Taking it up a Notch!

LAKE GEORGE STANDARDS AND THE DO’S AND DON’TS OF DESIGN

NORTH COUNTRY STORMWATER TRADESHOW & CONFERENCE

OCTOBER 2022
The Era of Teleconferences is Done, Virtually

Hollywood Squares: 1960’s-1980’s TV

Reality TV?
Virtual Conferences...
Finn : )

Five Year Review
Finn : )
Five Year Review
Finn : )
Five Year Review
Finn : )
Five Year Review
What is the Lake George Park Commission?

The Lake George Park Commission is a NYS agency established to oversee and manage the unique resources of the “Lake George Park” especially the lake’s superior water quality.

To do so, the Commission is conveyed special authority and responsibility by New York State. The Commission’s programs fill critical gaps to ensure the lake’s protection and encourage cooperation among the many public and private entities whose common goal is the lake’s preservation.
The Problem: Stormwater Runoff and Water Quality

- “Nation’s largest source of water quality problems”, EPA

- Pollutants in stormwater runoff are the single largest impact to Lake George water quality and clarity

- Primary pollutants: phosphorus, nitrogen, sediment, chlorides
The Cause: Stormwater Runoff and Water Quality

- Removing vegetation
  - Decreases interception and evapotranspiration

- Impervious surfaces increase runoff:
  - Pollutants are increased
  - Water recharge is reduced
  - Floods more frequent and severe
  - Water temperature increases

- Increased flow causes:
  - Erosion
  - Wider, deeper channels
  - Lower base flow levels

Source: US EPA
Photo Source: https://i.etsystatic.com/17132315/r/il/a4ad8f/3410986446/il_794xN.3410986446_npai.jpg
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Source: US EPA
Photo Source: https://teachengineering.org/content/cub_/lessons/cub_watershed/cub_watershed_lesson01_figure1.jpg
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Source: US EPA
Photo Source: Center for Watershed Protection, "Impacts of Impervious Cover on Aquatic Systems," March 2003
National Trends in Development: Housing Units

Source: US EPA and US Census Bureau
National Trends: Household Size Vs House Size

# of People Per House

Floor Area Per House

Source: US EPA and US Census Bureau
The Impact: National Stormwater Numbers

- Per US EPA, Urban-related stormwater runoff is thought to be responsible for the impairment of:
  - 51,548 miles of rivers and streams
  - 858,186 acres of lakes, reservoirs, & ponds
  - 13,867 square miles of Great Lakes open water
  - Streamflow is altered at 86% of monitoring stations in developed areas.
    - Majority of waters have not been assessed

Source: US EPA
Development in the Lake George Watershed

Pre-1960

1980

2015

Development in the Lake George Watershed

Pre-1960

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2015

27% INCREASE IN YEAR-ROUND HOUSING
within the watershed since 1990. Housing within the communities along Lake George, but outside the watershed, has increased 27%. A significant amount of this growth has occurred in Queensbury.

66% of new housing within the watershed since 1990 is within Bolton, Lake George, and Ticonderoga.

50% of Lake George’s 120,000 acre watershed is protected land, including Adirondack Forest Preserve lands and conservation easements.

6 of Lake George’s 12 communities have Adirondack Park Agency (APA) approved land use plans.

9,900 ACRES (8.2%) OF THE WATERSHED can be described as disturbed or developed. Bolton, Lake George, and Queensbury have the greatest area of disturbance. The Town of Hague and Ticonderoga include substantial disturbance areas as well.

Reductions in water clarity

- Secchi disk data show a decline in transparency over time – 6% lakewide over 30 yrs
- Rate of decline is similar in all basins
- A clear south to north gradient in transparency is present
- Difference of 1.6 m from south to north
- Increased algal production may account for the difference

Increased Chlorophyll Levels Observed

- Chlorophyll increased lake-wide by 33% over 30 years
- Indicative of increased primary productivity
- Chlorophyll levels show a strong south to north gradient
- The differences between basins are increasing over time

Trends in Water Quality Correlate with Development

- Similar to water quality, land development has a strong south to north gradient
- In the south basin, 19% of the watershed contains 43% of the hardscape
- Areas of decreased water quality are associated with greater development

What we do?... Take it up a notch!
Watershed-Based Stream and Stormwater Regulations

- SW Effective September 1990

- Key Elements
  - Low Threshold of Jurisdiction
    - 1,000 sqft of new impervious area, or
    - 5,000 sqft of land disturbance
  - Post Construction SWCM’s Limiting Offsite Impacts through onsite Volume Control

1. Prepare a Project Plan: a scale drawing showing key features of the site.
   - The project plan can be developed from a top map, site survey, or other accurate drawing of the site. The property and boundaries should be accurate in scale.
   - The project plan should include:
     - A line showing the limit and location of parcels that will be cleared for buildings, driveways and lawns.
     - The location of all structures, existing and proposed (house, shed, garage, etc.), include driveways, parking areas, any other impervious surfaces, well and septic system.
     - The location of property boundaries, any streams, or wetlands, and separation distances of structure(s) to any water body or stream.
     - Indication whether property soil is normally wet or dry, and the beginning of the property in relation to any water body or stream.

2. Calculate the newly created impervious area:
   - Identify the newly created impervious areas. Note on the plan the area of each proposed structure and impervious surface (garden, walkway, etc.) and calculate the sum of the areas. For example:
     - 10' x 30' driveway = 300 sq.ft.
     - 20' x 42' building footprint = 840 sq.ft.
     - 20' x 20' shed = 400 sq.ft.
     - 6' x 60' walkway = 360 sq.ft.
   - Total impervious area = 2,700 sq.ft.

3. Calculate the volume of stormwater runoff:
   - For small and medium size projects, simply multiply the total square footage of newly created total impervious surface by 1.5 gallons.
   - For Example:
     - 2,700 sq.ft. x 1.5 gallons/sq.ft. = 4,050 gallons
   - This volume is used to size the stormwater control storage devices. Information about selecting stormwater storage devices follows.

4. Identify/choose the stormwater and erosion control measures. (see page 66)

5. Size and place the selected stormwater control measures. (see page 74)

6. Add stormwater and erosion control measures to the project plan. (see page 9)
Commission Stormwater Regulations

- **Minor Projects**
  - <15,000 sqft land disturbance
  - Infiltration Device Performance:
    - 1.5 gallons / sqft Impervious Area

- **Major Projects**
  - >15,000 sqft land disturbance
  - Akin to Full SWPPP
  - Infiltration Device Performance
    - 10-yr/24-hr Storm Volume
    - 25-yr/24-hr Storm Rate
  - Retrofit existing development
Bending The Curve

- For the first time in 20+ years, the Commission conducted a full evaluation of its regulations
- Current condition still leads to slow decline
- How do we change?

- NEW Stream Corridors
- SW Device Setbacks
- Fertilizer Restrictions
- SW Retrofits
AA-S Stream Corridor Regulations

- Multiple benefits of stream buffers
  - Reduce sediment, nutrients, stream bank erosion, flood impacts, stream temps, etc.

- New 35' Stream Corridor Standards
  - Permit required for activity in corridor
  - Cutting Restricted – 30% or 75' max
  - Impervious Area <100 sqft
  - Pervious Hardscape < 400sqft

- Removal Efficiency:
  - TSS: 70 - 98%
  - Total P: 46 - 79%
  - Total N: 48 - 74%
Multiple benefits of stream buffers:
- Reduce sediment, nutrients, stream bank erosion, flood impacts, stream temps, etc.

New 35’ Stream Corridor Standards:
- Permit required for activity in AA-S stream corridor
- Cutting Restricted – 30% or 75’ max
- Impervious Area < 100 sqft
- Pervious Hardscape < 400 sqft

SHORELINE CUTTING RESTRICTIONS

Except to allow for the removal of diseased vegetation and rotten or damaged trees, all vegetative cutting on a parcel with shoreline on a lake, pond, or navigable river or stream must comply with the following restrictions:

(a) Within 35 feet of the mean high-water mark, no more than 30 percent of the trees in excess of six inches diameter at breast height (4 1/2 feet above ground) may be cut over any 10-year period.

(b) Within 6 feet of the mean high-water mark, no more than 30 percent of any vegetation may be removed.
Multiple benefits of stream buffers
- Reduce sediment, nutrients, stream bank erosion, flood impacts, stream temps, etc.

New 35’ Stream Corridor Standards:
- Permit required for activity in corridor
- Cutting Restricted – 30% or 75’ max
- Impervious Area <100 sqft
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Removal Efficiency:
- TSS: 70-98%,
- Total P: 46-79%
- Total N: 48-74%

Table 2: Removal of Total Phosphorus by Grass Buffers.

Table 3: Removal of Total Nitrogen by Grass Buffers.

Source: “A Review of the Scientific Literature on Riparian Buffer Width, Extent, and Vegetation”, 1999, Wenger
AA-S Stream Corridor Regulations

Crossings and Culverts
- No channelization or piping of streams except for approved utility/road crossings (no burying streams)
- # of Crossings Limited to one per site, and for logging one per 1,000ft of stream
- Crossing max width: Driveways 20’, Roads 30’

Crossing Design Review by DEC
- Culverts embedded 20% to mimic natural bottom
- Structures shall span 1.25x the stream bed width
- Structures shall not impound 10-yr storm
- 50-year peak storm event passage required
Old Regs Waterbody Setbacks
- Previously no setback for infiltration devices on smaller projects (<15,000sqft)
  - Devices placed in riparian areas
  - Limited overflow protection between devices and waterbodies
  - Reduced the benefits of the riparian areas
    - Loss of mature vegetation
    - Less contact time for surface and subsurface filtration and volume reduction

Updated Regs: 35’ setback
- All infiltration devices servicing new development have a minimum 35’ setback to waterbodies
- 100’ setback to remain for areas subject to high traffic (roads, commercial parking lots)
- Protects shoreline buffers/corridors (APA & LGPC)
Fertilizer Restrictions

- No lawn fertilizer applications within 50 feet of a waterbody
- Will help reduce phosphorus and nitrogen inputs from lawns
- Apply Queensbury and Lake George fertilizer code to the entire watershed
Retrofits: Make it Better

- Apply existing retrofit standard to all jurisdictional projects
  - Previously only applied to Major Projects, extended to Minor Projects
  - Infiltrate existing stormwater from a site
  - Devices sized for minimum volume control of 0.5” from all impervious areas

- Simple fixes
  - Trenches
  - Swales
  - Rain gardens

- Low cost, great impact
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Bending The Curve

- Each proposed element is a simple, common sense, balanced approach
  - Stream Corridors
  - Infiltration Device Setbacks
  - Fertilizers
  - SW Retrofits
- Not overly burdensome to landowners
- In concert, these items will collectively strengthen improve long-term water quality
Quiz Time!!

- In the last 10+ years, only two applications received a permit without any request for modification or clarification...

- What two firms accomplished this?
  - A) Chazen & EDP
  - B) Jarrett Engineers & LA Group
  - C) SRA & Trudeau
  - D) DeFranco & Hutchins Engineering
  - E) Trick Question – It’s never happened!

Photo Source: https://www.liveabout.com/best-game-show-catch-phrases-1396892
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What two firms accomplished this?

- A) ----
- B) ----
- C) ----
- D) DeFranco & Hutchins!!!
- E) ----
Small Site Hydrology Crib Notes

- GET THE H₂O IN THE GROUND
  - Impermeable Liners
  - Underdrains

- LIVING ON THE EDGE
  - Retaining walls
  - Exempt Disturbance
  - Trench on a hill

- HAVE A BACK-UP PLAN
  - Permeable Pavers
  - Weirs

- COMMUNICATION
  - Soils
  - Device Sizing

- STAY HOME
  - Treat close to the source
  - Shared Devices
The Do’s and Don’ts

- **Get Water into the Ground**
  - **Do!**
  - **For How Long?**
    - For-eh-ver
  - **Don’t** design or construct things that will preclude or short circuit infiltration
The Do’s and Don’ts: Get it in the Ground

- **Impermeable Liners**
  - Don’t Diaper Your Device!
    - Unless you need the protection
  - When are they appropriate?
    - That Depends (HA!!!)
      - Hotspots – Gas Station
  - Do you need volume control via infiltration?
    - Lose the liner!

Photo Source: https://www.phe-online.com/v/vspfiles/photos/KBC19-Men-2.jpg
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Photo Source: https://i.pinimg.com/736x/7a/51/4f/7a514f8e760ef94050fbb4e1f98de80.jpg
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  - Don’t, Unless you need the protection
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    - That Depends (HA!!!)
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Diagram:
- 5:1 side slopes, typ.
- 6" max. ponded water depth
- 18" soil media
- 12" washed stone
- 4"Ø underdrain
- Undisturbed subgrade
- Mulched with leaf compost or shredded wood; no wood chips
- 12" domed riser with domed grate
- Impermeable geomembrane liner surrounding system
- Drain to daylight
The Do’s and Don’ts: Get it in the Ground

- **Underdrains**
  - **Don’t Andy Dufresne the Device!**
    - Daylighted Underdains Short Circuit Infiltration
    - Footing drains can act similarly

Photo Source: https://www.independent.co.uk/arts-entertainment/films/news/this-is-how-long-andy-s-tunnel-was-in-the-shawshank-redemption-a6874701.html
Photo Source: https://miro.medium.com/max/1400/1*7Xj8dAH1GmxiD6A5yM_jn1g.jpeg
The Do’s and Don’ts: Get it in the Ground

- **Underdrains**
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The Do’s and Don’ts: Get it in the Ground

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  - Don’t Andy Dufresne the SW!
  - Daylighted Underdrains Short Circuit

[Diagram of Underdrains]

*Photo Source: https://www.independent.co.uk/arts-entertainment/films/news/this-is-how-long-andy-s-tunnel-was-in-the-shawshank-redemption-a6874701.html
Photo Source: https://miro.medium.com/max/1400/1*Xj8dAH1GmxlDAy3M_jn1g.jpeg*
The Do’s and Don’ts: Living on the Edge

- **Retaining Walls**
  - Some Walls are Good & Necessary
  - Don’t put a device behind them
    - Structural instability
    - Drainage short-circuits infiltration
    - Indicates the design is not working with the land

Photo Source: https://cdn.shopify.com/s/files/1/0361/2200/1543/products/pink_ef1444ae-3d38-4602-bbfe-e066068192e7_700x.jpg?v=1654914767
Photo Source: https://2.bp.blogspot.com/-RUW50tOC-8/9/WhHRs173EI/AAAAAAAAARoU/oBppUBw9kJPsmsmGyEwaoksVBQKISWOhs1zgCLeBGAs/s1600/Thre%2B%2BGreat%2BWalls%2B%2Bmonster%2B%2B%2B%2BQueen.jpg
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The Do’s and Don’ts: Living on the Edge

- **Do**
  - Depict and note the limits of land disturbance

I Find Your Lack of Faith

Disturbance Limits Disturbing

Photo Source: https://us-tuna-sounds-images.voicemod.net/e091e343-00ea-4385-aef0-4a19c2870750.jpg
The Do’s and Don’ts: Living on the Edge

- **Do**
  - Depict and note the limits of land disturbance
  - Do differentiate between land disturbance that counts toward project classification and that which is exempt

- **Don’t**
  - Exempt extraneous grading
  - Design infiltration devices that behave as conveyances (e.g. trench on a slope)
The Do’s and Don’ts: Living on the Edge

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The Do’s and Don’ts: Have a Back-Up Plan

**Permeable Pavers**

- **Do**
  - Have a Plan for when they Back-Up
    - Overflow mechanism
    - Contingency plan for surface blinding
  
- **Don’t**
  - Don’t put them in a place where you can’t infiltrate - separate from SWGW and Bedrock
The Do’s and Don’ts: Have a Back-Up Plan

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**Weirs**

- **Do**
  - Use Weirs
  - Weirs are great!
    - Johnny
    - Bob
    - Weir-d Al

- **Don’t**
  - Assume that water will safely and diffusely overflow on its own

Photo Source: https://66.media.tumblr.com/402fec34e09038d6827b692915302384/tumblr_inline_mgaaoyEjobhryshh2.jpg

Photo Source: https://s.yimg.com/ny/api/res/1.2/sQ8dtWv_6A3WLj2w7f.y6w--~A/YXBwaWQ9aGlnaGxhbmRlcjtzbT0xO3c9ODAw/https://media.zenfs.com/en/gq-402/82182903af25e3164564692cd90a06f3

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The Do’s and Don’ts: Communication

Gotta See the Baby Soils!

- **Do!**
  - Show test pit locations
  - Show results
  - Presence/Absence & Depth to SHGW & BR

- **Don’t**
  - Rely on soil maps
  - Use test pits located far from the device
  - Ask to do test pits after the permit
The Do’s and Don’ts: Communication

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**TEST PIT #1 (DTP #1) DATA (6/28/2020)**

- **DTP #1**
  - 0–3” - TOPSOIL
  - 3”–48” - YELLOW SAND
  - 48”–60” - DARK BROWN SAND W/ FRAGMENTED CHunks OF STONE

- ROOTS @ 48”
- SHGW @ 48”
- NO EVIDENCE OF LEDGE / BEDROCK
The Do’s and Don’ts: Communication

- **Device Sizing**
  - **Do**
    - Show your Calculations
    - Right-Size your device based on the tributary area
  - **Don’t**
    - Assume that because all the devices cumulatively meet the volume requirement that they are individually sized correctly
The Do’s and Don’ts: Communication

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The Do’s and Don’ts: Stay Home

- **Stay Close to Home**
  - **Do**
    - Treat SW Close to the Source
  - **Don’t**
    - Concentrate water and convey it to an end of pipe solution
The Do’s and Don’ts: Stay Home

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The Do’s and Don’ts: Stay Home

Sharing Devices

- Don’t
  - Share devices unless you have to
    - Too many hands in the pot
    - Associations are not well known for their professional and efficient functioning...
Thank you!
Keep up the good work!

Joe Thouin, Environmental Analyst
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Photo courtesy of Carl Heilman
Photo Source: http://e.lvme.me/k9rb7r5.jpg