

Reducing Runoff with Green Infrastructure

Lake George , NY

The Duties of a Stormwater Designer:

- Reduce Peak Runoff Rates
- Remove Pollutants from Runoff
- Reduce Runoff Volume



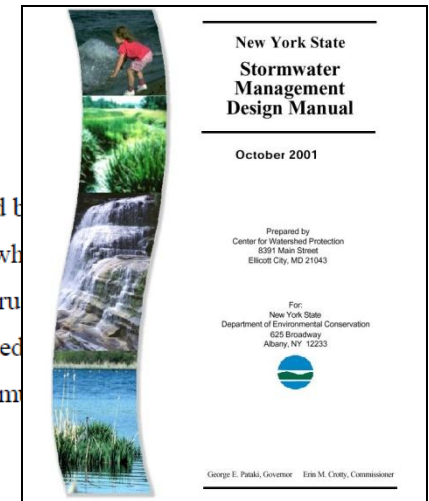
Runoff Reduction
from
Impervious Surfaces
is *(will soon be)*
THE LAW OF THE LAND



It's all on page 4.5

- Projects that do not achieve runoff reduction to pre-construction condition must, at a minimum, reduce a percentage of the runoff from impervious areas to be constructed on the site. The percent reduction is based on the Hydrologic Soil Group(s) (HSG) of the site and is defined as Specific Reduction Factor (S). The following lists the specific reduction factors for the HSGs:
 - HSG A = 0.55
 - HSG B = 0.40
 - HSG C = 0.30
 - HSG D = 0.20

The specific reduction factor (S) is based on the HSGs present at a site. The values are defined by hydrology analysis of low, medium, and high imperviousness. This reduction is achieved when a percentage of the impervious area on a site is captured, routed through green infrastructure (SMP), infiltrated to the ground, reused, reduced by evapotranspiration, and eventually removed from stormwater discharge from the site. The following equation can be used to determine the minimum reduction volume:



4-5

August 2010



The Target:



Reduce 100%
of the
Water Quality Volume

The Minimums.

Reduce Impervious Runoff by:

- 55% on A soils
- 40% on B soils
- 30% on C soils
- 20% on D soils
- Weighted average of above



How do we

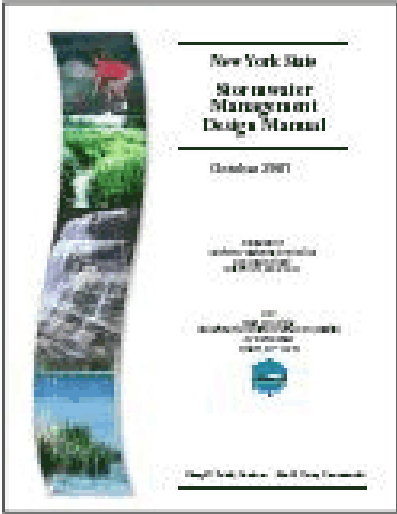
Git-R-Done!



BY GOING GREEN

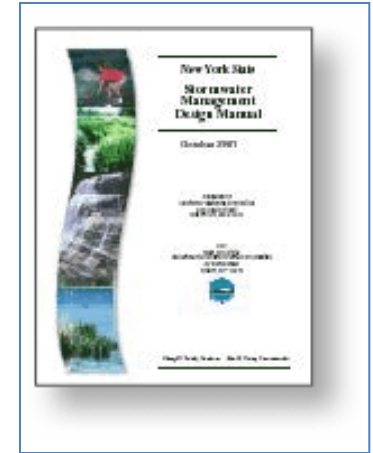


The New 2010 Design Manual



- Chapter 1 - Intro to Manual
- Chapter 2 – New Development Impacts
- Chapter 3 – Stormwater Management Planning
- Chapter 4 – Sizing Criteria
- Chapter 5 – Green Infrastructure Practices
- Chapter 6 – SM Practices
- Chapter 7 – SM Practice Selection
- Chapter 8 – SM Design Examples
- Chapter 9 – Redevelopment Projects
- Chapter 10 – Enhanced Phosphorus Standards

The Stormwater Tool Box



The Old Way:

22 Standard Practices:

Ponds

Wetlands

Filters

Infiltration

Open Channels

The New Way:

22 Standard Practices

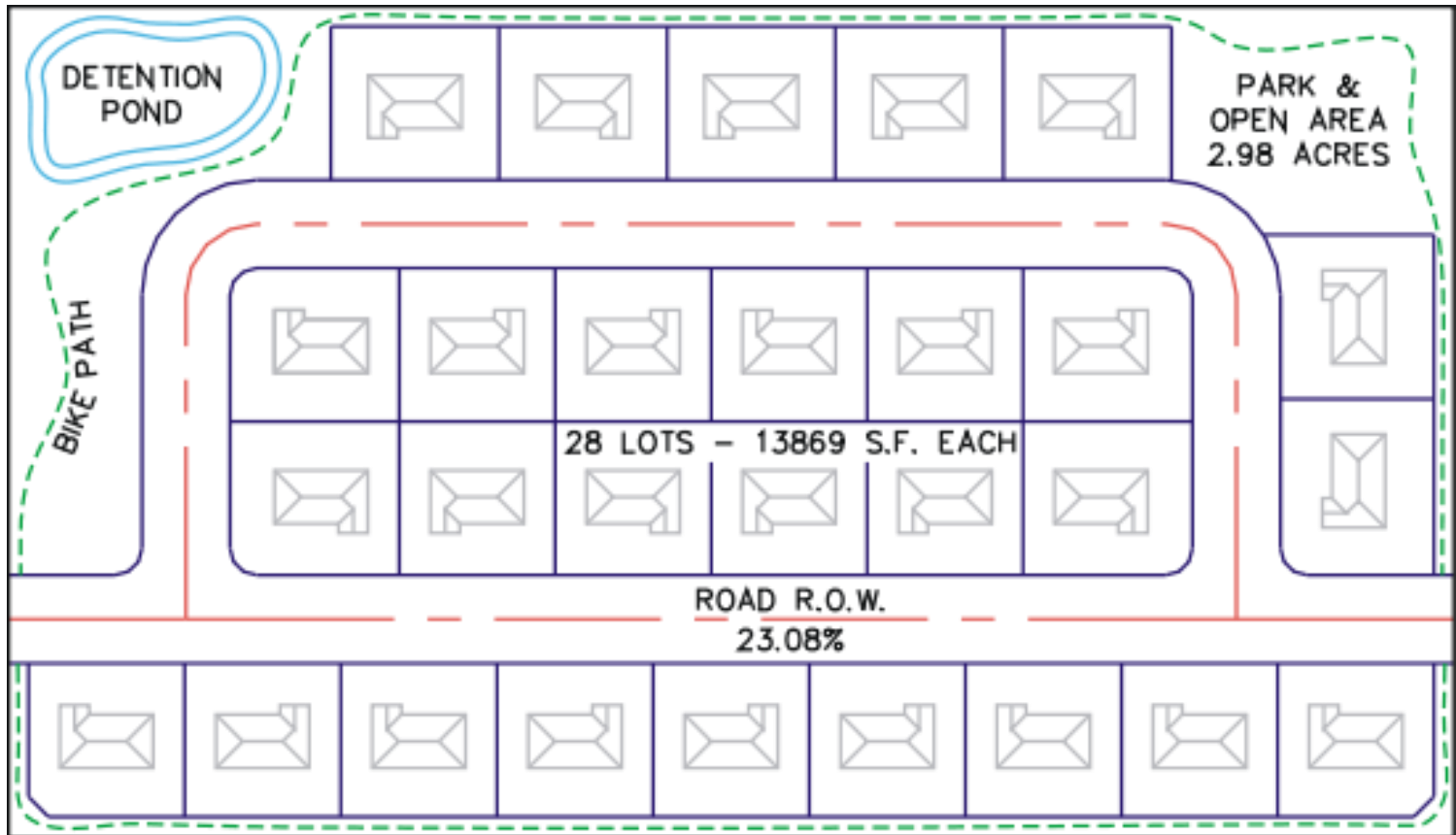
+ 33 new GI Practices

= 55 Practices

The Old Way

- Develop
- Capture and convey runoff
- Treat Runoff





The New Way

- Plan to Minimize/Prevent/Preserve
- Reduce Runoff at the Source
- Capture and Convey Runoff
- Treat Runoff



New Storm water Management Objectives

“...a holistic approach to resource protection, water quality treatment, and flow control, preserving and restoring natural landscape features,..... utilization of soils, vegetation, and engineered media, rather than traditional hardscape collection, conveyance and treatment.”

Stormwater and Development...



.....THE NEW RELATIONSHIP



Runoff Reduction with GREEN INFRASTRUCTURE



5 WAYS to Reduce Runoff:

- Minimize Development Footprint
- Minimize Impervious Surfaces
- Area Reductions
- Impervious Disconnection
- Source Control Treatment

Minimize Development Footprint

- Preservation of Natural Areas
- Avoidance of Sensitive Areas
- Minimize Clearing and Grading
- Open Space/Conservation Design



Minimize Impervious Surfaces



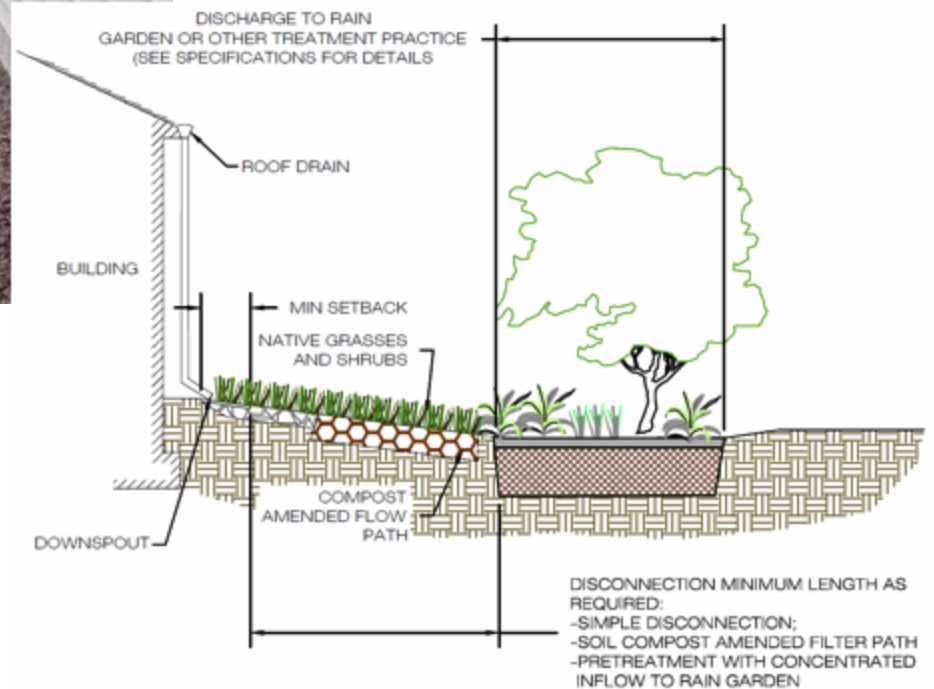
- Minimize Roadways, sidewalks and driveways
- Minimize Parking
- Use Permeable/Porous Pavement
- Minimize Building Footprint

Area Reductions

- Conservation of Natural Areas
- Sheet Flow to Buffers/Strips
- Tree Planting



Impervious Disconnection



Source Control Treatment

Standard Practices(used as source control)

- Infiltration
- Bioretention
- Dry Swale



Green Infrastructure Practices

- Vegetated Swale
- Green Roof
- Rain Garden
- Planters
- Cisterns/Rain Barrels
- Porous Pavement



The Process

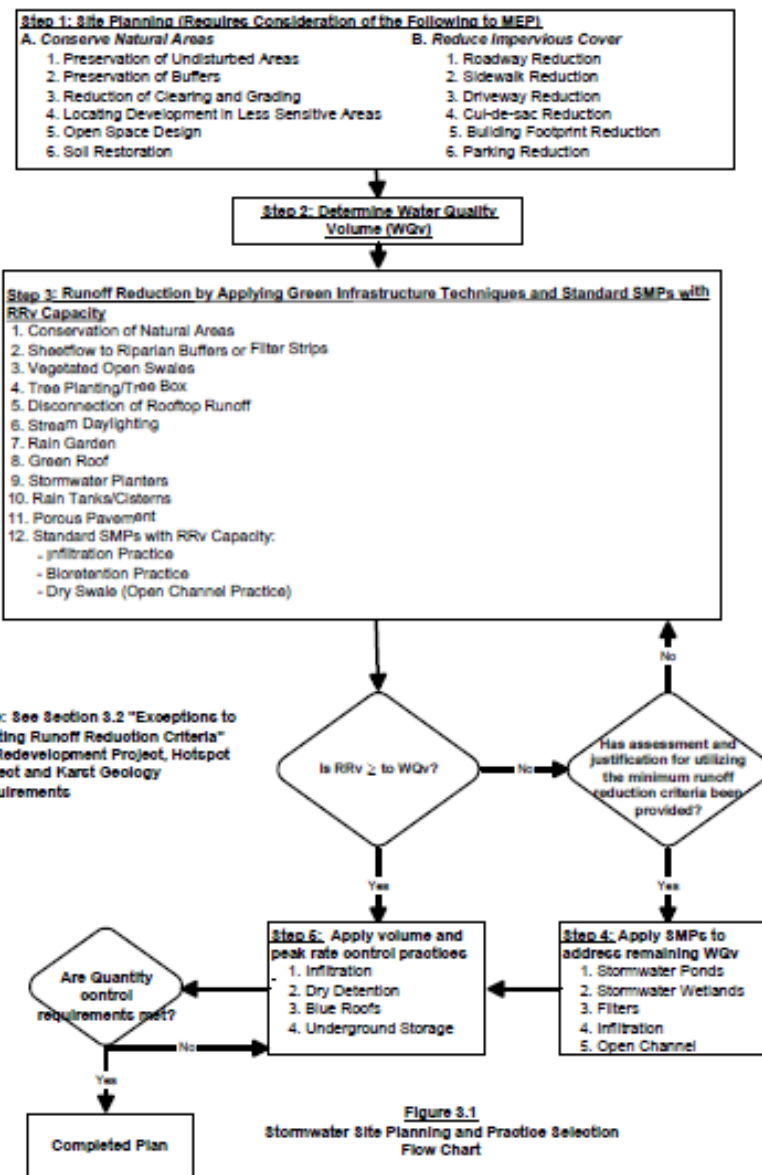
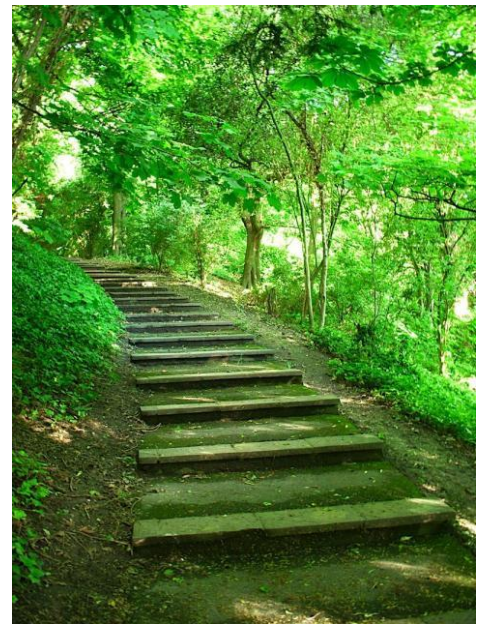


Figure 3.1
Stormwater Site Planning and Practice Selection
Flow Chart

The Steps:

1. Site Planning
2. Calculate Water Quality Volume
3. Apply Runoff Reduction Practices
4. Apply “Standard” Treatment Practices
5. Apply Quantity Control Practices



And of course.....

MAINTENANCE!



All stormwater Practices Need
Maintenance



O&M Plans

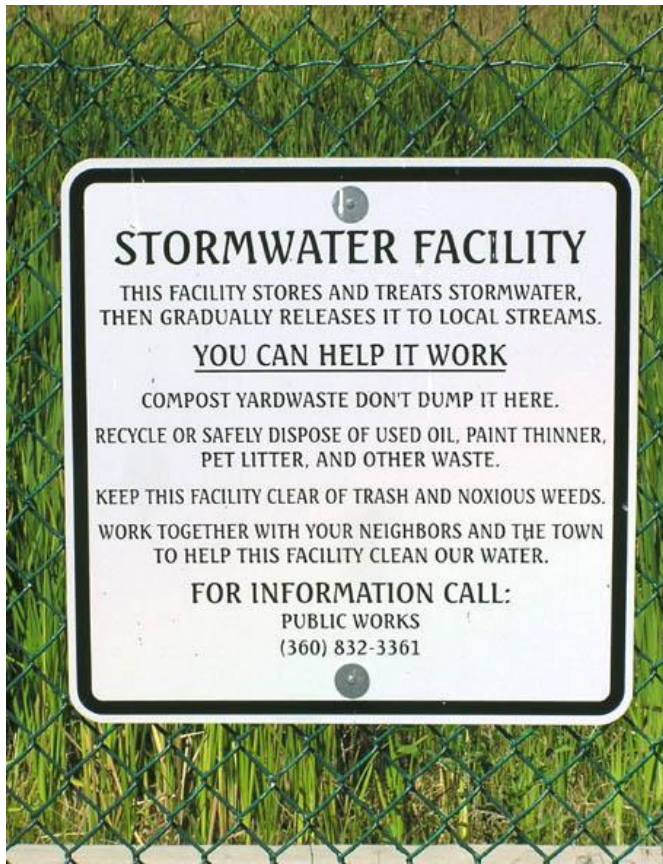
1. Signage
2. Responsible Entity
3. Legal Mechanism
4. Practice details
5. Maintenance requirements/schedule





P 3-12:

“An owner of stormwater management practice, including the runoff reduction practices, shall erect or post, in the immediate vicinity of the practice, a conspicuous and legible sign of not less than 18 inches by 24 inches (or 10"X12" for footprints smaller than 400 sf) bearing the following information:



STORMWATER MANAGEMENT PRACTICE - *(name of the practice)*

Project Identification - *(SPDES Construction Permit #, other)*

Must Be Maintained In Accordance With
O&M Plan

DO NOT REMOVE OR ALTER

(NYSSWDM pg. 3-12)



GI Practices Most Applicable
to
Residential Development

Planning Practices:

- Natural and Open Space Preservation
- Sensitive area avoidance
- Open Space Design
- Roadway Minimalization
- Sidewalk Minimalization
- Driveway Minimalization
- Cul-de-Sac Minimalization
- Building Footprint Minimalization

Most Applicable Practices for Residential Development (cont.)

Impervious Disconnection

Treatment Practices:

- Natural Space Conservation
- Filter Strips/Buffers
- Infiltration
- Rain garden
- Vegetated /Open Swales
- Tree Planting
- Rain Barrel/Cisterns

GI Practices Most Applicable
to
Commercial Development

Planning Practices:

- Natural and Open Space Preservation
- Sensitive area avoidance
- Sidewalk Minimalization
- Driveway Minimalization
- Building Footprint Minimalization
- Parking Minimalization

Most Applicable Practices for Commercial Development (cont.)

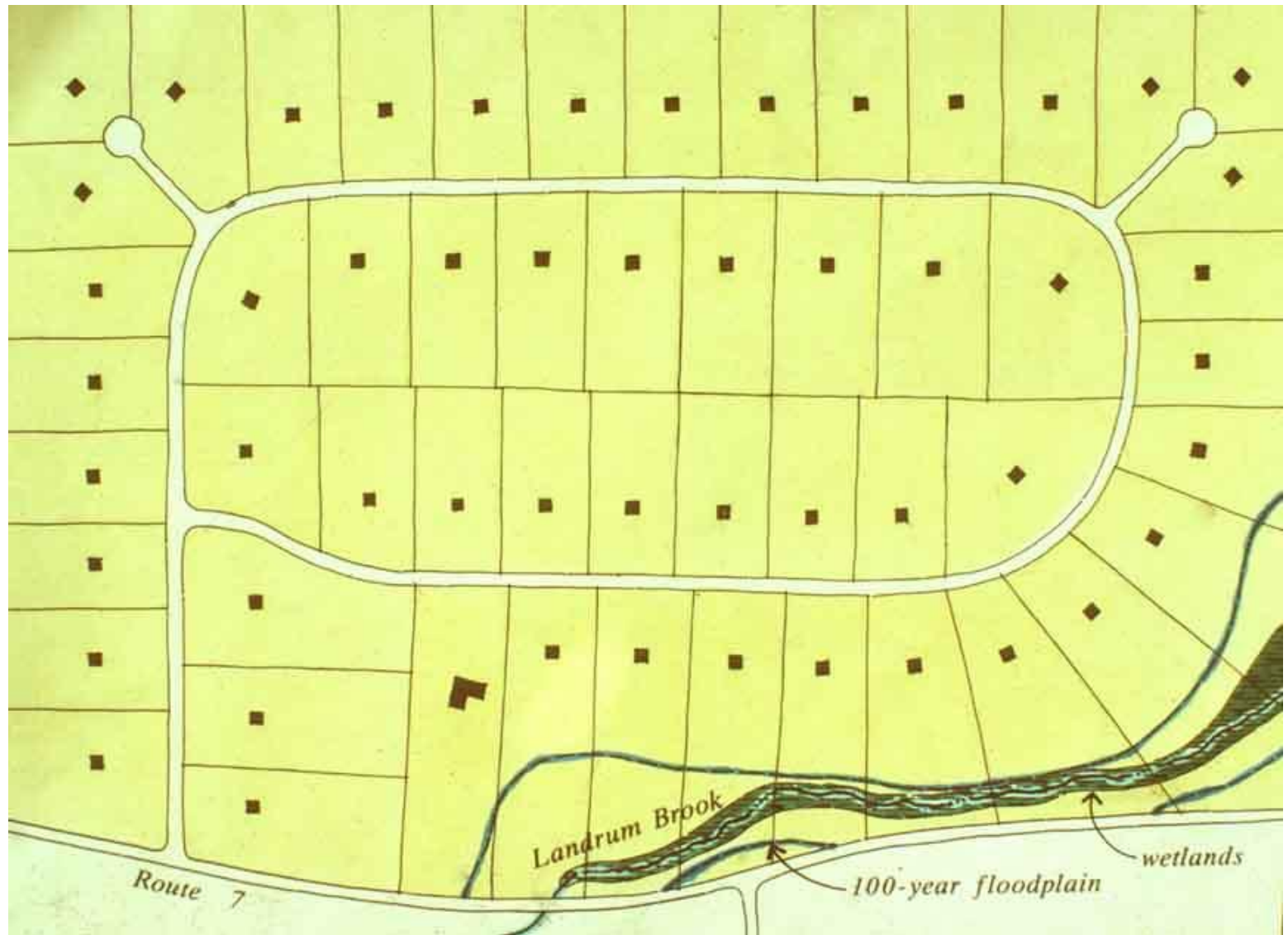
Impervious Disconnection

Treatment Practices:

- Natural Space Conservation
- Filter Strips/Buffers
- Infiltration
- Bio-filter
- Vegetated /Open Swales
- Tree Planting
- Rain Barrel/Cisterns
- Stream Day lighting
- Green Roofs
- Porous/Permeable Pavement
- Tree Planting
- Stormwater Planters

The Dinosaur Gallery



















The New Age of Stormwater

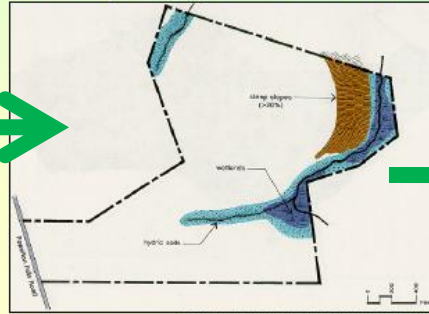


Example:
Undeveloped Land



(Source: Aronk, Randall, Conservation Design for Subdivisions, Page 59)

Elements of Creating Conservation Design Subdivisions:
Identify Primary Conservation Areas



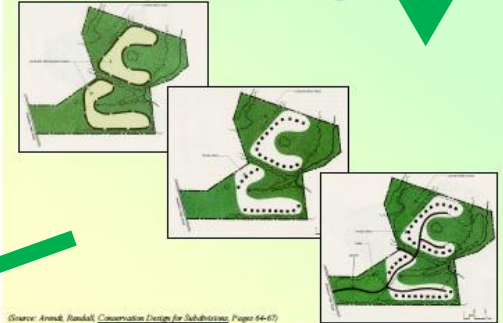
(Source: Aronk, Randall, Conservation Design for Subdivisions, Page 60)

Elements of Creating Conservation Design Subdivisions:
Identify Secondary Conservation Areas



(Source: Aronk, Randall, Conservation Design for Subdivisions, Page 61)

Elements of Creating Conservation Design Subdivisions:
Identify Potential Developable Areas

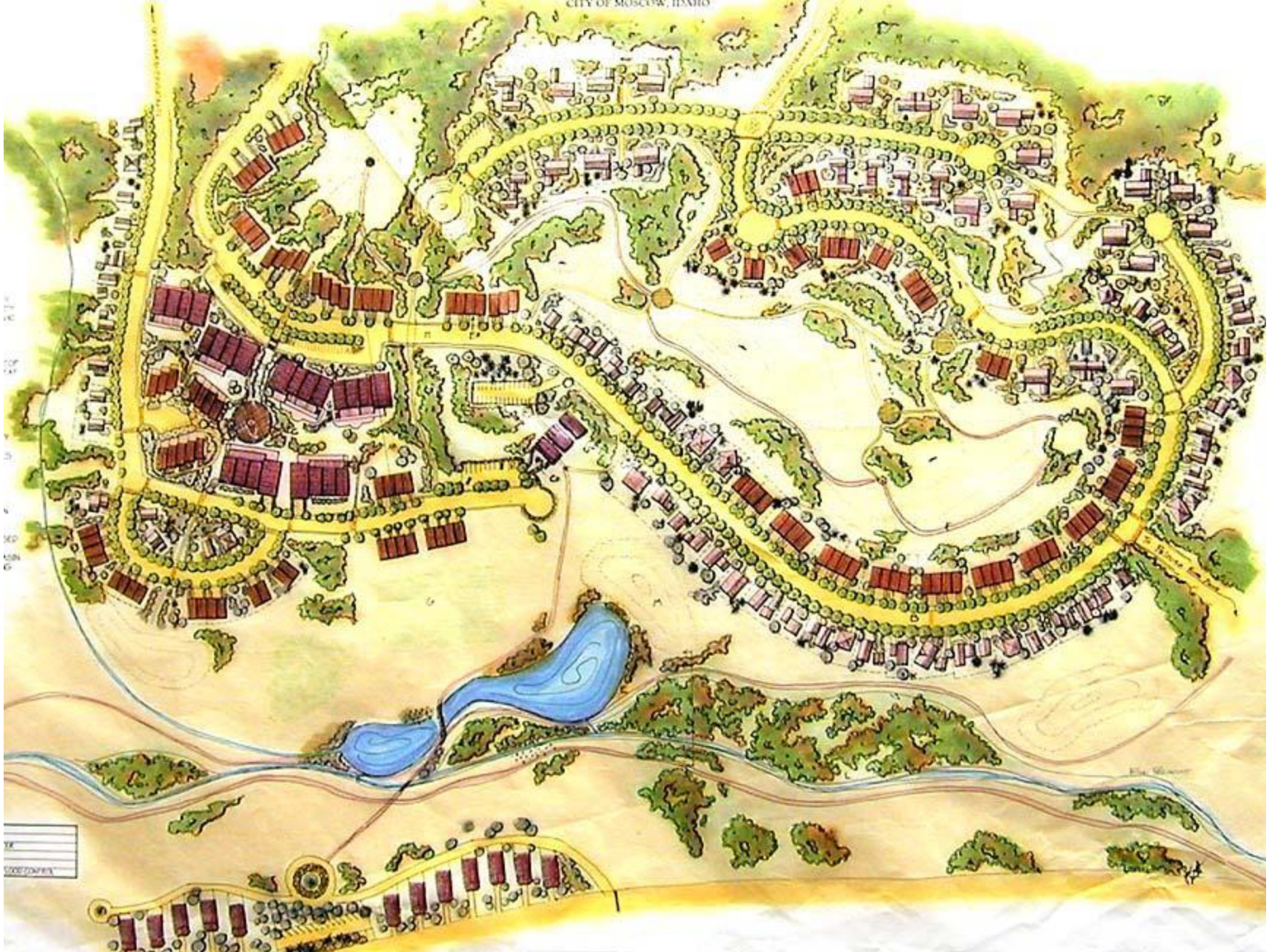


(Source: Aronk, Randall, Conservation Design for Subdivisions, Page 64-67)

Example:
Conservation Subdivision Design



(Source: Aronk, Randall, Conservation Design for Subdivisions, Page 68)



0 10 20 30 40 50 60 70 80 90 100

1/4"
1/2"
3/4"
1"
1 1/4"
1 1/2"
1 3/4"
2"
2 1/4"
2 1/2"
2 3/4"
3"
3 1/4"
3 1/2"
3 3/4"
4"
4 1/4"
4 1/2"
4 3/4"
5"
5 1/4"
5 1/2"
5 3/4"
6"
6 1/4"
6 1/2"
6 3/4"
7"
7 1/4"
7 1/2"
7 3/4"
8"
8 1/4"
8 1/2"
8 3/4"
9"
9 1/4"
9 1/2"
9 3/4"
10"













STORMWATER MANAGEMENT

OUTDOOR STORAGE OF TRASH/DEBRIS AND OTHER SOLID MATERIALS

- Inspect dumpsters and other waste containers periodically. Repair or replace leaky dumpsters and containers.
- Cover dumpsters and other waste containers.
- Never dispose of waste products in storm drain inlets.
- Recycle wastes or dispose properly.

STORMWATER MANAGEMENT FACILITY

YOU CAN HELP IT WORK

- RECYCLE OR PROPERLY DISPOSE OF OILS, PAINTS, TRASH, AND OTHER WASTES
- COMPOST YARD WASTE – DON'T DUMP IT HERE
- HAVE YOUR LAWN TESTED FOR NUTRIENTS SO YOU DON'T OVER-FERTILIZE; FERTILIZE ONLY IN THE FALL
- PICK UP AFTER YOUR PET
- WASH YOUR CAR AT A CARWASH OR ON THE GRASS – NOT ON THE PAVEMENT

This facility helps to prevent stormwater pollutants from entering our local streams and, ultimately, the Chesapeake Bay. Construction of this facility was required by the County of Albemarle to offset impacts from surfaces such as roads, parking lots, buildings, and lawns. The responsible party must maintain this facility so that it can continue to function properly. Activities within the area draining to this facility may impact its performance. Work together with your neighbors and the County of Albemarle to help this facility protect our waters.

FOR INFORMATION CONTACT:
ALBEMARLE COUNTY WATER RESOURCES
(434) 296-5866
www.albemarle.org/water



STORMWATER FACILITY

THIS FACILITY STORES AND TREATS STORMWATER,
THEN GRADUALLY RELEASES IT TO LOCAL STREAMS.

YOU CAN HELP IT WORK

COMPOST YARDWASTE DON'T DUMP IT HERE.

RECYCLE OR SAFELY DISPOSE OF USED OIL, PAINT THINNER,
PET LITTER, AND OTHER WASTE.

KEEP THIS FACILITY CLEAR OF TRASH AND NOXIOUS WEEDS.

WORK TOGETHER WITH YOUR NEIGHBORS AND THE TOWN
TO HELP THIS FACILITY CLEAN OUR WATER.

FOR INFORMATION CALL:

PUBLIC WORKS
(360) 832-3361

STREAM BUFFER

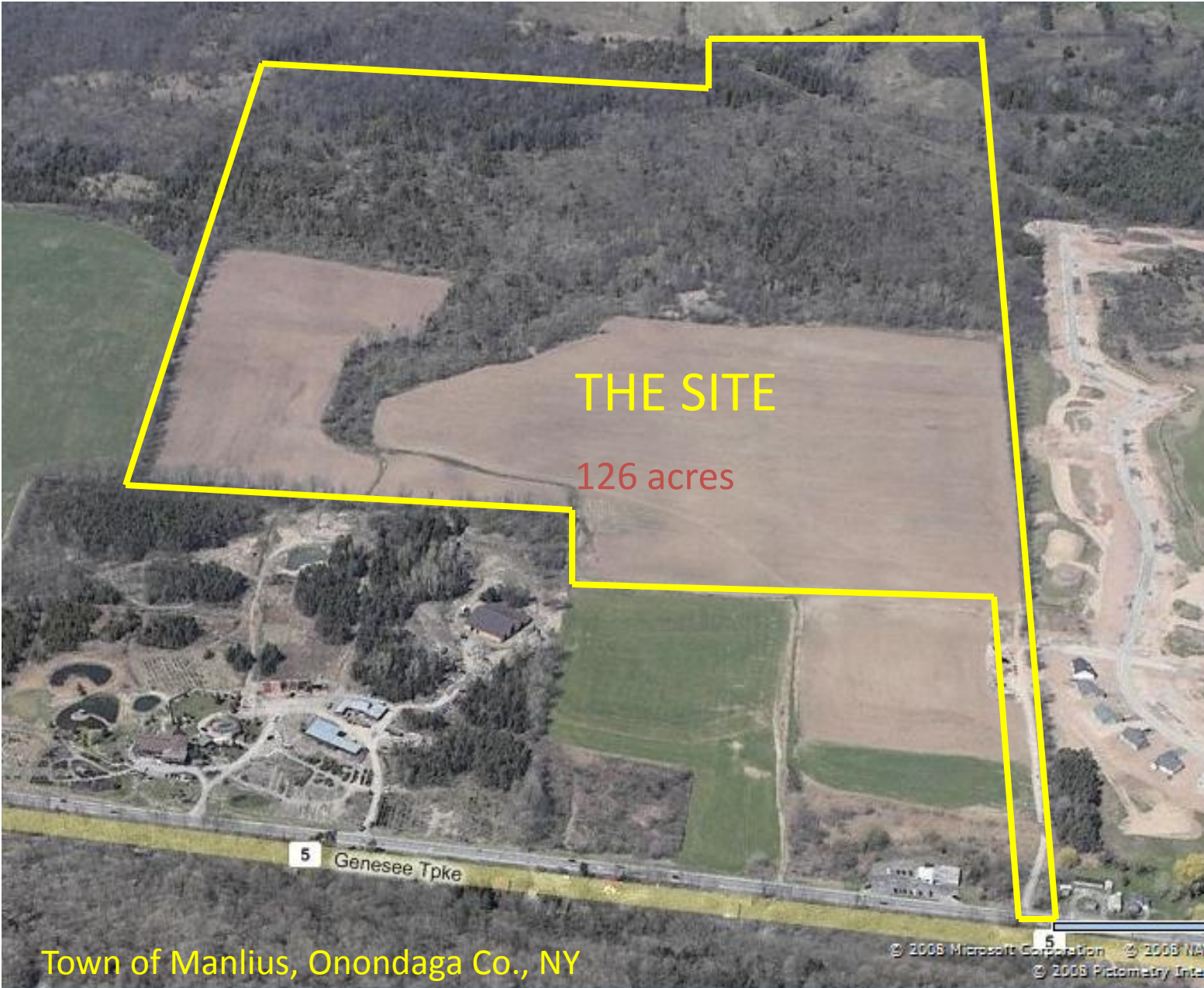
DO NOT DISTURB

Metro Nashville
Stormwater NPDES Department

880-2420

An Example of GI Planning





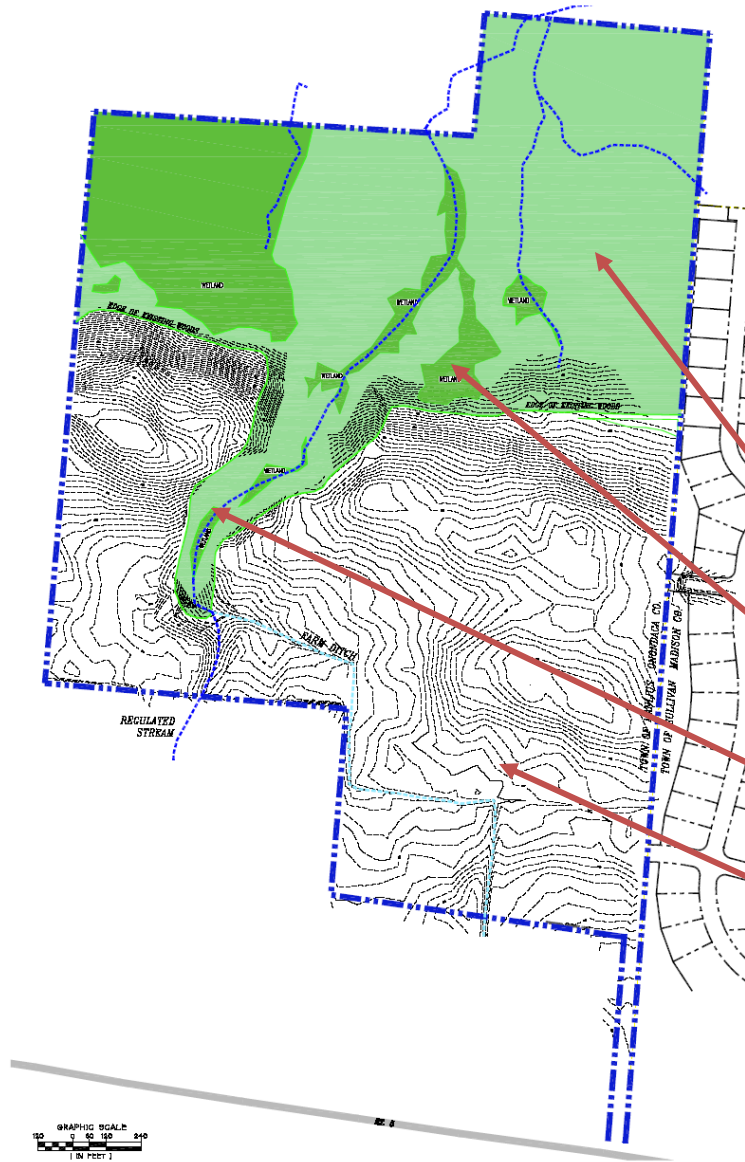
THE SITE

126 acres

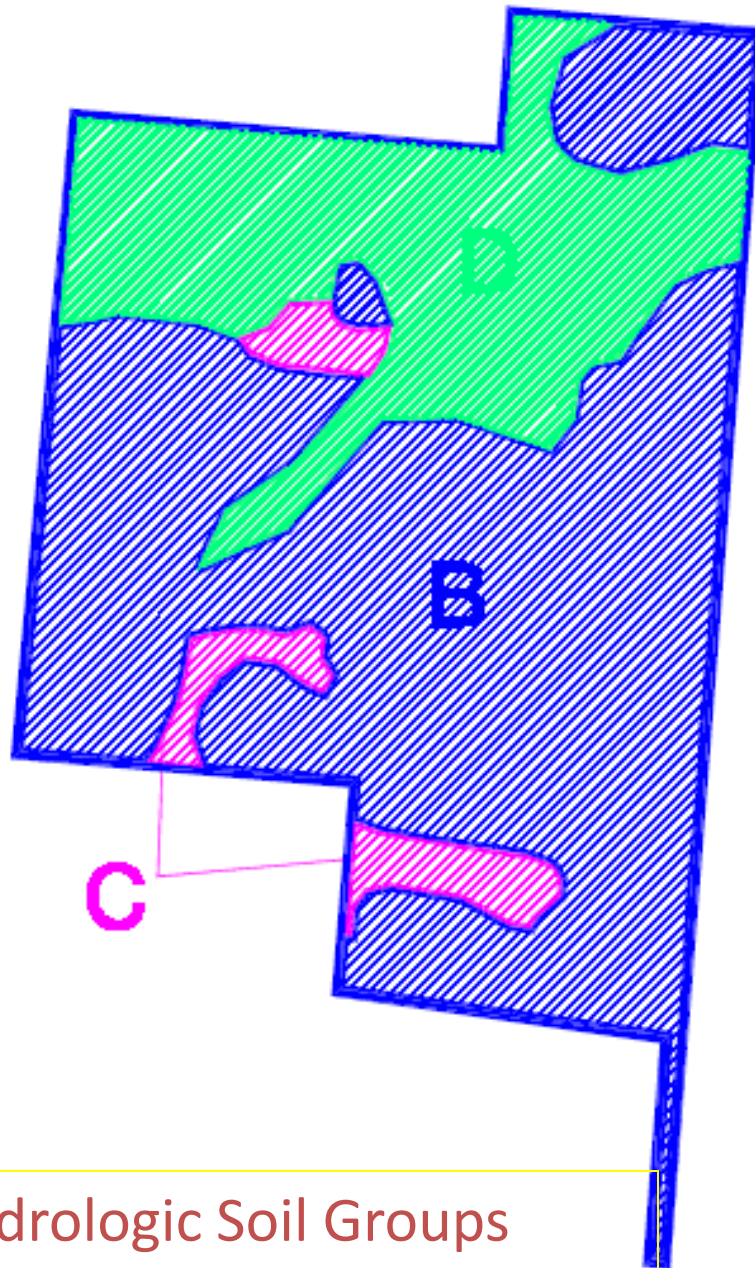
5 Genesee Tpke

Town of Manlius, Onondaga Co., NY

Natural Resources



- Mature Woodlands
- USACE Wetlands
- DEC Trout stream
- Prime Agricultural Soils

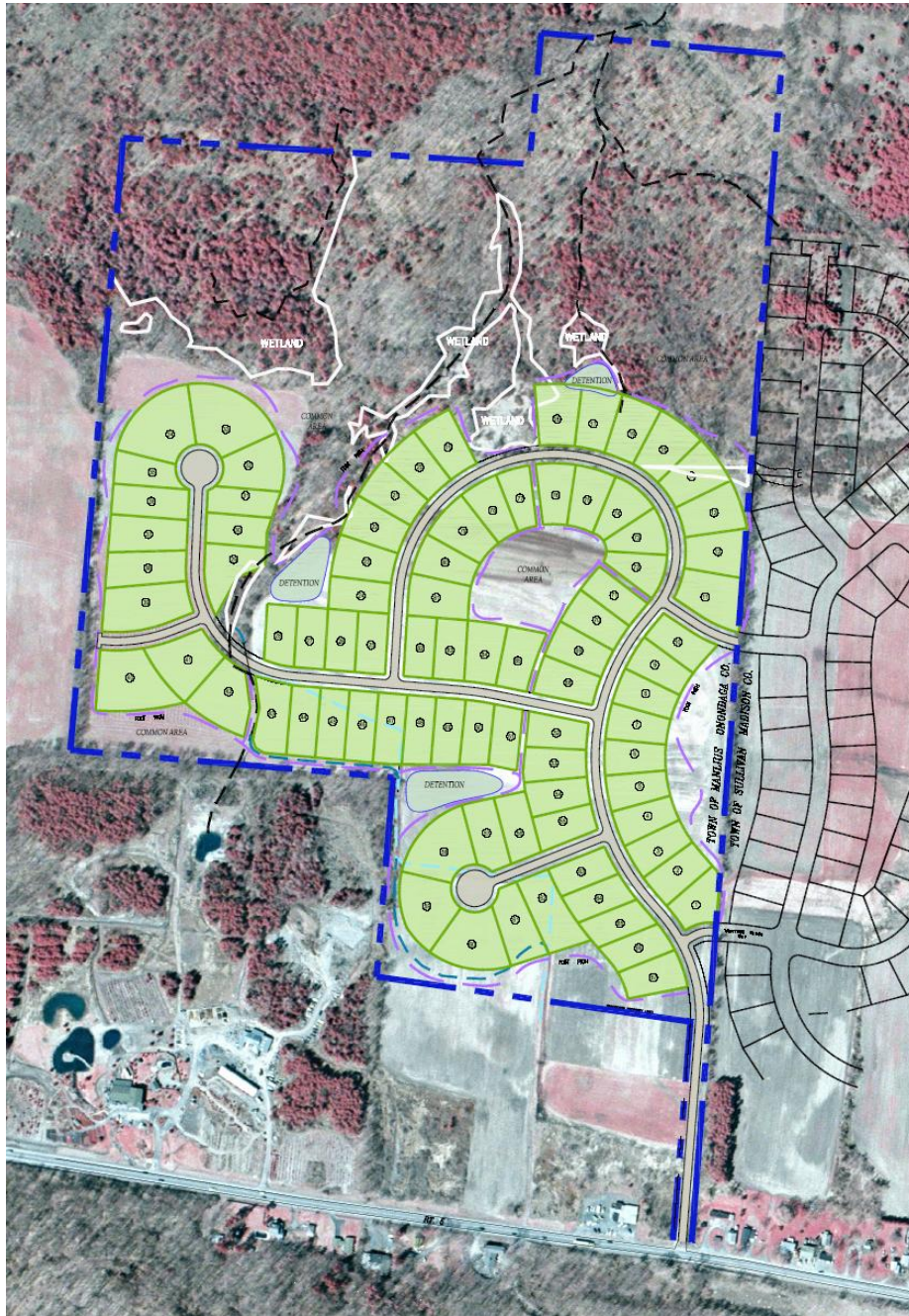


Hydrologic Soil Groups

Conventional Zoning Subdivision

85 - 40,000 s.f. lots





85
20,000 s.f.
Lots



85 1 acre lots

- Open space 0 ac
- Development footprint 126 ac
- Infrastructure 10,800 lf
- Impervious Surfaces 29 ac
- Composite RCN_ 77
- 100 yr storage volume 7.9 ac-ft
- Water Quality volume 2.3 ac-ft



85 ½ acre lots

- Conservation easement 56 ac
- Development footprint 70 ac
- Infrastructure 7900 lf
- Impervious Surfaces 23 ac
- Composite RCN 72
- 100 yr storage volume 5.5ac-ft
- Water Quality volume 1.8 ac-ft

The Intersection of Municipal Planning and Stormwater



GI Planning and Municipal Laws

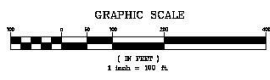
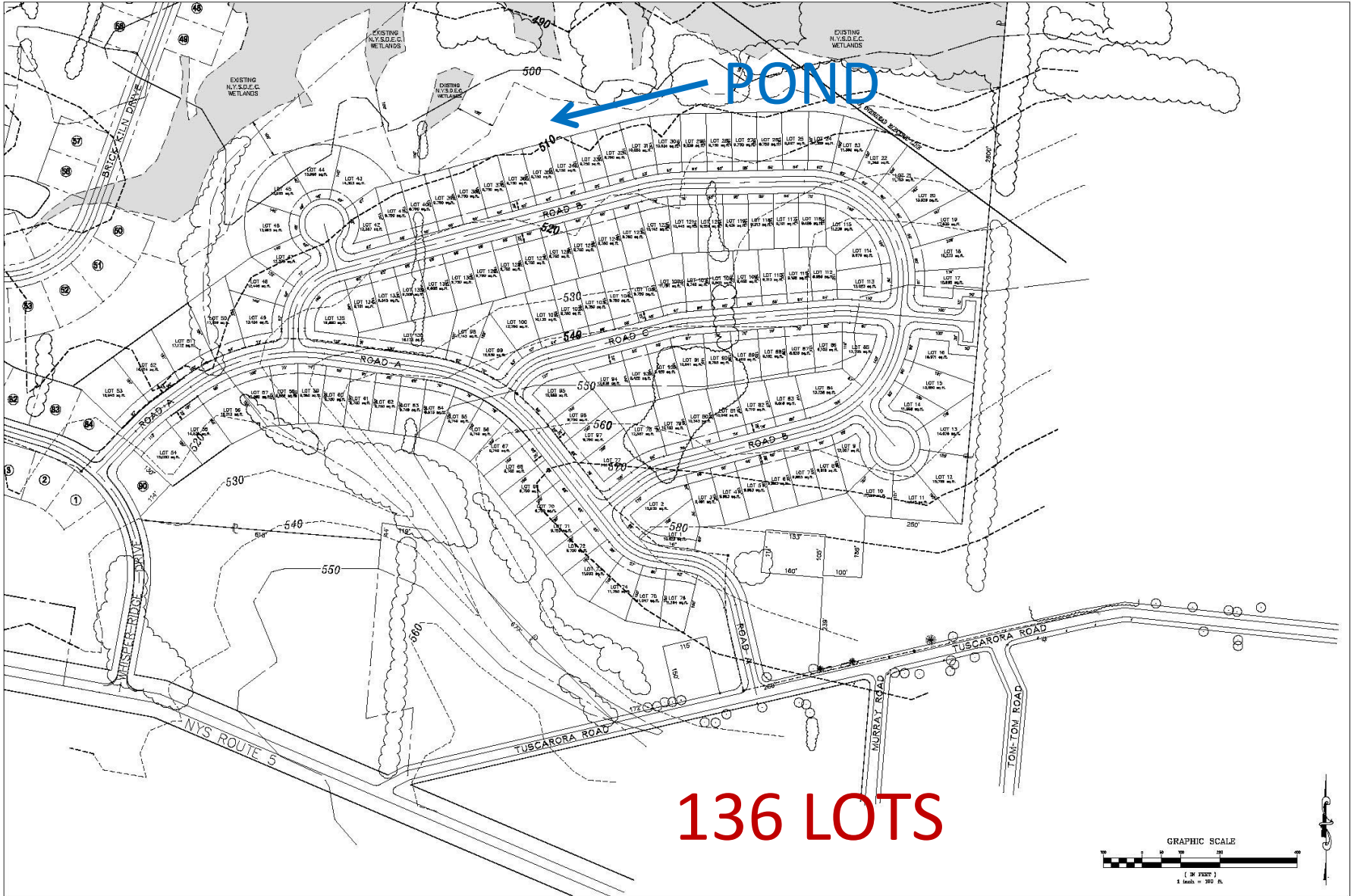
- Zoning
- Subdivision
- Development Standards
- Comprehensive Plan
- Enforcement
- Administration
- Stormwater (MS4) laws

Application of Runoff Reduction

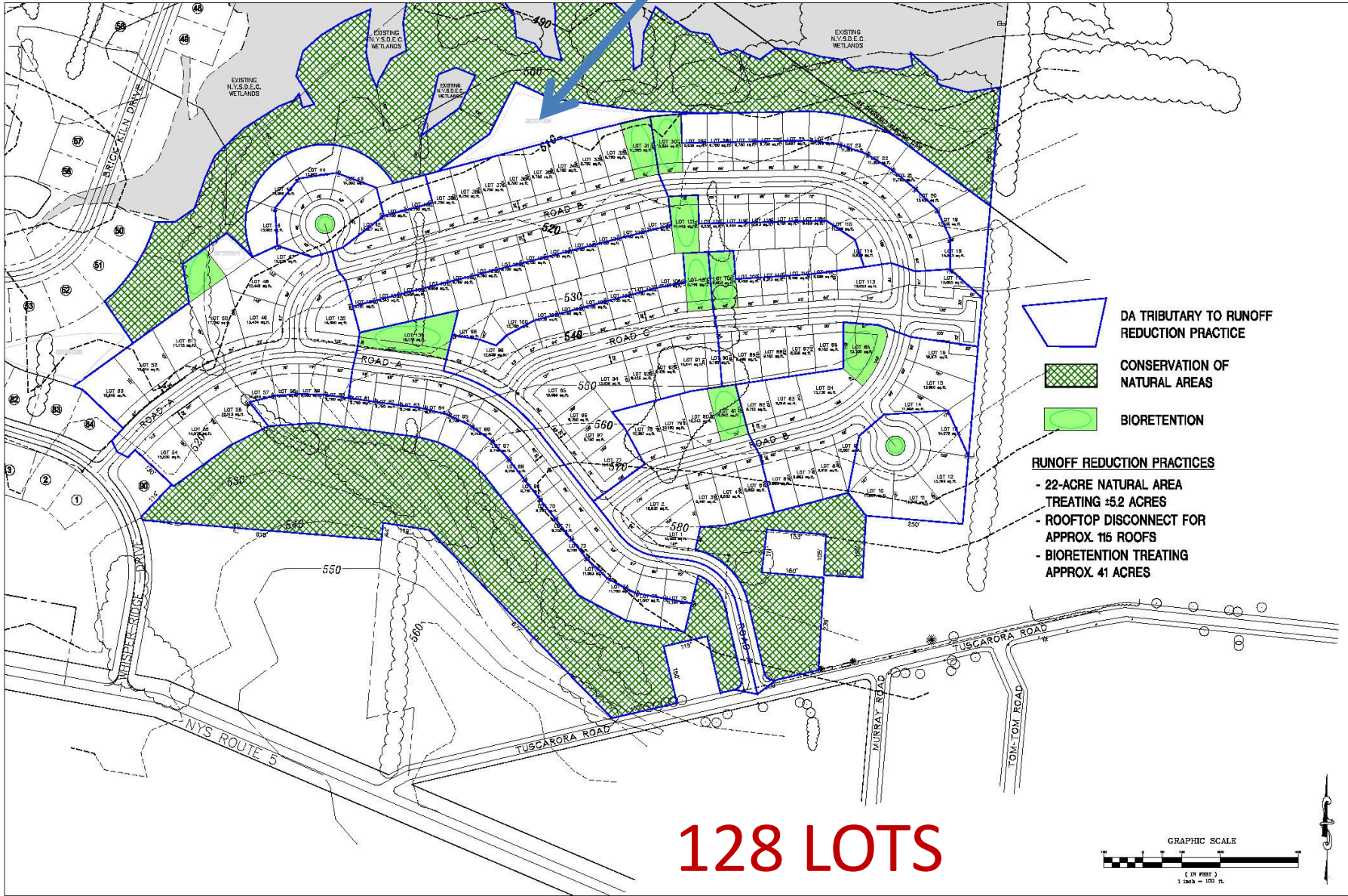
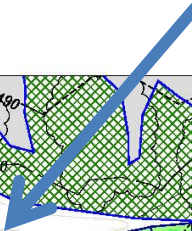
POND

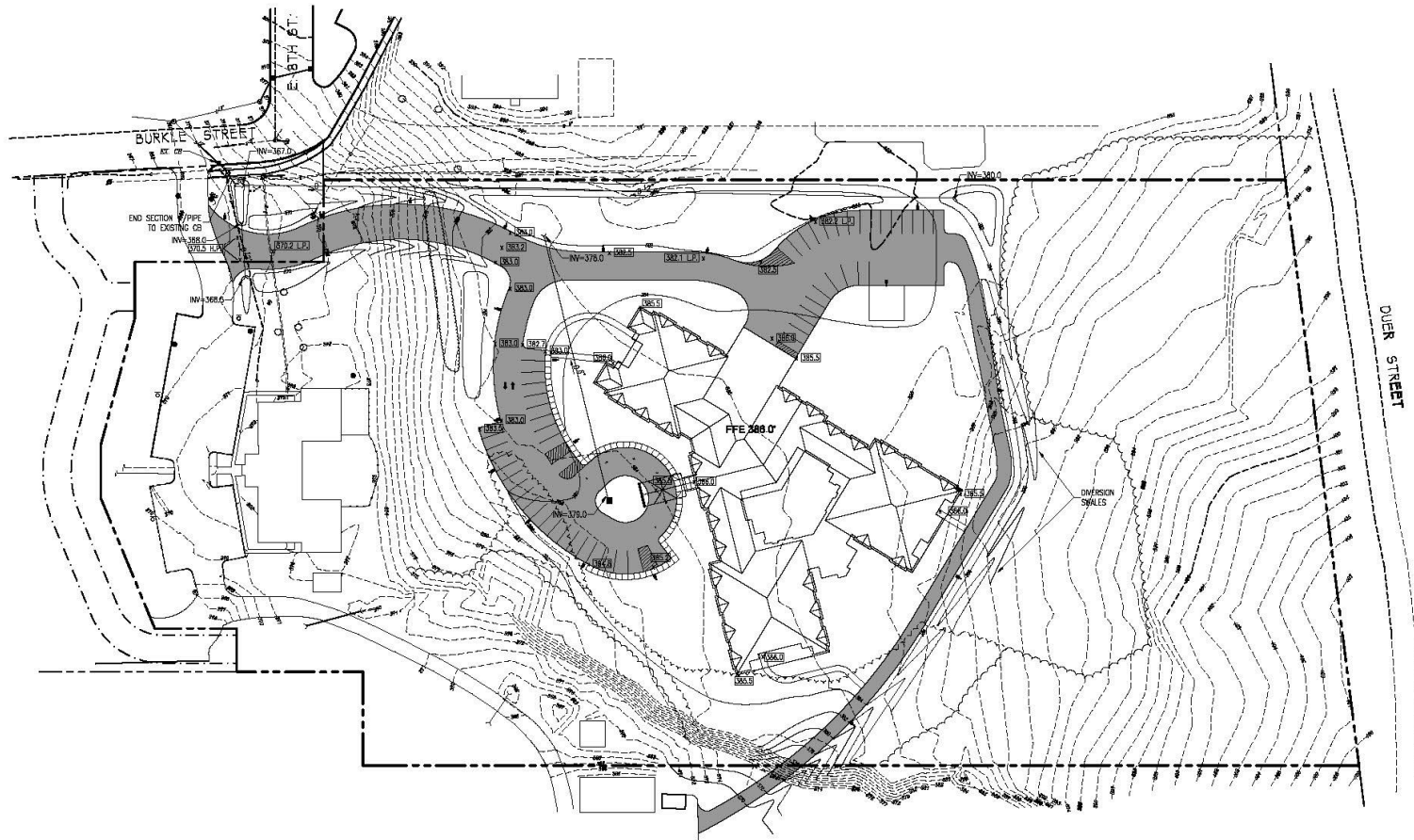


136 LOTS

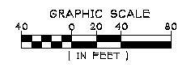


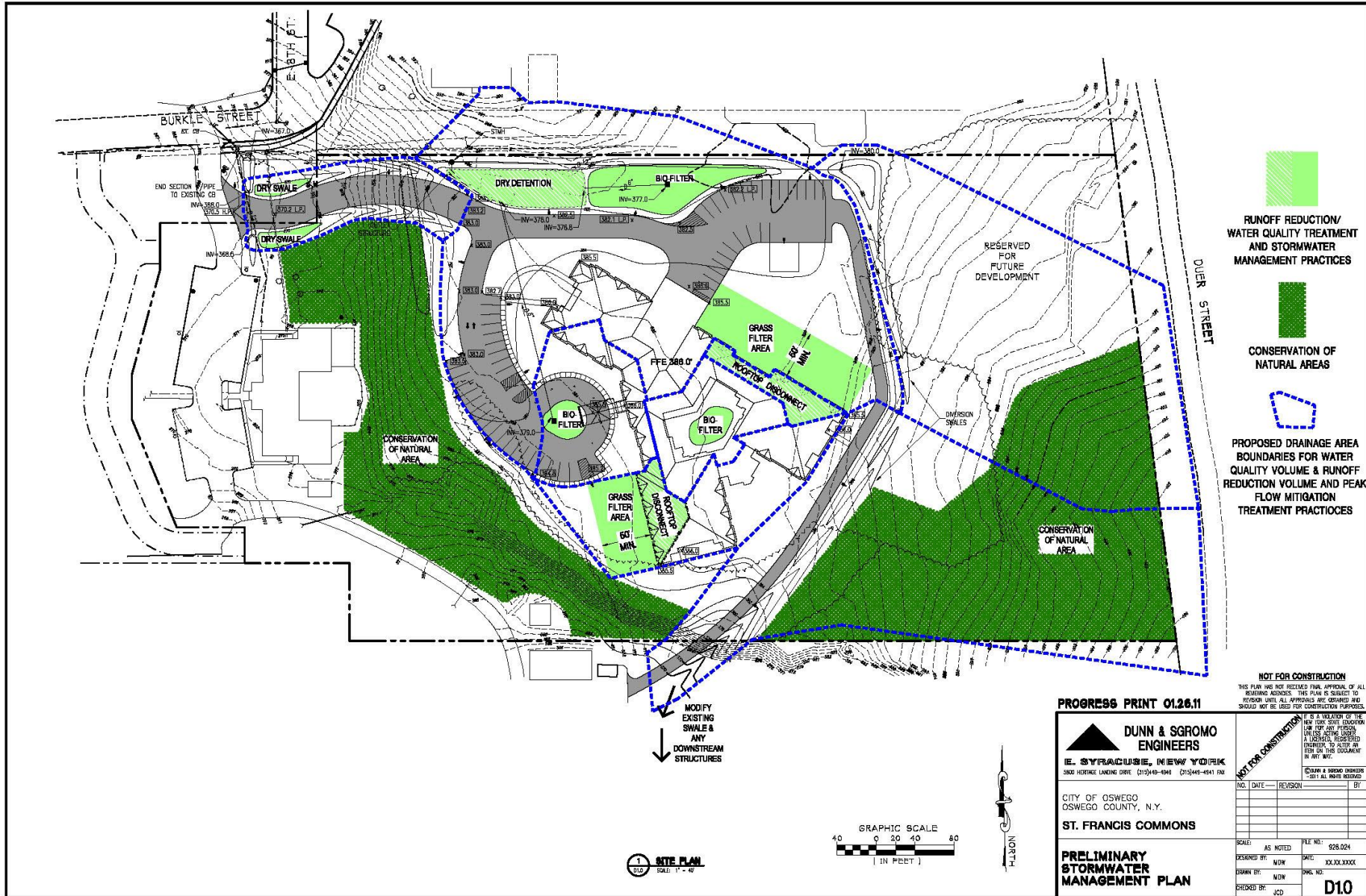
Detention







SITE PLAN
SCALE: 1" = 40'





-  RUNOFF REDUCTION/
WATER QUALITY TREATMENT
AND STORMWATER
MANAGEMENT PRACTICES
-  CONSERVATION OF
NATURAL AREAS
-  PROPOSED DRAINAGE AREA
BOUNDARIES FOR WATER
QUALITY VOLUME & RUNOFF
REDUCTION VOLUME AND PEAK
FLOW MITIGATION
TREATMENT PRACTICES

NOT FOR CONSTRUCTION
 THIS PLAN HAS NOT RECEIVED FINAL APPROVAL OF ALL
 RELEVANT AGENCIES. THIS PLAN IS SUBJECT TO
 REVISION UNTIL ALL APPROVALS ARE OBTAINED AND
 SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

PROGRESS PRINT 01.26.11

DUNN & SGROMO ENGINEERS
 E. SYRACUSE, NEW YORK
 3802 HERRING LANDING DRIVE (315) 465-6963 (315) 465-4541 FAX

CITY OF OSWEGO
 OSWEGO COUNTY, N.Y.
ST. FRANCIS COMMONS

PRELIMINARY STORMWATER MANAGEMENT PLAN

NO.	DATE	REVISION	BY

SCALE: AS NOTED FILE NO: 928.024
 DESIGNED BY: MDM DATE: 03.03.2008
 DRAWN BY: MDM DWG. NO.:
 CHECKED BY: JCD

D10

1 SITE PLAN
 S.D. SCALE: 1" = 40'

WHERE DO WE GO FROM HERE?



Developer Challenges

- How much more will GI cost?
- How will GI affect value and development potential of land?
- Is there a market for property with GI?
- Will financial Institutions support projects with GI?
- How will municipal home rule affect uniform application of GI?

Municipal Challenges:

- Who will enforce/monitor Green Infrastructure?
- Who will Maintain Green Infrastructure?
- Who will pay for maintenance?
- How will natural areas be preserved?
- How will technical and legal review be completed?
- Do local laws need amending for Stormwater?



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