


1

Protecting New York's Natural Resources with

Better Construction Site Management

NYS Department of Environmental Conservation
Division of Water 

2


AGENDA

- Stormwater Construction Permit Regulations
- Contractor Responsibilities and Construction Permit Requirements
- Construction Site Inspections
- Erosion and Sediment Control
- Winter Site Operations

3

It all starts with Stormwater Runoff


Stormwater flows from rooftops, over paved areas, bare soil and lawns – it picks up litter, sediment, pesticides, fertilizers, chemicals from automobiles, bacteria from animal waste and other pollutants.



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Why is Stormwater a Concern?

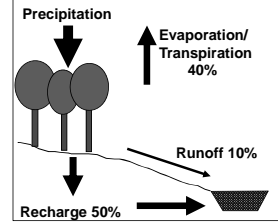
Untreated stormwater runoff can create significant environmental and public health and safety problems.



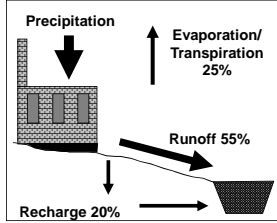
Polluted runoff is one of the Nation's greatest threats to clean water

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Undeveloped Conditions




Highly Developed Conditions



Stormwater runoff is a natural part of the hydrologic cycle ... but as land use changes, runoff can increase, resulting in erosion, pollutant transport, sedimentation, loss of aquatic habitat, & other damages.

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Basic concept: We no longer want to pave over as much as possible and send water down the pipe as fast as we can



Stormwater Runoff from Construction ⁷

1 acre of land cleared for development → 10 tons of eroded sediment per year

1 acre of impervious cover → 1 million gallons of runoff per year

The U.S. loses 600 million tons of sediment per year. That is enough to cover more than 400 football fields per day to a depth of 1 foot.

Sediment runoff from construction sites is 10 to 20 times greater than from agricultural lands



Stormwater Impacts from Erosion and Sedimentation ⁸

Property Damage
Damage to Roads and Bridges
Beach & Shellfishing Closures



Loss of Aquatic Habitat
Drinking Water Contamination
Streambank Erosion

How Can You Minimize Stormwater Impacts on your Construction Site? ⁹

1. Protect Natural Resources During Construction
2. Divert “run-on” from off-site sources
3. Implement and Maintain *Erosion and Sediment Control*
4. Manage Stormwater Runoff

Why Do We Have to Do This? ¹⁰

- Stormwater Management is mandated by the US Environmental Protection Agency (EPA)
 - Required by the 1987 Amendments to Clean Water Act
- Implemented in NYS by the DEC and regulated municipalities
- NYS DEC issued “General Permits” to regulate stormwater discharges from construction sites and municipalities

New York State Pollutant Discharge Elimination System (SPDES) Stormwater General Permits ¹¹

SPDES General Permit for Stormwater Discharges from Construction Activity

Regulates **Construction Activities** that disturb 1 acre or more of land

SPDES General Permit for Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s)

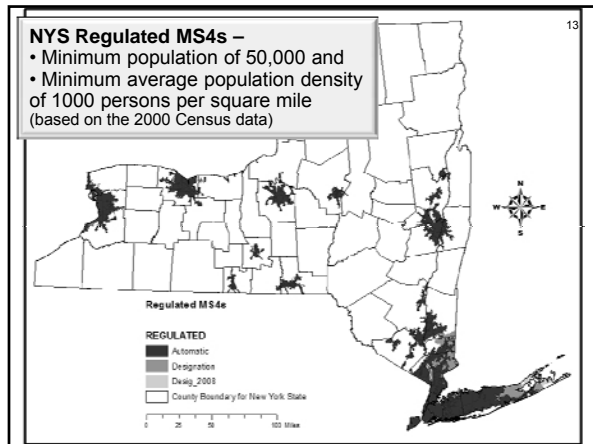
Regulates **MS4s** located in “urbanized areas”

Municipal Separate Storm Sewer System (“MS4”) ¹²

A conveyance or system of conveyances owned by a State, City, Town, Village, or other public entity that discharges to the Waters of the United States and is:

- designed or used to collect or convey stormwater (includes gutters, pipes, ditches)
- not a combined sewer
- not part of a Publicly Owned Treatment Works (i.e. sewage treatment plant)





Regulated MS4 Stormwater Management Program

1. Public education and outreach
2. Public participation & involvement
3. Illicit discharge detection and elimination
4. **Construction site runoff control**
5. Post-construction site runoff control
6. Pollution prevention & good housekeeping of municipal operations

Even if a project doesn't need any permits... It can cause a water quality violation →

All site operators and contractors should:

- Take all reasonable steps to prevent unpermitted discharges
- Practice erosion and sediment control and “good housekeeping”

Article 17 of the NYS Environmental Conservation Law:

Turbidity Violation: a substantial visible contrast to natural conditions

Subject to Penalties up to \$37,500 per day for each violation

Phase II Stormwater Construction Permit

Stormwater Construction Permit

Who Needs a Permit?

- Anyone disturbing **1 acre** or more of soil (about **208' x 208'**)
- Even if the soil is not all exposed at the same time
- Including single-family homes in subdivisions
- Sometimes smaller projects, in protected watersheds or sensitive areas

Soil Disturbing Activities Requiring Permit Coverage

- Grading
- Excavating
- Filling
- Soil Stockpiling
- Demolition*
- Clear-cutting*
- Grubbing and Stump Removal
- Construction

** If done in preparation for construction, these activities require a permit*

Ineligible Construction Activities ¹⁹

Construction activities that are ineligible for coverage under the General Permit (they must obtain an individual permit):

- Residential, commercial or institutional projects that disturb 1 or more acres of steep slope* and are tributary to AA and AA-s classified waters (unfiltered drinking water)
- Roadway or linear utility projects disturbing 2 acres or more on steep slopes* tributary to AA or AA-s waters

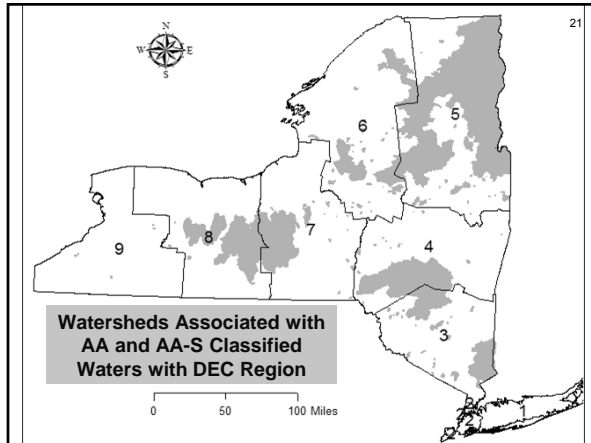


Ineligible Construction Activities ²⁰

* Steep slope = 25% or greater

<http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

AA classified waters will be added to DEC Stormwater Interactive Map



Ineligible Construction Activities ²²

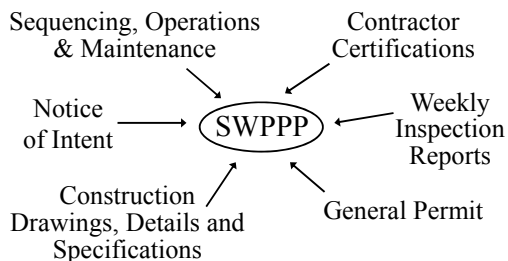
Construction activities ineligible for coverage the General Permit:

- Construction activities adversely affect property listed or eligible for listing on the State or National Register of Historic Places
 - NYS Historic Preservation Act, Section 14.09
- <http://nysparks.state.ny.us/shpo/resources/index.htm>



General Permit Requirements: ²³

Develop a plan for managing runoff and controlling erosion & sedimentation



Purpose of the SWPPP ²⁴

Protect on-site and off-site resources and waterways by:

- Minimizing Erosion
- Controlling Volume and Peak Rate of Runoff
- Reducing Channel Erosion
- Improving Water Quality
- Reducing Flooding



SWPPP Components 25

Single-family Residential and Agricultural construction:

- disturbance between 1 and 5 acres, and
- 25% or less impervious cover, and
- not discharging directly to an impaired waterbody listed in Appendix E of the general permit, and
- not located in a watershed identified in Appendix C of permit
- ✓ includes Erosion and Sediment Control Plan

All other construction projects disturbing 1 acre or greater*:

- ✓ includes Erosion and Sediment Control Plan
- ✓ and Water Quality and Quantity Control Plan

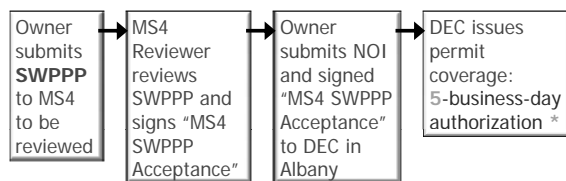
* Some grading or linear construction projects only require Erosion and Sediment Controls – see Appendix B of the General Permit

I'm only building one house in a subdivision – why do I need a permit? 26

A “larger common plan of development” is a situation in which multiple construction activities are occurring, or will occur, on a contiguous area (such as a residential subdivision or business park)

- Total disturbance of one or more acres **but not necessarily all at once**
- One Full SWPPP prepared for **entire subdivision**
- Notice of Termination filed after ALL lots are developed and stabilized

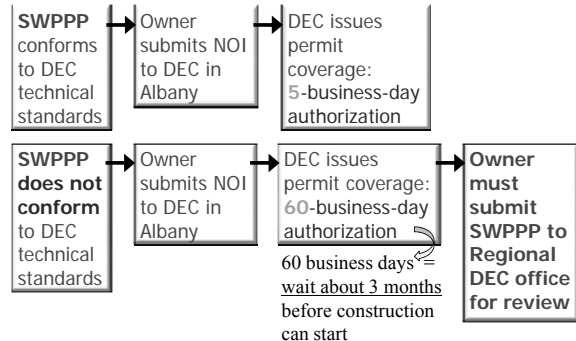
Obtaining Permit Coverage – Projects within Regulated Traditional Land-Use Control MS4s 27



To find MS4 boundaries, check the Stormwater Interactive Map at: <http://www.dec.ny.gov/imsmaps/stormwater/viewer.htm>

* Permit coverage begins in 5 business days (including projects with SWPPPs that are not in conformance with technical standards – **IF the MS4 reviewer accepts it**)

Obtaining Permit Coverage – Projects Not Located in Regulated MS4s 28



Construction Permit Paperwork 29

must be available at the construction site at all times



- Stormwater Pollution Prevention Plan (SWPPP) including construction drawings and plans
- Notice of Intent (NOI) signed by owner and SWPPP preparer
- NOI Acknowledgment Letter from DEC
- General Permit GP-0-08-001
- MS4 SWPPP Acceptance Form
- Site Log Book including certifications, site inspection reports, SWPPP updates
- Letter of permission to disturb > 5 acres (some projects)

Contractor Responsibilities 30

- All contractors and sub-contractors involved in SWPPP implementation activities must sign a certification statement agreeing to implement and maintain the control measures identified in the SWPPP
- Contractors shall begin implementing corrective actions identified during site inspections within one business day of notification and complete corrective actions in a reasonable time frame



★ Violators may incur fines of up to \$37,500 per day for each violation

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Contractor Certification Statement

I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the New York State Pollution Discharge Elimination System (SPDES) general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a _____ of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of State of New York and could subject me to criminal, civil and/or administrative proceedings.

Name _____ Title _____
 Signature _____ Date _____
 Contractor Address _____ Phone _____
 Project Name _____ Site address _____
 Provisions Responsible for _____

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Contractor Responsibilities: Stabilization and Maintenance


Seed and Mulch disturbed soil areas within 14 days

Remove sediment from silt fences, sediment traps and ponds when the capacity is reduced by 50%



Maintain Erosion and Sediment Controls throughout building/home construction (not just during road construction phase)

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Contractor Responsibilities: Construction Sequencing

- » Install runoff & sediment controls **before** grubbing and grading
- » Apply temporary stabilization no more than 14 days after grading inactivity
- » New Sequence for each phase

Phasing


- » Completely stabilize exposed soil in one phase of construction before moving to the next phase
- » Limit the extent and duration soil is exposed

» Avoid clearing vegetation until absolutely necessary!

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Will you be disturbing greater than 5 acres at one time?

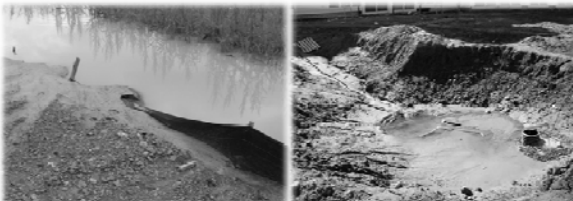
- Requires written authorization from DEC Regional Office or regulated, traditional land use control MS4
- 2 site inspections per week separated by 2 full days
- Soil stabilization required within 7 days
- Requires phasing plan & cuts and fills plan



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Contractor Responsibilities: Construction-Duration Maintenance

- Plan defines frequency of inspection and monitoring
- Identifies who inspects the erosion and sediment control practices (every day before you leave the site!)
- Specifies thresholds for maintenance
- Identifies who is responsible for maintenance




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Contractor Responsibilities: Pollution Prevention Measures

- Fuel, paints and solvents containment
- Spill prevention and spills response
- Temporary sanitary facilities
- Litter control
- Dust control

No secondary containment = spills and possible surface water or groundwater contamination



Contractor Responsibilities: Construction and Waste Materials Storage and Control ³⁷

- Designated spoils and waste disposal areas
- Concrete truck washout area
- Locate waste away from sensitive areas
- E&SC for borrow and spoil areas



Contractor Training ³⁸

- Owner shall identify contractor(s) responsible for SWPPP implementation
- Contractor(s) shall identify at least one individual trained in Erosion and Sediment Control by April 30, 2010
- Trained individual must be on site on a daily basis during soil disturbance activities starting May 1, 2010
 - 4 hours of training in E&SC required every 3 years
 - Only DEC-endorsed training accepted



Why controlling Stormwater Runoff should matter to the Construction Industry: ³⁹

Bare Soil + Precipitation = \$\$\$



- Cleanup costs
 - Lost work days
 - Materials and equipment replacement costs
- = \$\$\$



and . . .

Water Quality Standards Violation
and potential fines from DEC
= more \$\$\$

Construction Site Inspections ⁴⁰

Construction Site Inspections ⁴¹

- Owner/Operator's Site Inspection
- DEC Compliance Inspection
- Municipal Site Inspection (MS4s)



Owner/Operator's Site Inspections ⁴²



This fiber log has NOT been applied properly!

Must be performed by a Qualified Site Inspector:

- Licensed Professional Engineer
- Registered Landscape Architect
- Certified Professional in Erosion and Sediment Control
- or a trained technician working under the *direct* supervision of a licensed P.E. or L.A.*

* Must attend 4-hour training

Today's course does not qualify contractors to conduct site inspections

Qualified Inspector's Site Inspections ⁴³

On sites with 5 acres or less exposed:

- **At least one inspection required every 7 days**

On sites with greater than 5 acres exposed:

- **Required at least twice every 7 days, separated by 2 full days**

Inspection Reports must be kept on site



Within 1 business day, the Qualified Inspector must notify the owner and contractors of any corrective actions that need to be taken

Inspections for Stormwater and Erosion & Sediment Controls ⁴⁴

Purpose – to assure that:

- The approved stormwater and erosion & sediment control measures are being implemented
- Implementation deficiencies are identified and addressed
- The site is being kept in compliance with State and Local regulations.



What your inspector looks for: ⁴⁵

- Are E&SC measures installed per SWPPP?
- Are E&SC measures being maintained?
- Are Phasing and Sequencing Plans being followed?
- Are inactive areas stabilized?
- Are permanent stormwater control measures in place?
- Is there a discharge to receiving waters?
- Are there signs of a water quality violation (turbidity, sedimentation, or an oil sheen)?



Temporary Shutdown ⁴⁶

If you need to temporarily shut down the site you may reduce inspection frequency if you:

- First notify the DEC Regional office
- Implement temporary stabilization on all disturbed areas
- Perform at least 1 inspection every 30 days
 - Weekly inspections must resume when soil-disturbing activity resumes
 - Weekly inspections must resume if a permit violation occurs

Proper temporary stabilization means that exposed soil has been covered with mulch, seed and mulch, geotextile or erosion control mats to prevent the soil from eroding. ⁴⁷

↓ **This is NOT properly stabilized!**




Termination of Coverage (NOT) ⁴⁸

When a site has been fully stabilized* the permittee (owner/operator) must submit a Notice of Termination form to the DEC to terminate coverage of the SPDES Permit

- Qualified Inspector(s) shall sign NOT certifying final stabilization and that post-construction stormwater management practices have been constructed in accordance with the SWPPP
- Owner or operator must also sign NOT
- Owner shall ensure maintenance commitment, identify responsible party on NOT

Final Stabilization 49


- * All construction and soil-disturbing activity has been completed
- * A uniform perennial vegetative cover with a density of 80% has been established on all unpaved areas, or permanent stone surface is implemented
- * Post-construction controls have been constructed, are operational, and conform to the SWPPP
- * Temporary structural E&SC measures have been removed
- * A Qualified Site Inspector (hired by the permittee) certifies on the NOT that the site has been stabilized



These sites are not stabilized – cannot file NOT 50




NYS DEC Compliance Inspection 51



Purpose:

- Document Permit Compliance
- Evaluate SWPPP Performance
- Provide Technical Guidance Materials
- Protect Water Resources

NYS DEC Compliance Inspection 52




Site Selection:

- Citizen Complaints
- Non-Compliant Site Inspections
- Unannounced Random Inspection
- High Risk Sites
 - > 5 acre disturbance approval
 - poor soils and/or steep slopes
 - proximity to water resources
 - prior history
 - large-acreage sites
 - sensitive watersheds/pollutants of concern

DEC Inspection Rating 53

“Marginal” or “Unsatisfactory” rating


- Implementing non-compliant practices
- Gross failure to implement SWPPP
- Failure to maintain E&SC practices
- Over 5 acres disturbed without prior DEC or MS4 authorization
- Inactive areas not stabilized within 14 days (7 days for > 5 ac.)



DEC Inspection Rating 54

“Marginal” or “Unsatisfactory” rating

- SWPPP/SPDES permit/inspection reports not kept on site
- Weekly self-inspections not being conducted
- Contractors not implementing corrective actions outlined by self-inspector
- Water quality standards violation – “Unsatisfactory”



Follow-Up on Non-Compliant Sites ⁵⁵

- Letter to owner / consulting engineer / contractor / municipality asking for permit compliance through voluntary measures and corrective actions
- Follow-up inspection with all interested parties

If remediation is unsatisfactory:

1. Meeting with DEC Regional staff to discuss deficiencies and set compliance criteria
2. Notice of Violation
3. Stop Work Order and assessment of penalty



Tips for a successful DEC Inspection ⁵⁶

- Follow NYS Technical Standards for Erosion and Sediment Control
- Follow SWPPP
- Follow Construction Sequence schedule and Phasing Plan
- Conduct weekly and “wet-weather” inspections
- Maintain Erosion & Sediment Control practices
- Ask for guidance!

Municipal Construction Site Inspection ⁵⁷

Municipalities in regulated urban areas (MS4s) must conduct periodic site inspections.

Municipalities may:

- Require a SWPPP as part of building permit issuance
- Withhold building permit or Certificate of Occupancy if site does not meet requirements or pass inspection
- Issue Stop Work Orders and assess penalties



Nobody ever plans to fail, but:

- If Erosion and Sediment Controls are not maintained...
- If Stormwater Management facilities are not functioning properly...

... the owner, the contractor, and the municipality* may be financially and legally responsible for damages!

** applies to Regulated MS4s*



What this all means to Contractors ... ⁵⁹

- Make sure the project you are working on has permit coverage before you start any soil disturbance – ask the site owner for a copy of the DEC “Acknowledgment Letter”
- Sign the “Contractor Certification Statement” before you start work
- Follow the Stormwater Pollution Prevention Plan (SWPPP) and construction sequence and phasing plans
- Inspect the site daily to be sure Erosion and Sediment Control measures are effectively controlling sediment and runoff
- Notify the site owner/operator if something in the SWPPP doesn’t perform as it was intended


Erosion and Sediment Control ⁶⁰

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E&SC Basics


Erosion Controls

- 1st line of defense
- Prevent erosion thru soil stabilization and runoff controls
- Relatively easy and very effective



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E&SC Basics

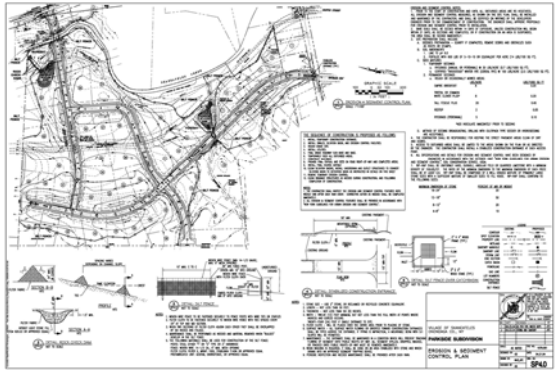


Sediment Controls

- Last line of defense
- Remove sediment from water
- Very challenging

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E&SC Construction Plans



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E&SC Construction Plans

- Description of temporary and permanent structural and vegetative measures for soil stabilization, runoff control and sediment control

For example:

- Annual ryegrass will be applied at a rate of 100 lbs./acre
- Permanent rock check dams shall be constructed of 2" to 9" angular limestone with the downslope dam crest even with the upslope dam toe
- Silt fence and orange snow fence will be installed along the 100-foot wetland adjacent area before clearing and grubbing

65

E&SC Construction Plans

- Implementation and Maintenance Schedule for E&SC measures, including timing of placement and minimum time frame each practice will remain in place

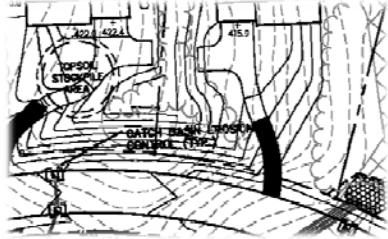
For example:

- Bare soil areas will be seeded and mulched within 14 days of the last grading activity in that area
- Contractor will keep pavement areas free of soil and debris
- Sediment trap #1 will be constructed before dry swales

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E&SC Construction Plans

- Construction drawing(s) showing specific locations, size and length of each erosion and sediment control practice

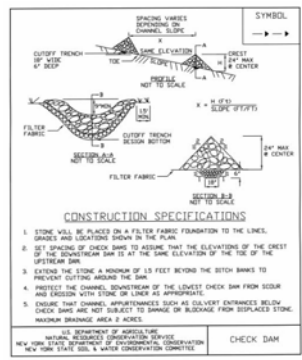


E&S Construction Plans

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- Material specifications, dimensions and installation details

Must be in conformance with the **New York State Standards and Specifications for Erosion and Sediment Control ("Blue Book")**



Example Specifications Silt Fence

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STANDARD AND SPECIFICATIONS FOR SILT FENCE



- Maximum drainage area = 1/4 acre (100 ft. by 100 ft.) per 100 feet of fence
- Steeper slopes = closer silt fence spacing
- Installed perpendicular to the direction of flow
- Never installed in channels or ditches

Submittals
A complete set of drawings shall be submitted as the contract is to be executed showing the location and spacing of all silt fences to be installed on the site.

Installation
The spacing of all silt fences shall be determined by the contractor in accordance with the specifications and the site conditions. The spacing shall be such that the maximum drainage area of any one silt fence shall not exceed 1/4 acre.

Construction
Silt fences shall be constructed in accordance with the specifications and the drawings. The silt fence shall be constructed of a minimum of 12 inches of stone or other suitable material placed on a filter fabric. The silt fence shall be installed perpendicular to the direction of flow.

Materials
The stone or other suitable material shall be of a minimum size of 1/2 inch and shall be placed on a filter fabric. The filter fabric shall be of a minimum weight of 100 lbs. per 100 sq. yds.

Quality Control
The contractor shall be responsible for the installation and maintenance of all silt fences. The contractor shall be responsible for the removal of all silt fences when they are no longer needed.

Check Dams
Check dams shall be constructed in accordance with the specifications and the drawings. The check dam shall be constructed of a minimum of 12 inches of stone or other suitable material placed on a filter fabric. The check dam shall be installed perpendicular to the direction of flow.

Outlet Protection
Outlet protection shall be constructed in accordance with the specifications and the drawings. The outlet protection shall be constructed of a minimum of 12 inches of stone or other suitable material placed on a filter fabric. The outlet protection shall be installed perpendicular to the direction of flow.

Pipe Slope Drain
Pipe slope drain shall be constructed in accordance with the specifications and the drawings. The pipe slope drain shall be constructed of a minimum of 12 inches of stone or other suitable material placed on a filter fabric. The pipe slope drain shall be installed perpendicular to the direction of flow.

Typical Runoff Controls

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- Diversions
- Swales
- Water Bars
- Check Dams
- Lined Channels
- Outlet Protection
- Pipe Slope Drain

Clean runoff from offsite not diverted or controlled soon becomes dirty runoff



Temporary Lined Channel

71

A conveyance channel to divert off-site drainage from the active construction site

- Runoff control
 - reduces amount of water flowing onto the construction site
 - usually not permanent
- Considerations
 - rock lining stabilizes channel
 - stone size based on flow rate
 - lined with fabric



Grassed Waterway

72

A wide, shallow channel below adjacent ground level that is stabilized by vegetation

- Erosion control
 - conveys runoff without causing erosion
- Consideration
 - if erosion occurs, a lined waterway should be used

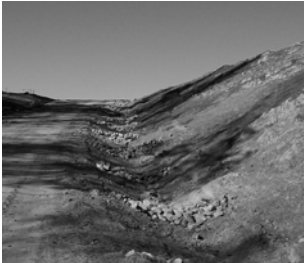


Check Dam

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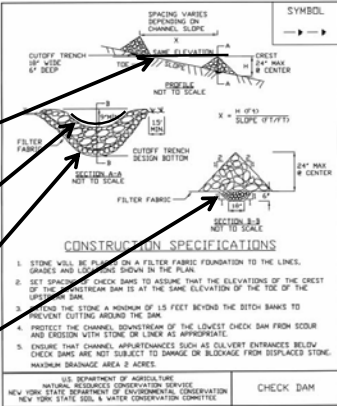
A small barrier or dam, constructed of stone, bagged sand or gravel across a drainage way

- **Runoff and Erosion control**
 - restricts velocity
 - temporary
- **Considerations**
 - downstream crest = upstream toe
 - stone size = 2-9"
 - lined with fabric



Check Dam

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- Downstream crest equal elevation to Upstream toe
- Parabolic shape
- Filter fabric
- Cutoff trench

Manufactured Check Dam

75


A flexible, reusable erosion control product for use in shallow channels

- **Runoff and Erosion control**
 - restricts velocity
 - temporary
- **Considerations**
 - downstream crest = upstream toe
 - filter fabric apron for stabilization



Check Dam


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Check Dam

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Errors and Deficiencies




Unacceptable check dam materials cause erosion
No flow concentration over center of dam

Check Dam

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Errors and Deficiencies




Wrong materials used Wrong practice choice
Not anchored by a cutoff trench

Lined Waterway 79

A channel lined with rock, concrete or other permanent material


- Erosion control
 - conveys runoff without causing erosion
 - Reduces velocity
- Considerations
 - Underlined with filter fabric
 - Rock size based on velocity




Outlet Protection 80

Rock, Riprap or concrete placed at the outlet end of a culvert or channel

- Erosion control
 - Reduces velocity, depth and energy of water in a non-erosive manner
- Considerations
 - Rock size and apron length based on velocity and drainage area




Rock riprap below these outlets reduces flow velocity so that it is non-erosive... 81



... and it also allows sediment to drop out

Lined Waterway or Outlet 82

Errors and Deficiencies




No rock below pipe causes slope failure
Rounded rocks are unstable

Pipe Slope Drain 83

Temporary drainage structure to reduce erosion on slopes


- Runoff and Erosion control
 - conveys runoff down slopes in a non-erosive manner
 - temporary
- Consideration
 - runoff must be directed to the pipes at the top of slope



Water Bar 84

Temporary or permanent drainage structure to reduce erosion on sloping roads

- Runoff and Erosion control
 - conveys runoff in a non-erosive manner along slopes at pre-designed intervals
- Consideration
 - placed at points of concentrated flow
 - aligned diagonally to low side of road
 - spacing depends on slope percent



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Soil Stabilization


- Correct Clearing and Grading
- Seeding and Mulching
- Rolled Erosion Control Products
- Dust Control

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Seeding


Perennial vegetative cover such as grasses

- Required on inactive areas
- Erosion control
 - stabilizes soil
 - reduces soil loss by up to 90%
 - the most cost-effective erosion control available
- Sediment control
 - filters runoff



87

Seeding




88

Seeding



89

Seeding



90

Grass Seed applied before snow cover
will germinate in spring before the soil is
dry enough to work



91
 Insufficient seed application can cause sediment accumulation in conveyances and ponds – maintenance becomes difficult and costly



92
Seeding

Errors and Deficiencies



- Insufficient application rate
- Soil left exposed for greater than 14 days
- Lack of maintenance, mulch, or watering

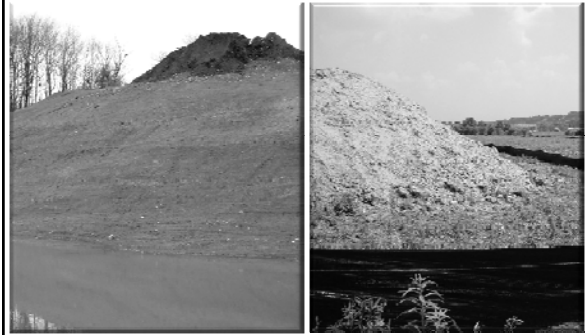
93
Hydroseeding

Pressure spraying a seed mix, in liquid form, through a nozzle – can also include mulch, fertilizer, a polymer (tackifier), etc.

- Erosion control
 - fast
 - effective – good germination rate
 - easy
 - expensive
 - good on critical areas and slopes

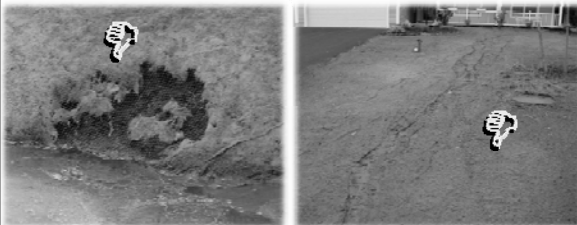


94
Hydroseeding



95
Hydroseeding

Errors and Deficiencies



- Don't spray hydroseed on top of RECP
- Application on steep slopes without mulch
- Applied just before rain

96
Mulching

Coarse plant residue or chips as a soil cover

- Erosion control
 - protects seeding
 - ❖ conserves moisture
 - ❖ lessens temperature fluctuations
 - breaks raindrop velocity
 - stabilizes soil in non-growing months
 - usually temporary (biodegradable)
 - can be permanent (stone)



Mulching

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Stabilization With Sod

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Rolled grass turf

- Erosion control
 - stabilizes soil
- Sediment Control
 - filters runoff
- Advantages
 - provides quick cover
 - enhances natural beauty
 - can be installed late in growing season



Rolled Erosion Control Products

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Natural fiber or synthetic soil cover

- Erosion control
 - protects seeding
 - ❖ conserves moisture
 - ❖ lessens temperature fluctuations
 - breaks raindrop velocity
 - stabilizes soil in non-growing months
 - usually temporary (biodegradable)
 - can be permanent (turf reinforcement mat)



Rolled Erosion Control Products

100



Rolled Erosion Control Products

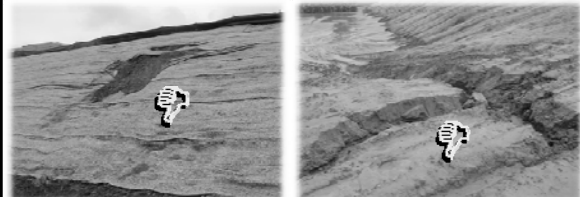
101



Rolled Erosion Control Products

102

Errors and Deficiencies



Applied across slope (should be vertical)

Uneven terrain

Ran out of materials

Seedbed preparation - Rake or scarify the soil surface before seeding

103

- Track up and down the slope to create mini terraces to slow runoff



Dust Control

104

The control of dust movement to prevent off-site damage

- Erosion control
 - driving areas
 - ❖ sprinkling
 - ❖ Polymer additives
 - ❖ barriers
 - ❖ windbreaks
 - non-driving areas
 - ❖ vegetation
 - ❖ mulch
 - ❖ spray adhesives



Stockpile stabilization – A row of silt fence around the pile is helpful for small slumps, but what will happen when the wind blows?

105



Sediment Control

106

- Stabilized Construction Entrance
- Silt Fence and “perimeter controls”
- Sediment Traps and Basins
- Rock Dam
- Inlet Protection
- Turbidity Curtain

Stabilized Construction Entrance

107

A stabilized pad of aggregate over geotextile at points of ingress and egress

- Sediment control
 - reduces sediment tracking onto public roads
- Considerations
 - width at least 24' (12' if multiple entrances)
 - length at least 50' (30' on residential lots)
 - Stone size 1-4"



Stabilized Construction Entrance

108



109

Stabilized Construction Entrance Errors and Deficiencies

No stone entrance installed

Not being maintained
Stone size less than 1"

110

Silt Fence

A temporary barrier of geotextile fabric

- Sediment control
 - intercepts sediment laden runoff
 - reduces velocity
 - traps sediment
- Considerations
 - not a filter
 - sheet flow only
 - install on contour
 - no concentrated flow
 - bury toe minimum 6"
 - stakes go on low side
 - 1-year design life

111

Silt Fence

112

Silt Fence

113

Silt Fence Errors and Deficiencies

Toe not buried
Shredded

Used in a stream
Stakes on wrong side

114

Silt Fence Errors and Deficiencies

Installed parallel to slope
concentrates flow

Poor splice allows runoff
and sediment to escape

Silt Fence 115

Errors and Deficiencies

Not maintained when
50% capacity is reached

Not embedded
Not securely fastened

Silt Fence 116

Errors and Deficiencies

Left in place too long

Not on contour
In concentrated flow

117

This soil stockpile should have been stabilized to keep sediment out of the roads and storm sewer

118

Sensitive Area Protection

Special fence and signage to delineate sensitive or regulated areas

- Sediment control
 - Silt fence to protect from sediment-laden runoff
- Considerations
 - Must be seen by equipment operators
 - Must be understood by public users of the site
 - Heavy-duty stakes
 - Signage identifying the protected area

119

Sensitive Area Protection

**WETLAND
BUFFER ZONE**

• NO BURNING WOODS (BWP)
 • No Piling or Non-Point Source Storage (NPSS) 100'
 • Catchment for Sediment
 • Maintain Buffer Condition
 • No New Storm Drainage or Retention

120

Sensitive Area Protection

Errors and Deficiencies

- Silt fence dumped on
- No signage or reinforcement of sensitive area


- Silt fence placed below high water level and located incorrectly

121

Straw Bale Dike

A temporary barrier of hay or straw

- Sediment control
 - intercepts sediment laden runoff
 - reduces velocity
 - traps sediment
- Considerations
 - not a filter
 - use as a last resort
 - sheet flow only
 - install on contour
 - no concentrated flow
 - 3-month design life




122

Straw Bale Dike

Errors and Deficiencies

- Used as check dams in ditches
- Used in streams
- Left in place too long




123

Sediment Basin

A temporary excavation and/or embankment

- Sediment control
 - intercepts sediment-laden runoff
 - traps sediment
- Considerations
 - drainage area < 100 ac.
 - sediment must be removed when half of basin depth is lost
 - outlet structure to trap sediment
 - minimum 2:1 length to width




124

Sediment Trap


A temporary excavation and/or embankment

- Sediment control
 - intercepts sediment-laden runoff
 - reduces velocity
 - traps sediment
- Considerations
 - drainage area ≤ 5 ac.
 - sediment must be removed when half of basin depth is lost
 - outlet should not erode
 - sediment should not leave the trap



125

Sediment Trap



126

Sediment Traps are not effective without outlet protection




Sedimentation on outlet cover

127

Rock Dam

A rock embankment to capture sediment

- Sediment control
 - Retains sediment onsite
- Considerations
 - Do not locate in stream channel
 - Smaller stone on inside face of dam to reduce seepage rate
 - 3600 cu. ft. of storage per acre of drainage area




128

Storm Drain Inlet Protection

A temporary, permeable barrier around an inlet


- Sediment control
 - traps water
 - deposits sediment
- Considerations
 - use only if sediment traps not feasible
 - acceptable types:
 - ❖excavated (gravel)
 - ❖fabric (or bales)
 - ❖stone and block



129


Fabric Drop Inlet Protection

Use a durable fabric and maintain the practice frequently



130


Storm Drain Inlet Protection Errors and Deficiencies



Sand bags or gravel bags placed directly on the grate cause ponding
Corrected DI protection with stone-filled bags to keep road debris out


131

Storm Drain Inlet Protection Errors and Deficiencies



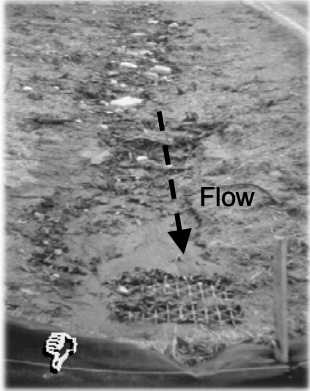
Filter fabric under grate blocks flow and causes ponding
The same scene a few months later – the basin is still off-line

132



Catch basin inserts and filter fabric under the grate are unacceptable – they cause ponding and are difficult to remove without releasing sediment into the catch basin

133



Inlet Protection is obviously not effective when it's installed *downslope* of the runoff


If this was supposed to be a check dam, it's the wrong practice in the wrong place!

134

Turbidity Curtain


A flexible, impenetrable barrier to trap sediment in water bodies

- Sediment control
 - prevents migration of sediment from a work site in water into the larger body of water
 - top of curtain is floatable
 - bottom is weighted
- Considerations
 - use for short duration
 - do not use across flowing water



Improper Construction Sequencing


135



Stormwater fills this excavation every time it rains – to keep working, they have to dewater the basin

Improper Construction Sequencing


136



Silt fence and other sediment controls must be installed *before* grading and excavating


The contractor has failed to control this site

137




Insufficient runoff control, insufficient slope stabilization and poor soils caused this blowout

138



139

Steep slopes call for additional erosion and sediment control measures and more frequent inspections



140

Key Tips for Erosion, Sediment and Runoff Control

- Keep “Clean Water” Clean (divert off-site run-on)
- Preserve natural drainages and vegetative buffers
- Install runoff controls and sediment controls **before** grubbing and grading
- Direct runoff to sediment trapping practices

141

Key Tips for Erosion, Sediment and Runoff Control

- Prevent erosion at the source – *apply seed and mulch promptly* within 14 days (within 7 days on sites with over 5 acres exposed)
- Completely stabilize one phase of construction before moving on to the next
- Maintain Erosion and Sediment Controls throughout home/building construction (not just during road construction phase)

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Constructing Stormwater Management Practices

Groundwater Recharge • Retention • Detention

143

Something to remember...

Better Site Management improves your development projects and communities

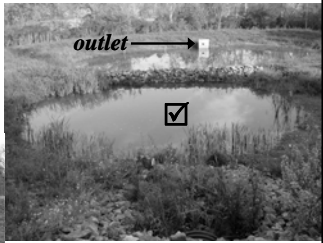
- Preserve vegetation
- Reduce impervious cover
- Use pervious areas for stormwater treatment
- Promote groundwater recharge
- Reduce required stormwater treatment (pond) size
- Increase property values




144

Water Quantity Control

Old technology: Detention Basins (Dry Basins) – they provide only flood control



New standards: Retention Basins (Wet Ponds) – they provide water quality treatment and flood protection




Forebay: Water Quality Control ¹⁴⁵

The forebay (a small pond cell at the inlet) and a rock-lined spillway to the permanent pool provide sediment settling and water quality treatment ↓




Forebay that has not been cleaned – forebays must be dredged when the sediment accumulates to 50% of the capacity ↑

Pond Construction ¹⁴⁶





Forebay

- Small pond “cell” at inlet
- Berm between forebay and main pond
- Spillway in berm

Aquatic Bench: Water Quality Treatment ¹⁴⁷



Pond constructed without aquatic bench – not in compliance with DEC Technical Standards, poor slope stability and habitat ↓

Aquatic bench – provides vegetation for pollutant filtering and habitat for fish and frogs that feed on mosquitoes ↑

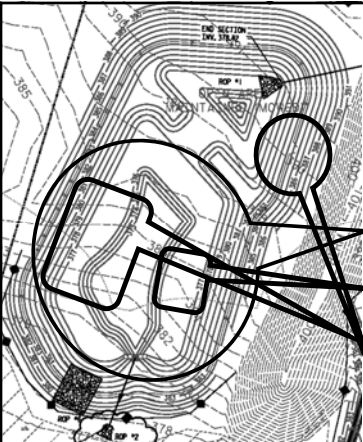
Aquatic Bench: Water Quality Treatment ¹⁴⁸

No aquatic bench – limited space for plants for filtering and habitat ↓

The Aquatic Bench is a flat shelf below the permanent water level – use a survey level to make sure it is 12-18” below the low flow orifice ↑

Pond Construction ¹⁴⁹



Aquatic Bench

- Flat shelf 12-18” below water surface
- Extends up to 15 feet into pond
- irregular shape
- Slopes 4:1 (h:v) or less

Establish proper depth in ponds to preserve water quality

Protect existing vegetation during and after construction to reduce runoff





Stormwater Management Practices are not permitted in New York State or Federal regulated wetlands or 100-foot adjacent areas to NYS wetlands

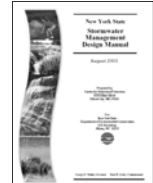
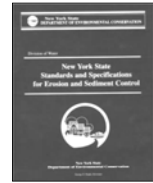
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New York State Technical Standards

152

- **New York State Standards and Specifications for Erosion and Sediment Control (“Blue Book”)**
Current Version: August 2005
- **New York State Stormwater Management Design Manual**
Current Version: April 2008



Both documents available on DEC website
<http://www.dec.ny.gov/chemical/8694.html>

DEC and SWCD Guidance In training sessions ...

153

- We explain E&SC concepts
 - Why you need to *implement* E&SC
 - Why you need to *maintain* E&SC
- We explain General Permit requirements
- We provide and explain Blue Book specs

On the job site ...

- We *do not* tell the contractor or operator which practice to use or where to place them
 - If we become the designer, we could be held responsible if the practice fails!

Winter Site Operations

154

Winter Operations

155

- Drainage patterns change
- Access points are smaller
- Stockpiling and snow management
- Practices hidden by “white mulch”
- Limitations of frozen soil

Water often continues to flow under snowpack

156



Sediment Barriers

157

Install sediment barriers (e.g. silt fence, drop inlet protection) at ALL necessary perimeter and sensitive locations

Install drop inlet protection before soil freezes



Slopes and Soil Stockpiles

158

- Protect with *anchored* straw or mulch, rolled erosion control product or other durable covering
- A sediment barrier must be installed around piles and at slope toes to prevent soil transport from the pile or slope



Stabilize exposed soil and stockpiles before snow covers them...

... because in spring you won't be able to fix the problems.

159



Runoff from soil/snow piled over silt fence will be uncontrolled in spring

160



Construction Entrance

161

ALL entrance/exit locations must be properly stabilized and maintained to accommodate snow management



This was not a good location to park equipment!

Winter Site Inspections

162

If soil disturbance is *completely* suspended AND the site is *properly stabilized*, the inspection frequency can be reduced, with written notification to the Regional DEC office.

- Monthly inspections at minimum
 - Check sediment control measures after rain or snowmelt events
- You can't totally abandon the site between inspections – if you get a rain-on-snow event or snowmelt, you could have significant runoff and sediment transport

Additional Training & Information ¹⁶³

- DEC Stormwater Training Calendar
<http://www.dec.ny.gov/chemical/8699.html>
- SUNY-ESF Continuing Education - Stormwater Management Program
<http://www.esf.edu/outreach/stormwater>
- Certified Professional in Erosion and Sediment Control, Inc. <http://www.cpesc.org>
- International Erosion Control Association
<http://www.ieca-nechapter.org>
- Center for Watershed Protection
<http://www.cwp.org>
- Stormwater Manager's Resource Center
<http://www.stormwatercenter.net>

Where Can I Turn for Help? ¹⁶⁴

DEC and SWCD staff provide technical assistance on the Construction and MS4 Permits and the development and proper implementation of Stormwater Pollution Prevention Plans

- **DEC Division of Water Stormwater Web Page**
<http://www.dec.ny.gov/chemical/8468.html>
- **County Soil and Water Conservation Districts**
<http://www.nyacd.org/districts.html>
- **EPA Stormwater Homepage**
http://cfpub.epa.gov/npdes/home.cfm?program_id=6
- **DEC Conservation Officers**
(Environmental Conservation Law violations)

NYS DEC Regional Stormwater Contacts ¹⁶⁵

- Region 1:* 631-444-0409 Nassau, Suffolk
- Region 2:* 718-482-4933 Bronx, Kings, New York, Queens, Richmond
- Region 3:* 914-332-1835 Dutchess, Orange, Putnam, ext. 359 Rockland, Sullivan, Ulster, Westchester
- Region 4:* 518-357-2045 Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady, Schoharie
- Region 5:* 518-623-1200 Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren, Washington

NYS DEC Regional Stormwater Contacts ¹⁶⁶

- Region 6:* 315-785-2524 Herkimer, Jefferson, Lewis, Oneida, St. Lawrence
- Region 7:* 315-426-7504 Broome, Cayuga, Chenango, or 426-7503 Cortland, Madison, Onondaga, Oswego, Tioga, Tompkins
- Region 8:* 585-226-5448 Genesee, Livingston, Monroe, Ontario, Orleans, Wayne
- Region 8:* 607-796-2216 Chemung, Schuyler, Seneca, Steuben, Yates
- Region 9:* 716-851-7070 Allegany, Cattaraugus, Chautauqua, Erie, Niagara, Wyoming

Questions? ¹⁶⁷

