June 7, 2021

Kathleen Baskin
Assistant Commissioner Bureau of Water Resources
Massachusetts Department of Environmental Protection
1 Winter Street
Boston, MA 02108

Re: Written Comments on Proposed Revisions to MA Stormwater Policy and Handbook

Dear Assistant Commissioner Baskin,

We are writing to provide comments on behalf of the Massachusetts Rivers Alliance and the undersigned organizations in response to proposed revisions to the MA Stormwater Policy and Handbook which have been under discussion by the MA Stormwater Updates Advisory Committee.

We appreciate the opportunity to be represented on the Committee and for many of us to participate in the discussions informally. Please feel free to post these comments publicly or otherwise share with interested parties as you see fit.

We strongly support MassDEP's goal of updating the Commonwealth's Stormwater Policy, and many of the changes being proposed by MassDEP are positive ones. That said, we offer the following recommendations as MassDEP moves forward in preparing more specific regulatory proposals.

1. **We strongly support increasing the recharge to 1" in A, B, and C soils.**
   Increasing the groundwater recharge requirement to 1" in hydrologic soil group types A, B and C will be extremely beneficial and we urge you to retain this important and overdue reform in your final proposed policy and regulations.

   The existing groundwater recharge requirements fall short of reestablishing natural recharge rates once a property has been developed. This shortfall is only getting worse as annual rainfall and average storm size increases.

   Increasing groundwater recharge is one of the few tools available to help offset the effects of climate change on the Commonwealth's hydrology. This includes loss of winter snowpack and associated winter recharge, the shift in our rainfall patterns toward fewer, larger rainfall events that reduces the annual benefit of capturing only smaller storms, the expected and observed increasing frequency of drought, and increasing annual evaporation rates. This provision will help to provide greater base flows to support water supply, wetlands hydrology and streamflow. It is especially important that these provisions will apply to both public and private properties, given that the majority of our impervious cover is under the control of private parties.

It will also have significant water quality benefits, particularly in reducing pathogen and nutrient pollution, both of which are growing more problematic as more of our land base is developed. Increased temperatures, longer growing seasons, and declining stream base flows combine to concentrate these pollutants in local waterways and provide conditions in which pathogens and algae are better able to flourish in local waterbodies.

During the Advisory Commission's discussions some suggested that the "1-inch rule" would also help to reduce peak runoff rates. However, as important as the 1" recharge requirement is, it will not help address the need to reduce peak runoff rates unless MassDEP modifies the way its peak runoff rate control requirements are structured, as discussed further below.

2. **We recommend that MassDEP adopt the full NOAA Atlas14 upper confidence interval (Atlas14++) as the basis of the new design storm, rather than 90% of the NOAA Atlas14 upper confidence interval (Atlas14+).**

MassDEP has enunciated a goal of updating its precipitation design criteria to match the full range of variability in EXISTING precipitation events and NOT to set standards that would address future rainfall patterns. Thus MassDEP has proposed adopting the so called Atlas 14+.

We would respectfully disagree with the way MassDEP has framed the goal. This framing is clearly inconsistent with the requirements of the 2016 Executive Order 569: "Establishing an integrated Climate Change Strategy for the Commonwealth," which requires that "…within two years of this Order … that includes a statewide adaptation strategy incorporating: (i) observed ***AND PROJECTED*** climate trends based on the best available data, including but not limited to, extreme weather events, drought, coastal and inland flooding…" [emphasis added].

Virtually all sites which are developed under the new precipitation criteria will have a useful life extending well into the second half of the century or beyond. Failing to address the realities of rainfall during the expected service lives of structures built under this policy represents an unreasonable transfer of risk and cost from those developing sites in the present, onto those who will own and inhabit the sites in the future, municipalities that will be compelled to correct the resulting future problems at substantially higher expense. The health of our wetlands and waterways will be further impaired as a result.

We recommend that MassDEP instead adopt Atlas14++ as a readily available standard that aligns well with current projections of late century precipitation patterns.

3. ***We recommend that MassDEP commit to revisit and update its rainfall criteria every five years following adoption to incorporate both new rainfall data and improved, downscaled precipitation projections.***

MassDEP's current update to rainfall design criteria is welcome but extremely overdue. It has been widely understood and documented for at least 15 years that rainfall patterns have been shifting and that TP40 was no longer an accurate framework upon which to base design storm criteria. Given the rate of ongoing climate change, the uncertainty about the direction of global CO2 emissions, the rapidly evolving science around climate change projections, and MassDEP's demonstrated failure to update design storm criteria in a timely manner in the past, we believe that MassDEP should commit to a limited review of the stormwater policy to update design storm criteria every five years going forward.

4. **In order to protect stream and wetland functions, maintain the capacity of existing municipal infrastructure and prevent damage to existing development near and in historic floodplains, for new development sites, pre-development runoff rates should be calculated using NOAA14 and post-development runoff rates should be calculated using NOAA14+**

For new development sites, increasing the <u>*pre-development*</u> design storm standard from historical (TP40) rainfall levels, past current average rainfall levels (NOAA14), to the upper range of current rainfall levels (NOAA14+) will result in a sharp increase in the magnitude of peak discharge rates, beyond historical or even current average runoff rates as further discussed in the example below. This is especially true during smaller storms which generally define the bankfull geometry of a stream channel which is critical for maintaining stream channel and wetland stability and habitat characteristics and for the capacity of existing municipal storm drain conveyance infrastructure.

The following example further explains this concern. For a hypothetical 1-acre forested site with HSG B Soils (see attached HydroCAD calculations) the current standard is calculated using TP40 and asks site developers to design for a 50% annual chance (i.e. 2-year storm) that site discharge rates will reach 0.34 CFS. Using NOAA14 to calculate pre-development runoff implies the site designer should achieve a 50% annual chance that peak discharge rate will reach 0.60 CFS, and setting the standard at NOAA14+ effectively directs the designer to aim for a 50% annual chance that the peak discharge rate will reach 0.90 CFS. Adopting NOAA14+ as the pre-development criteria rather than NOAA14, has the effect of directing the site developer to design for a 50% higher peak discharge rate (e.g. 0.90 CFS) during the 2-year probability event relative to the current AVERAGE 2-year probability runoff rate (e.g. .60 CFS based on NOAA14).

While we support MassDEP's decision to use NOAA14+ rather than NOAA14 (and in fact advocate for the use of NOAA14++), we disagree with the way MassDEP is applying this standard.

By using a standard representing the high range of current rainfall and applying this high range value to define BOTH pre-development AND post-development design criteria, we are concerned that MassDEP is directing designers to increase peak runoff rates above the rates historically allowed, and above the rates that presently exist under current *average* rainfall conditions. We anticipate that especially for smaller storms around which stream channels form themselves and around which municipal drainage conveyance systems have traditionally been designed, this will result in significant environmental impacts, will contribute to expensive stormwater "nuisance flooding" damage, and will force municipalities to undertake extremely expensive storm drain conveyance and/or storage capacity projects.

In order to maintain stream stability, and minimize damage to development constructed in or near floodplains as they have been historically defined, avoid further aggravating problems with municipal storm drain conveyance capacity, to the extent possible, we need to maintain peak runoff rates at the present average rates (e.g. NOAA14), or preferably at the historic rates (e.g. TP40) that have been the basis of shaping our existing stream morphology and built infrastructure.

We therefore urge MassDEP to modify the way the storm criteria are applied to new development sites. For new development sites, MassDEP should NOT match NOAA14+ pre-development rates to NOAA14+ post-development runoff rates. Rather, NOAA14 (with no "+") pre-development runoff rates should be matched to NOAA14+ post-development runoff rates. While it may be somewhat challenging to apply this approach at the 100-year level, for stream and wetland health and the viability of existing MS4 infrastructure, it is critical that we not increase the runoff rate above existing averages at least for more frequent storms such as the 2- and 10-year probabilities.

5. ***Redevelopment projects should be required to match post development runoff rates with undeveloped runoff rates rather than predevelopment runoff rates to the maximum extent practicable.***

Most waterways and watersheds across the state, and all watersheds in the heavily populated eastern half of the state, have already experienced significant increases in peak runoff rates due to the creation of unmitigated or partially mitigated impervious cover by development projects implemented prior to the adoption of the MA Stormwater Policy.

This change has been highly adverse to multiple interests of the Wetlands Protection Act including flood control, water quality, and wildlife habitat. Flood elevations, pollutant transport, and stream channel erosion have increased and stream channel stability has decreased as a result of existing impervious cover that lacks peak runoff rate controls. Similarly, many if not most existing municipal storm drain conveyance systems are undersized due to the creation of un- or under-managed impervious cover.

The peak runoff rate consequences of converting a site from undeveloped to developed without modern peak rate controls are dramatic, especially in the smaller, more frequent storms that are responsible for the majority of annual pollutant transport and erosive forces guiding stream channel formation, and which municipal drain infrastructure is designed to convey.

Taking a hypothetical acre of forest on HSG B soil and converting it to impervious surface without mitigation measures (assuming TP40 rainfall levels for both pre and post development) increases peak discharge rates by more than 33 times in the 2-year storm, almost six times for the 25-year storm and about double for the 100-year storm (see attached HydroCAD results).

In spite of these impacts, the current MA Stormwater Policy makes no attempt to improve these existing degraded peak runoff conditions at any storm level when existing sites are redeveloped even where it would be technically and economically feasible to do so. The current policy aims to maintain the existing degraded condition.

As climate change applies increased rainfall intensity to our watersheds, peak runoff rates will increase across the entire landscape, although the biggest increase in CFS will come from developed sites. If we hope to minimize the damage caused by climate change to the environment, critical infrastructure, lives and property, we must reduce peak runoff rates at a watershed scale by finding locations to create additional rainfall storage and retention capacity.

The most important place to look for that capacity is on private sites, which were paved with minimal peak runoff rate controls. These sites contribute more to peak runoff rates than any other category of sites, yet our current Stormwater Policy completely ignores the potential benefits of reducing runoff rates from such sites. Furthermore, incorporating peak rate controls that improve existing conditions is far less expensive at the time of redevelopment than trying to retrofit such features after the fact or than shifting the problem from private property owners to municipalities who would need to somehow convey vast quantities of water from private sites to the small fraction of land which is publicly owned and could be used for centralized storage and detention.

In short, if we hope to minimize flood damage from increasingly severe storms, there is no meaningful alternative to reducing peak runoff rates at previously developed private sites.
We would offer three possible approaches to addressing this problem. Note that for all of these options, we would recommend that pre-development runoff rate calculations be based on NOAA14 and post-development calculations be based on NOAA14+.

a) Rather than requiring that site developers match post-development runoff rates with pre-development (e.g. existing degraded) runoff rates, require that to the maximum extent practicable post-development runoff rates be matched with undeveloped (e.g. naturally vegetated rather than paved) runoff rates. This approach would have the greatest potential benefit, though may have the highest cost. However, it has the advantage flexibility to accomplish as much as possible at sites where cost are low, and to make more modest gains where costs are high.
b) Require that post development runoff rates for the existing developed condition be reduced by 50% for the 2-year storm and be reduced by at least one storm size for each of the other regulated storm sizes. Something similar to this approach is already being successfully implemented in the City of Cambridge, one of the Commonwealth's most densely developed municipalities.
c) At a bare minimum, post-development runoff rates should be matched to pre-development runoff rates calculated using NOAA14 rainfall values minus 1" for each regulated storm size. This will have only a small incremental benefit, but it will ensure that the 1" infiltration rule results in a reduction in peak runoff rates and not merely a reduction in detention basin capacity that would otherwise be required.

Conclusion

Thank you in advance for your consideration of these proposals. The changes MassDEP is about to implement to the MA Stormwater Standards and Handbook may well represent the most important climate adaptation policy change under consideration by the Commonwealth, and as such, we urge MassDEP to take the opportunity to be aggressive in implementing policy changes now that will help the residents and businesses of the Commonwealth to avoid dramatically larger future costs.

Sincerely,

Julia Blatt
Executive Director
Massachusetts Rivers Alliance

Ian Cooke
Executive Director
Neponset River Watershed Association

Andrew Gottlieb
Executive Director
Association to Preserve Cape Cod

Grant Monahon
President
Belmont Citizens Forum, Inc.

Jane Winn
Executive Director
Berkshire Environmental Action Team

Donna Williams
President
Blackstone River Coalition

Laura Jasinski
Executive Director
Charles River Conservancy

Heather Miller
General Counsel and Policy Director
Charles River Watershed Association

Keith Davies
President
Chicopee 4Rivers Watershed Council

Andrea Donlon
River Steward
Connecticut River Conservancy

Nancy Goodman
Vice President for Policy
Environmental League of Massachusetts

Aimee Petras
Programs Director
Farmington River Watershed Association

Brian Yellen
President
Fort River Watershed Association

Karen Buck
President
Friends of the Malden River

Rui Coelho
President
Greater Boston Trout Unlimited

Heather McMann
Executive Director
Groundwork Lawrence

Wayne Castonguay
Executive Director
Ipswich River Watershed Association

Jane Calvin
Executive Director
Lowell Parks and Conservation Trust

Ed Himlan
Executive Director
Massachusetts Watershed Coalition

Heidi Ricci
Director of Policy and Advocacy
Mass Audubon

Matthew Thorne
Executive Director
Merrimack River Watershed Council

Ivan Ussach
Director
Millers River Watershed Council

Caroline Reeves
President
Muddy River Initiative

Patrick Herron
Executive Director
Mystic River Watershed Association

Elizabeth Ainsley Campbell
Executive Director
Nashua River Watershed Association

Samantha Woods
Executive Director
North and South Rivers Watershed Association

Alison Field-Juma
Executive Director
OARS: For the Assabet, Sudbury, and Concord Rivers

Norman Rehn
Treasurer
Parker River Clean Water Association

Peter Severance
Program/Research Director
River Merrimack

Kate McPherson
Narragansett Bay Riverkeeper
Save the Bay

Deb Pasternak
Massachusetts Chapter Director
Sierra Club

Anne Slugg
Chair & Sudbury Representative
Sudbury, Assabet, and Concord Wild and Scenic River Stewardship Council

Stephen Silva
Treasurer
Taunton River Watershed Alliance

Alison Bowden
Director of Rivers, Coasts and Oceans
The Nature Conservancy in Massachusetts

Christine Collins
President
Weir River Watershed Association

Brian W. Conz
President
Westfield River Watershed Association

Deborah Weaver
Executive Director
Westport River Watershed Alliance

Scenario	Condition	Land Cover	HSG	SWM Provided	Rainfall
Scenario 1A	Pre-development	Woods (good)	B	-	TP40
Scenario 1B	Pre-development	Woods (good)	B	-	NOAA14
Scenario 1C	Pre-development	Woods (good)	B	-	NOAA14 PLUS
Scenario 2A	Post-development	100% Impervious	B	No SWM or volume controls	TP40
Scenario 2B	Post-development	100% Impervious	B	No SWM or volume controls	NOAA14
Scenario 2C	Post-development	100% Impervious	B	No SWM or volume controls	NOAA14 PLUS
Scenario 2D	Post-development	100% Impervious	B	Subtract 1" off rainfall depth (to account for required infiltration)	NOAA14 PLUS

Storm	24-hour Precipitation Depth (in)				
	TP-40	NOAA14 PLUS	NOAA Atlas 14		
		0.9*Upper	90% Confidence Interval	Lower	Upper
2-yr	3.1	3.67	3.43	2.86	4.08
10-yr	4.5	5.77	5.33	4.4	6.41
25-yr	5.2	7.49	6.52	5.17	8.32
50-yr	6	8.75	7.4	5.73	9.72
100-yr	6.8	10.35	8.35	6.25	11.5
500-yr	9.1	14.94	11.13	7.46	16.6

Storm	Peak Flow per Scenario (cfs)						
	1A	1B	1C	2A	2B	2C	2D
2-yr	0.34	0.60	0.90	11.75	13.03	13.96	10.07
10-yr	2.48	4.45	5.61	17.17	20.38	22.08	18.22
25-yr	4.12	7.72	10.69	19.88	24.97	28.71	24.86
50-yr	6.24	10.41	14.84	22.97	28.37	33.57	29.71
100-yr	8.56	13.49	20.46	26.05	32.03	39.73	35.88
500-yr	16.73	23.31	37.88	35.68	42.73	57.39	53.54