# CLIMATE-SMART WETLAND PROTECTION BYLAW PROVISIONS



**NOTE:** This Table was developed through a collaboration between the Nashua River Communities Resilient Lands Management Project* (NRCRLM Project) [which was funded by the Massachusetts Executive Office of Energy and Environmental Affairs Municipal Vulnerabilities Preparedness Program (MA EEA MVP)] and the Massachusetts Association of Conservation Commissions (MACC) Climate Conversations Committee**. This team would like to thank all the organizations, conservation commissions, and individuals who have contributed to the development of climate-smart wetland protection bylaws and regulations, including the following information sources that this project team reviewed:

- **MassAudubon Bylaw Review Tool** (https://www.massaudubon.org/our-conservation-work/policy-advocacy/shaping-climate-resilient-communities/publications-community-resources/bylaw-review)
- **Cape Cod Commission Model Resilience Bylaw Article**: https://capecodcommission.org/resource-library/file/?url=/dept/commission/team/projects/Project%20Files/MULTI-TOWN/EEA%20grant%20Responding%20to%20Climate%20Change/EEA%20Deliverables/ModelCoastalResilienceArticle.pdf
- **Metropolitan Area Planning Council Climate Resilient Land Use Strategies Website**: https://capecodcommission.org/resource-library/file/?url=/dept/commission/team/projects/Project%20Files/MULTI-TOWN/EEA%20grant%20Responding%20to%20Climate%20Change/EEA%20Deliverables/ModelCoastalResilienceArticle.pdf
- **MassDEP** draft climate change 2022 regulatory revisions
- **Municipal** wetland protection bylaws, ordinances and regulations from municipalities across the state of Massachusetts

The team would especially like to thank our funder, the MA EEA MVP Program, and the Central Region MVP Coordinator, Hillary King, for their support, without which this project would not have been possible.

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**MA EEA MVP Regional Coordinator**: Hillary King

**KEY:** Light Blue = Inland or Inland & Coastal; Sandy Color = Coastal

| Bylaw Section (based on MACC Model Bylaw) | Recommendation | Justification | Preferred Regulatory Language | Second Choice | Relevant Municipal Bylaw/Ordinance Examples |
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| I. Purpose | Expand the interests/values identified in your Bylaw/Ordinance to allow recognition of climate change related interests/values. Recognize existing interests/values as climate adaptation and resilience benefits to humans and nature. | The existing eight interests of the Wetlands Protection Act (which are likely in your Bylaw/Ordinance as well) all provide climate adaptation and resilience benefits to humans and nature. Protecting wetlands from climate impacts is essential to protecting the interests of the WPA and your Bylaw/Ordinance. Additionally, wetlands are invaluable in providing carbon storage, sequestration and resilience to the impacts of climate change including providing localized cooling and support for biodiversity, while simultaneously being extremely sensitive to these impacts themselves. Wetlands are particularly biodiverse, and biodiversity tends to confer climate resilience.<br><br>Climate change interacts with all of the existing interests of WPA and all or some of the Bylaw/Ordinance interests, and can act synergistically with existing stressors, such as pollution, land use change, hydrologic alterations, and invasive species. Additional provisions within regulations under your wetland Bylaw/Ordinance will help cover a broad range of scenarios (droughts, floods, increasing air and water temperatures, increasing soil erosion), thereby helping protect wetlands under increasingly unpredictable weather and climate scenarios. | 1. Add to the list of protected resource area interests/values: "carbon/greenhouse gas storage and sequestration (i.e. carbon/greenhouse gas mitigation), localized cooling, and protection of biodiversity, and mitigation of impacts from climate change" as new interests.<br><br>2. Add a statement such as: "All [or some] of the foregoing interests are climate adaptation and resilience interests" to clarify that the interests of the Bylaw/Ordinance provide climate adaptation and resilience. | | **Newburyport** - "The purpose of the City of Newburyport Wetlands Protection Ordinance...is to protect the wetlands, water resources, flood prone areas, and adjoining upland areas (i.e. Buffer Zones) in the City of Newburyport by controlling activities deemed by the Newburyport Conservation Commission...likely to have a significant or cumulative adverse effect on resource area values deemed important to the community. These include, but are not limited to the following:...adaptation to climate change." |
| II. Jurisdiction - Isolated Wetlands and Intermittent Streams | Add Isolated Wetlands i.e. ponds (without minimum size limit), vernal pools (extended to vernal pools outside of WPA-defined Areas Subject to Protection), Isolated Land Subject to Flooding (without minimum size limit), and intermittent streams upstream of wetlands (including seeps, springs and ephemeral streams to the list of jurisdictional areas. Include Isolated Wetlands on the list of wetlands that have jurisdictional AURAs/Buffer Zones. | Isolated Wetlands can be extremely abundant, and they provide important habitat for plants and wildlife, as well as key water storage and water quality services. However, these wetlands are currently not included in the WPA unless they qualify as Isolated Land Subject to Flooding (ILSF). Intermittent streams that are upgradient of Bordering Vegetated Wetlands (BVWs) can be extremely abundant, and they provide important carbon and nutrient cycling functions, habitat for plants and wildlife, and water cycling, storage and water quality benefits. Extending local jurisdiction to protect Isolated Wetlands that do not meet the ILSF definition and intermittent streams located upgradient from BVWs can provide numerous ecological and community benefits under future climate scenarios, increasing habitat availability, biodiversity, water cycling, storage and infiltration capacity, carbon cycling, and provide a buffer to protect adjoining land uses from flood and storm events. | Jurisdictional Areas include:<br>Additional areas not covered by the Massachusetts Wetlands Protection Act that are identified in the Bylaw/Ordinance Section [X], include:<br>a. wetland areas listed in Section [X ]that do not border on the wetland areas listed in Section [X] in this Wetland Protection Bylaw/Ordinance<br>b. intermittent streams that are upgradient of Bordering Vegetated Wetlands<br>c. ponds that meet the following definition: any open body of fresh water, either naturally occurring or man-made by impoundment or excavation, which is never without standing water due to natural causes, except in periods of extended drought. For purposes of this definition, extended drought shall mean any period of four or more months during which the average rainfall for each month is 50% or less of the ten-year average for that same month. Basins or lagoons which are part of wastewater treatment plants, swimming pools or other impervious man-made retention basins shall not be considered ponds.<br><br>The preceding Resource Areas shall have XXX-foot AURAs/Buffer Zones. | Isolated vegetated wetlands are defined as a Freshwater Wetland, of at least 1,000 sf in areas that do not border creeks, rivers, streams, ponds, or lakes. The types of IVW may include wet meadows, marshes, swamps, and bogs. In addition to the minimum size requirement, IVW must also meet the definition and characteristics BVW stated in 310 Code Mass. Regs. 10.55(2) with the exception that IVW do not border any creeks, rivers, streams, ponds, lakes, or other water bodies. | **North Andover** - Isolated Vegetated Wetlands protected under this Bylaw are freshwater wetlands, of at least 1,000 sq. ft. in surface area, that do not border on creeks, rivers, streams, ponds or lakes. The types of Isolated Vegetated Wetlands may include wet meadows, marshes, swamps and bogs. In addition to the minimum size requirement, Isolated Vegetated Wetlands must consist of the following three (3) delineation parameters:<br>♦ The vegetation community of an Isolated Vegetated Wetland consists of 50% or more wetland indicator plants. Wetland indicator plants are classified in the following categories: Facultative, Facultative+, Facultative Wetland-, Facultative Wetland, Facultative Wetland+, or Obligate Wetland (source: U.S. Fish & Wildlife Service) and,<br>♦ Other indicators of hydrology including site inundation or saturation, water marks, drift lines, sediment deposits, oxidized rhizospheres, water-stained leaves, shallow root systems, buttressed tree trunks, and recorded hydrologic data (stream or lake gauge, aerial photo, other) and,<br>♦ Hydric Soils (source "Field Indicators for Identifying Hydric Soils in New England", most recent version). |
| II. Jurisdiction - AURA/Buffer Zone | If your Bylaw/Ordinance doesn't already protect the Buffer Zone as a wetland resource area, then amend it so that it identifies Buffer Zone as a wetland resource area, and designate it as an Adjacent Upland Resource Area (AURA) (see MACC Wetlands Buffer Zone Guidebook). | As flooding and other climate impacts intensify, protection of the Buffer Zone as a resource area itself, and called the AURA, will become even more critical in protecting the downgradient/adjacent wetland resource areas. Not only does the Buffer Zone shield wetland resource areas from development impacts, but it increasingly will be needed as space for wetlands to migrate into as flood levels and Sea Level Rise increase. See the 2019 MACC Wetland Buffer Zone Guidebook for additional information. | Except as permitted by the Conservation Commission, no person shall commence to remove, fill, dredge, build upon, degrade, discharge into, or otherwise alter the following resource areas: ...lands adjoining these resource areas out to a distance of 100 [or XXX] feet, known as the Adjacent Upland Resource Area or Buffer Zone. | | **Amesbury** - "The Ordinance and Regulations provide protection for Resource Areas and their wetland values. Resource Areas protected under the Ordinance are ANY of the following:<br>- Land within a minimum distance of 100 feet from any of the aforementioned Resource Areas (1-4 described above) herein referred to as Adjacent Upland Resource Area(AURA) or Buffer Zone. |
| II. Jurisdiction | Add to the list of jurisdictional areas an additional wider Adjacent Upland Resource Area (AURA)/Buffer Zone (could specify/reference optimum widths) or create an Ecological Climate Resilience Zone around Bordering Vegetaed Wetlands, perennial rivers/streams, Land Subject to Flooding and other wetland resource areas. | Impacts of climate change are likely to include both direct impacts to existing wetlands (e.g. changes in precipitation frequency and intensity, changes in flooding frequency and intensity, changes in temperature), and indirect impacts (e.g. reduced water quality as a result of temperature and precipitation changes, increases in invasive species, pests, diseases due to warming). Providing an additional buffer area to protect against these impacts and to provide room for potential upgradient shifts of the wetland boundary (resulting from increased flooding) will improve the climate resilience of wetland systems, as well as providing an increased area for climate resilience benefits to humans (for naturally vegetated Buffer Zones and Riverfront Areas).<br><br>A wider Buffer Zone will provide increased storage capacity during high precipitation and storm events, improved water retention during drought and low flow events, improved water quality, more shading/cooling, more biodiversity, and improved habitat availablity. | The AURA and/or Ecological Climate Resilience Zone shall include all lands within XX feet of wetland resource areas enumerated above, including the Riverfront Area and [Coastal and Inland] Lands Subject to Flooding. | | **Brookline** - 150-ft Buffer Zone to all resource areas; **Blackstone** - 150-ft Buffer Zone if in Public Water Supply Catchment Basin; **Bourne** - increased to 200-ft for resource areas within ACEC, the Waters Resource District, or Bournedale Environmental Overlay District; **Harvard** - 200-ft Buffer Zone to rivers, ponds, vernal pools and lakes (smaller 100-ft Buffer Zone to other resource areas); **Lancaster** - extends 200-ft Riverfront Area to intermittent streams, as well as perennial. **Framingham** - 125-ft Buffer Zone to all resources areas jurisdictional to the bylaw, including Isolated Wetlands, Land Subject to Flooding and Riverfront Area. |
| II. Jurisdiction | Add to the list of jurisdictional areas a Buffer Zone for Land Subject to Flooding and Coastal Land Subject to Storm Flowage and designate this buffer area as Adjacent Upland Resource Area (AURA) or Coastal Adjacent Upland Resource Area (CAURA). | As we experience increased heavy precipitation events, the area of land that is subject to both high and low frequency flooding events will expand upgradient. Establishing a regulated Buffer Zone for these wetland resource areas can create an area for the upgradient migration of floodwaters, thus reducing flood impacts to structures and infrastructure. By designating the Buffer Zone as a wetland resource area itself, performance standards for the Buffer Zone can be established. | XXX Town's wetland resource areas consist of:<br>- Any XXX hundred foot Buffer Zone for wetland resource areas listed in Subsection X (1) to (6) listed above. [Include "Any land subject to tidal action, storm flowage, or flooding by groundwater or surface water" in the list of wetland resource areas with a Buffer Zone, and determine the width of the Buffer Zone (100 or greater feet)] | | **Orleans** - "..or upon or within one hundred (100) feet of any land subject to flooding or inundation by groundwater, surface water or tidal action; or upon land subject to coastal storm flowage" |

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| II. Jurisdiction - Flood Resilience Zone (Coastal or Inland) | Add an additional jurisdictional area beyond land currently defined as Land Subject to Flooding/Land Subject to Coastal Storm Flowage, to encompass predicted future flood scenarios (including sea level rise for coastal areas, and the increasing frequency and magnitude of flood events predicted for inland areas under Climate Change). The Flood Resilience Zone could be an overlay district based on predicted sea level rise and precipitation changes, or (if data are unavailable), it could be established as a fixed Buffer Zone around the existing area of Land Subject to Flooding/Land Subject to Coastal Storm Flowage.<br><br>Be sure to use a stricter standard than the MassDEP WPA 2022 regulatory update for LSCSF. | Increases in flood frequency and flood extent are widely predicted in response to increasingly irregular precipitation events. As such, providing additional buffer areas around Land Subject to Flooding/Land Subject to Coastal Storm Flowage will help reduce the risk of damage to property and adjoining land uses, as well as alleviating pressure on wetland resource areas by providing them a greater buffer during both normal and extreme weather events. | Jurisdicational Areas include... the Flood Resilience Zone...<br><br>The preceding Resource Areas shall have XXX-foot AURAs/Buffer Zones. | | No municipalities currently have a Climate Change-specific Flood Resilience Zone. However, many do regulate the area beyond existing Land Subject to Flooding. Municipalities which extend a 100-ft Buffer Zone to the area of Land Subject to Flooding include Bedford, Boston, Bourne, Dunstable, Falmouth. Most municipalities with a Flood Hazard Overlay in their Zoning Bylaws base these on current FEMA maps, which do not take climate change into consideration. |
| III. Exemptions & Exceptions | No alterations proposed. | | | | |
| V. Notice and Hearings | No alterations proposed. | | | | |
| VI. Coordination with Other Boards | No alterations proposed. | | | | |
| VII. Permits and Conditions | Include the interests pertaining to climate resilience and greenhouse gas mitigation (such as local temperature regulation, biodiversity, carbon sequestration and storage), under climate conditions predicted for the lifespan of the project, when the Commission is evaluating significant individual or cumulative effect of the project on wetland resource areas, and when making a decision to approve or deny a permit. | To protect wetland resource areas as the climate changes over the coming decades, future climatic conditions, and how a specific proposed project or activities will interact with our changing climate, must be evaluated. The timeframe for this assessment should correspond to the anticipated lifespan of the project. For instance, if a house is anticipated to last for 100 years, the timeframe to be considered should be 100 years. | When making a decision to approve or deny a permit, the Commission shall consider whether proposed activities are likely to have a significant individual or cumulative impact on the interests of the Bylaw/Ordinance, including the interests pertaining to climate resilience and greenhouse gas mitigation (such as local temperature regulation, biodiversity, and carbon sequestration and storage), under climate conditions predicted for the lifespan of the project. The Commission shall consider whether the Applicant has provided sufficient information in this regard. | |
| VII. Permits and Conditions | The Commission should consider the Applicant's avoidance, minimization and/or mitigation measures to address climate change resilience when making a decision to approve or deny a permit. | Avoiding alteration of wetlands is likely to result in the best climate resilience and carbon mitigation outcomes overall. Where minimization and mitigation becomes necessary, consideration of wetland type and associated functions will be important (for example, peat bogs provide particularly high levels of carbon sequestration and water retention). Since not all wetland types provide the same level of carbon sequestration and storage, water quality, climate resilience, flood control or biodiversity benefits, any replication/mitigation measures should be tailored to replicate the specific functions and structure of the wetland resource area(s) being impacted. | The Commission's decision to approve or deny a permit shall consider the Applicant's avoidance, minimization and/or mitigation measures to address climate change resilience and carbon sequestration and storage functions/interests. | | |
| VII. Permits and Conditions | When the Commission is reviewing AURA/Buffer Zone and wetland resource area impacts, include loss of biodiversity, loss of climate change resilience, and carbon sequestration and storage in evaluation of adverse impacts from construction and use. | Impacts within the AURA/Buffer Zone and wetland resource areas are likely to have additional climate change resilience impacts, both now (for example, loss of carbon sequestering trees and vegetation), and in the future (for example, loss of flood storage capacity during future predicted high flow events). | In reviewing AURA/Buffer Zone and wetland resource area impacts, the Commission shall consider loss of biodiversity, loss of climate change resilience, and carbon sequestration and storage in evaluation of adverse impacts from construction and use. | | |
| **DEFINITIONS** | | | | | |
| Definitions - Alter | Expand "Alter" to refer to a change in the ability of wetlands to provide Ecological Climate Resilience and Ecological Carbon Mitigation benefits, and to refer to impacts to the resilience of wetlands in the face of climate change. Extend "alter" to include: - reduction of a wetland's capacity to provide localized cooling; - reduction of wetland's capacity to provide carbon sequestration benefits; - reduction of stored carbon in soil and/or biomass (both above and belowground). | Climate change is exerting additional pressures on wetland systems, including alteration of hydrologic regimes, changes in precipitation including more intense and frequent storms, changes in temperature, changes in water quality, as well as indirect impacts such as changes in vegetation, increases in invasive species, pests & diseases. As such, when reviewing whether a project will cause an "alteration" in wetland conditions, changes to the capacity of the wetland to resist and recover from climate change-induced impacts, both direct and indirect, should also be evaluated. Proposed or potential alterations in a wetland's capacity to sequester carbon and provide localized cooling services should be evaluated, as should proposed or potential alterations to existing carbon stores in the wetland, in addition to proposed or potential alterations to a wetland's capacity to provide the interests of the Wetlands Protection Act (and Bylaw/Ordinance), which all provide climate reslience benefits. | The term "Alter" includes changes to:<br>- the ability of resource areas to provide Ecological Climate Resilience benefits including reduction of a wetland's capacity to provide localized cooling and all of the named interests of the Wetlands Protection Act and their reference in the Bylaw/Ordinance;<br>- the ability of resource areas to provide Ecological Carbon Mitigation benefits including: reduction of a resource area's capacity to provide carbon sequestration benefits and reduction of stored carbon in soil and/or biomass (both above and belowground).<br>- the resilience of resource areas in the face of climate change. | | **Boston** - Alter includes "decreasing the capacity of wetlands to respond to the impacts of climate change, including without limitation, changes in: the timing, intensity and amount of rainfall' temperatures; intensity and/or frequency of storms, extreme weather events, and/or droughts".<br><br>**Example:** Alter includes reducing the capacity of the wetland resource area to sequester carbon and/or reducing or destroying the existing carbon stored in vegetation and soil in the wetland resource area.<br><br>**Example:** Alter includes reducing the capacity of the wetland resource area to provide climate resilience benefits such as prevention of flooding and storm damage, provision of water supply and water quality, prevention of pollution, protection of biodiversity, fisheries, shellfisheries and wildlife habitat. |
| Definitions - AURA/Buffer Zone | Enlarge the area that is Adjacent Upland Resource Area/Buffer Zone to be more than 100 feet laterally (as shown on a site plan) from the boundary of any of the regulated wetland resource areas. | A larger AURA or Buffer Zone allows for more shifting of resource areas and their boundaries as the climate changes. Additionally, provides for more protection of adjacent resource areas and opportunities for climate change resilience measures and mitigation. | Adjacent Upland Resource Area or Buffer Zone - That area of land extending 150 feet horizontally outward from the boundary of a Resource Area, optional: [except that Riverfront Areas shall have no Buffer Zones]. | Adjacent Upland Resource Area or Buffer Zone - That area of land extending 125 feet horizontally outward from the boundary of a Resource Area, optional: [except that Riverfront Areas shall have no Buffer Zones]. | **Brookline** - 150-ft Buffer Zone to all resource areas; **Blackstone** - 150-ft Buffer Zone if in Public Water Supply Catchment Basin; **Bourne** - increased to 200-ft for resource areas within ACEC, the Waters Resource District, or Bournedale Environmental Overlay District; **Harvard** - 200-ft Buffer Zone to rivers, ponds, vernal pools and lakes (smaller 100-ft Buffer Zone to other resource areas); **Lancaster** - extends 200-ft Riverfront Area to intermittent streams, as well as perennial. **Framingham** - 125-ft Buffer Zone to all resources areas jurisdictional to the bylaw, including Isolated Wetlands, Land Subject to Flooding and Riverfront Area. |
| Definitions - Bordering Land Subject to Flooding | Extend definition of "Bordering Land Subject to Flooding" to include the maximum lateral extent of the water elevation predicted by the most up-to-date data sets/models, or the FEMA 500-year frequency storm, rather than referencing the FEMA 100-year frequency storm.<br><br>Require applicants to use best available scientifically valid, up-to-date, predictive floodplain modelling, if feasible.<br><br>Avoid using out-of-date historical floodplain mapping.<br><br>Be sure to use a stricter standard than the MassDEP WPA 2022 regulatory update. | FEMA 100-year floodplain boundaries are based on out-of-date historical data rather than being based on modeling and predicted floodplains and flood zones. Use of best available scientifically valid, up-to-date, predictive modelling is the most accurate way to determine future conditions, but when it is not possible to use a predictive model, using the FEMA 500-year floodplain acknowledges that today's 100-year storms, in the future, may be similar today's 500-year storms (or worse) in terms of severity (at some point, even the 500-year storm will be exceeded). | In determining the boundaries of Bordering Land Subject to Flooding, use of the best available scientifically valid, up-to-date, predictive modelling is the preferred approach, but when it is not possible to use a predictive model, the FEMA 500-year floodplain should be used rather than the FEMA 100-year floodplain. The use of the FEMA 500-year floodplain reflects the understanding that today's 100-year storms, in the future, may be similar today's 500-year storms (or worse) in terms of severity. | In determining the boundaries of Bordering Land Subject to Flooding, the FEMA 500-year floodplain should be used rather than the FEMA 100-year floodplain. The use of the FEMA 500-year floodplain reflects the understanding that today's 100-year storms, in the future, may be similar today's 500-year storms (or worse) in terms of severity. | **Arlington** - "BORDERING shall be defined to include any land within either of the following or the greater thereof:<br>(a)100 feet horizontally lateral from the edge of any marsh, freshwater wetland, vernal pool, wet meadow, bog, swamp, river, stream, creek, pond, reservoir, or lake; or<br>(b)within the maximum lateral extent of the water elevation of the statistical 100 year frequency storm."<br><br>**Bedford** - 100-ft Buffer Zone is applied to Land Subject to Flooding, as well as wetland resource areas. |

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| Definitions - Bordering Vegetated Wetlands | Add flexibility to the definition of Bordering Vegetated Wetlands (BVW), and to the delineation criteria for BVW boundaries, that addresses temporary shifts in herbaceous vegetation that may occur during abnormally dry times (below normal water tables and/or precipitation and/or periods of drought during the 2 - 3 months prior to site visit). These may be due to dry season conditions or to climatic changes. Whenever possible, BVW delineation should be avoided under these conditions. If delineation must be conducted during these dry time periods, create flexible BVW delineation methodology and criteria including:<br>- If the hydrophytic status of the area's vegetation during the normal wet season of a year with normal precipitation cannot be determined, exclude consideration of vegetation or of herbaceous vegetation, and delineate BVW boundaries based on hydric soil conditions and evidence of wetland hydrology. If appropriate, woody and other perennial species can be considered. Also:<br>- Consider landscape position;<br>- Evaluate desktop data, aerial photos, and mapping;<br>- Use data from water table monitoring wells if they are available for the area during normal groundwater conditions. | When conditions are drier than normal (such as being due to dry season conditions or to climate changes), short-term changes in herbaceous vegetation that shift an area from supporting a predominance of wetland vegetation to supporting a predominance of upland vegetation can occur. When normal conditions return, the area returns to supporting a predominance of wetland vegetation and fully meeting regulatory criteria as Bordering Vegetated Wetland. Adjusting BVW delineation methodology and criteria can help avoid loss of jurisdiction due to this type of seasonally or climatically-induced temporary shift in vegetation. | Whenever possible, BVW delineation should be avoided under abnormally dry conditions, which can occur during dry seasons or as a result of climate change. If delineation must be conducted during these dry time periods, BVW delineation methodology and criteria should be modified as follows:<br>- If the hydrophytic status of the area's vegetation during the normal wet season of a year with normal precipitation cannot be determined, exclude consideration of vegetation or of herbaceous vegetation, and delineate BVW boundaries based on hydric soil conditions and evidence of wetland hydrology. If appropriate, woody and other perennial species can be considered. Also:<br>- Consider landscape position;<br>- Evaluate desktop data, aerial photos, and mapping;<br>- Use data from water table monitoring wells if they are available for the area during normal groundwater conditions. | Whenever possible, BVW delineation should be avoided under abnormally dry conditions, which can occur during dry seasons or as a result of climate change. If delineation must be conducted during these dry time periods, BVW delineation methodology and criteria should be modified as outlined on pages 118 - 127 of the US Army Corps of Engineers Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0). January 2012. ERDC/EL TR-12-1. | See US Army Corps of Engineers *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (Version 2.0). January 2012. ERDC/EL TR-12-1. Pages 118 - 127. |
| Definitions - Ecological Climate Mitigation Zone | Add "Ecological Climate Mitigation Zone" to extend existing AURAs/Buffer Zones around wetland resource areas and to extend Riverfront Areas. | Impacts of climate change are likely to include both direct impacts to existing wetlands (e.g. changes in precipitation frequency and intensity, changes in flooding frequency and intensity, changes in temerature), and indirect impacts (e.g. reduced water quality as a result of temperature and precipitation changes, increases in invasive species, pests, diseases due to warming). Providing an additional buffer area to protect against these impacts and potential upgradient shifts of the wetland boundary (resulting from increased flooding) will improve the climate resilience of wetland systems, which then allows them to provide greater climate mitigation benefits to humans such as increased carbon storage and sequestration (for naturally vegetated AURAs/Buffer Zones and Riverfront Areas). | The Ecological Climate Mitigation Zone extends [specify] feet beyond [specify which] wetland resource areas (including the AURA/Buffer Zones and Riverfront Areas). This area provides room for wetland resource areas to expand naturally as a result of climate impacts such as increased flooding and more severe storms, and provides additional wetland resource area protection against climate impacts. Providing an additional buffer area to protect against these impacts and to provide room for potential upgradient shifts of the wetland boundary (resulting from increased flooding) will improve the climate resilience of wetland systems, as well as providing an increased area for climate mitigation benefits to humans (for naturally vegetated AURAs/Buffer Zones and Riverfront Areas). | | **Brookline** - 150-ft Buffer Zone to all resource areas; **Blackstone** - 150-ft Buffer Zone if in Public Water Supply Catchment Basin; **Bourne** - increased to 200-ft for resource areas within ACEC, the Waters Resource District, or Bournedale Environmental Overlay District; **Harvard** - 200-ft Buffer Zone to rivers, ponds, vernal pools and lakes (smaller 100-ft Buffer Zone to other resource areas); **Lancaster** - extends 200-ft Riverfront Area to intermittent streams, as well as perennial. **Framingham** - 125-ft Buffer Zone to all resources areas jurisdictional to the bylaw, including Isolated Wetlands, Land Subject to Flooding and Riverfront Area. |
| Definitions - Ecological Climate Resilience Zone | Add "Ecological Climate Resilience Zone" to extend existing AURAs/Buffer Zones around wetland resource areas and to extend Riverfront Areas. | Impacts of climate change are likely to include both direct impacts to existing wetlands (e.g. changes in precipitation frequency and intensity, changes in flooding frequency and intensity, changes in temerature), and indirect impacts (e.g. reduced water quality as a result of temperature and precipitation changes, increases in invasive species, pests, diseases due to warming). Providing an additional buffer area to protect against these impacts and to provide room for potential upgradient shifts of the wetland boundary (resulting from increased flooding) will improve the climate resilience of wetland systems, as well as providing an increased area for climate resilience benefits to humans (for naturally vegetated Buffer Zones and Riverfront Areas). | The Ecological Climate Resilience Zone extends [specify] feet beyond [specify which] wetland resource areas (including the AURA/Buffer Zones and Riverfront Areas). This area provides room for wetland resource areas to expand naturally as a result of climate impacts such as increased flooding and more severe storms, and provides additional wetland resource area protection against climate impacts. Providing an additional buffer area to protect against these impacts and to provide room for potential upgradient shifts of the wetland boundary (resulting from increased flooding) will improve the climate resilience of wetland systems, as well as providing an increased area for climate resilience benefits to humans (for naturally vegetated AURAs/Buffer Zones, Rvierfront Areas, etc.). | | **Brookline** - 150-ft Buffer Zone to all resource areas; **Blackstone** - 150-ft Buffer Zone if in Public Water Supply Catchment Basin; **Bourne** - increased to 200-ft for resource areas within ACEC, the Waters Resource District, or Bournedale Environmental Overlay District; **Harvard** - 200-ft Buffer Zone to rivers, ponds, vernal pools and lakes (smaller 100-ft Buffer Zone to other resource areas); **Lancaster** - extends 200-ft Riverfront Area to intermittent streams, as well as perennial. **Framingham** - 125-ft Buffer Zone to all resources areas jurisdictional to the bylaw, including Isolated Wetlands, Land Subject to Flooding and Riverfront Area. |
| Definitions - Inland Flood Resilience Zone | Add "Inland Flood Resilience Zone" (for inland municipalities). | Creating Inland Flood Resilience Zones is likely to be particularly important upgradient of rivers, Riverfront Area and Land Subject to Flooding, where climate change is already leading to increased flood frequency and flooding extent. Providing upstream and upgradient areas free from development, where rivers and floodplains are able to naturally flood, is important for slowing the flow of water downstream, providing flood storage during high rainfall events, and reducing flood risk downstream. Creating Inland Flood Resilience Zones along rivers and Riverfront Areas and upgradient of Land Subject to Flooding may extend jurisdictional areas in certain locations, but could also include river and floodplain restoration measures to provide increased flood storage capacity (removal of embankments, re-meandering of river reaches to allow for controlled flooding in specific areas, removal of fill in floodplain areas, reconnection of incised streams & rivers with floodplains, revegetation of developed land in floodplain, daylighting of streams, dam removal, etc.). | Inland Flood Resilience Zone is the area of land beyond the current boundary of Land Subject to Flooding [and Riverfront Area] that the Commission determines has a reasonable probability of flooding as the strength, duration or frequency of precipitation events increase within approximately the next 100 years. The area may be periodically reviewed by the Commission, and may be divided into sub-zones with different regulatory requirements. | Inland Flood Resilience Zone is the area of land beyond the current boundary of Land Subject to Flooding [and Riverfront Area] that the Commission determines has a reasonable probability of flooding as the strength, duration or frequency of precipitation events increase within approximately the next 50 years. The area may be periodically reviewed by the Commission, and may be divided into sub-zones with different regulatory requirements. | **Boston** - Inland Flood Resilience Zone is defined as "the area of land beyond the current boundary of Land Subject to Flooding that the Commission determines has a reasonable probability of flooding as the strength, duration or frequency of precipitation events increase within approximately the next 50 years". The area may be periodically reviewed by the Commission, and may be divided into sub-zones with different regulatory requirements. |
| Definitions - Prevention of Pollution | Redefine "Prevention of Pollution" to include pollution of air, soil, and sediment as well as water. | The WPA references only water pollution, leaving out air, soil and sediment.<br>The US EPA identifies greenhouse gases as air pollution. As such, anthropogenic disturbance of wetland soils and vegetation that leads to a release of greenhouse gases, such as carbon dioxide, methane, and/or nitrous oxide, from a regulated resource area should be accounted for in impact assessments of proposed projects, and in provision of mitigation for project-related impacts. | PREVENTION OF POLLUTION means the prevention or reduction of contamination of surface or groundwater, air, soil or sediment. | | **Arlington** - "PREVENTION OF POLLUTION - The prevention or reduction of chemicals (e.g., nutrients, hydrocarbons, solvents, metals, vapors) known or suspected of causing harm to humans, plants, or animals via exposure to any media (air, water, soil, sediment)".<br><br>**Example**: "Prevention of Pollution - The prevention or reduction of chemicals (e.g., greenhouse gases, nutrients, hydrocarbons, solvents, metals, vapors) or other substances (sediment, etc.) known or suspected of causing harm to humans, plants, animals, biodiversity and/or the climate, via exposure or release to any media (air, water, soil, sediment)." |
| Definitions - Coastal Flood Resilience Zone | Add definition for "Coastal Flood Resilience Zone" (for coastal municipalities). | Current impacts from climate change and future climate scenarios predict increasing sea level rise, storm frequency, and irregular rainfall patterns (encompassing both an increase in drought, and an increase in extreme rainfall events). Both coastal and inland communities are likely to experience increases in flood frequency and magnitude, and as such, regulating the area beyond the current FEMA 100-year floodplain will help protect the interests of bylaws and ordinances, as well as protecting surrounding land uses and property interests. The Coastal Flood Resilience Zone could be defined based on relative sea level rise modelling predictions, rainfall and flood level modelling predications, or more simply by using a set AURA/Buffer Zone width around Land Subject to Coastal Storm Flowage. | COASTAL FLOOD RESILIENCE ZONE - The area of land beyond the current boundary of Land Subject to Coastal Storm Flowage, that the Commission determines has a reasonable probability of becoming subject to future coastal storm flowage due to relative sea level rise, within approximately the next 50 years". The area may be periodically reviewed by the Commission, and may be divided into sub-zones with different regulatory requirements. | | **Boston** - Coastal Flood Resilience Zone is defined as "the area of land beyond the current boundary of land subject to coastal storm flowage, that the Commission determines has a reasonable probability of becoming subject to future coastal storm flowage due to sea level rise, within approximately the next 50 years". The area may be periodically reviewed by the Commission, and may be divided into sub-zones with different regulatory requirements. |