BUILD: SANDY SPRINGS

Let’s build something great together

Practical Guide to Designing around Trees and Water

SANDY SPRINGS™
GEORGIA

May 23, 2022

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DESIGNING AROUND TREES

Can I Remove Trees?

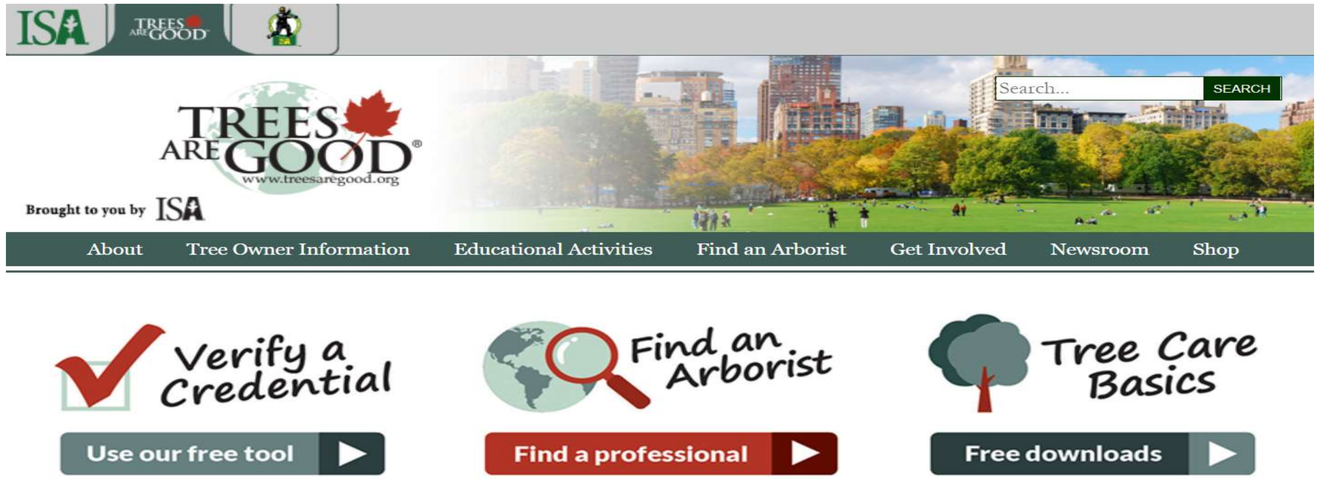
Can I Remove Trees?

- The simple answer is YES!
  - Hazardous and dead trees can always be removed.
  - **Within 2,000′ of the Chattahoochee River:**
    - Clearing trees would need to be consistent with the Metropolitan River Protection Act (MRPA). MRPA determines the allowable percentage based on soil studies.
  - **Within 75′ of streams, creeks, ponds,** etc:
    - Removals are discouraged since they provide shade to streams and promote desirable aquatic habitat.
  - **All other trees under 18″ in diameter can be removed without a permit.**
  - **All trees 18″ in diameter and larger need to be permitted.**

What Is A Hazardous Tree?

What is A Hazardous Tree?

- A hazardous tree means a tree that is at risk for failure because it is structurally defective, and where that failure could result in personal injury or property damage.
- Hazardous trees will need to be verified by a private arborist and then coordinated with the City Arborist prior to removal.
- You can find a private local arborists at www.treesaregood.org



Hazardous Tree Examples:

Typical tree that is splitting

Typical lightening damage to a tree

Hazardous Tree Examples:

Typical hazardous leaning tree

Typical tree that is dying

Hazardous Tree Examples:

Mushrooms are a sign that a tree is in decline. Decaying wood provides the ideal conditions for mushrooms to grow.

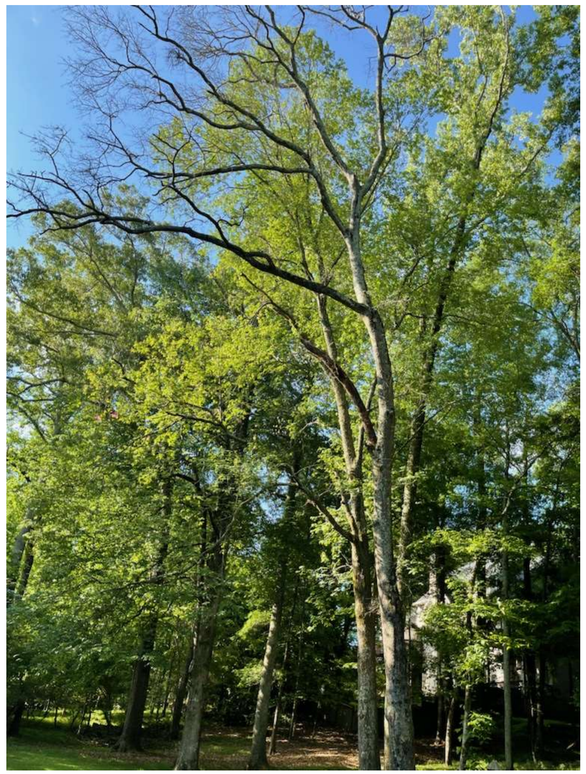
Hazardous Tree Examples:

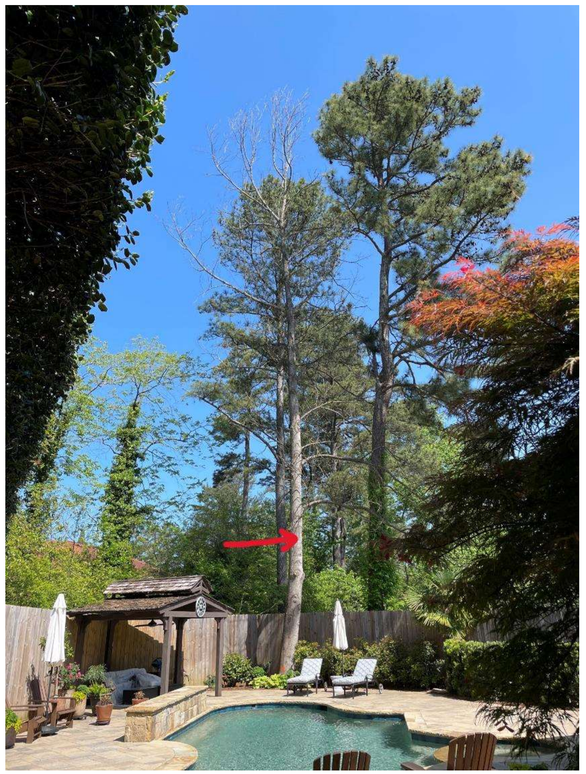
Typical hollow tree. Notice how deep the hollow goes into the tree.

What If I Have A Dead Tree?

What if I Have a Dead Tree?

- A dead tree is a tree completely void of leaves.
- To notify Sandy Springs that you are removing a dead tree, please email: arborist@sandyspringsga.gov
- **Include the address and pictures showing the tree's** condition.





Do I Need A Tree Removal Permit?

Do I Need A Tree Removal Permit?

- A Tree Removal Permit is required to remove the following:
  - **Any Tree 18″ in Diameter and** Larger
  - **Any Size Tree within 2,000′ of** the Chattahoochee River
  - **Any Size Tree within 75′ of a** Stream, Creek or Body of Water

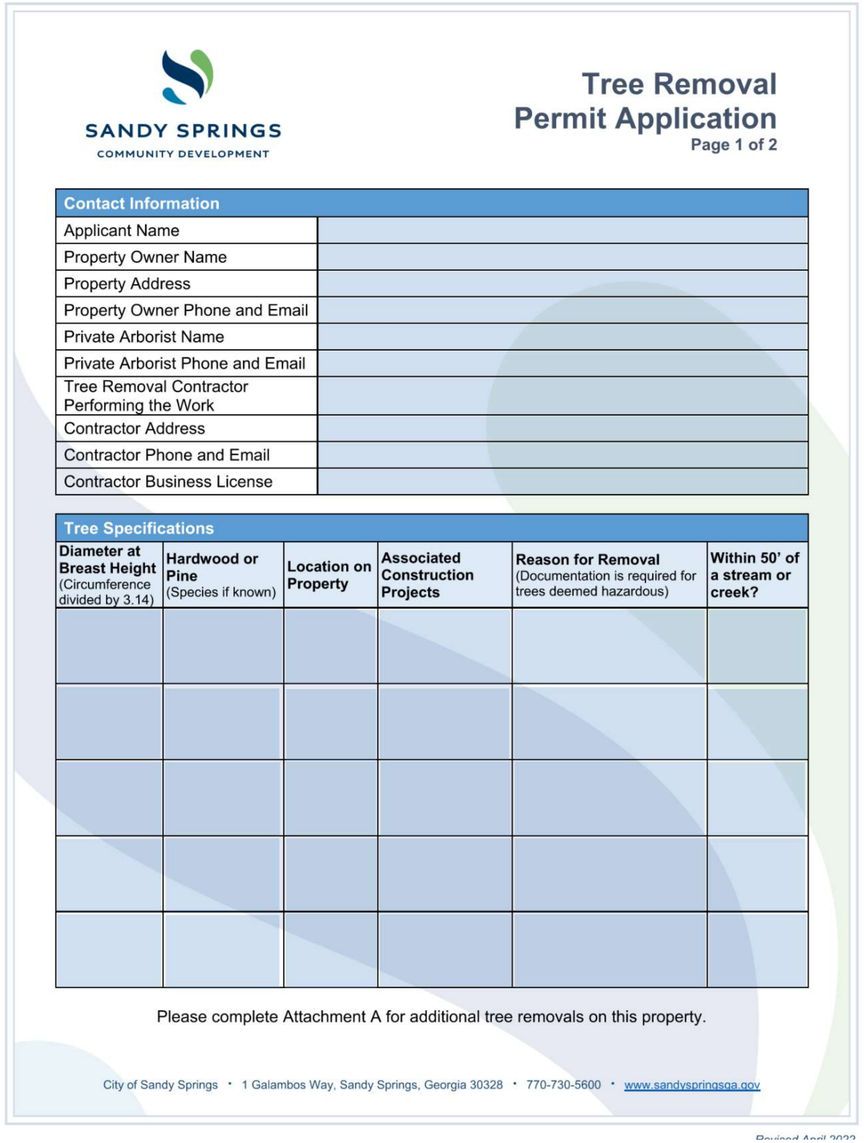
These trees are marked for removal.

How Do I Apply For A Tree Removal Permit?

How to Apply for a Tree Removal Permit

- There is a two-page fillable application on our website to list out all trees proposed for removal and the Protected Trees that will be remaining on site.
- When you submit this application, you will need to include pictures or a report from a certified arborist for any tree deemed hazardous or in decline. You will also need to include a drawing or sketch showing the tree locations on your property.
- To apply for a Tree Removal permit online, go to build.sandyspringsga.gov and upload your documentation.
- Expect a week for review and issuance of your tree removal permit.

How to Apply for a Tree Removal Permit



SANDY SPRINGS
COMMUNITY DEVELOPMENT

Tree Removal Permit Application
Page 1 of 2

Contact Information	
Applicant Name	
Property Owner Name	
Property Address	
Property Owner Phone and Email	
Private Arborist Name	
Private Arborist Phone and Email	
Tree Removal Contractor Performing the Work	
Contractor Address	
Contractor Phone and Email	
Contractor Business License	

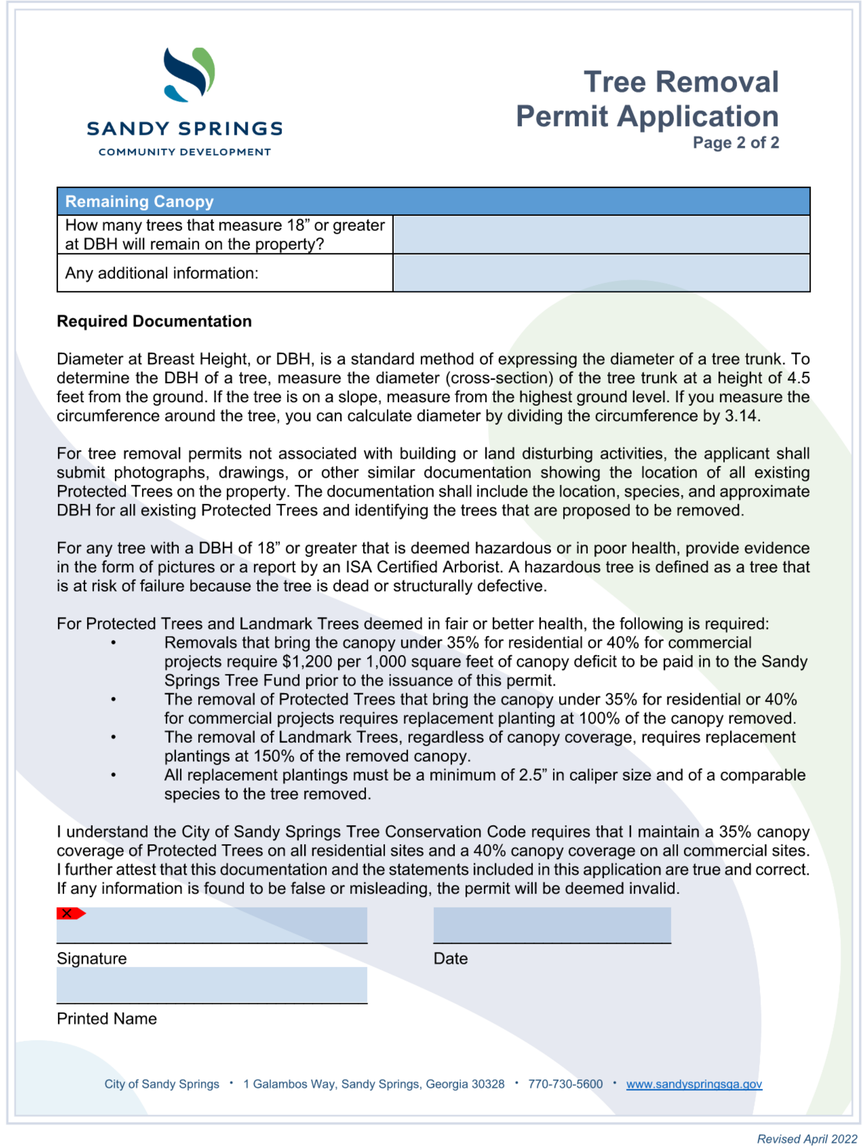
Tree Specifications

Diameter at Breast Height (Circumference divided by 3.14)	**Hardwood or Pine** (Species if known)	**Location on Property**	**Associated Construction Projects**	**Reason for Removal** (Documentation is required for trees deemed hazardous)	**Within 50' of a stream or creek?**

Please complete Attachment A for additional tree removals on this property.

City of Sandy Springs • 1 Galambos Way, Sandy Springs, Georgia 30328 • 770-730-5600 • www.sandyspringsga.gov

Revised April 2022



SANDY SPRINGS
COMMUNITY DEVELOPMENT

Tree Removal Permit Application
Page 2 of 2

Remaining Canopy	
How many trees that measure 18" or greater at DBH will remain on the property?	
Any additional information:	

Required Documentation

Diameter at Breast Height, or DBH, is a standard method of expressing the diameter of a tree trunk. To determine the DBH of a tree, measure the diameter (cross-section) of the tree trunk at a height of 4.5 feet from the ground. If the tree is on a slope, measure from the highest ground level. If you measure the circumference around the tree, you can calculate diameter by dividing the circumference by 3.14.

For tree removal permits not associated with building or land disturbing activities, the applicant shall submit photographs, drawings, or other similar documentation showing the location of all existing Protected Trees on the property. The documentation shall include the location, species, and approximate DBH for all existing Protected Trees and identifying the trees that are proposed to be removed.

For any tree with a DBH of 18" or greater that is deemed hazardous or in poor health, provide evidence in the form of pictures or a report by an ISA Certified Arborist. A hazardous tree is defined as a tree that is at risk of failure because the tree is dead or structurally defective.

For Protected Trees and Landmark Trees deemed in fair or better health, the following is required:

- Removals that bring the canopy under 35% for residential or 40% for commercial projects require $1,200 per 1,000 square feet of canopy deficit to be paid in to the Sandy Springs Tree Fund prior to the issuance of this permit.
- The removal of Protected Trees that bring the canopy under 35% for residential or 40% for commercial projects requires replacement planting at 100% of the canopy removed.
- The removal of Landmark Trees, regardless of canopy coverage, requires replacement plantings at 150% of the removed canopy.
- All replacement plantings must be a minimum of 2.5" in caliper size and of a comparable species to the tree removed.

I understand the City of Sandy Springs Tree Conservation Code requires that I maintain a 35% canopy coverage of Protected Trees on all residential sites and a 40% canopy coverage on all commercial sites. I further attest that this documentation and the statements included in this application are true and correct. If any information is found to be false or misleading, the permit will be deemed invalid.

X _____ _____

Signature Date

_____

Printed Name

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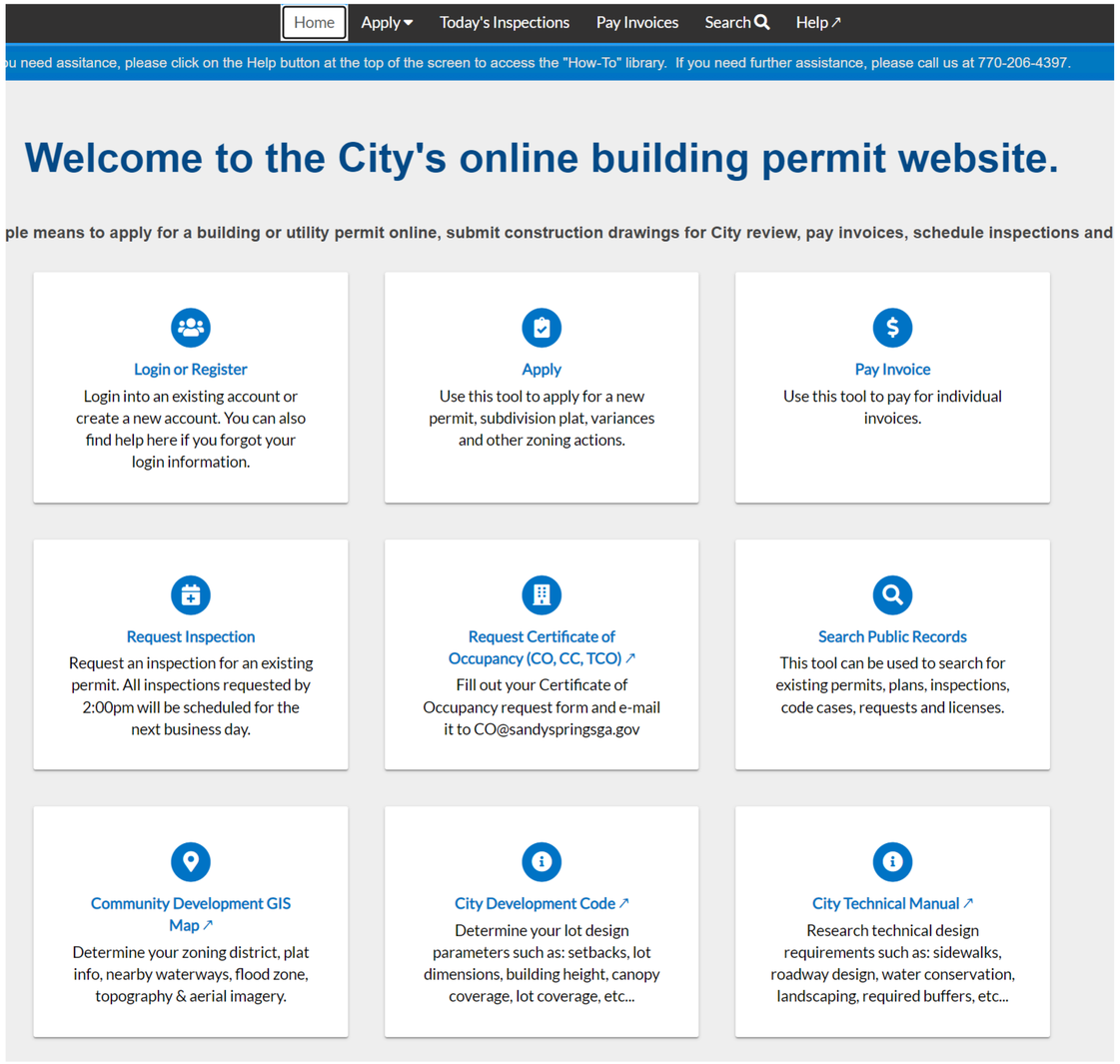
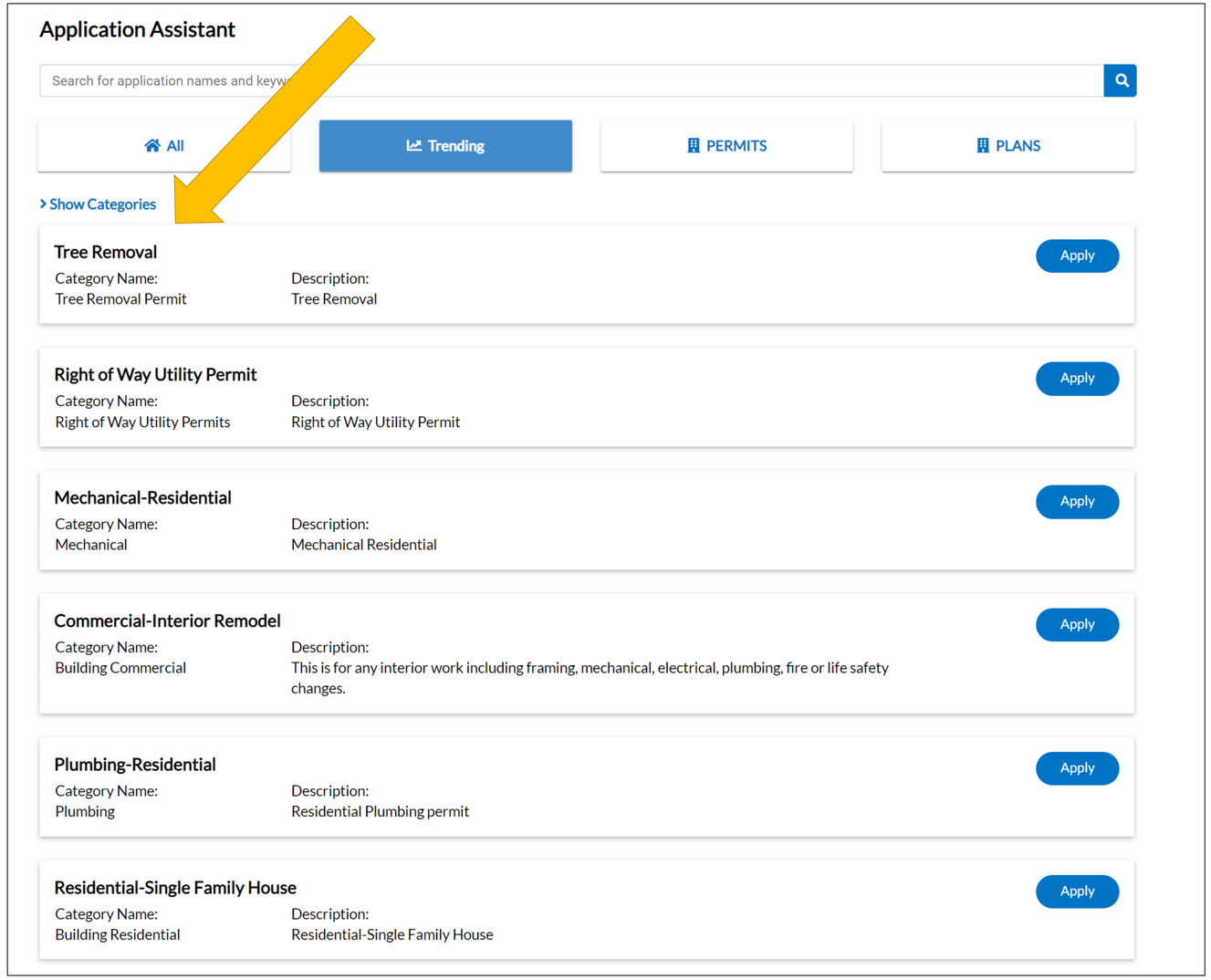
How to Apply for a Tree Removal Permit





How Much Does A Tree Removal Permit Cost?

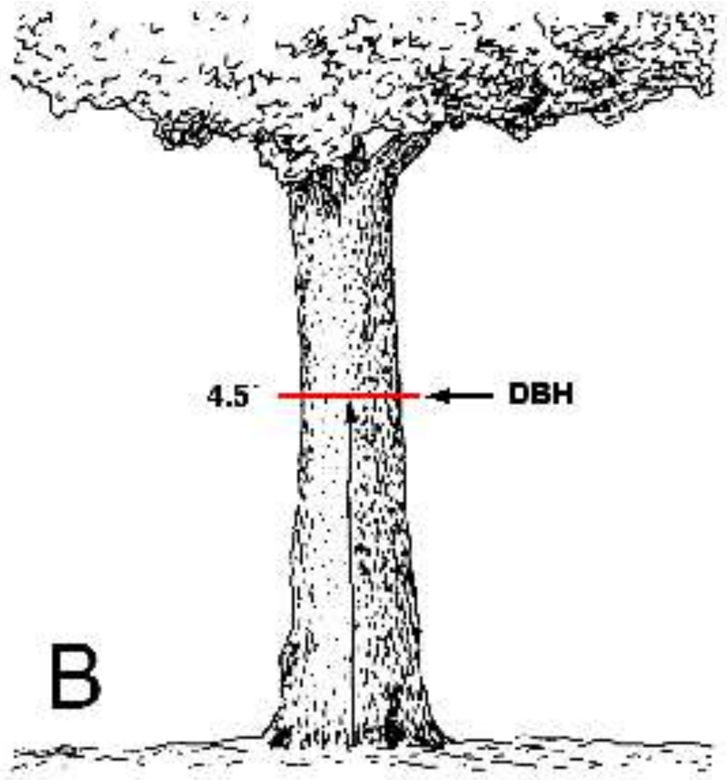
How Much does a Tree Removal Permit Cost?

- There is a minimum permit fee of $30 for all permits.
- Additional fees may apply depending on the extent of the project
  - If you go under your tree canopy requirements:
    - Canopy Loss Mitigation Fees ($1200 per 1000 SF of loss of canopy coverage)
    - $5000 / 1000 SF of canopy will be used when canopy replacement cannot be achieved by replanting on the site.
- All invoices can be paid online or in person at City Hall.

How Do I Measure An Existing Tree?

How Do I Measure An Existing Tree?

- Diameter at Breast Height (DBH) is the standard method of tree measurement. The diameter is measured at 4.5 feet from the ground.
- The DBH can calculated by measuring the circumference (perimeter) of the tree using a tape and dividing that by 3.14.
  - Example: **60″ perimeter / 3.14 = 19″ diameter tree**
- You can also estimate the diameter (width) of the tree if you are unable to get the circumference.



How Do I Measure A Replacement Tree?

How Do I Measure A Replacement Tree?

- The diameter of new plantings or existing saplings used as replacement trees are measured in Caliper.
- The Caliper is measured between 6-**12" off the ground.**

What Is Canopy Coverage?

What Is Canopy Coverage?

- Canopy Coverage refers to the number of large trees shading a property.
  - Residential Properties have a required canopy coverage of 35% **made up of 18" diameter or larger** trees.
  - Commercial Properties have a required canopy coverage of 40% **made up of 18" diameter or larger** trees.
- If you cannot maintain canopy coverage requirements, mitigation and recompense would apply.

What Are The Canopy Coverage Requirements?

Mitigation & Recompense

What Are the Canopy Coverage Requirements?

- Mitigation: The replanting of trees to offset the removal of trees under canopy requirements.
  - Required for the removal of all Landmark Trees at 150%; regardless of remaining canopy.
    - Landmark trees consist of the following:
      - **Hardwood tree 27″ diameter or larger**
      - **Pine tree 30″ diameter or larger**
      - Dogwood or redbud tree ten inches DBH or larger being in fair or better condition
  - **Required for the removal of Protected Trees (18″ diameter or larger)** under canopy requirements.
  - Must be mitigated with a tree of similar growing potential.

What Are the Canopy Coverage Requirements?

- Recompense: The payment into the Sandy Springs Tree Fund to compensate the loss of canopy.
  - Required for the removal of all Protected and Landmark Trees under canopy requirements.

What Are the Canopy Coverage Requirements?

Table 1-3. Recommended Species List
(Species not listed may be considered for City Arborist approval)

Large Canopy Shade Trees (1,000 sf credit)

Common Name	Botanical Name	Height	Width	Native	EvGrn	Urban	Riparian	Utility
Maple, Sugar	*Acer saccharum/A. barbatum*	60	30	y			y	
Hickory, Bitternut	*Carya cordiformis*	50	50	y				
Hickory, Pignut	*Carya glabra*	60	40	y				
Hickory, Shagbark	*Carya ovata*	70	50	y				
Hickory, Mockernut	*Carya tomentosa*	60	40	y				
Chestnut, Chinese	*Castanea mollissima*	50	50			y		
Ash, White	*Fraxinus americana*	60	40	y			y	
Ash, Green	*Fraxinus pennsylvanica*	50	30	y			y	
Ginkgo (male only)	*Ginkgo biloba*	60	40			y		
Sweetgum	*Liquidambar styraciflua*	75	50	y			y	
Poplar, Tulip or Yellow	*Liriodendron tulipifera*	70	40	y			y	

^What Are the Canopy Coverage Requirements?

How Do I Determine My Canopy Coverage?

How Do I Determine My Canopy Coverage?

- STEP 1 – Calculate Your Proposed Canopy Coverage
  - **Count the number of Protected Trees 18" and larger proposed to remain** and multiply each tree by 1000 sf
  - For example: 7 Protected Trees x 1000 sf = 7000 sf

How Do I Determine My Canopy Coverage?

- STEP 2 – Calculate Your Minimum Canopy Coverage:
  - Take your lot size in square feet and multiple that by your canopy requirements:
    - For example: 18,000 sf Lot Size x 0.35 (residential canopy requirements) = 6,300 sf of Minimum Canopy Coverage

How Do I Determine My Canopy Coverage?

- STEP 3 – Compare Proposed vs Allowable Canopy Coverage
  - If Proposed is greater than the Allowable:
    - You are done and no additional requirements are needed
  - If Proposed is less than the Allowable:
    - Then additional Mitigation and/or Recompense is required (City Arborist shall verify the Mitigation and/or Recompense)

- **For any exterior work that requires a construction permits, it's required to** provide this calculation as part of your tree conservation plan.

What Is A Tree Conservation Plan?

What is A Tree Conservation Plan?

- A Tree Conservation Plan (TCP) is site plan that shows the following:
  - **All canopy coverage trees 10″ in diameter and larger labeled by their diameter** size and species shown at their location on a property.
  - The *Critical Root Zone* (CRZ) shall be labeled for each tree.
    - The CRZ is the location of the primary roots of the tree and varies based on the diameter of the tree.
    - To calculate the CRZ **for each tree, multiply every 1″ diameter of the tree by 1.25′.**
      - **Example: 18″ diameter x 1.25′ = 22.5′** CRZ **radius (45′ circle around the** center of the tree).
  - If the CRZ of a tree is *Impacted* (damaged) by 25% of more, the tree is considered destroyed and cannot count towards the canopy coverage requirements.
  - All *Impacted* trees must be labeled on the site plan. An Impacted Tree Inventory List that includes their percentage levels of impact shall be provided.

What is A Tree Conservation Plan?

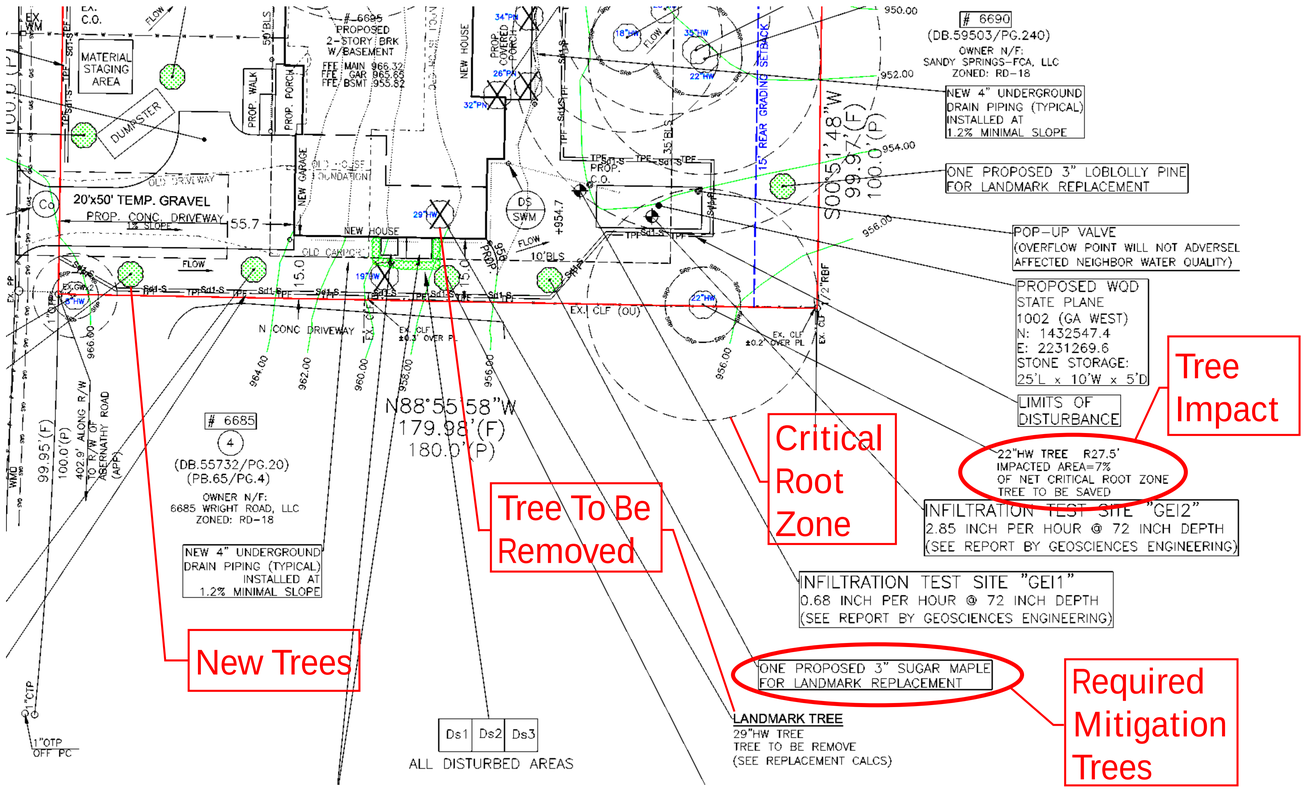
- A Tree Conservation Plan (TCP) is site plan that shows the following (cont.):
  - Trees proposed for removal should be represented with an X.
  - All *Boundary Trees* **(neighboring trees 10″ and greater) that have roots** encroaching into the permitting property and their percentage levels of impact shall be shown at their location on a property.
  - The canopy coverage calculations shall be provided.
  - All trees proposed for Canopy Mitigation, Landmark Mitigation, Grading / Setback Mitigation and Front Yard Tree Requirements must be shown at their proposed location on the property and identified by minimum caliper size, species and mitigation purpose.
  - The location, species, and caliper size of all proposed mitigation planting trees;

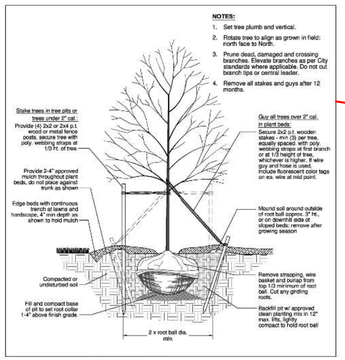
What is A Tree Conservation Plan?

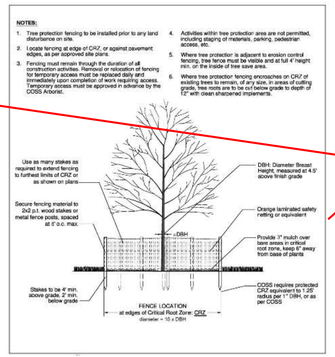
- All Construction Permits Must Include a Tree Conservation Plan (TCP) that includes the following (cont.):
  - The location of all proposed building construction and land development activities, including grading, drainage, proposed utility locations and all proposed tree protection measures.
- As part of the application for a Tree Removal Permit, a Tree Conservation Plan is required in conjunction with any activity requiring the issuance of a building permit (other than a building permit for a deck, open air patio, fence or interior renovations), demolition permit, land disturbance permit, or erosion and grading permit by the City.

What Does A Tree Conservation Plan Look Like?

What does a Tree Conservation Plan Look Like?







Tree Planting Details & Tree Save Fencing Details

CANOPY REQUIREMENTS:

NET LOT AREA: 17,987.85 SF
REQUIRED: 6,296 SF (35%)
REMAINING: 10,250 SF (57%)

Canopy Coverage Calculations

PROPOSED DEVELOPMENT DOES NOT CAUSE THE PROJECT SITE TO FALL BELOW MINIMUM CANOPY.
REQUIREMENT SATISFIED

SIDE YARD GRADING MITIGATION TREE REPLACEMENT REQUIREMENTS:

RIGHT SIDE SETBACK: 1 TREE DESTROYED BY GRADING
LEFT SIDE SETBACK: NO GRADING PROPOSED & NO TREES DESTROYED

REPLACEMENT REQUIRED: 1 TREE PLANTED PER 1 TREE REMOVED OR PER 1,000 SF OF GRADED AREA = 1 TREES REQUIRED

1 TREES FOR SIDE SETBACK GRADING MITIGATION PROPOSED
REQUIREMENT SATISFIED

FRONT YARD TREE REPLACEMENT REQUIREMENTS:

1 LARGE CANOPY TREE REQUIRED PER EVERY 40' OF STREET FRONTAGE
LOT CONTAINS 99.94' OF FRONTAGE
99.94 ÷ 40 = 2.5 TREES REQUIRED

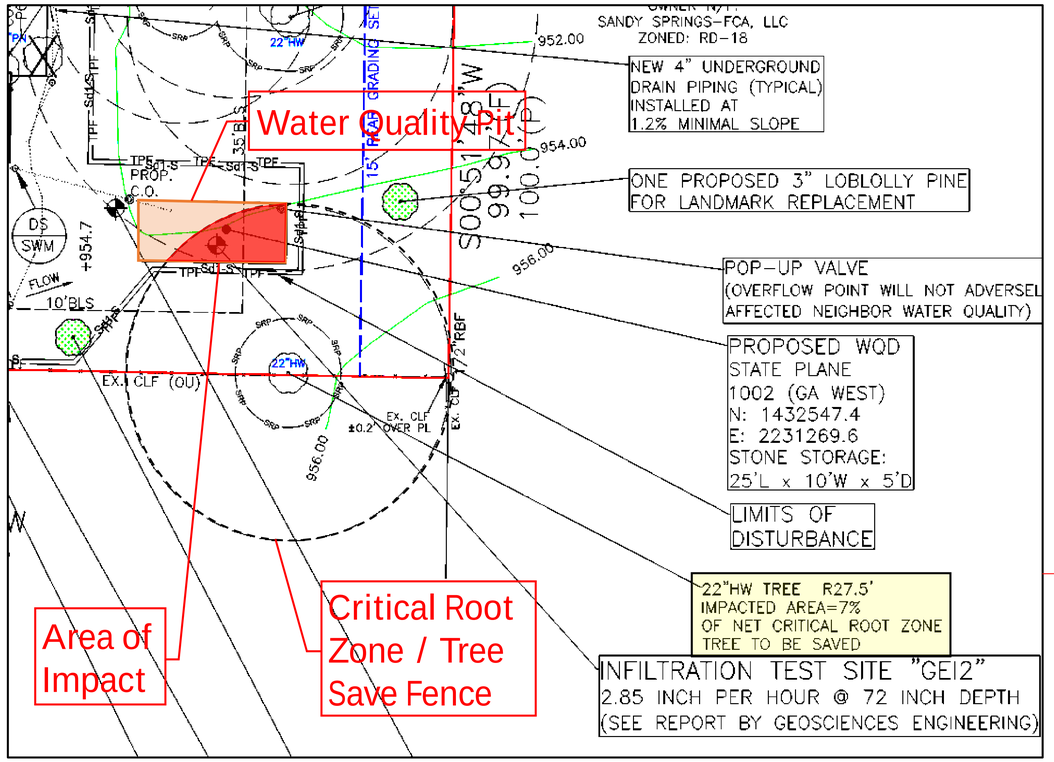
3 TREES PROPOSED IN FRONT YARD
REQUIREMENT SATISFIED

LANDMARK TREE REPLACEMENT REQUIREMENTS:

REMOVED: 3 TOTAL x 1,000 SF = 3,000 SF
REPLACEMENT REQUIRED: 3,000 SF x 1.5 = 4,500 SF (5 OVERSTORY TREES)

REPLACEMENT PROPOSED: 5 TOTAL x 1,000 SF = 5,000 SF
REQUIREMENT SATISFIED

What does a Tree Conservation Plan Look Like?



- The *Area of Impact of Trees* is the area of construction that is in the *Critical Root Zone*.
  - It shall be clearly shown on the plan (shown in RED) with the impacted areas clearly shown (highlighted yellow).

Example Summary: They are constructing their water quality pit, so we know they will be excavating that area and impacting the CRZ. The identified impact is 7% which is less than the 25% allowable impact.

- It is important to maintain BMPs like your tree save fence to prevent further impact. Without that clear sign in the field, the contractor may grade, excavate or park equipment closer to the tree, which can compact the soil and damage the roots.

What Is A Tree Save Fence?

What Is A Tree Save Fence?

- A Tree Save Fence is a physical barrier around a tree during construction that clearly indicates the Critical Root Zone.
- Tree save fencing helps protect trees from construction impact.

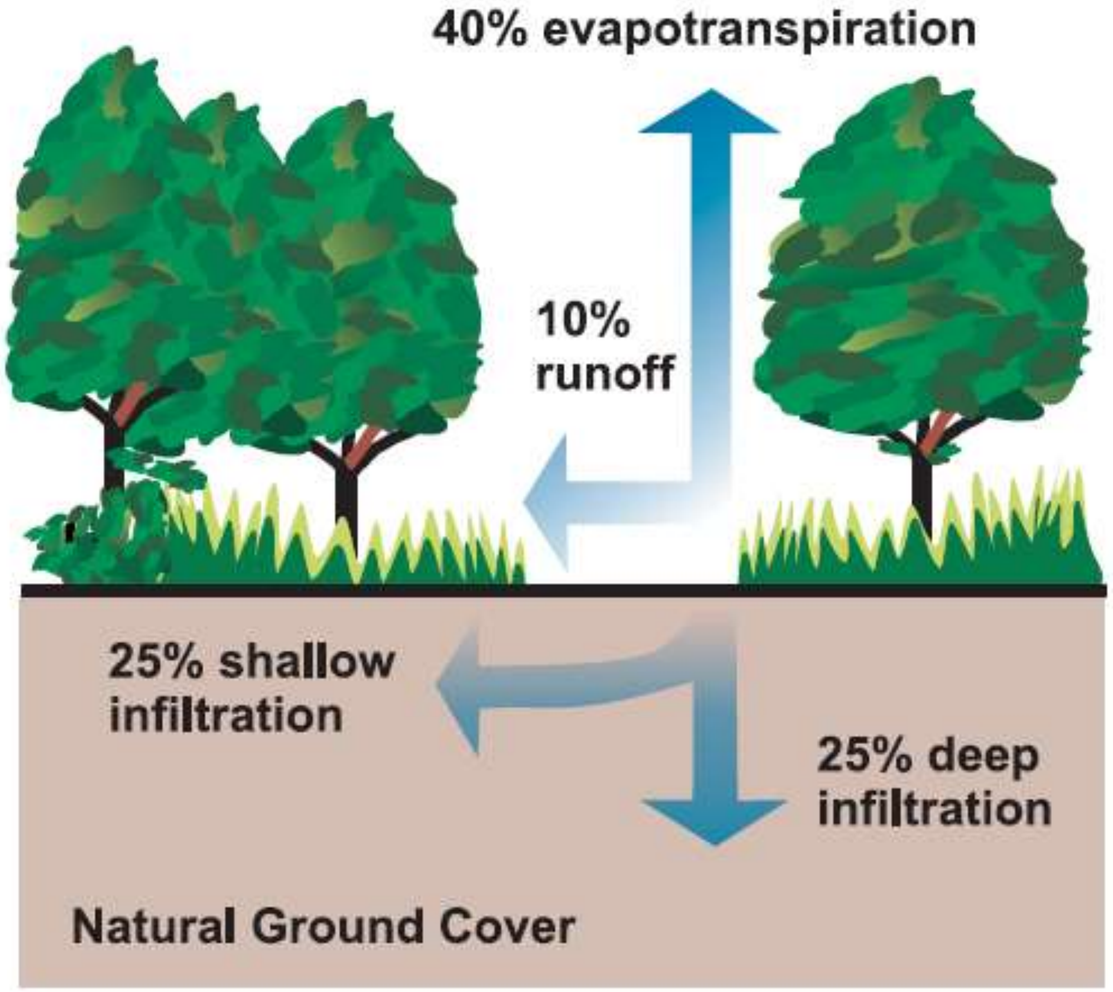
Why Should We Protect Our Trees?

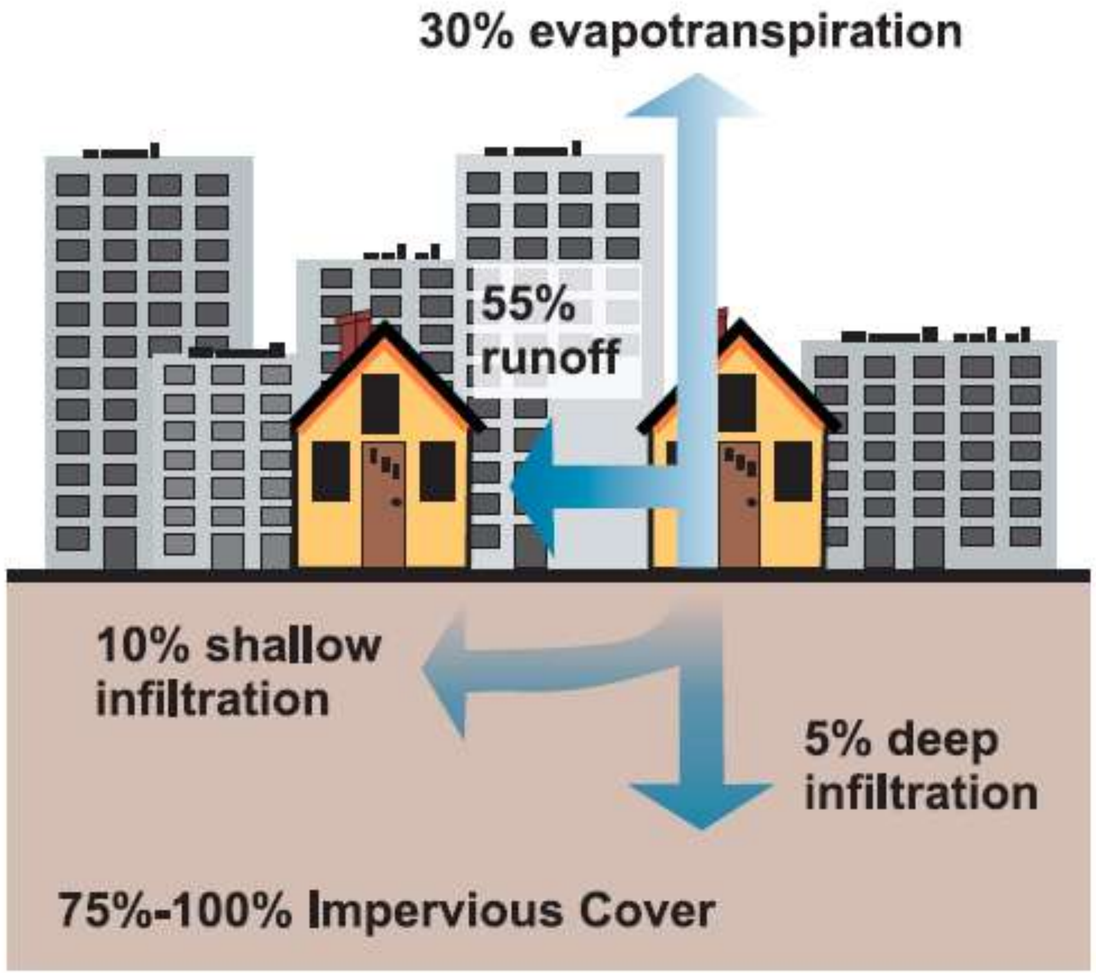
Why Should We Protect Our Trees?

- Trees are vital to our environment. In Sandy Springs, the most noticeable impact from tree removal is soil erosion, flooding and excess stormwater runoff.
- Stormwater runoff is the number one stream impairment in urban areas.
- Trees help stabilize the soil, stabilize stream banks, intercept rainfall, as well as filter and reduce stormwater runoff

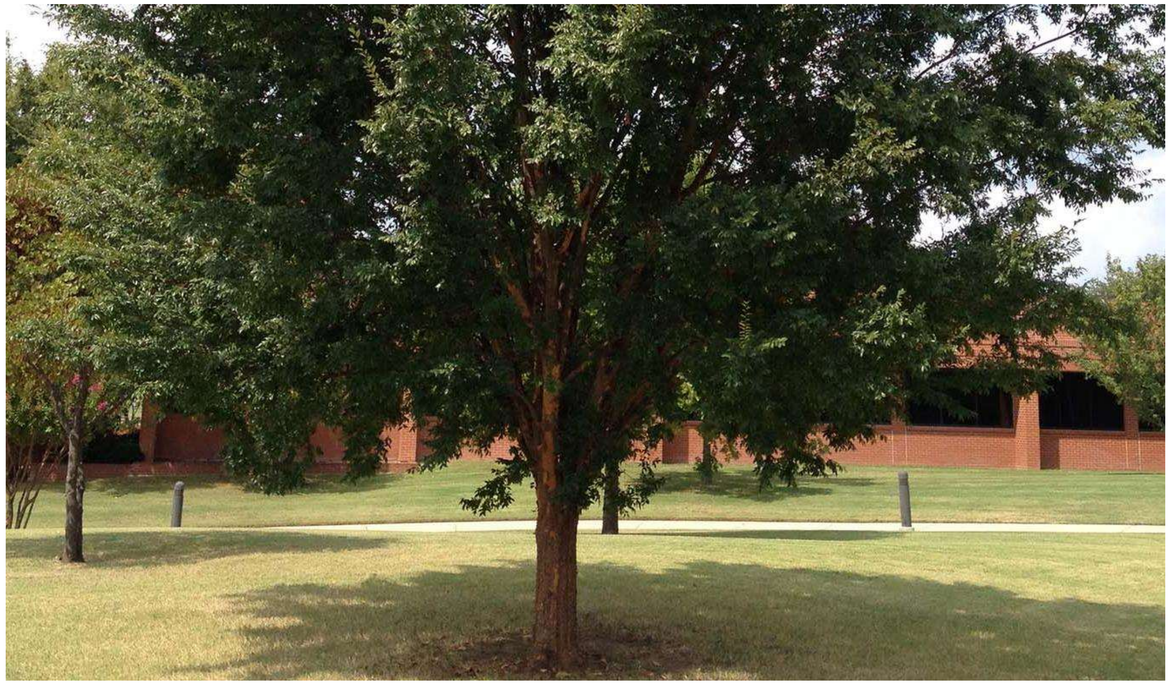
Picture taken at Big Trees Forest Preserves

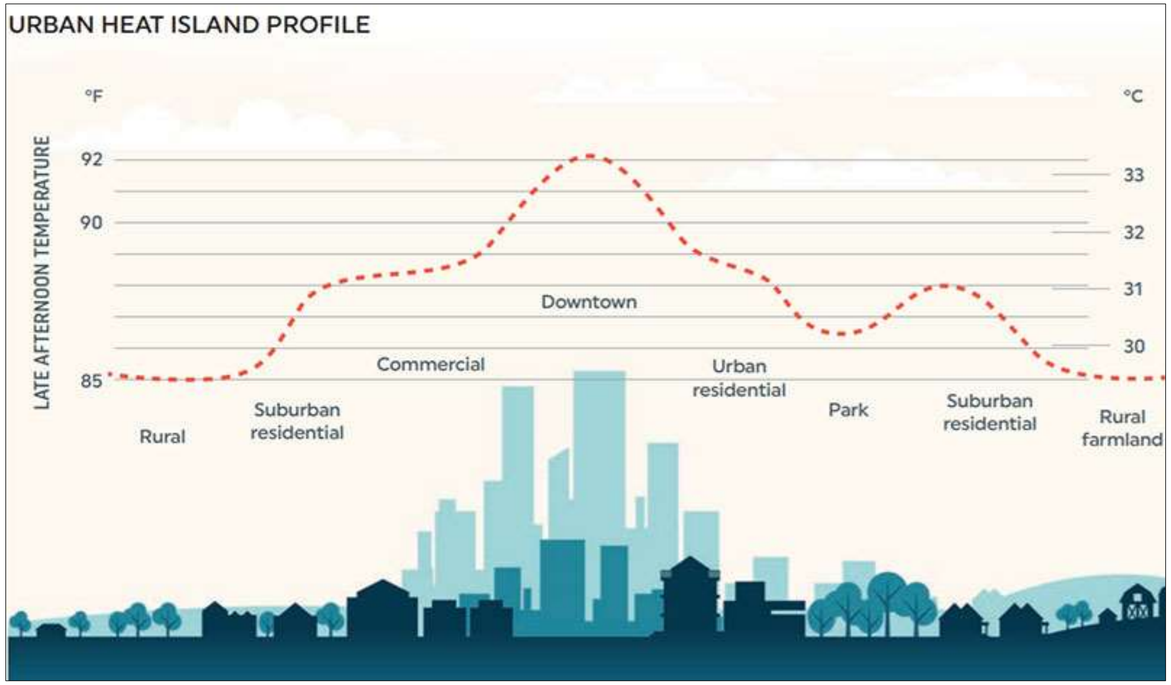
Why Should We Protect Our Trees?





Why Should We Protect Our Trees?





- Trees improve our air quality by filtrating dust and improving environmental conditions.
- Trees mitigate the urban heat island effect by shading and provide a buffer to reduce vehicular noises.

Why Should We Protect Our Trees?

- Trees provide habitat for desirable wildlife by providing food, shelter and nesting sites
- Trees improve community aesthetics and quality of life

DESIGNING AROUND WATER

Can I Build Around Water?

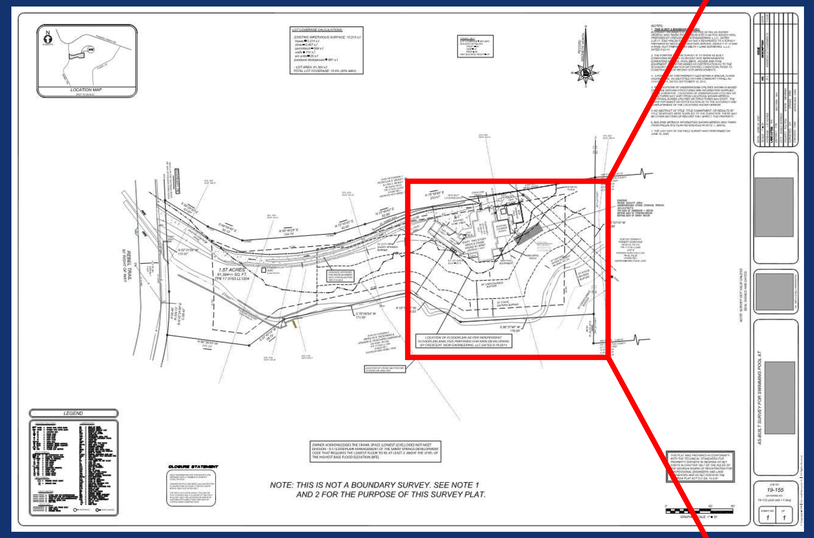
Can I Build Around Water?

- The simple answer is YES!
- In general, the construction of a Principal Residence, Pools, Accessory Structures & Commercial Developments are permitted BUT are subject to specific regulations:
  - **Within 2,000′ of the Chattahoochee River:**
    - Land disturbance activities would need to be consistent with the Metropolitan River Protection Act (MRPA). MRPA determines the allowable percentage based on soil studies.
    - **You cannot build within 150′ of the water.**
  - **Within 75′ of streams, creeks, ponds,** etc:
    - No construction is allowed within 75 feet of the stream/creek.

What Is A Buffer?

What Is A Buffer?

- A buffer is an area measured horizontally from the edge of a water body (stream-creek-river-pond) where the natural flow of water has wrested or scoured vegetation from the stream bank.



N 79°56'46" E
253.67'

NEW SELF LATCHING GATE

CHAIN LINK FENCE

16.3'

16.0'

EXISTING METAL FENCE

NEW METAL FENCE

ELEC. TFORMER

NEW JACUZZI

SSMH

0.4'

15.0'

15' B/L

NEW SWIMMING POOL

NEW POOL DECK

CO

LAND LOT LINE

19.7'

GI

EXISTING CONC. DRIVE

EX. CONC. WALL

22.5' GAR. FEE =862.1

55.6'

MAIN FEE =862.50

COV. PRCH.

FOOTPRINT = 3214+/- S.F. BLDG.HT.= 36.5'

EXISTING COVERED PORCH

0.2'

EXIST. TWO STORY BRICK & FRAME HOUSE W / BSMT. ADDRESS = 5001

DECK

EXISTING WQ DEVICE N-1415717.72 E-2223589.37

EX. A/C UNITS ELEV.=857.0

NEW POOL EQUIPMENT

NEW METAL FENCE

20' SANITARY SEWER EASEMENT DB 20982, PG 335

20'

75.5'

50' UNDISTURBED BUFFER

25' STATE WATERS BUFFER

25'

50'

40' B/L

L.L. 163

L.L. 136

50' UNDISTURBED BUFFER

'33" W
78.53'

S 86°37'46" W
179.65'

S 00°33'16" W
39.46'

LOCATION OF FLOODPLAIN AS PER INDEPENDENT FLOODPLAIN ANALYSIS PREPARED FOR [redacted]
BY [redacted] DATED 6-18-2014

What Are The Different Types Of Buffers?

What are the Different Types of Buffers?

Chattahoochee Corridor Plan and Metropolitan River Protection Act (MRPA)

- Requires a 50-foot undisturbed vegetative buffer;
- Requires a 150-foot impervious surface setback on the Chattahoochee and its impoundments; and
- Requires a 35-foot undisturbed vegetative buffer (all measured from the edge of the water) on perennial tributary streams in a corridor extending 2,000 feet from either bank of the river and its impoundments.
- The corridor extends from Buford Dam to the downstream limits of the Atlanta region (Douglas and Fulton Counties). Streams in the basin of the Corridor are required to be protected by buffers, but no required width is specified.

What are the Different Types of Buffers?

Types of Streams/Creeks

- Ephemeral: A stream that under normal circumstances has water flowing only during and for a short duration after precipitation events.
- Intermittent: A stream with discernible channels which show evidence of annual deposition or scour, but which do not carry flow year-round.
- Perennial: A Stream that has flowing water year-round during a typical year.

What Are The Different Types Of Buffers?

- Ephemeral Streams do not have buffers
- Intermittent and Perennial Streams have buffers.
  - **25′ State of Georgia** Undisturbed buffer
  - **50′ City of Sandy Springs** Undisturbed buffer
  - **75′ Sand Springs Impervious** buffer

How Do I Know If I Have Buffer?

How Do I Know If I Have A Buffer?

- This can be determined on **the City's GIS website. A link** to the website can be found at build.sandyspringsga.gov.
- Simply enter your address at the top left and the zoning district will be the shaded region your property is located.
- If your lot has any water buffers, they will be shown on the screen.

Can I Request A Buffer Variance?

Can I Request A Buffer Variance?

Variance Process for City Buffers

- Variances will be considered only in the following cases:
- When a property's shape, topography or other physical conditions existing on December 12, 2005 prevents land development unless a buffer or setback variance is granted.
- Unusual circumstances when strict adherence to the minimal buffer and setback requirements in this Division would create an extreme hardship.
- Variances will not be considered when actions of any property owner of a given property after December 12, 2005 have created conditions of a hardship on that property.
- City fees are dependent on the location of the lots.

Can I Request A Buffer Variance?

Review Process for Chattahoochee Corridor Plan and Metropolitan River Protection Act (MRPA)

- This is a review of the MRPA regulated classification
- The Applicant submits a site plan showing existing disturbed / impervious areas and proposed disturbed / impervious areas.
- City Cost is $500 with an additional cost from the Atlanta Regional Commission (ARC)
- City submits the review to the ARC and await their determination.
- Approvals must be reviewed and approved by the Mayor and City Council at a public hearing prior to permit issuance for the work.

Applications

- Variance
  - Stream Buffer Variance Application 2022.pdf (sandyspringsga.gov)
- MRPA
  - Metropolitan River Protection Act - ARC (atlantaregional.org)

Do I Need A Permit?

Do I Need A Permit?

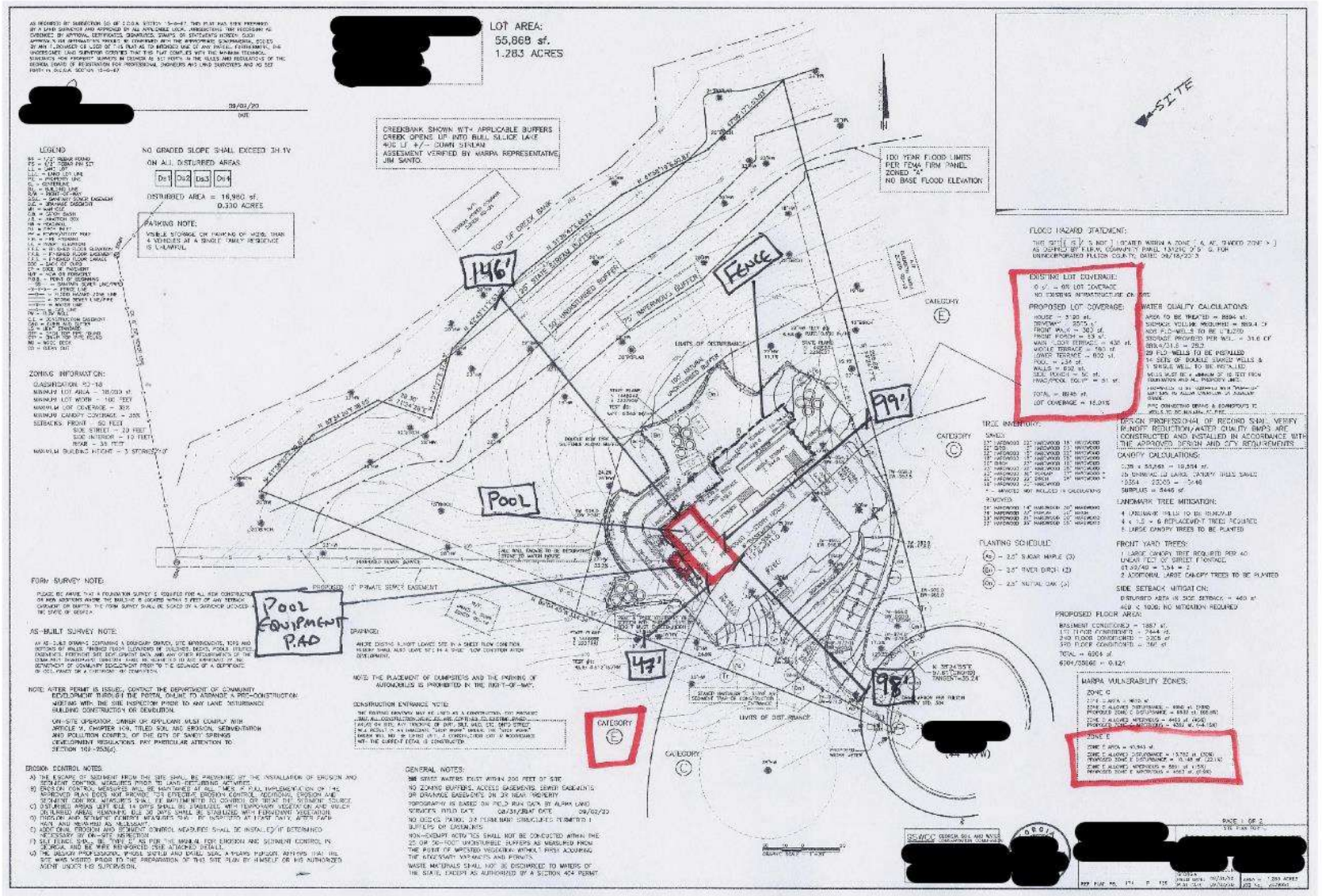
- The answer is YES!
- Any new development, redevelopment, addition or replacement that involves the creation of 1,000 square feet or more of impervious cover is required to obtain a Land Disturbance Permit
- Any land development activities of 2,500 square feet or more is required to obtain a Land Disturbance Permit

What Plans Do I Need To Submit for A Permit?

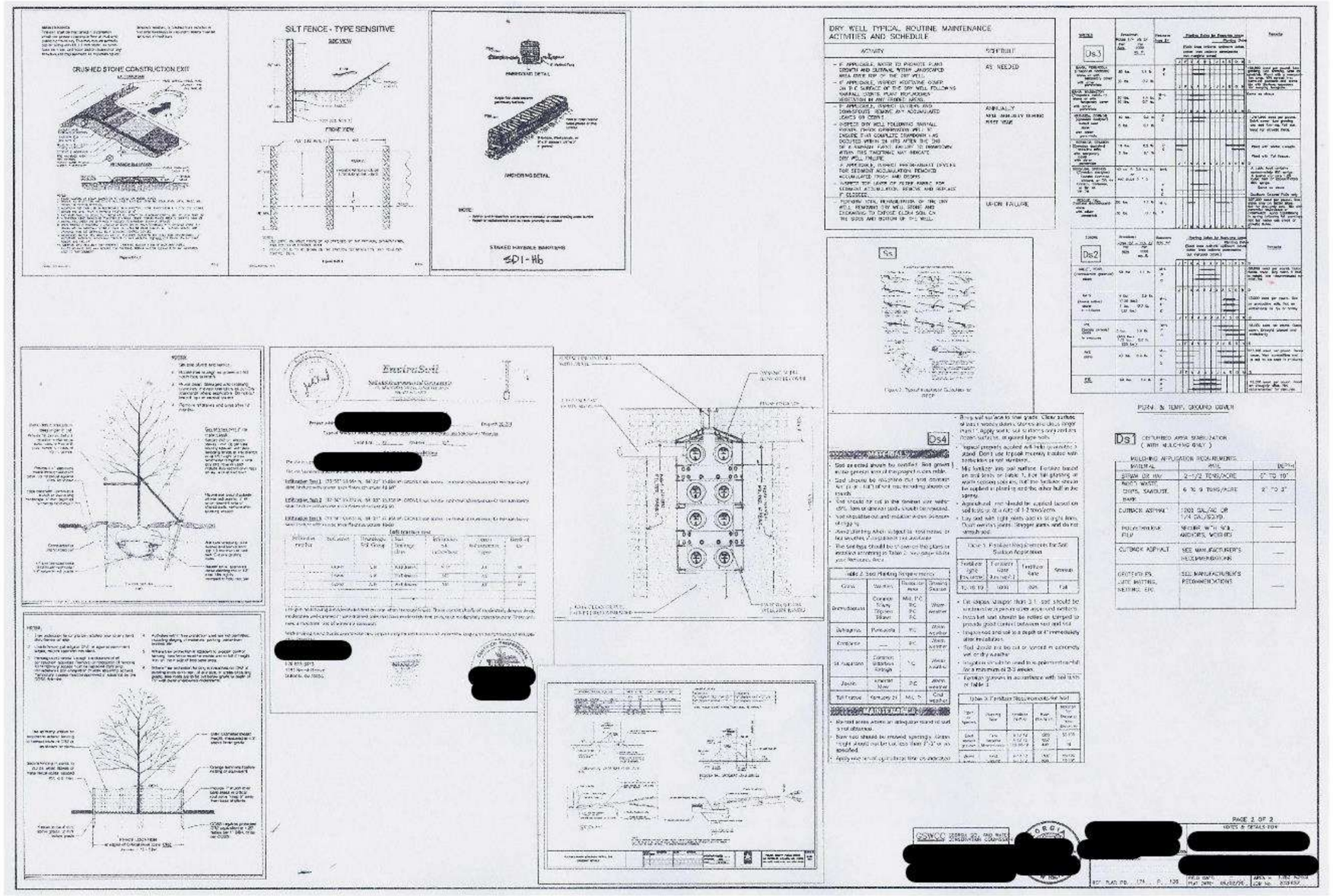
What Plans Do I Need to Submit For A Permit?

- A Site Plan that includes the following:
  - Shows the existing and proposed construction
  - Shows the location of all trees:
    - To be removed
    - To remain
    - To be replanted
  - Shows the location of all buffers
  - Stormwater calculations
  - Zoning information
  - ARC information
  - Construction details

What Plans Do I Need to Submit For A Permit?



What Plans Do I Need to Submit For A Permit?



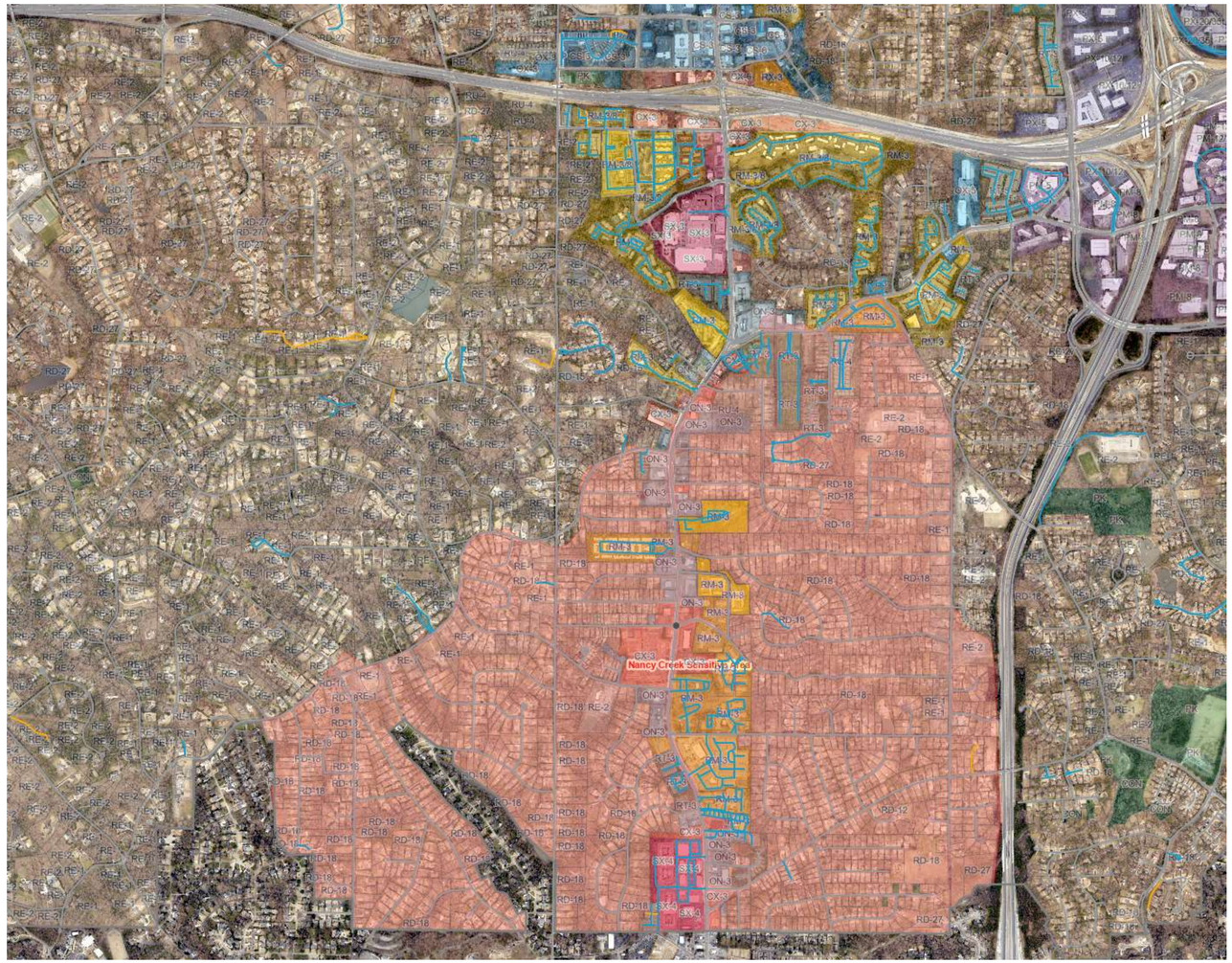
What Are The Water Quality Requirements?

What are the Water Quality Requirements?

- The State of Georgia Environmental Protection Division requires that stormwater management be provided on all permitted sites.
  - Every municipality must follow the minimum requirements of the Georgia Stormwater Management Manual (Blue Book)
  - Municipalities can have stricter policies and regulations.
- Your design professional is required to provide a Site Plan showing:
  - Current Site Conditions
  - Compliance with the Blue Book
  - Compliance with City Ordinances
- **First 1.2″ of rain shall be treated on site before discharge.**
- Nancy Creek Declared Sensitive Area requires an additional treatment measures.
- Marsh Creek Watershed Regional Detention Pond.

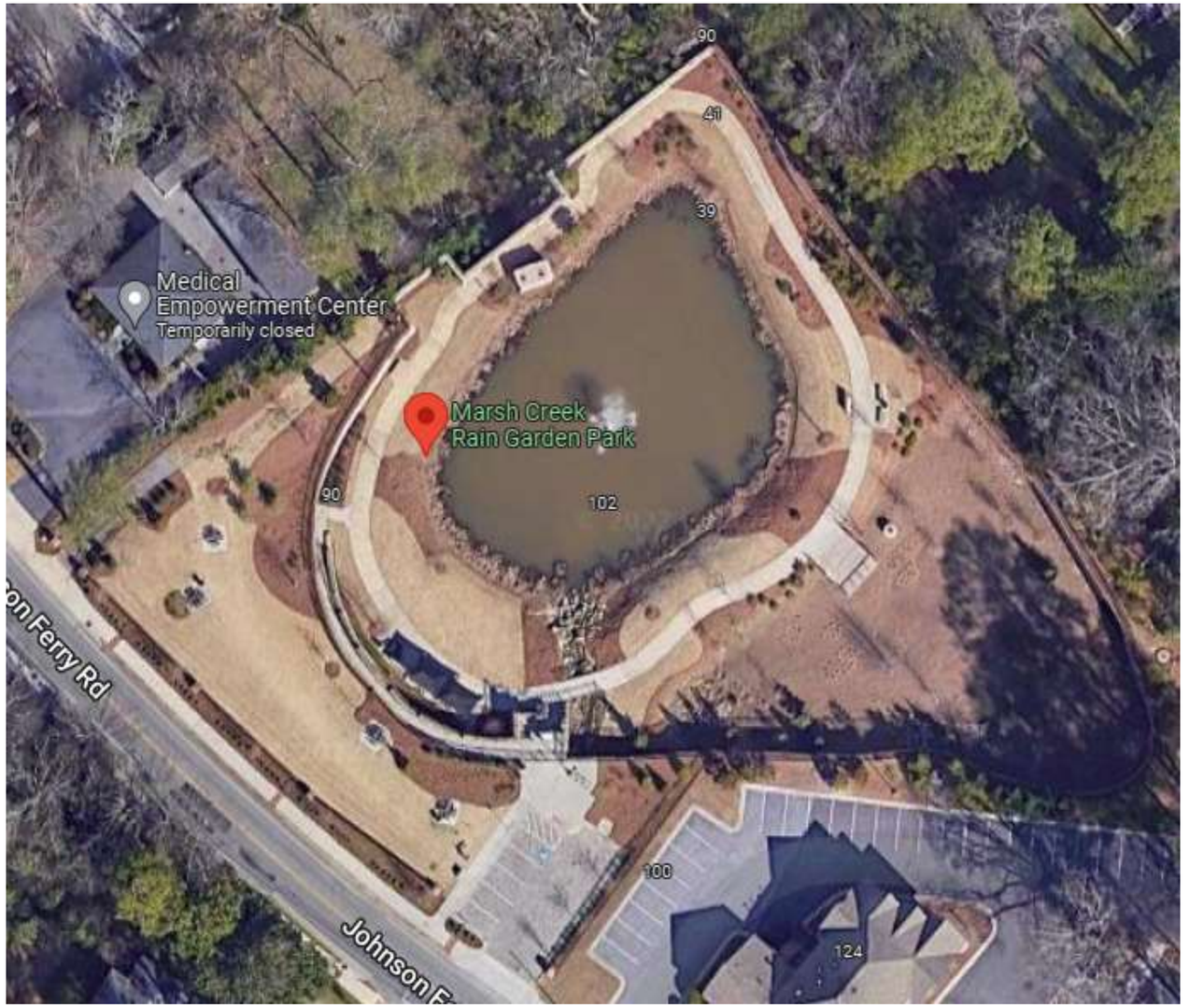
Nancy Creek Declared Sensitive Area

- Area declared to reduce the amount of stormwater affecting Nancy Creek an area known for flooding.
- Located south of Mt. Paran Rd/ Roswell Rd/Glenridge Dr to the north, High Point/GA 400 to the east, and City limits to the south.



Marsh Creek Watershed Regional Detention Pond Requirements

- The drainage basin encompasses 32.1 acres along Johnson Ferry Road west of Roswell Road, as far south as Mount Vernon Highway and west of Sandy Springs Circle
- The Rain Garden Park is located at 100 Johnson Ferry.
- Properties in this area pay to use the pond and pay into a fund for continued maintenance.



What Types Of Water Quality Devices and Practices Are There?

What Types of Water Quality Devices Are There?

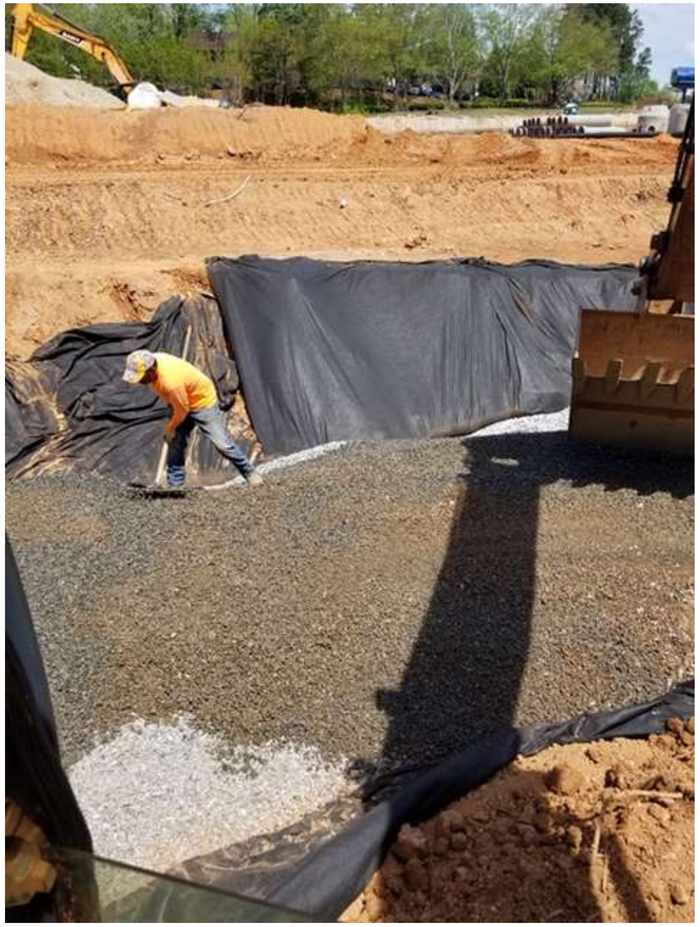
- Infiltration Trench
- Flow Wells
- Underground Detention Ponds
- Green Infrastructure Practices

What Types of Water Quality Devices Are There?
Infiltration Trench

What Types of Water Quality Devices Are There?
Flow Wells

What Types of Water Quality Devices Are There?

Underground Detention Pond



What Types of Water Quality Devices Are There?
Green Infrastructure Basics

- Stormwater management best practice
- Rainfall infiltrates and is treated close to source
- Mimics natural patterns

- Gray infrastructure:
  - Pipes carry stormwater runoff off-site
  - Degrades streams – water quality and physical alterations
- Infiltration of first 1.2″ of rain required to mitigate impervious surfaces (Sec. 9.6.3. of Development Code)

What Types of Water Quality Devices Are There?

Green Infrastructure Practices

- Conservation of soils and vegetation ← *Natural*

- Rainwater harvesting
- Dry wells
- Modified French drains
- Rain gardens
- Vegetated filter strips
- Pervious pavers

Constructed

What Types of Water Quality Devices Are There?

Conservation

- Should always be prioritized
- Native soils might provide good infiltration
- Established vegetation prevents erosion
- Requires minimal maintenance

What Types of Water Quality Devices Are There?

Rainwater Harvesting

- Cisterns, rain barrels
- Recipient connected to gutter downspout and spigot
- Quick calculations:
  - 1 gal. rain / 1 sq. ft. of impervious
  - 3 sq. ft. irrigated / 1 sq. ft. of impervious
  - Typical rain barrel holds 50-60 gal.

- Does not itself provide infiltration
- Small footprint, minimal maintenance

What Types of Water Quality Devices Are There?
Dry Wells

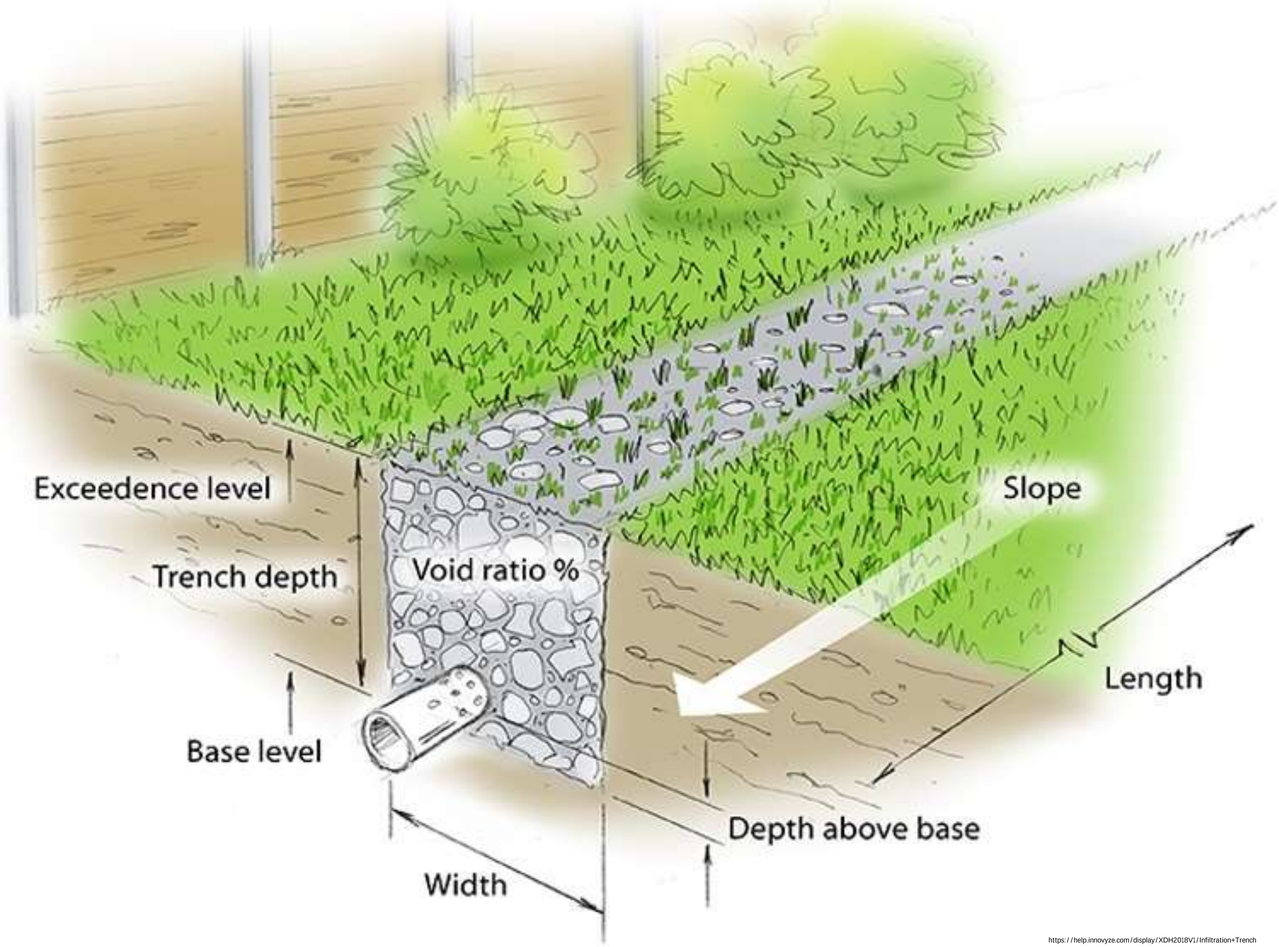
- Stone-filled underground infiltration well
- Connected to gutter downspout
- Requires infiltrating soil
- 500 sq. ft. of roof requires 60″Hx30″D well

- “Out of sight, out of mind”…

What Types of Water Quality Devices Are There?
Modified French Drain

- Stone-filled underground infiltration trench
- Connected to gutter downspout
- Requires infiltrating soil
- 500 sq. ft. of roof requires 42′Lx18″D trench

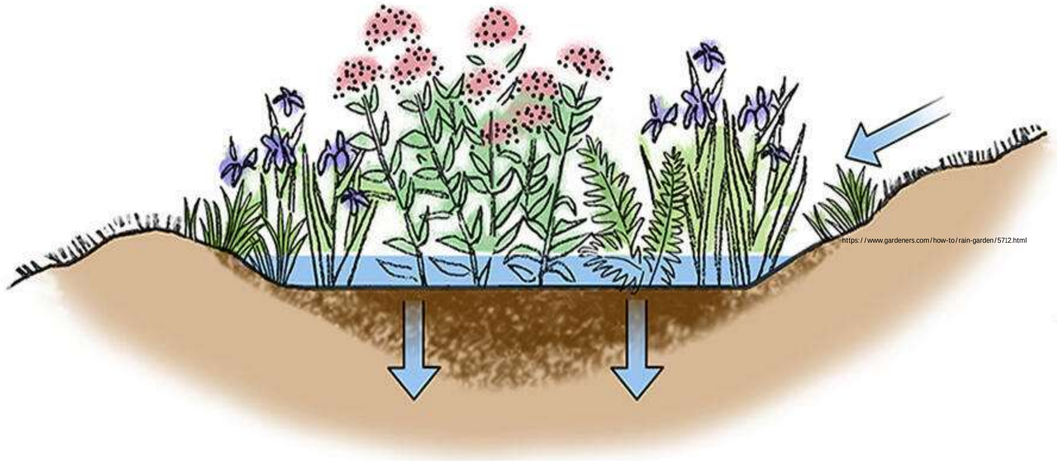
- “Out of sight, out of mind”…



https://help.innovyze.com/display/XDH2018V1/Infiltration+Trench

What Types of Water Quality Devices Are There?

Rain Garden



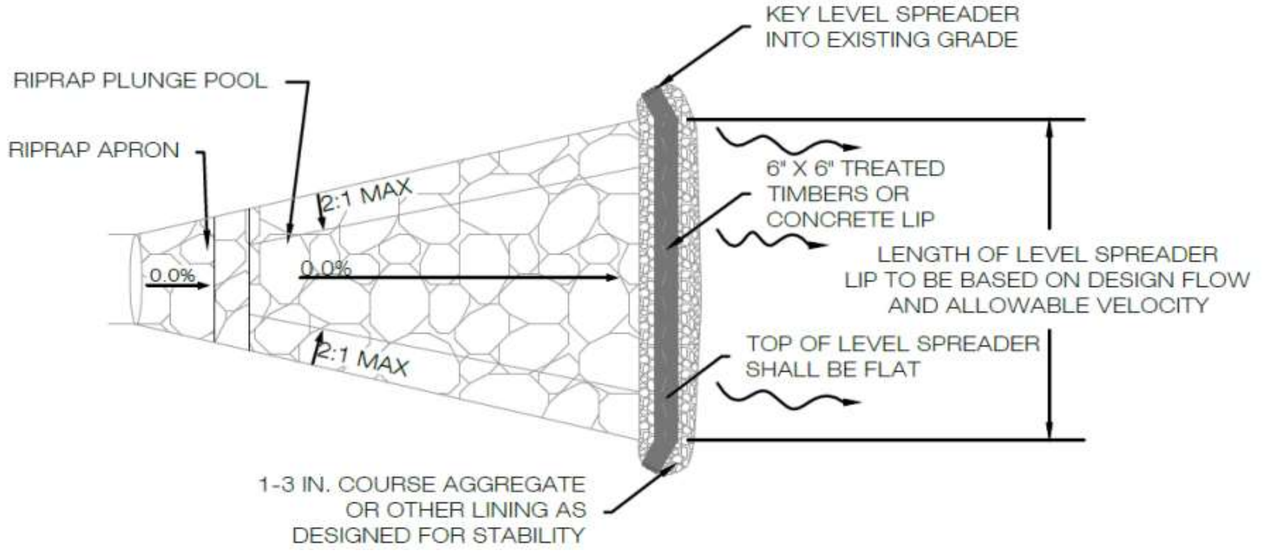
- Bioretention; landscaped infiltrating feature
- Up to 6″ ponding depth; drains in 24-36 hours
- Amended soil: 2/3 native soil, 1/3 compost
- 500 sq. ft. of roof requires:
  - 45 sq. ft. rain garden with 18″ of amended soil OR
  - 29 sq. ft. rain garden with 36″ of amended soil
- Requires regular maintenance

What Types of Water Quality Devices Are There?

Vegetated Filter Strip

- Landscaped channel that filters pollutants
- Limitations:
  - Max 5,000 sq. ft. of drainage area
  - 50% of runoff reduction
- Advantages:
  - Can be placed over utilities
  - Can be used for sheet flow

- 500 sq. ft. patio requires 225 sq. ft. of filter with amended soil

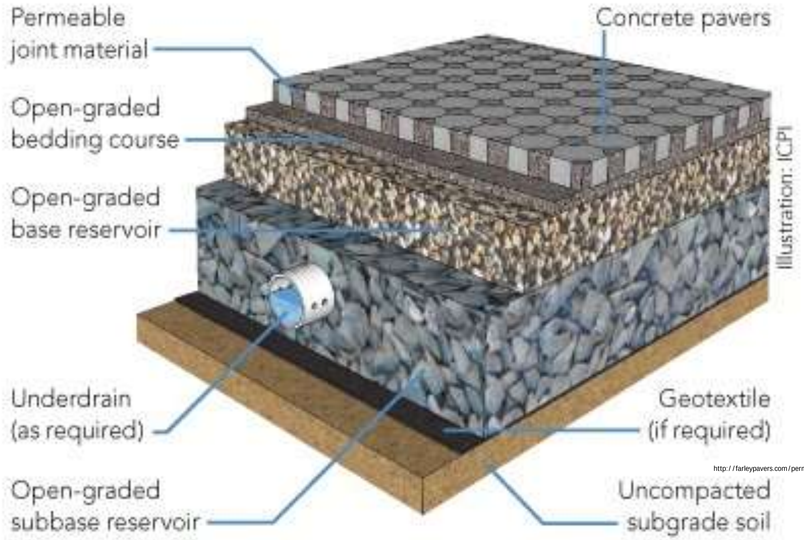


http://chesapeakestormwater.net/wp-content/uploads/downloads/2012/02/DCR-BMP-Spec-No-2_SHEET-FLOW_Final-Draft_vi-9_03012011.pdf

What Types of Water Quality Devices Are There?

Pervious Pavers

- Modular paver installation that allows infiltration
- Installed over stone “reservoir”
- Cannot be used for runoff reduction
- Require regular maintenance



http://farleypavers.com/permeable-paver-installation/

http://www.paveshare.org/library

http://www.belgard.com/products/permeable-pavers/turfstone

Why are Buffers Important?

Why are Buffers Important?

- Types of Pollution Sources
- Effects of Pollution
- Types of Construction Related Pollutants
- Types of Pollution Solutions

Why are Buffers Important?
Types of Pollution Sources

- **The City's Code states:**
  - No person shall throw, drain, or otherwise discharge, cause, or allow others under his control to throw, drain, or otherwise discharge into the City separate storm sewer system any pollutants or waters containing any pollutants other than storm water.

Why are Buffers Important?

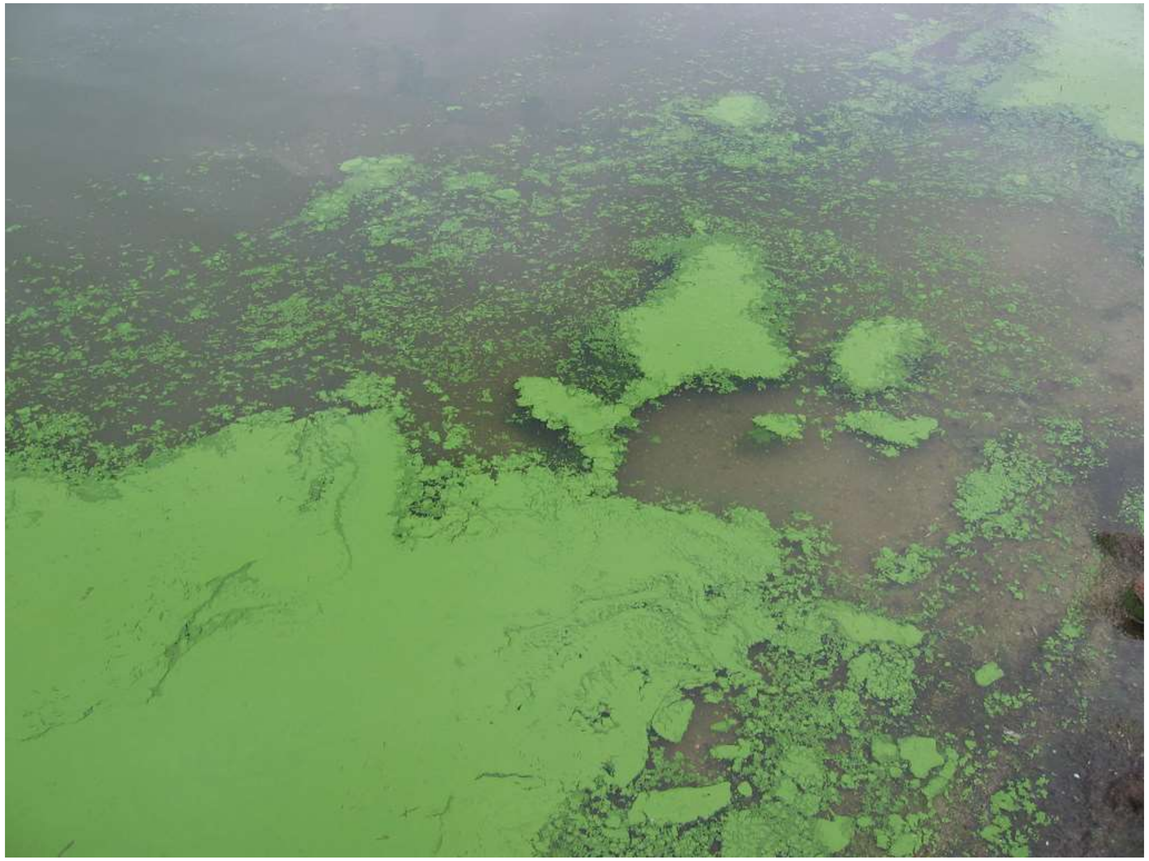
The Effects of Pollution

- Sediment enters rivers and streams.
- **Fish and other aquatic organisms can't exist in water with low dissolved** oxygen levels thus causing more damage to the ecosystem.

Why are Buffers Important?

The Effects of Pollution

- Excess nutrients cause algae blooms
  - Can block sunlight causing aquatic plats to suffer.
  - When algae die, they sink to the bottom and creates a process that removes oxygen causing damage to ecosystem



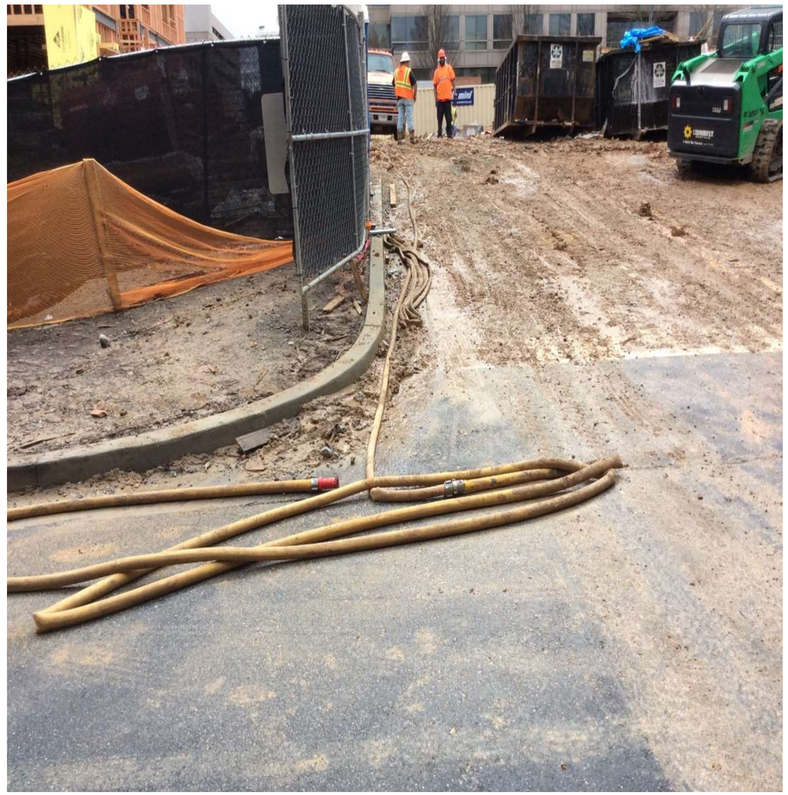
Why are Buffers Important?

The Effects of Pollution

- Bacteria and other pathogens can wash into swimming areas and create health hazards, often making beach closures necessary.
- Polluted Stormwater often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Why are Buffers Important?

Types of Construction Related Pollutants



Why are Buffers Important?
Types of Pollution Solutions

- Divert storm water away from disturbed or exposed areas of the construction site.
- Install silt fences, vehicle mud removal areas, vegetative cover, and other sediment erosion controls. Properly maintain them, especially after rainstorms.
- Prevent soil erosion by minimizing disturbed areas during construction projects, and seed and mulch bare areas as soon as possible.