

Short Memo Topic

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ECOL8710 Upper Altamaha Watershed Practicum

White Hall Mill Condominium Community Stormwater Management

I. Site Design Possibilities:

1. Create a vegetative swale in the lower parking lot close to the river. Drainage patterns across the parking lot suggest this would be an excellent solution to stop stormwater from rushing across the parking lot straight to the river as is currently the case. This would involve digging out soil as well as widening the strip to receive rain water. Light poles would have to be relocated at the edge of the new swale and current vegetation removed, hopefully to be reused elsewhere on site. Rain water would collect and filter into the ground at this swale. Vegetation suitable to damp conditions due to rain water collection, as well as the site's current conditions along side the river, should be planted in this swale. It is anticipated there would be no drastic loss of parking area.

2. Build a rain garden in the area that is now the "pet area" and park. Drainage patterns from the hillside above along with the high water table suggest this would be a good site for a rain garden or some type of stormwater field. A rain garden is suggested as this can be a lovely site well planted and using native stone and other such materials to enhance the beauty of this community park area while mitigating stormwater run off.

3. Replant the recently cleared hillside as soon as possible. This hillside, as well as other steeply inclined areas on the site, is prone to erosion. Vegetation root systems help both to prevent run off as well as erosion. Proper planting of the hillside will create little terraces that collect rain water for the planted vegetation. A plan for terracing the hill side using retaining walls, pea-gravel patios, stairs, etc. should also be considered, creating additional outdoor spaces that would have full view of the river.

4. Utilize your constructed spaces and consider using green roofs. In some cases, these would be additional garden spaces for the condo owner. The flat roof tops of Whitehall seem ideally suited for green roofs. Consider also replacing some asphalt with porous paving products. Porous concrete as well as pavers would reduce runoff.

5. Rainwater harvesting could be a useful tool for collecting rainwater as well as benefit the community by satisfying some water needs. Currently all downspouts are directed to small drainage gutters at ground level that then spill out to the parking lot. At the higher elevations of Whitehall Mill, these downspouts could be directed underground to a collection tank and utilized in the complex for irrigation of planted areas or to a bio-retention site to allow for filtration into the ground. At the lower elevations this is more difficult due to the high water table. To direct these underground to the stormwater sewer suspected to be on site would only send this water rushing directly to the river, which is ideally avoided. It is suggested that the rainwater from these ground level gutters be directed via rivulets cut into the pavement (and topped with solid grates so driving across them is possible) directly to the vegetative swale and/or the rain garden. Consider also the possibility of directing gutters and downspouts underground directly to the raceway. Since this area already exists and was once used for retaining water, it is an existing

Plant Installation	\$1.00 - \$3.00/sq. ft.
Plants	\$2.00 - \$4.00/sq. ft.

I have estimated the cost for some design suggestions (numbered as noted in Section I) and those are as follows:

- (1.) Vegetative swale in the lower parking lot close to the river: \$1,500 - \$3,300
- (2.) Rain Garden at pet area by the river: \$1,750 - \$3,850
- (3.) Replant the hillside: \$2,000 - \$4,000
- (5.) Rain Barrel: average cost for a rain barrel set up is \$225/barrel
- (7.) Detention pond/rain garden on slope by the Fowler home: \$1,000 - \$2,200

III. Funding Opportunities and Resources:

Environmental Protection Agency, current funding opportunities: <http://www.epa.gov/ogd/> The **Office of Water and the Office of Wetlands, Oceans and Watersheds** could be of particular focus in searching for granting opportunities to protect the local watershed through better stormwater management practices.

Environmental Finance Handbook produced for the EPA can be found at:
<http://www.epa.gov/efinpage/guidbkpdf.htm>

Georgia Environmental Facilities Authority, Clean Water State Revolving Loan Fund: <http://www.gefa.org/cwsrf.html> for constructing storm water control structures such as detention and retention ponds (particularly on a regional basis), and restoring stream banks. Loans are available at a low interest rate for a maximum of twenty (20) years.

Catalog of Federal Assistance: The online Catalog of Federal Domestic Assistance gives you access to a database of all Federal programs available to State and local governments (including the District of Columbia); federally -recognized Indian tribal governments; Territories (and possessions) of the United States; domestic public, quasi-public, and private profit and nonprofit organizations and institutions; **specialized groups; and individuals.**
<http://12.46.245.173/cfda/cfda.html>

Georgia Department of Natural Resources:

<http://www.gadnr.org/>

Fish and Wildlife Service

<http://georgiawildlife.dnr.state.ga.us/> click on General Info, then click on Conservation Programs that Offer Financial Incentives and Technical Assistance:

Partners for Fish and Wildlife funding - Contact the USFWS office in Athens (706) 613-9493.

Wildlife Habitat Incentive Program funding - Contact your local Natural Resource Conservation Service (NRCS) office. For contact information, go to <http://offices.sc.egov.usda.gov/locator/app> click either north or south GA, then click your county. EQIP applications are accepted throughout the year.

U.S. Natural Resources Conservation Service: NRCS's natural resources conservation programs help people reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. Public benefits include enhanced natural resources that help sustain agricultural productivity and environmental quality while supporting continued economic development, recreation, and scenic beauty.

<http://www.nrcs.usda.gov/programs/>

Athens-Clarke County Government:

<http://www.accstormwater.com/>

Stormwater fee funds could be used to make Whitehall Mill a demonstration site for the ACC government.

Watersheds and Wetlands Division, Natural Resources Conservation Service, Department of Agriculture:

<http://www.nrcs.usda.gov>

Center for Watershed Protection:

<http://www.cwp.org/restoration.htm> and specifically http://www.cwp.org/stormwater_mgt.htm for stormwater management

Georgia Stormwater Management Manual:

<http://www.georgiastormwater.com/>

Environmental Protection Division

<http://www.gaepd.org/>

The Georgia Water Council

<http://www.georgiawatercouncil.org>

Georgia Rivers Network

<http://www.garivers.org/>

See Grants for current opportunities.

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IV. Next Steps:

1. This project should become a Summer 2006 Land Use Clinic project and then a Fall 2006 Upper Altamaha Practicum project. I see this project fitting into the service and outreach goals of the Initiative for Watershed Excellence: Upper Altamaha Pilot Project to provide technical, organizational and legal assistance to stakeholder groups to increase their capacity to enhance and protect water quality. Seeking funding, design and installation could be carried out by students in these courses.
2. See Attachment I “Residential Rain Gardens: Suggested Plants and Design Notes” for a listing of plants (native and non-native) and some basic design guidelines (some things to think about).
3. See Attachment II “Stormwater management information and examples for Whitehall project” for a listing of websites that have information that I found useful in my research.

Residential Rain Gardens: Suggested Plants and Design Notes

Large Trees

• Bald Cypress	Taxodium disticum	south GA native
• Black Gum	Nyssa sylvatica	native
• Ginkgo	Ginkgo biloba	non-native
• Green Ash	Fraxinus pennsylvanica	native
• Loblolly Pine	Pinus taeda	native
▪ Overcup oak	Quercus lyrata	native
• Persimmon	Diospyros virginiana	native
• Red Maple	Acer rubrum	native
• River Birch	Betula nigra	native
• Sugar Hackberry	Celtis laevigata	native
• Willow Oak	Quercus phellos	native

Small Trees

• Crape Myrtle	Lagerstroemia indica	non-native
• Dahoon Holly	Ilex cassine	south GA native
▪ Devilwood	Osmanthus americanus	south GA native
• Fringetree	Chionanthus virginicus	native
▪ Muscledwood, Ironwood	Carpinus caroliniana	native
▪ Red buckeye	Aesculus pavia	south GA native
▪ Serviceberry	Amelanchier arborea	native
▪ Southern sugar maple	Acer barbatum	native
• Sweetbay Magnolia	Magnolia virginiana	native
• Green Hawthorn	Crataegus viridis	native

Shrubs

• American Beautyberry	Callicarpa americana	native
• Anise	Illicium parviflorum	south GA native
• Arrowwood	Viburnum dentatum	native
• Bottlebrush Buckeye	Aesculus parviflora	south GA native
• Buttonbush	Cephalanthus occidentalis	native
• Devil’s walking-stick	Aralia spinosa	native
• Elderberry	Sambucus canadensis	native
• Florida leucothoe	Agarista populifolia	south GA native
• Inkberry	Ilex glabra	south GA native
• Oakleaf Hydrangea	Hydrangea quercifolia	native in western GA
• Possumhaw	Ilex deciduas	native
• Red chokeberry	Aronia arbutifolia	native
• Silky dogwood	Cornus amomum	native
• Strawberry bush	Euonymus americanus	native
• Summersweet Clethra	Clethra alnifolia	south GA native
• Swamphaw	Viburnum nudum	native
• Swamp rose	Rosa palustris	native
• Virginia Sweetspire	Itea virginica	native
• Wax Myrtle	Morella cerifera	south GA native
• Winterberry	Ilex verticillata	native

Attachment I

Herbaceous Perennials

- Asters Aster spp. – A. pilosus, A. patens, A. dumosus
- New England Aster Aster nova-angliae
- English Countryside Aster Aster nova-angliae native further north
- Blackeyed Susan Rudbeckia hirta ‘Indian Summer’ cultivar of native
- Blue Lobelia Lobelia native
- Laguna Compact Blue with Eye Lobelia native
- River Oats Chasmanthium latifolium native
- Cardinal Flower Lobelia cardinalis native (*needs water in severe dry conditions*)
- Goldenrod S. nemoralis, S. odora, S. speciosa, native
- Goldenrod Fireworks cultivar S. rugosa native
- Ironweed Vernonia noveboracensis native(*needs water in severe dry conditions*)
- Joe Pye Weed Eupatorium fistulosum native (*needs water in severe dry conditions*)
- St. Johns Wort Hypericum fasciculatum south GA native
- Swamp Milkweed Asclepias incarnata native further north/west
- Royal Fern Osmunda regalis native (*needs water in severe dry conditions*)
- Cinnamon Fern Osmunda cinnamomea native (*needs water in severe dry conditions*)
- Canna Lilies Canna x generalis (‘Pink Sunburst’ non-native)
- Soft rush Juncus effuses native
- Corkscrew Rush Juncus effusus (‘Spiralis’ Rush cultivar of native)
- Little bluestem Schizachyrium scoparium native (cultivars “The Blues”)
- Indiangrass Sorghastrum nutans native
- Switchgrass Panicum virgatum native (cultivars “Heavy Metal”, “Cloud Nine” & others)

Rain Garden Design

- Design it to handle a 1.25 inch rain event (this captures 80% of rainfall events)
- Square footage x 1.25 in. (or .104 ft) = X cu ft of water

Example:

$$\begin{aligned} 60 \times 30 &= 1800 \text{ sq. ft.} \\ 1800 \text{ sq. ft.} \times .104 \text{ ft. of rain (1.25 in rain)} &= \\ &187 \text{ cu. Ft. of water} \end{aligned}$$

Just for Fun

$$187 \text{ cu. ft. of water} \times 7.48 = 1398 \text{ gallons}$$

- Locate the rain garden down slope from any buildings
- Away from large trees (easier digging)
- In areas that take advantage of natural slope.
- Consider the size and placement in the landscape design. It may be easier to create two separate rain gardens for example.
- For large projects it may be easier to hire a landscaper.
- For smaller projects use the excavated soil to build a berm on the downhill side of the garden.
- Use a rope or water hose to layout the edge of the garden.
- For deep gardens set aside the top 4-6 inches of soil (topsoil), excavate the hole then use the top soil to backfill the planting area.
- Do a perk test. Dig an 8 by 8 inch hole 8 inches deep and fill with water. If it takes more than 8 hours to drain then the soil needs to be amended.
- On poorly drained soil excavate 10-12 inches of soil from hole, mix 3-6 inches of coarse sand or small

Attachment I

gravel with excavated soil and replace into rain garden.

- Bring 2 cups of soil to Extension Office for soil test (\$8 fee, results in two weeks)
- Add lime and fertilizer according to soil test results, 3-6 inches of organic matter then till to a depth of 6 inches.
- Determine sun exposure
 - Full sun = 6 or more hours of direct sun
 - Part Sun to Part Shade=
 - less than 6 hours of direct sun
 - Shade = virtually no direct sun
- Don't forget specific site problems
 - Deer!
 - Plants will need to be watered until established

Plants to Avoid Using in the Rain Garden

- Those Susceptible to Root Rots
 - Azaleas
 - Junipers
 - Indian Hawthorn
 - Chinese Privet
- By all means MULCH!!!!
 - A minimum of 2" needed
 - Keeps weeds down
 - Acts as sponge to capture heavy metals, oils and grease
 - Holds moisture
 - Maintains even temperature
 - Shredded hardwood mulch or pine straw recommended
- The planting plan design should include species that tolerate extremes.
- Rain gardens can be left to evolve into a natural wild condition.
- Native plants are best adapted to local climate and once established are generally low maintenance.
- When planted with native species rain gardens can have additional value as a wildlife habitat.
- Shrub, trees, and ground covers absorb up to 14 times more rainwater than a grass lawn.

Stormwater management information and examples for Whitehall project

Low Impact Development Center, Low Density Residential Bioretention Specifications

http://www.lid-stormwater.net/bioretention/biolowres_specs.htm

University of Wisconsin Extension Service PDF documents

Rain Gardens: A household way to improve water quality in your community

Rain Gardens: A how-to manual for homeowners

<http://clean-water.uwex.edu/pubs/raingarden/>

The Center for Watershed Protection, slides of small rain garden design and installation

http://www.cwp.org/Community_Watersheds/Rain_Garden.htm

Sweetwater Alliance, an example of a small scale project (with donated native plants)

http://www.sweetwateralliance.org/Rain_Garden.html

Home and Garden Television, Rain Barrels

http://www.hgtv.com/hgtv/gardening/article/0,1785,HGTV_3546_2165903,00.html

Clean Water Campaign

<http://www.cleanwatercampaign.com/>

Rain Garden at the Southeast Clarke Park, Athens

<http://www.gwf.org/raingarden.htm>