Mapping and Legal Implications of Future Flooding in the Lamprey River Watershed of New Hampshire Due to Changes in Land Use and Climate

### Water Weather Climate Community Sept. 27, 2012

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#### http://100yearfloods.org

#### http://www.granit.unh.edu/

Funded by NOAA Cooperative Institute for Coastal & Estuarine Environmental Technology











#### Lamprey River Watershed, New Hampshire



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#### **5 Decades of Population Growth and Development**



#### 4 Inch Precipitation Events by Decade 1948 - 2007



#### Changing Floodplains with Changing Climate & Land Use



#### **100-year Rainfall Estimates**



Extreme Precipitation Estimates 24hr 100yr TP-40 Rainfall Frequency Atlas used for effective conditions = 6.3" (1938-1957)

Northeast Regional Climate Center Atlas for Extreme Precipitation for current conditions = 8.5"

http://precip.eas.cornell.edu/

#### Hydraulics Model – Calibration & Results – RT108



7,300 cfs (FIS; 6.3") to 10,649 cfs (NRCC 8.5")

 An increase in base flood elevations by an average of 1.9 ft along the 36 mile study reach (FIS compared to 2005)

#### **FIS Cross Section WSE and Discharge Table**

FIS <sup>1</sup>	FIS	FIS	Current	2100CON	FIS	Current	2100CON
Cross	WSE <sup>2</sup>	WSE <sup>2</sup>	WSE	WSE	Discharge	Discharge	Discharge
Section	(ft) <sup>3</sup>	(ft) <sup>4</sup>	(ft) <sup>4</sup>	(ft) <sup>4</sup>	cf/sec	cf/sec	cf/sec
А	32.8	32.1	35.3	38.5	6,000	8,350	13,506
В	33.0	32.3	35.9	39.5	7,300	10,636	17,609
С	33.4	32.7	36.2	39.9	7,300	10,636	17,609
D	32.9	32.2	36.0	39.7	7,300	10,636	17,609
E	38.3	37.6	38.8	42.3	7,300	10,636	17,609
F	39.5	38.8	41.5	45.5	7,300	10,636	17,609
Packer's	Falls Road,	, Durham					
G	53.4	52.7	58.6	63.8	7,300	10,636	17,609
H	53.5	52.8	58.8	63.9	5,600	10,437	17,122
I	53.7	53.0	58.8	63.9	5,600	10,437	17,122
J	54.1	53.4	58.9	64.1	5,600	10,437	17,122
К	54.4	53.7	59.1	64.3	5,600	10,437	17,122

#### Watershed Scale CN and Runoff

Sub Basin	Current 2005 CN	2050 CON Build-out CN	2050 LID Build-out CN	∆Runoff Depth (in) CON-LID
RT27, Raymond	64.1	65.3	64.5	0.07
Langford Rd, Raymond	64.6	66.5	65.4	0.10
Downstream Raymond	67.4	69.9	68.8	0.10
West limit, Epping	66.1	70.1	67.1	0.27
Blake Road, Epping	64.9	66.4	65.6	0.07
RT 101, Epping	64.7	66.7	65.4	0.11
Northern limit, Epping	67.2	68.6	67.7	0.08
USGS Gage 01073500	63.5	65.9	64.6	0.16
Durham & Newmarket	64.6	66.6	66.1	0.08
Pisscassic River	66.5	69.6	68.3	0.16
Macallen Dam	66.5	69.6	68.3	0.14

### **Rainfall – Runoff Relationship based on CN**

Direct runoff (Q), inches



Rainfall (P), inches

# Urban Scale CN, Runoff, and Discharge for 8.5" precip in 24 hrs

Sub-Basin		Current 2005 CN	2005 CON Build-out CN	2050 LID Build-out CN	CON-LID
Мос	onlight Brook, New	market (0.9 s	sq. miles)	OIT	
	CN	68.5	72.4	69.9	2.5
	Runoff Depth (in)	4.5	5.2	4.9	0.3
	Discharge (cfs)	655	759	712	47
Inte	Intermittent Stream, Epping (1.2 sq. miles)				
	CN	70.0	74.6	71.2	3.4
	Runoff Depth (in)	4.4	4.7	4.6	0.1
	Discharge (cfs)	510	551	535	16
	a state and a second				
Intermittent Stream, Raymond (0.9 sq. miles)					
	CN	65.9	68.7	67.6	1.1
	Runoff Depth (in)	4.9	5.5	5.0	0.4
	Discharge (cfs)	1031	1149	1062	87





#### Map Key:

ō	2100 100-Year Floodplains. Conventional Buildout	Lamprey River Watershed Boundar
	Effective Zone AE 100-Year Floodplains: Special Flood Hazard Areas with Base Flood Elevations (BFEs) determined	Lamproy River
	Effective Zone A 100-Year Floodplains: Special Flood Hazard Areas with no Base Flood Elevations (BFEs) determined	Town/County Bounds
A	Effective Cross Sections	Local roads

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#### Technical Notes:

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- 4.What legal stanc met to support re future environmer

#### sexposure of communities 5.What is the potentia if they impose regul . us that are designed to address anticipated future en monmental conditions?

Authority, Measures and Consequences

University of Mississippi

March 2012 Draft

National Sea Grant Law Center Grants Program

Produced by the Vermont Law School Land Use Clinic

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## Lamprey River Watershed http://100yearfloods.org cameron.wake@unh.edu

