

# Lancaster County Roof Greening Project



Presented by Mary Gattis-Schell, AICP  
Lancaster County Planning Commission



# Project Partners

- Lancaster County Planning Commission
- LIVE Green
- Millersville University Department of Earth Sciences
- Lancaster Environmental Center
- Lancaster County Housing and Redevelopment Authority
- Lancaster County Career & Technology Center
- Lancaster County Conservation District
- Sierra Club
- Susquehanna Sustainable Business Network



# What is a Green Roof ?

A ***green roof*** is a vegetated roof cover that is installed on top of an otherwise conventional roof, giving the roof characteristics that more closely resemble a natural environment





# Benefits



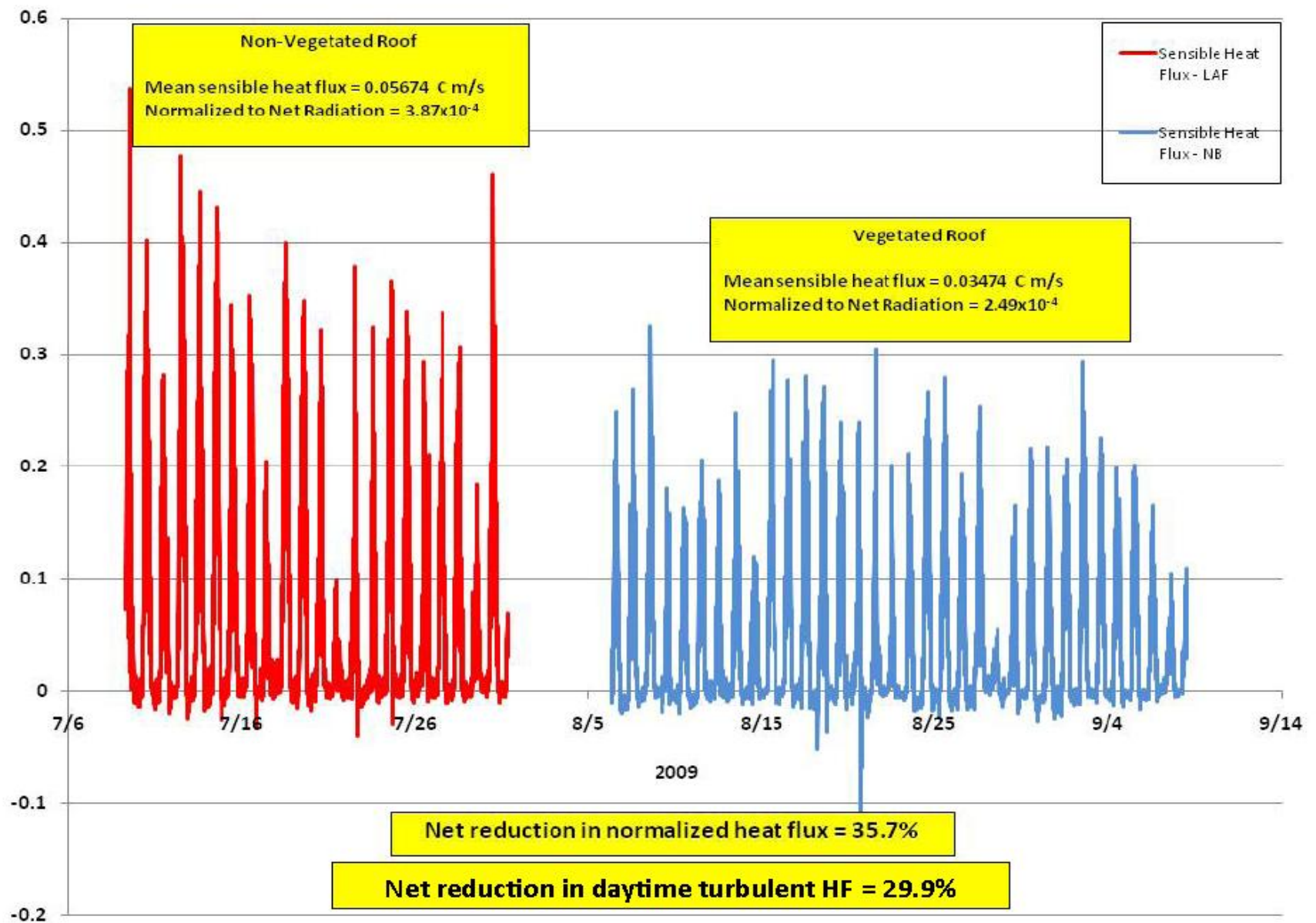
- Energy Conservation
- Stormwater Runoff Reduction
- Environmental Enhancement
- Resource Conservation



# Energy Conservation

- Green Roofs provide additional insulation for the building
- They decrease heating and cooling loads
- They decrease summer temperatures on a roof
- They reduce the “urban heat-island effect”





# Stormwater Management

- Reduces stormwater run-off from 70 to 90 percent
- Delays run-off
- Filters toxins and pollutants from run-off
- Reduces combined sewer overflows
- Minimizes amount of land needed for development





## Surface Water Measurements

- Nitrate concentrations
- Surface runoff
- pH

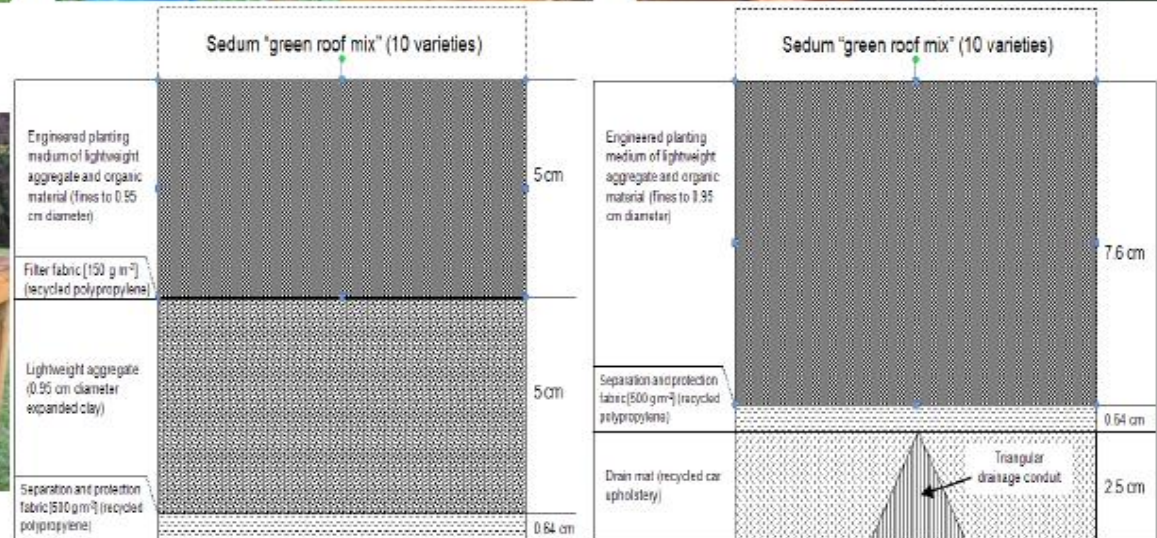
Plot 1  
Standard Roof



Plot 2  
Green roof medium and  
Sedum



Plot 3  
Green roof medium,  
sedum, and drainage  
conduit





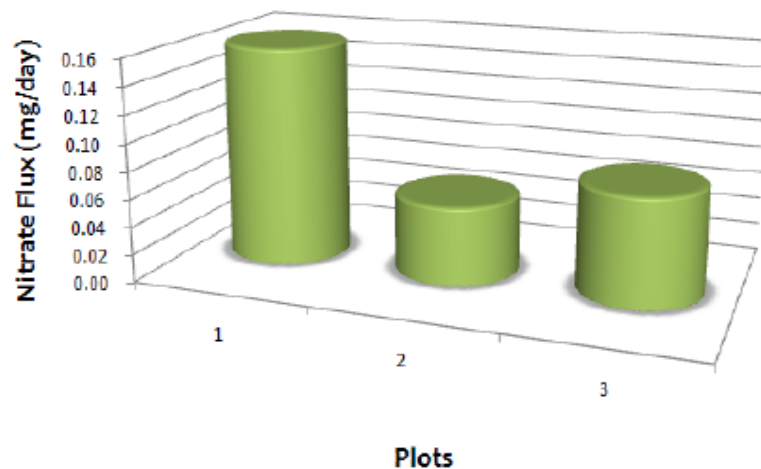
# Comparison of nitrate flux and runoff for the three plots 130 day sample period of 18 August 2009 to 26 December 2009

Plot 1	
Runoff Volume (L) =	61
pH =	5.30
Conductivity ( $\mu\text{S}/\text{cm}$ ) =	41
Lab Blank =	0.014
Measured Nitrate (mg/L)=	0.12
Total Nitrate (mg/L)=	0.11
Runoff (L/day) =	1.4
Nitrate Flux (mg/day) =	0.16

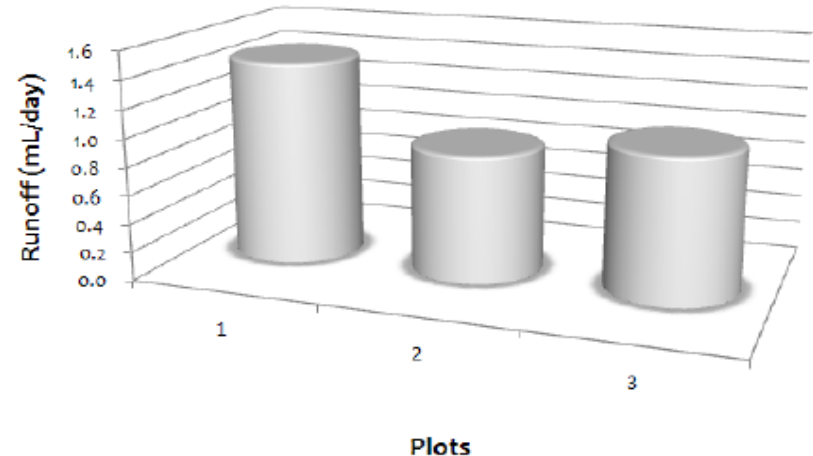
Plot 2	
Runoff Volume (L) =	38
pH =	6.85
Conductivity ( $\mu\text{S}/\text{cm}$ ) =	166
Lab Blank =	0.040
Measured Nitrate (mg/L)=	0.063
Total Nitrate (mg/L)=	0.023
Runoff (L/day) =	0.90
Nitrate Flux (mg/day) =	0.057

Plot 3	
Runoff Volume (L) =	43
pH =	6.74
Conductivity ( $\mu\text{S}/\text{cm}$ ) =	118
Lab Blank =	0.056
Measured Nitrate (mg/L)=	0.077
Total Nitrate (mg/L)=	0.021
Runoff (L/day) =	1.0
Nitrate Flux (mg/day) =	0.078

**Nitrate Reduction**



**Runoff Reduction**



# Conclusions-Water

- Conclusions based on 130 day sample period of 18 August 2009 to 26 December 2009.
- Green roofs modify precipitation from slightly acidic (pH 5.5) to circumneutral levels (pH 6.9).
- Precipitation that infiltrates the green roof media picks up solutes other than nitrate as evidenced in the 63-73% increase in specific conductance.
- Green roofs are capable of reducing the nitrate concentration in runoff by an order of magnitude. That is from 0.47 mg/L in plot #1 to 0.012-0.013 mg/L in the green roof plots.
- Green roofs are capable are reducing the volume of water runoff by 25-28%.
- There is a two order of magnitude reduction in the flux of nitrate attributable to a green roof. That is, a standard roof has a nitrate flux of 17 mg  $\text{NO}_3^-$ /day, while the green roof range is 0.32-0.37  $\text{NO}_3^-$ /day. This reduction in flux reflects the combined effects of both reduction in nitrate concentration and reduction in volume of runoff.





# National Novelty Brush Company

*17,000 SF installed May 2008*



Sept. 2008



April 2009



June 2010





# Franklin & Marshall College

*3,150 SF installed May 2010*



Brooks College  
Commons



Wohlsen Center for the  
Sustainable Environment

Lancaster County  
Roof Greening Project





# School District of Lancaster

*22,000 SF installed June 2010*



Lafayette  
Elementary



Ross  
Elementary



Wharton  
Elementary



# The Groff's Family Funeral Homes

*10,000 SF installed June 2010*



Lancaster County  
Roof Greening Project





# Where can I get more information and assistance ?

**[www.lancasterroofgreening.org](http://www.lancasterroofgreening.org)**

## **Lancaster County Planning Commission**

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## **LIVE Green**

Fritz Schroeder

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