

## Summary of the Messer Pond Watershed Study

This is a summary of the Messer Pond Watershed Study which was prepared by CLD Consulting Engineers. We, the MPPA Board, strongly recommend reading the entire Study as there is much more detailed information to be found there. The Study can be found on the MPPA website.

### **Purpose of the Study**

- Gain better understanding of Messer Pond watershed dynamics and how they will affect the future of the Pond.
- Recommend actions we can take to preserve and improve the Pond.

### **General Information**

- Messer Pond is 69 acres in size with an average depth of 9 ft. and a maximum depth of 20 ft.
- The watershed comprises 1,334 acres extending roughly from Burpee Hill on the north to Maple Lane on the south and from Knight's Hill Road on the east to Tracy Road on the west. (There's a detailed map on the last page of the Study document.)
- About a half mile of I-89 passes through the south and west portions of the watershed.
- Three major streams flow into the Pond:
  - County Road Brook from the north drains the largest of the 8 sub-watersheds.
  - Brown's Brook from the south.
  - Nutter Brook from the southwest.
- A volunteer water quality sampling program has been in place since 1996.

### **Watershed Characteristics and Water Quality**

- Almost all residences have individual septic systems.
- Winter maintenance of Town roads utilizes sand with some salt at times.
- Winter maintenance of I-89 utilizes salt with some sand.
- Impermeable surfaces (buildings, driveways, roads, etc.) cause more runoff; these make up about 6% of the total watershed area and will increase as more development occurs.
- Many road sections in the watershed have ditches which channel storm runoff and other material to streams. Many of our roads are on slopes which results in faster water velocity. Fast moving water can both carry a greater quantity of material and cause channel erosion on its own.
- Historically, runoff has been channeled into brooks and streams resulting in negative impacts to the receiving water bodies. Unchanneled runoff can flow over the land where particles and nutrients can be absorbed by the soil and its vegetation and microbes. Wetlands also act to filter out particles and nutrients.
- Our soils are typically not very deep sandy loams and are susceptible to erosion especially when exposed with no vegetative cover.
- Developed sites where the natural, wooded conditions are left intact have a lower potential for erosion.

### **Observations as Noted from the MPPA Homeowner Questionnaires**

- Concerns over filling in of the Pond by sediment and plants.
- Concerns over poorer water quality due to fertilizers and septic systems.
- Concerns over the impact of new construction.
- What can we do?
- (Refer to the Study for the full list.)

### **Impacts on Messer Pond Water Quality – Sources, Locations, Indicators**

- Shallow depth of the Pond makes it more susceptible to eutrophication.
- Degradation of the Pond can be most influenced by a program to control the input of sediment and nutrients.
- Potential Sources of Negative Impacts to Water Quality
  - Increased development especially on steep slopes.
  - Concentrated road runoff.
  - Concentrated runoff from home sites.
  - Ineffective erosion control during construction.
  - Large impermeable areas close to streams or the Pond.
  - Malfunctioning and improperly located septic systems.
  - Agricultural runoff.
  - Excessive use of lawn fertilizers.
  - Exposed soils with no stabilization or vegetation.
  - Petroleum leakage.
  - Heavy land clearing.
  - Overuse of insecticides or herbicides.
- Most Sensitive Locations in the Watershed
  - Shoreline areas immediate to existing and new shorefront homes (1<sup>st</sup> tier homes).
  - Access roads within the shoreland buffer (within 250 ft. of the water's edge).
  - Second tier homes – homes on the uphill side of a road around the Pond.
  - New developments within the watershed.
  - Roads, particularly steeper roads, anywhere in the watershed.
  - Grazing of animals close to streams.
- Indicators of Negative Water Quality Impacts
  - Sediment buildup in streams and the Pond.
  - Excessive plant growth in the Pond.
  - Water samples indicating high conductivity, phosphorus, nitrates, turbidity or E-Coli.
  - Eroded ditches and swales; culvert washouts.
  - Foul odors.
  - Loss of fish populations; fish kills.

- Sheen on water surface.
- Reduced channel or culvert capacity.
- Lot erosion.

### **Road and Lot Runoff and Erosion**

- This section contains detailed observations and recommendations for roads most affecting Messer Pond and a brief discussion of individual lot runoff.
  - I-89
    - Culvert pipes and a sediment collection pool show sediment buildup and should be cleaned out (NHDOT, MPPA).
    - Salt and sand are used in winter but there's little that can be done here.
  - Forest Acres Road
    - Source of a lot of sand and sediment.
    - Paving not scheduled / budgeted.
    - Remove sand from ditches, shoulders and basins (Town, MPPA).
    - Vegetate shoulders and ditches (Town, MPPA).
    - Slow down and spread the flow of water wherever possible (who?).
  - County Road
    - Steep road; sand washes into County Road Brook and surrounding wetlands.
    - Periodically clean out ditches and catch basins (Town).
  - Rocky Ridge development
    - Low impact design and construction techniques should be followed (Town).
    - Best management practices for erosion control should be implemented at the individual lot level.
  - Woodland Trace
    - Runoff is mostly into wooded areas; not much sand buildup.
  - Roads on the north side
    - Heavy buildup of sand which should be removed (Town, MPPA).
    - Vegetate shoulders and ditches (Town, MPPA).
    - Install sediment basins along the ditches (who?).
  - Individual lots
    - Lot runoff is a significant contributor to overall runoff.
    - Employ methods to disperse runoff from impervious surfaces.
    - Reduce lawn area.
    - Refer to the "Guide to Erosion Control & Stormwater Management for Homeowners & Contractors" available on the MPPA website.

### **Discussion of Volunteer Lake Assessment Program (VLAP) Sampling**

- See the Study report for details but the trends from 1996 to 2007 show a decline in water quality as shown by a variety of measures.

### **Watershed Management & Protection**

- This section discusses eight essential elements in a comprehensive watershed management and protection plan.
- See the Study document for details but it's worth noting that the MPPA is "uniquely prepared to handle many critical [watershed] stewardship programs given their watershed focus, volunteers, low cost and ability to reach into communities."

### **Concerns and Recommendations (and Some Actions Taken So Far)**

- Sediment and sand transport from road runoff.
- Sediment carried in Nutter Brook has formed a delta in the Pond which disrupts the balance in the Pond and contributes to premature aging.
- The impact from Brown's Brook is similar but less extensive.
- Shoreline septic systems. These should be checked for proper function and pumped on a regular basis. The MPPA needs the cooperation of its members and other residents in the watershed to carry out these tasks.
- County Road Brook. Extensive wetlands may ameliorate the effects of runoff but bracketed sampling would help better understand these effects.
- Address sand buildup on local roads by working with the Town and through volunteer efforts. The MPPA Board is arranging a meeting with the Town to discuss sand removal and other watershed issues raised in the report. Pond residents can help by participating in any upcoming planned volunteer efforts.
- Educate homeowners on methods for reducing erosion and dispersing runoff.
- Educate homeowners on proper maintenance and operation of septic systems.
- Develop riparian (shoreline) buffers along and between house sites.
- Request NHDOT to clean out I-89 culverts. The MPPA Board has made this request to NHDOT and they have indicated a willingness to pursue this.
- Add additional water sampling sites to determine sources of nutrient inputs. The MPPA Board and volunteers have already met with NHDES to determine additional sampling sites.
- Observe stream conditions at various times of year and during major rain events to help define problem areas.
- Develop a watershed management plan.
  - Identify sources of negative impacts to water quality.
  - Identify actions to avoid or ameliorate the negative impacts.
  - Prioritize the actions based on a balance between effectiveness, effort and feasibility. Pond residents will play a critical role in implementing these actions through volunteer activities, care and maintenance of their property, use of phosphate-free products, proper lawn care, etc.
  - Continue/expand the MPPA program to measure water quality.