The Watershed Protection Standard Toolkit

Materials for Adopting and Implementing a Stormwater Design Standard that Protects Watersheds While Supporting Growth

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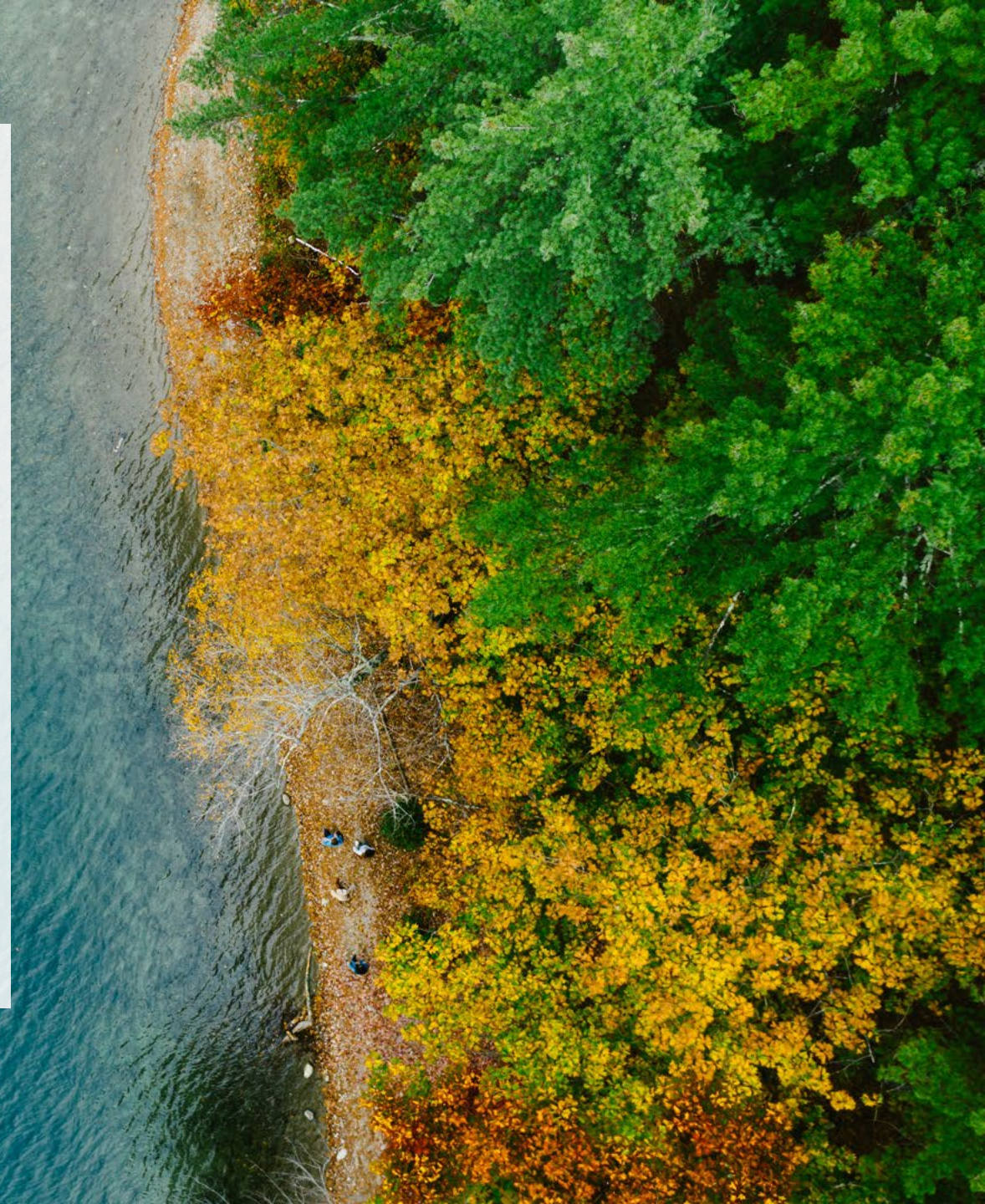

Acknowledgements

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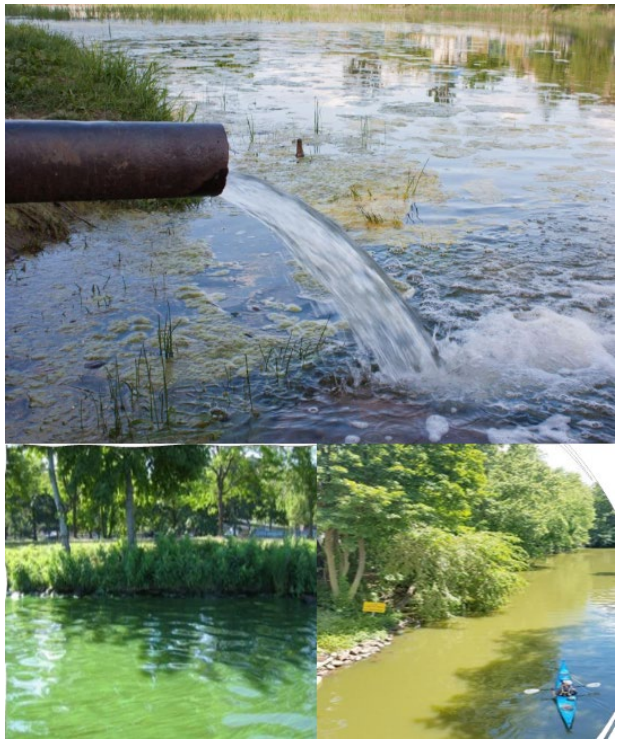
- Developed by VHB
  - Sarah Nalven, Caroline Herzog, Theresa McGovern, Justin Redfield, Chris Dubois, Olivia Ryder

- Technical Support:

How does development impact watersheds?

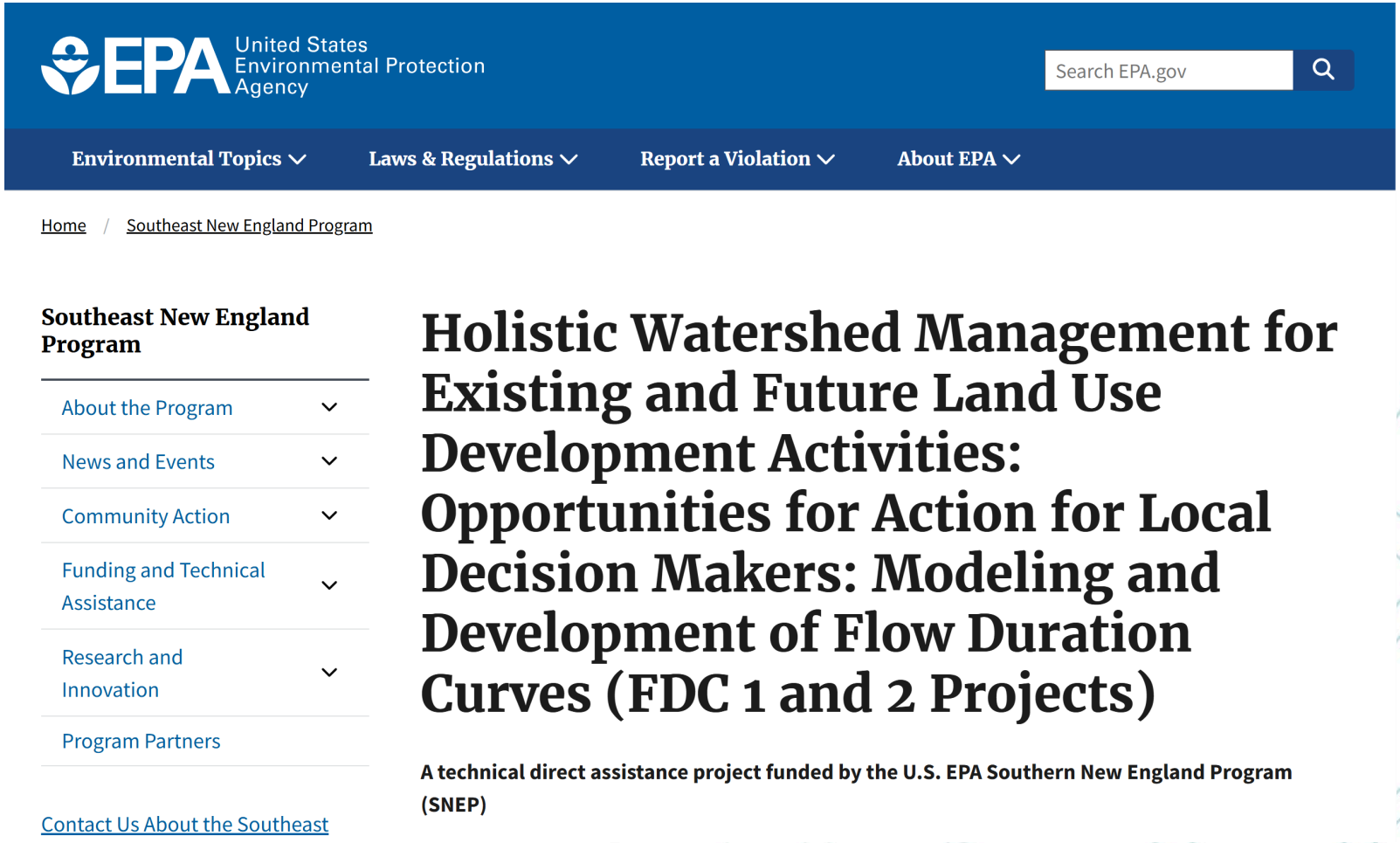
More water

More pollution

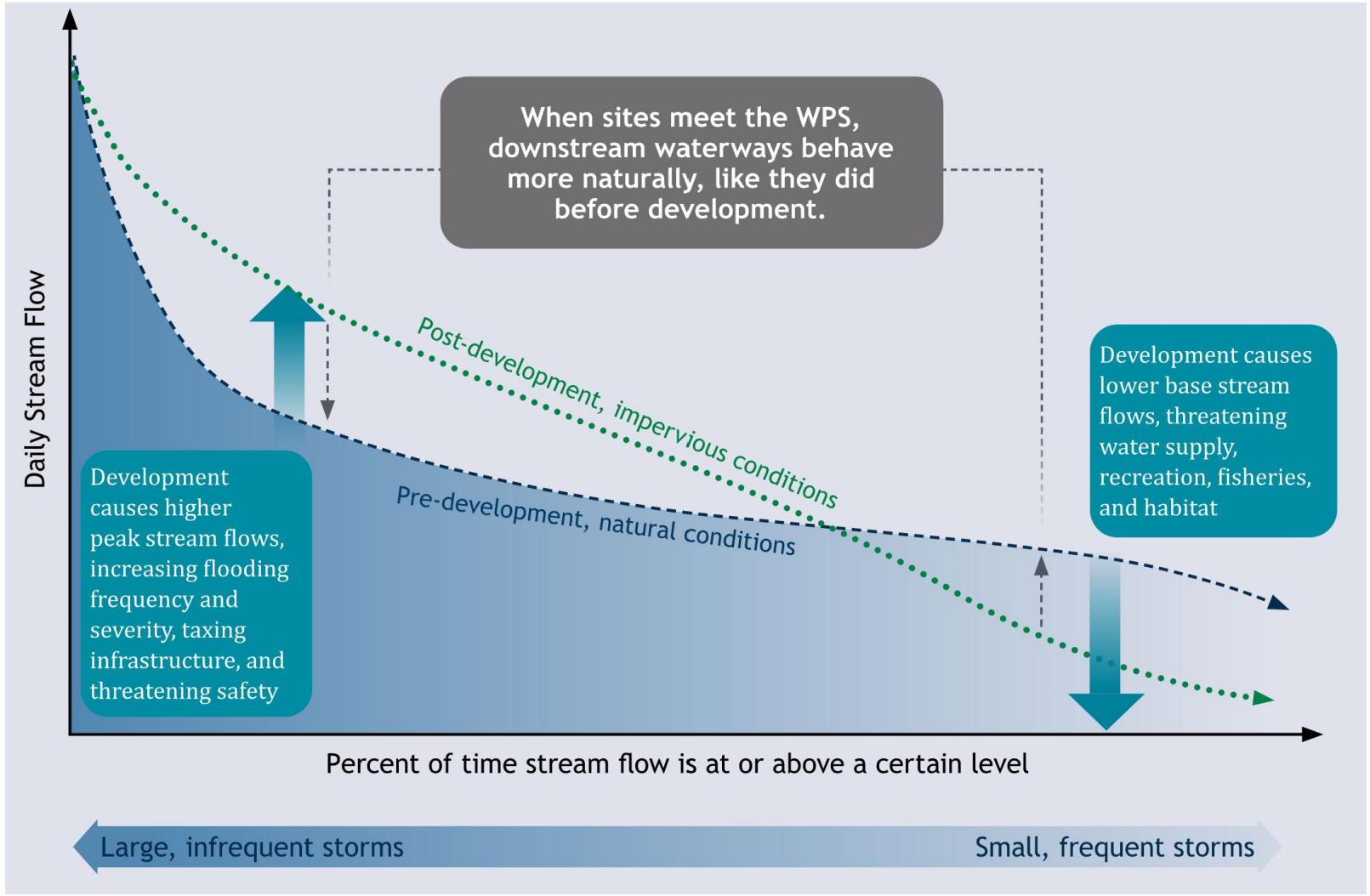


Less recharge

https://www.epa.gov/snep/holistic-watershed-management-existing-and-future-land-use-development-activities



Watershed Protection Standard



A design standard that allows development to happen in a sustainable manner

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Why adopt the WPS?

- To protect community resources
  - Protects natural resources and infrastructure now and for future generations
- To save money
  - Provides upfront watershed protection, sparing taxpayers costly retrofits and clean-ups
  - Design strategies used to meet WPS often use less closed drainage and less real estate
- Current standards are not enough
  - Current state and local standards still allowing watershed degradation
- It's practical and doable
  - Developed and evaluated with the latest science
  - Can be comfortably achieved with smart design strategies

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Projected Increase in Impervious Cover for an average town in MA by Land Use Category (Year 2016 to Year 2060)

Year	Transportation	Commercial & Industrial	Residential	Open	**TOTALs**
2016 Baseline	643	618	626	130	**2017**
2060	1110	921	1190	259	**3480**
projected increase	**467**	**303**	**564**	**130**	**1463**
projected % Increase	**73%**	**49%**	**90%**	**100%**	**72%**

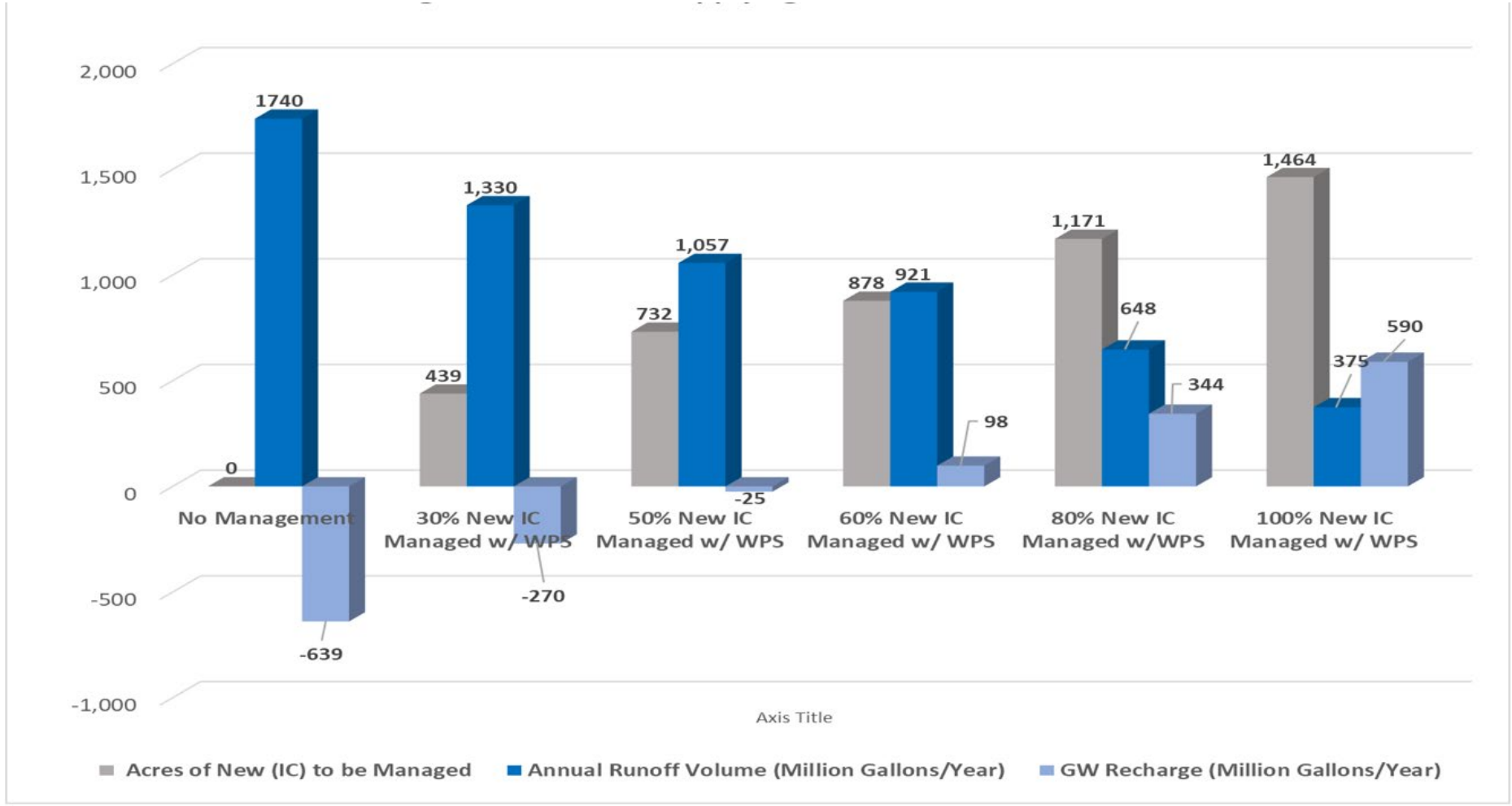
- Source of IC information: https://www.epa.gov/system/files/documents/2022-09/fdc2a-task-4%20-technical-memo.pdf

Current stormwater standards

Trigger Threshold	Percent Regulated
5,000 sf	80%
10,000 sf	60%
20,000 sf	50%
40,000 sf	30%

Source of Table 7: Minimizing Environmental Impacts Through Stormwater Ordinance and Site Plan Regulation (https://scholars.unh.edu/cgi/viewcontent.cgi?article=1046&context=stormwater)

Estimated Net Changes to Runoff Volume and Groundwater Recharge from land use change by 2060



Watershed Protection Standard (WPS)

- Stormwater design standard applied to sites undergoing new development and redevelopment

- Formulated by EPA to protect and restore water resources
  - Long-term continuous simulation modeling demonstrated state standards are not enough
  - Modeling also determined the runoff reduction values that would be enough

- Under WPS, sites match pre-development hydrology/water quality on average annually

- Requires management of a site's stormwater to achieve pre-development levels of:
  1. groundwater recharge
  2. pollutant export (TP, TN)

WPS Compliance is Based on Runoff Reduction

- Compliance with the WPS is achieved by meeting a **required runoff reduction volume** that is determined by the pre-development infiltrating capacity of the soils
- (Alternative requirements are outlined for sites that cannot infiltrate)

Achieve Predevelopment Annual Groundwater Recharge and SW Nutrient Load Export									
SCM Category	SCM Types	HSG	Infiltration Rate, in/hr	Controlling DSV, in.	PreDevel. Recharge* DSV*, in.	Pre Development TP Export**, DSV, in.	Pre Development TN Export,** DSV, in.	WPS Recommended DSV,in	Equivalent IC Runoff Control Depth, in.***
Surface Infiltration	Basin, swale, raingarden (i.e., bioretention), permeable pavement	A	8.27	0.39	0.16	0.39	0.39	0.4	2.0
		A	2.41	0.67	0.32	0.67	0.60	0.7	1.7
		B	1.02	0.59	0.37	0.59	0.39	0.6	1.0
		B	0.52	0.73	0.45	0.73	0.42	0.75	1.0
		C	0.27	0.60	0.40	0.60	0.33	0.6	0.65
		C	0.17	0.69	0.49	0.69	0.35	0.7	0.6
		D	0.1	0.60	0.50	0.60	0.25	0.6	0.4
		D	0.05	0.86	0.86	0.80	0.30	0.9	0.3
Subsurface Infiltration	Trench, Chambers, drywell, tree filter retention	A	8.27	0.60	0.23	0.60	0.60	0.6	2.0
		A	2.41	1.00	0.46	1.00	0.80	1.0	1.7
		B	1.02	0.86	0.49	0.86	0.53	0.9	1.0
		B	0.52	0.99	0.60	0.99	0.53	1.0	1.0
		C	0.27	0.81	0.55	0.81	0.38	0.85	0.65
		C	0.17	0.93	0.68	0.93	0.39	0.95	0.6
		D	0.1	0.79	0.72	0.79	0.25	0.8	0.4
		D	0.05	1.25	1.25	1.00	0.22	1.25	0.3

*Predevelopment Recharge based on Water Balance method for Boston MA, 1992-2020 using average annual runoff yields from continuous simulation hydrologic SWMM HRU models of meadow and forested lands for HSGs A, B, C and D. Predevelopment recharge conditions will be met when Infiltration practices are sized (DSVs) to capture

Required runoff reduction values hover around 1 inch

Required design storage volume much less

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The WPS Toolkit

- Suite of materials developed to aid municipalities, designers and other stakeholders in adopting and implementing the WPS

- Toolkit purpose:
  - Motivate municipalities to adopt the WPS
  - Convince stakeholders that meeting the WPS is feasible and practical
  - Assist municipal staff in adopting and implement the WPS
  - Assist designers in efficiently complying with the WPS

- Finalized in November 2025

- Found online: https://snepnetwork.org/watershed-protection-standard-toolkit/