. To find such an expert, a community can check with agencies like the New York State Department of Environmental Conservation or United Stated Geological Survey, or organizations such as the County Soil and Water Conservation Service or county planning agency. Determining local erosion rates is a practical and useful step for coastal communities to take, especially those experiencing significant erosion. A number of communities in New York have used local erosion rates to guide their coastal regulations, and more are beginning to do so. State funding to calculate erosion rates may be available, including through the Local Waterfront Revitalization Program (LWRP) for participating municipalities.

Methods for estimating the life expectancy of a structure and determining the appropriate multiplier to use in setback calculations vary. The *Model Coastal Floodplain Development Bylaw* cited and discussed above drew from a study of the average life expectancy of buildings in coastal areas around the United States, which considered the Federal Emergency Management Agency (FEMA) Coastal Construction Manual and a study[[28]](#endnote-29) done for the Federal Insurance Administration to establish reliable estimates for the life of residential coastal structures. In North Carolina, the life of the structure is based on a 30‐year mortgage.[[29]](#endnote-30) The County of Kauai, Hawaii requires using a 70-year multiplier for small buildings and a 100-year multiplier for larger buildings proposed on lots with an average lot depth of greater than 160 feet. A municipality’s estimate of the life expectancy of a structure will greatly influence its setback policies and the long-term erosion and flood risk posed to coastal structures.

The natural unpredictability of shorelines led the authors of the *Model Coastal Floodplain Development Bylaw* to include a requirement that all new construction and substantial improvements shall be located a minimum of 40 feet landward of the first line of stable natural vegetation. The narrative of the law explains,

“Often, bylaws require that construction be located landward of the reach of mean high tide, however mean high tide does not indicate stability. Dry sandy beaches landward of mean high tide are highly dynamic, normally eroding or narrowing in winter and becoming wider in summer. Short-term storm fluctuation in dry beach width is more critical, allowing storm waves and flood waters to inundate farther landward. The 40-foot additional buffer is necessary to accommodate a safety/design buffer for a storm erosion event and a margin to allow a homeowner sufficient time to consider alternatives to coastal armoring.” [[30]](#endnote-31)

USAGE

Setback standards can be added to the zoning law in a section on general provisions or additional land use regulations, or they can be incorporated into a more detailed overlay district addressing coastal erosion hazard areas or coastal floodplains. In either case they should be accompanied by a supersession clause to provide local authority for establishing coastal setbacks.

Add the setbacks to the schedule of dimensional regulations that apply to the district(s).

ADAPTED FROM THE FOLLOWING SOURCE

Woods Hole Sea Grant, Barnstable County (MA), and UH Sea Grant Model Coastal Floodplain Development Bylaw[[31]](#endnote-32) [*Note that this model bylaw is currently under revision and will be updated sometime in 2020*].

LANGUAGE

*Add the following definitions to the list of zoning definitions in the municipal code:*

Coastal Bank. The seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other wetland.

Coastal Beach. Unconsolidated sediment subject to wave, tidal and/or coastal storm action which forms the gently sloping shore of a body of water and may include tidal flats. Coastal beaches extend from the mean low water line landward to the dune line, coastal bank line or the waterward edge of existing man-made structures, when these structures replace one of the above lines, whichever is closest to the waterbody.

Coastal Dune. Any natural hill, mound or ridge of sediment landward of a coastal beach deposited by wind action or storm overwash. Coastal Dune also means sediment deposited by artificial means and serving the purpose of storm damage prevention or flood control.

Coastal Floodplain. Coastal resource managers use certain terms interchangeably to reference the area considered to be the coastal floodplain. The following terms and resource areas are synonymous and equal the coastal floodplain: a) Land Subject to Coastal Storm Flowage, and b) The sum of V-Zone, Coastal A-zones, AO-Zones, and tidally influenced A-Zones.

Coastal Resources:Coastal resources include barrier beaches, coastal beaches, coastal dunes, rocky intertidal shores, tidal flats, land subject to 100 year coastal storm flowage, coastal banks, land containing shellfish, lands subject to tidal action, and lands under an estuary, salt pond or certain streams, ponds, rivers, lakes or creeks within the coastal zone that are anadromous/catadromous fish runs.

Water Dependent. An activity or use which can only be conducted on, in, over or adjacent to a water body because such activity requires direct access to that water body, and which involves, as an integral part of such activity, the use of the water.

*Add the following to the zoning regulations*:

Section X. Development Standards for use and activity in the [*insert name of designated area, if applicable, such as “Coastal Floodplain District” or “Coastal Erosion District”*].

Any allowed use or activity within the boundaries of the Coastal Floodplain District [*adjust language or insert other local law as applicable*] shall meet the following standards in addition to all other applicable provisions of this local law:

A. Setback from Coastal Beach, Coastal Dune, and Coastal Bank Resources [*or substitute “coastal resources”*]. All new buildings and structures located adjacent to the [*insert name of waterbody(s)*] shoreline shall be setback from the landward edge of the landward most coastal resource 70 times the average annual erosion rate for buildings <5,000 square feet, and 100 times the average annual erosion rate for buildings >5,000 square feet. The erosion rate shall be calculated over the longest time frame available, but not less than 50 years, unless it is demonstrated that a different time frame is more appropriate in reflecting current and future shoreline conditions. If other standards apply, the stricter of the standards shall be adhered to.

B. Setback to Coastal Bank.

(1) New Development: The setback from the top of the coastal bank for all new non-water dependent development shall be at least 70 times the average annual erosion rate of the bank or 100 feet, whichever is greater. The average annual rate of erosion shall be determined by averaging the erosion over the previous 70-year period at a minimum or other time frame determined by the permit issuing authority to appropriately reflect current and future shoreline conditions.

(2) Reconstruction/Renovation: Redevelopment shall be designed to have no adverse effect on the height, stability, or the use of the coastal bank as a natural sediment source to beaches, dune, barrier beaches and sub-tidal areas. All coastal banks are sediment sources to one degree or another for beaches, dunes, barrier beaches, salt marshes and/or near- or off-shore areas. Every feasible effort shall be made to reduce impacts to the resource, such as to maintain the same footprint or relocate structures landward.

(3) Water-dependent marine infrastructure or public recreation facilities exception: The setback from the top of the coastal bank for all new water-dependent marine infrastructure [*or public recreation facilities*] shall be as far landward as feasible and shall be designed to minimize impacts to the greatest extent feasible.

C. Setback to stable natural vegetation. All new construction and substantial improvements shall be located a minimum of 40 feet landward of the first line of stable natural vegetation.

D. Accommodating the migration of coastal resources in response to relative sea level rise. Activity within the 10-year coastal floodplain shall not impede the landward migration of coastal resources in response to relative sea level rise [*for a freshwater body, substitute “rising water levels”*], therefore:

(1) No new construction shall be allowed;

(2) No fill shall be placed except for the purposes of beach or dune nourishment and shoreline restoration activities; and,

(3) Any redevelopment and other activities shall be located and designed so as not to impede the landward migration of coastal resources.

E. Flood water flow characteristics. Activity shall not increase the elevation or velocity of flood waters or increase flows due to a change in drainage or flow characteristics (e.g. change in direction) on the subject site, adjacent properties, or any public or private way.

F. Inter-tidal aquatic vegetation. No destruction or impairment of inter-tidal aquatic vegetation is permitted.

G. Repair or replacement of existing foundations. Existing foundations may be repaired, unless the work replaces the foundation in total, replaces the foundation so as to constitute new construction, or constitutes a substantial repair of a foundation, which is defined as a repair to greater than 50% of its total linear distance as measured around the foundation perimeter. In such events, the foundation shall be brought into compliance with the applicable provisions of the development standards for the flood zone within which the activity takes place.

H. Datum. The most recent applicable datum available for the site shall be used to determine the base flood elevation, and all other construction required elevations.

3.2.4 Erosion and Lot Depth-Based Setback

Erosion-based setbacks can be integrated with multiple additional considerations to make them more versatile and effective in the long term. For example, adding a minimum setback from an identifiable feature such as the first line of stable vegetation can make an erosion-based setback more secure by buffering against outlier storms and the possibility of underestimated erosion rates (see Section 3.1.3). In addition, lowering the minimum coastal setback requirement for small lots may help prevent too many lots from becoming unbuildable due to setback requirements, thereby avoiding potential lawsuits and community opposition (see Section 3.1.2).

The County of Kaua’i in Hawaii effectively integrated these considerations into its coastal setback law by establishing two standards for a setback determination based on average lot depths, building footprints, and annual erosion rates. The County’s objective was to reduce the impact of coastal erosion and hazards to property, life, and coastal resources. It also wanted to avoid structural shoreline protection measures. The County of Kaua’i website has shoreline setback forms and applications, ordinances, and setback determinations. It also has links to videos where the county staff and Hawai’i Sea Grant Extension Agent discuss the placement of buildings to account for natural beach action and sea level rise.[[32]](#endnote-33)

To provide a strong basis for this kind of setback, a municipality should use, if available, the long-term erosion rate for the designated area or commission a study to determine the rate (see Section 3.2.3 for information on determining erosion rates). Such rate should incorporate, where applicable, current predictions of water level changes.

When drafting a local law that would establish setbacks from natural features, the municipal attorney must draft the local law to include a provision superseding the State zoning enabling statutes in Town Law or Village Law (as appropriate), citing the authority to adopt local laws under the New York State Constitution Article IX and Municipal Home Rule Law § 10. Additional guidance regarding supersession of State statutes can be found in the Department of State publication, *Adopting Local Laws in New York State*.[[33]](#endnote-34)

USAGE

Add setback standards to the general provisions of the municipal zoning law or related land use regulations or incorporate the setbacks into a more detailed overlay district addressing coastal erosion hazard areas or coastal floodplains.

Add the setbacks to the schedule of dimensional regulations that apply to the district(s).

ADAPTED FROM THE FOLLOWING SOURCE

Kaua’i County (HI) Ordinance No. 979-2014[[34]](#endnote-35)

LANGUAGE

*Add the following definitions to the zoning law:*

ANNUAL COASTAL EROSION RATEmeans the annual rate of coastal erosion as estimated by a qualified professional.

AVERAGE LOT DEPTH means the measurement obtained by adding the lengths of the two sides of a lot which are at or near right angles with the shoreline, or the seaward boundary of the lot that runs roughly parallel to the shoreline if the property is not abutting the shoreline, to the length of a line obtained by drawing a line from a point in the center of the seaward side of the lot to a point in the center of the landward side of the lot and dividing the resulting sum by three. For irregularly shaped lots including flag lots, triangular parcels, lots on peninsulas, and/or lots having ocean, lake or river on two or more sides of the lot, the average lot depth will be determined by the Zoning Enforcement Officer.

BUILDING FOOTPRINT shall mean all parts of a main building (excluding roof overhangs) that rest, directly or indirectly, on the ground, including those portions of the building that are supported by posts, piers, or columns. Building footprint also includes attached garages, covered carports, bay windows with floor space, patio, decks, cantilevered decks, spas, and in-ground swimming pools.

SHORELINE means the upper reaches of the wash of the waves, other than storm and seismic waves, [*add if a tide is present “at high tide”*] during the season of the year in which the highest wash of the waves occurs, usually evidenced by the edge of vegetation growth, or the upper limit of debris left by the wash of the waves.

*Add the following section to the article for each zoning district in which it will apply:*

X. Shoreline Setback. All structures on lots in the [*insert name of designated area, such as “coastal erosion district” or “coastal floodplain district”*], shall be subject to a shoreline setback requirement.

(1) Shoreline determination. The Zoning Enforcement Officer shall determine the location of the shoreline based on the description provided in Section *[insert section number of zoning definitions*].

(2) The shoreline setback shall be measured from the shoreline based on the following calculations:

(a) For a lot with an average depth of one hundred sixty (160) feet or less, the shoreline setback line shall be established based on the average depth of the lot as provided in Table 1, or at the option of the applicant, upon a coastal erosion study as provided in Table 2.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | Table 1 |  |  |  |  |
| If the average lot depth is: | 100 feet or less | 101 to 120 feet | 121 to 140 feet | 141 feet to 160 feet | 161 feet to 180 feet | 181 to 200 feet | More than 200 feet |
| Then the minimum setback is: | 40 feet | 50 feet | 60 feet | 70 feet | 80 feet | 90 feet | 100 feet |

(b) For a lot with an average depth greater than 160 feet, the coastal shoreline setback is based on the building's footprint and a coastal erosion study. See Table 2. In no case will the setback distance be less than those in Table 1.

|  |  |  |
| --- | --- | --- |
|  | Table 2 |  |
| For structures with a building footprint that is: | Less than or equal to 5000 square feet | Greater than 5000 square feet |
| Then the setback distance is: | 40 feet plus 70 times the annual coastal erosion rate | 40 feet plus 100 times the annual coastal erosion rate |

[*Note that 70 years is considered the average life of a building*.[[35]](#endnote-36)]

Endnotes

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