



Pine Lake's WaterFirst PERC Plan

P) Protection, E) Education, R) Recycling & Reclamation and C) Conservation

WaterFirst

Pine Lake's

Committed to Caring for Our Water Resources

Purpose

The purpose of the City of Pine Lake's WaterFirst Plan is for the community as well as the city management. The goal of the plan is to provide the community with an assessment of the water and water associated resources available to them so they have an appreciation - and an understanding of their responsibility - for maintaining these resources.

Educating the community about their impact and responsibility requires that they be able to provide feedback to the city's management so that the city can prioritize individual tasks in order to preserve the environment and its resources in a manner favorable to the community.

This plan will serve as a basis for decision-making regarding economic development, environmental protection, public facilities, residential services, and land use. This plan addresses a variety of concerns and will include the following elements:

1. Watershed Assessment
2. Stormwater Master Planning
3. Water Supply Planning
4. Water Supply Protection
5. Water Conservation
6. Wastewater Master Planning
7. Residual Biosolids Recycling
8. Water Reclamation and Reuse



facing west along the City's Lake



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Because of city services and community priorities, this plan is weighted toward four of the elements: 1) Watershed Assessment, 2) Stormwater Planning, 3) Water Conservation, and 4) Water Reclamation and Reuse.

Executive Summary

The four elements in Pine Lake's WaterFirst PERC plan are necessary for the preservation of our managed ecosystem to counteract the adverse effects of sprawl. The following plan is established to maintain the lake and other watershed elements.

1. Continue to minimize the use of Snapfinger Creek's contaminated water to maintain lake levels.
2. Continue to maintain the banks of the city's lake to minimize bacteria and fecal matter (left by foul) from entering the lake.
3. Reduce the contamination levels within the creek by increasing in-line retention, increasing oxidation, and increasing sunlight (in retention areas).
4. Investigate potential sources of contamination in Snapfinger Creek (contamination source is somewhere in the 1.5 miles of headwaters upstream from the city).
5. Continue to search for and detect new development in the Snapfinger watershed that will adversely affect the downstream ecosystem. (Pine Lake has successfully threatened and filed suits against developers encroaching on the watershed).
6. Purchase and annex land to develop a pretreatment system for stormwater runoff.
7. Develop a consistent method to utilize stormwater runoff to maintain lake levels.
8. Save and collect resources for dredging the Lake

The long-range dredging initiative will include:

- a. Continue to coordinate efforts between DNR, the Army Corps of Engineers, and DeKalb County. Complete the environmental impact assessment.
- b. Close the dam separating the swimming area from the rest of the lake (to provide a minimum habitat),
- c. Drain the remainder of the lake by pumping some waters to "overflow" swimming area and some to Snapfinger creek,
- d. Continue to maintain swimming area levels by pumping springs over the berm,
- e. Collect species to return to the (overflowed) swimming area,



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- f. Collect, preserve and refrigerate surface sediment from the former lake bottom for later re-habitation.
- g. Use reputable dredging company and appropriately dispose of dredge soils (no gas motors have been used in the lake).
- h. After dredging, re-introduce surface sediment and begin to pump water from the swimming area over to the rest of the lake (while the springs also fill the Lake).
- i. Remove soils separating the swimming area from the rest of the lake.
- j. Monitor the species and water quality.



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Public Participation

Several public hearings and Town Hall meetings were held in the city to solicit input, desires, needs, and priorities of the community.

The City of Pine Lake has continually involved residents and local stakeholders throughout the WaterFirst planning process to ensure that the plan accurately reflects the values of our residents.

In 2003, the city developed and adopted its first Waterfirst program which sets a priority of a coordinated effort toward all water quality. Following the adoption, the city met with local, regional, state and federal stakeholders and water quality organizations. Community-based steering committees were established to ensure that the professional services meet the large-scale environmental goals while conforming to the desired aesthetics and recreation needs of the local community.

Community Profile

In 2002, the City of Pine Lake is a community of approximately 1000 people (2000 Census was contested by the city due to under survey).¹ The city has 302 homes, 144 housing units, and 66 businesses. The community is tight-knit, with several public green spaces that allow residents to walk within the community and see their neighbors. A city initiative to promote business growth has also attracted residential growth. Lots are filling in and homes are being demolished and replaced with larger homes.

The focal point of the community is the 13-acre man-made lake surrounded by 50 acres of parks and green space which is the location of most community events. The lake is healthy and supports fish, waterfowl and other wildlife. It is fed by three underground springs, some rainwater runoff from select areas, and augmented by some water from Snapfinger creek which is documented to contain fecal coliform and other bacteria.

Within a year, the city adopted its first cooperative water quality initiative which parallels Georgia's Waterfirst Program and within months showed measurable declines in water pollution. By 2004, the city acquired land along the Snapfinger Creek (called Wetlands Walk) to create 1.5 miles of contiguous park. The community organized to clean the trash, debris, and created retention areas adjacent to the creek. The city is has reached out to purchase land beyond its boarder and has a 5.5 acre parcel currently under contract and being annexed into the city. The city has submitted grants to wildlife societies and associations in order to offset costs for the future development of wetlands on the land which will create in-line retention along Snapfinger Creek as well as create a wildlife habitat for

¹ Estimated by City Hall, based on 2002 tax information and official city map.



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migratory waterfowl. The city met with the Army Corps of Engineers (ACE) to discuss the infrastructure improvements and ACE has committed to including Pine Lake's vision into the long-range plan for the water quality improvements along Snapfinger Creek.

The city has shared the long-range plans with DeKalb County and the county has committed to providing matching funds to the city to improve stormwater within the Snapfinger Watershed. The city has shared the overall plans with the GA EPD while filing for its stormwater discharge permit and along with the permit received technical assistance for wetlands habitat restoration. In 2004, the city was adopted as an honorary member of the Georgia Water and Pollution Control Association.

General Location and Regional Setting

There are a number of location-related issues that warrant recognition when considering the eight-WaterFirst program elements and initiatives. Pine Lake is in the geographic center of DeKalb County, Georgia. It is located within 1 mile of five roadways that have measured traffic counts of over 15,000 cars per day and two roads of over 20,000 cars per day.

The city was planned to be a private lake community with closely placed small cottages and has maintained that character despite the recent development of larger homes and landscaped lawns. The city is densely populated with houses built - for the most part - on properties with approximately 6,000 square feet (compared to the lots in the surrounding unincorporated properties which are larger than 10,890 square feet per household). The business district was initially developed without consideration for stormwater runoff. The homes were all initially on septic and most homes converted when sewers became available in 1965. New homes must connect to sewer, and nearly all other homes have converted to sewer. Anecdotally, some homes have tapped into their septic for their gray water.

A community that borders the east of the city was developed in the 1970's with little concern for surface water or septic management. The homes built there in the earlier period were on septic and those built later are all on sewer. The earlier built homes were had little road access, but once the newer homes were build, each was supplied with a storm drain that runs from the street, beyond the property and into the greenspace abutting Pine Lake. Since each storm drain exits at beyond each property in a line, the runoff has formed a swale that has cuts deep into areas used for septic leaching fields. The combined effect increases loads into Snapfinger Creek.

Committees

There are committees for Parks and Greenspace (Pine Lake Environmental Access and Stewardship, PLEAS), Ordinance Review, Community Relations (CRC), Cultural Affairs



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(PLCA), Historical Preservation Committee (HPC), and the Community Development & Architectural Review (CDC/ARB). The City also has a very active neighborhood association, the Pine Lake Association of Involved Neighbors (PLAIN). PLAIN is a 501(c)(3) organization and works closely with the government to better the community. Because of the community's interest in environmental issues, all of these committees are involved with the WaterFirst PERC planning.

The PLEAS committee has four subcommittees, a greenspace planning committee, a watershed planning committee, a tree ordinance committee, and a grants steering committee.

Within the city, there are two non-city volunteer organizations, the Snapfinger Watershed Alliance and the Garden Club. These programs coordinate with the other city committees in order to achieve mutual goals.

External Resources

The Snapfinger Creek Watershed Alliance includes communities outside of Pine Lake as Snapfinger has 1.5 miles of headwater outside of Pine Lake and the creek continues into the South Fork River. Another local organization that includes most of East Central DeKalb County is PRISM (Pride Rings in Stone Mountain), which holds environmental issues as one of its priorities.

The three other regional programs includes: 1) DeKalb County's Roads and Drainage; 2) DeKalb County Sewer; 3) Atlanta Regional Commission.

Three state-sponsored programs include: 1) Department of Natural Resources Adopt a Stream Program; 2) Department of Natural Resources State Waterways program; 3) Department of Community Affairs (WaterFirst program).



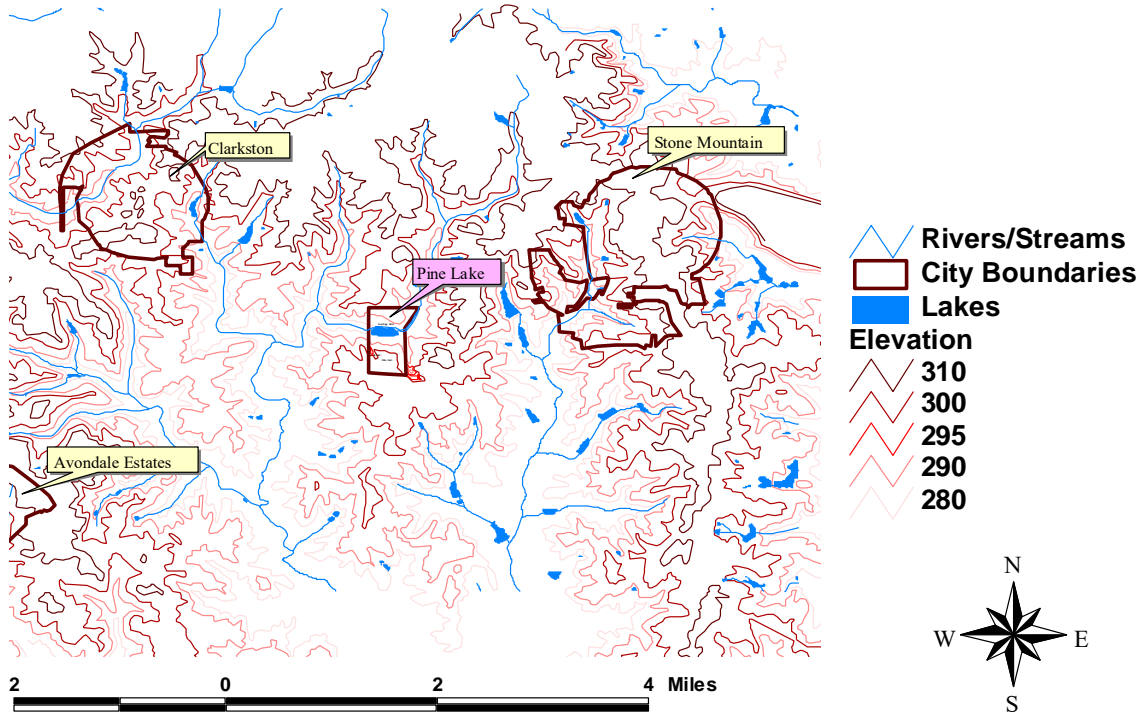
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1. Watershed Assessment A comprehensive effort to determine the multiple causes of water quality and habitat degradation in a watershed.

The city was envisioned, designed, and constructed to access, manage, and harmonize with an unusual and beautiful section of a watershed that includes unique topographical features. As a result of human intervention, a habitat was developed along a picturesque valley, previously used as a low yield farming area and pasture (corn was said to have grown well where the lake is now). A private community was founded and later incorporated to preserve an area dedicated to introducing water-dependent wildlife where people could live. Over time, the surrounding region grew and has impacted the watershed and thus has impacted the created habitat. This impact has created a need for continuous habitat management on the part of the city as well as a large number of its (volunteer) residents. The figure below illustrates the topographic features relevant to the region and provides some justification to the selection of the location for the development of Pine Lake - the “managed watershed city”.

Central DeKalb's Watersheds



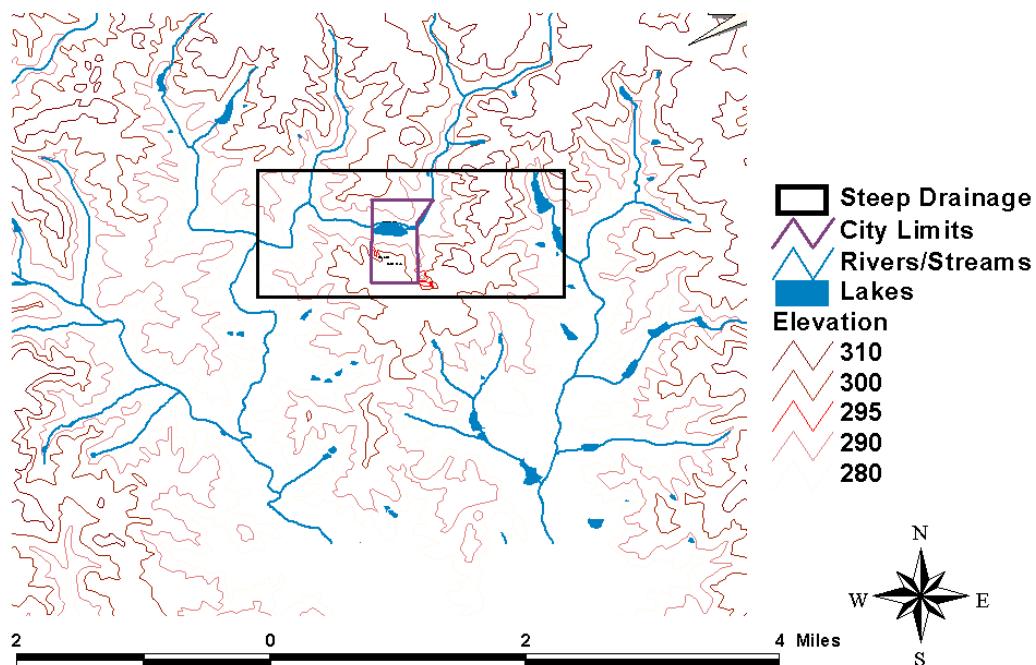


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Georgia's two general watersheds are divided within central DeKalb County along the Railroad bed that lies adjacent to Ponce De Leon Avenue (the continental divide). The watershed to the north of Ponce DeLeon Avenue flows into the Gulf of Mexico (Apalachicola) and the watershed to the south of Ponce DeLeon Avenue flows into the Atlantic Ocean (Savannah). Although, Ponce De Leon and the Railroad are not shown in the figure above, the continental divide can be identified by reviewing the topographic features. The region to the south of Clarkston and Stone Mountain which contain rapidly changing topography (denoted by the red-brown shading) are within the watershed region that leads to the Atlantic. Pine Lake resides within the region with the steepest drainage that leads to the Atlantic (as denoted by the rectangle below).²

DeKalb's Atlantic Surface Drainage



(A figure of the region that includes the roads is provided in the Appendix.) The steep and rapidly changing grade within the region originally provided the means of the watershed landscape desired to create a managed habitat. However, after regional development the same location has become subject to flooding and erosion as well as pollution.

² Pine Lake lies within the Snafinger Creek Watershed, a sub-basin of the South River Watershed.



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Pine Lake

The lake is approximately 13 acres and is the center - as well as focal - point of the community. It is entrusted to the City. Use of the lake and surrounding park area is restricted to those who pay for its upkeep. Access is controlled through the use of park cards given to residents (who pay for the upkeep through their taxes) and a limited number of the general public who pay for a season pass. The City made only a limited number of park cards available (on a first-come/first-served basis) to limit the adverse environmental impact, reduce liability, and improve relations with surrounding communities. The cost to maintain the lake and the park space is currently \$109,000 per year. The park card program protects the lake and the environment from the adverse impact of overuse and reduces the amount of work needed for the city to maintain or repair park facilities.

The climate of Pine Lake is somewhat different from the rest of the Atlanta region because of the topography and the lake. Peak temperatures tend to be milder in the City of Pine Lake due to the large number of trees, the topography and the watershed's ability to retain and return heat. In summer, water evaporates and cools. On winter nights, the lake radiates out the heat that it absorbed during the day. Early morning and late evening fogs are routine - caused by the difference in temperature between the lake and the air. The deep valley retains the fog layer more than in other lake communities.

Lake Water Quality

The water in the lake is routinely tested under contract with DeKalb County throughout the swimming season. Bacterial counts rose above acceptable levels during the drought years 1997-2002, necessitating the closing of the lake to swimmers.

Previously, the cause of the excess bacteria was believed to be from runoff and waterfowl. However, since the drought of 2002, the flume has been blocked to only allow city storm water runoff to enter into the lake and, as a result, measurements of bacteria have been very low. It is now believed that the contamination had been entering the lake through Snapfinger Creek. Plans are underway to 1), determine the upstream source of the contamination and 2) pre-treat surface storm water and distribute it within our watershed.

The County is responsible for storm water run-off and the quality of creek water. However, due to the fact that other county creeks are more contaminated, Snapfinger Creek's quality may be a lower priority to them. An additional problem with the lake is maintaining water levels during periods of low rainfall. The City is working with the GA DNR, the USDA, and other agencies in order to update a flume system built with the lake in the early 1930's.

The unusually high rainfall rates in 2003 and 2004 has allowed the city to utilize some of the storm water runoff to maintain lake levels without using the contaminated Snapfinger Creek. This cannot be sustained, so the city has developed a novel plan to capture storm water from the business district, pre-treat it in a detention pond located in the business district, divert a



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source to the lake, and use it to maintain sustainable lake levels. The city has shared the development information and has coordinated with DeKalb County and the ARC.

A developer has purchased the land and has initiated the annexation process in order to develop a mixed use project that has the pre-treatment facilities prescribed by the city.

Environmentally Sensitive and Ecologically Significant Areas

Being a “created natural” environment within a developing section of the county³ has established a growing number of threats to this “natural” environment. The lake is fed by Snapfinger Creek and spillover from the lake returns to the creek. No businesses are located along Pine Lake’s portion of the creek; however, there is development along the 1.5 miles of headwater outside of the city which includes some of the Memorial Drive corridor. Most of the building lots along the creek and lake are already developed. However, 2003 marked the first year that a house was demolished in order to subdivide the property to develop two new houses. In 2004 a few sound homes were demolished to be replaced with larger homes. Under the current laws, it is possible for eight more homes to be filled in around the lake, but the replacement of smaller homes with larger ones is likely to continue. Ordinances to protect the watershed have been established^{4,5} and additional ordinances are being studied⁶.

Ordinances prohibit motorized watercraft. Essentially, opportunities to pollute the lake or creek within Pine Lake are virtually nonexistent under normal conditions. In the fall of 2002, the Mayor formed the Pine Lake Environmental Access and Stewardship Committee charged with:

1. Replacing invasive vegetative species with native species,
2. planning for dredging the lake and repairing the flume and dam,
3. beautification of city parks, the lake and creek, and other city property,
4. encouraging xeriscaping,
5. reviewing ordinances and proposing updates, and
6. acquiring state, federal, and county funds and resources to protect Greenspace

A Greenspace Acquisition Fund (GAF) was created by the Mayor in the fall of 2002 for the express purpose of supplementing money set aside by the State for the acquisition, preservation, and maintenance of open Greenspace in the City of Pine Lake. The fund

³ The city (alone) filled in with 9% more homes in the past nine months. Other areas within the watershed also underwent recent infill.

⁴ The 2003 Stormwater Ordinance requires the use of impermeable materials and the inclusion of natural and engineered landscape features to offset the stormwater produced by new buildings.

⁵ The 2004 Floodplain Ordinance requires a factor of two reduction of stormwater for properties that touch the floodplain.

⁶ One ordinance studied would limit infill to a 1% per year in certain areas, to allow for the city to manage infrastructure and administrative changes as a result of the development of sensitive areas.



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currently has thousands of dollars some that was used to match grant money to purchase land in 2004.

Governor Roy Barns created a Green space grant fund which was created to allow municipalities to purchase property to be dedicated as green space. Funds are proportional to the census population. The city used \$7400 of this to assist with land purchases. The city has matched this with \$12,000 for greenspace acquisition.

Additionally, the city has is auctioning 6000 square feet of developable land inside the city to use to purchase over 30,000 square feet of land that abuts the city. This purchase should protect the diminishing greenspace within the region and create areas where stormwater controls are most feasible.

The city is willing to entertain commercial annexation and gives incentives for businesses to create contiguous greenspace instead of setbacks. This will allow for larger accessible and attractive green-areas that can be later accessed for retention should infill continue.

Watersheds

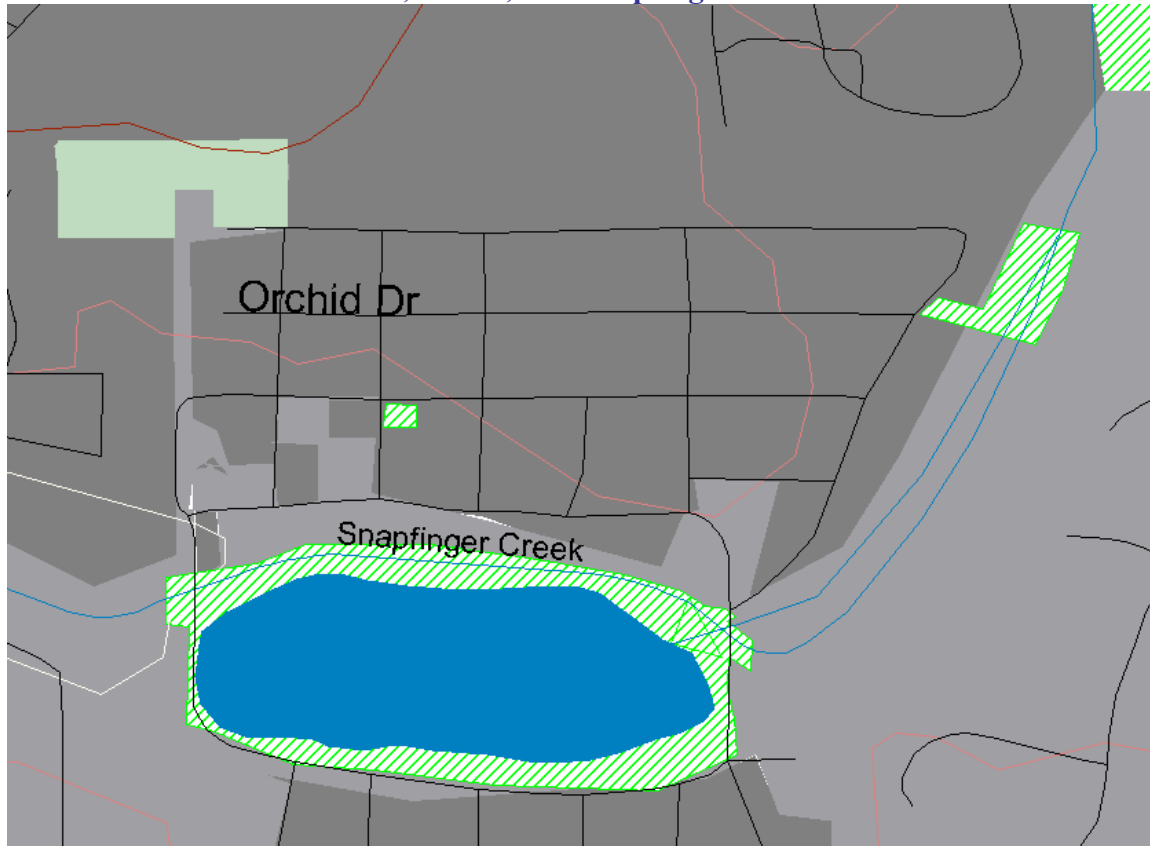
Pine Lake lies within the Snapfinger Creek Watershed, a sub-basin of the South River Watershed. A 13 acre lake is the focal point of the town. Snapfinger Creek runs through the town for approximately $\frac{3}{4}$ of a mile. All property in Pine Lake either drains directly to the lake and creek through a series of primitive open canals or the street surfaces themselves. Water is diverted from the creek as it enters the town and delivered to the lake $\frac{1}{4}$ mile through a partially open flume (the land of which was purchased in 2004). A map of the city's watershed to include the neighboring streets and the topographic features is provided below. The few contour lines indicate that the features depicted are nearly all located at the base of an otherwise steep valley. All the city's streets to the north and south of this area drain into this area. The business district is approximately 40 ft higher in elevation than this valley (1/2 mile south).



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Pine Lakes Watershed: Lake, Flume, and Snapfinger Creek



Groundwater Recharge Areas

The lake is not a designated groundwater recharge area. However, several older wells (now out of service) recharge due to the management of storm water. Furthermore, DeKalb county's records indicate a net loss on the order of 700 gallons/sec from Snapfinger creek as it passes through Pine Lake, indicating that there is recharge.

Pine Lake, Snapfinger Creek, the flume, the drainage ditches, the swale, and a silt box. A new development in our watershed, on Rockbridge Rd., contains a retention pond.

It is anticipated that with the newly enacted Storm Water Management Ordinance more water features for recharge will be incorporated into new developments.

The swale was partially re-built this year for more efficient recharging of ground water from surface storm water run-off. Additional modifications to the swale are planned for this year.

As part of the long-range plan, the swales will create inline retention and will connect into oxidation ponds for additional retention and recharge.



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Wetlands

The Snapfinger Watershed Alliance developed a plan to build a wetland in the flood plain above the lake to provide natural filtration and purification of the water in the flume before it enters the lake. Prior to 2004, this land was private property with an easement for the flume. In 2004, the city purchased it and designated part of it as a protected wetland. Plans are to create a natural filtration system (within five years). The City and Snapfinger Watershed Alliance have partnered with resources at the University of Georgia for design development, the draft plans were shared with the ACE and it is now included as part of the long-term restoration plan for Snapfinger Creek.

With the purchase of an additional 5.5 acres to the west, the city intends to create a wetlands corridor that will enhance water quality and wildlife habitats while creating exercise trails and improved views.

Plant and Animal Habitat

No formal inventory has been taken. Pine Lake is home to many animals including the belted kingfisher, great blue heron, small blue heron, green heron, Canadian geese, wood duck, 4 species of wood pecker, owls, muskrats, snapping turtles, bass, carp, perch, water snakes, raccoons, and frogs. An active gardeners group is promoting the preservation and planting of native plants, and xeriscaping.

Biological monitoring teams of the Snapfinger Creek Watershed Alliance are in the process of providing an inventory of birds, reptiles, mammals, and invertebrates that live in, or near, the water.

Parks and Recreation Areas

The focal point of Pine Lake is a 13 acre lake. It is surrounded by park land including a white sand beach, picnic areas, and gazebo. The city also maintains a beach house, club house, tennis court, basketball court, and playground. Fishing and non-motorized boats are permitted in the lake.

A citizen's group, P.L.A.I.N., through volunteer labor and corporate grants, has begun a project to replace two aging pedestrian bridges around the lake, and also has plans to re-furbish the play ground. An interest group is considering costs for refurbishing the tennis court. All of these paved recreation areas are kept to a minimum, environmentally safe paving is used whenever feasible, and all new paved surfaces are kept far from the lake and the creeks. With the acquisition of the two greenspace/wetlands properties the city has doubled the overall length of walkable park





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space. In the coming years the city is committed to creating several short retention ponds and a 3 acre oxidation pond that will increase the overall wetlands by 8 acres.

Scenic Views

Many pretty vistas are available to hikers from all sides of the lake. The designer of the city, Carl Schaub, provided community access to all parts of the lake and park. Modifications to these spaces have created extended walkable trails by creating a separate swimming area that is divided by two bridges from the beach peninsulas to an island. With the land acquisition, kudzu was removed to allow access. In 2005, the city will build bridges into these areas and continue to improve the views into these areas.

2. Stormwater Master Planning

In general, a program to manage the volume and flow rate of stormwater runoff so that it doesn't damage constructed or natural systems. Once considered primarily for flood control, stormwater management is vital to reduce nonpoint source pollution.

Protected River Corridors

There are no protected river corridors. The city strongly enforces development practices to ensure that runoff is minimized.

Flood Plains

Snapfinger Creek runs through the town for approximately $\frac{3}{4}$ of a mile. All property in Pine Lake drains either to the lake or creek through a series of primitive open canals, or the street surfaces themselves. Water is diverted from the creek as it enters the town and delivered to the lake $\frac{1}{4}$ mile through a partially open flume. A forested flood plain follows the creek through town. Areas designated "100 year flood plain", flooded in the spring of 2003 and after Hurricane Ivan. A picture of the flood at the base of the flood zone is provided below.



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It will take a much improved storm water management on the county lands upstream from Pine Lake to prevent these floods from re-occurring. The city has met with the Army Corps of Engineers (ACE) and DeKalb County to find a cooperative solution for stormwater management. ACE has identified a 17 acre parcel of land that lies between the Memorial Drive business corridor and Pine Lake. ACE is developing a plan for different retention/detention methods to reduce the storm surge in Pine Lake and other downstream areas along Snapfinger Creek.

Steep Slopes

Several properties on the East side of town backing onto the flood plain have a precipitous drop, as steep as 30' drop over 15'. Banks of both the lake and the creek are badly eroded due to storm water run-off.

Storm Water Management

A network of primitive open ditches on private property carries storm water run-off towards the creek from both sides of the lake. They are not designed to carry the storm water loads that have been added with today's larger homes.

The recent development of larger homes has made a noticeable impact on storm water flow in the City. Being known for environmental advocacy, the City decided that the best form of storm water management would be based on framework where storm water is considered a resource. In June of 2003, the City passed an ordinance requiring builders to find a creative



solution to the water drainage characteristics of each lot. A builder can choose to optimize the house plans by their footprint, use permeable paving materials, site homes to optimize saving mature trees, and/or create attractive water features. A copy of the ordinance follows:

**AN ORDINANCE TO AMEND THE CODE OF
THE CITY OF PINE LAKE, GEORGIA**

TITLE 6, CHAPTER 2, SECTION 6, (ADDING) SUBSECTION a

Be It Ordained by the Mayor and Council of the City of Pine Lake: Title 6, Chapter 2, Section 6, Hereby Amended By Adding Subsection a.

This ordinance is to minimize storm water runoff by requiring design measures to retain and pre-treat storm water on site prior to its impact to city and county lakes and streams.

Subsection a1. All builders will minimize the long-term impact of storm water run off produced as a result of their construction. This ordinance applies to all new construction and does not replace Title 6.2.6(d): Silt control and drainage plan.

Subsection a2. This ordinance shall become effective on the 9 day of June 2003.

Subsection a3. New construction will not intentionally divert untreated storm water from parking areas onto the street.

Subsection a4. Construction plans will yield one (1) gallon or less (or 0.1556 cubic feet) of surface water runoff according to engineering calculations for a peak rain event⁷ of six (6) inches (0.5 feet) per hour.⁸ Builders will calculate the storm water impact of all proposed new construction. The calculation will take into account the impermeability of engineered surface areas as well as the water retainability of natural and engineered retention features. The net storm water impact is the volume of runoff water calculated by subtracting the lot's ability to absorb water by the storm water produced by building or paving (covering), given as:

$$\text{Net storm water} = (\text{lot's ability to absorb}) - (\text{construction's storm water production})$$

Subsection a5. The construction's storm water impact will be calculated by multiplying the area of each covered portion by the associated impermeability factors⁹ by a rain rate of 0.5ft/hr. Then, subtract from that subtotal, the number of gallons credited for those features which absorb or retain water.

Subsection a6. Proposed calculations will assume the following:

- 1) Each 6,000 square foot plot will be credited with the ability to retain 2571 gallons of water¹⁰;

⁷ Consistent with American National Standards Institute: ANSI "Minimum Design Standards" for weather events exceeding the annual probability of exceeding 0.01 (100-yr mean recurrence interval).

⁸ According to the National Weather Service: NWS the mean 100-yr storm produces 3.7 inches/hr in Atlanta and 3.9 inches/hr in Macon: Peak localized flooding exceeds 6 inches/hr annually in Georgia; and Peak event rates exceed 14 inches locally.

⁹ The values listed in this ordinance reflect the ability of each feature to transmit or absorb water and further adjusted to reflect aesthetic characteristics of the feature.

¹⁰ A property is assumed to absorb the runoff of a 800 square foot house (800 square foot x 0.5 ft/hr = 400 cubic feet =2571 gallons).



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- 2) Each tree¹¹ less than 12 inches in width (at breast height) provides a credit of 10 gallons per inch –or- each tree thicker than 12 inches provides a credit of 20 gallons per inch;
- 3) Horizontally projected roofline (shadow) will create 3.21 gallons per square foot;¹²
- 4) Concrete or asphalt surface¹³ will create 2.89 gallons per square foot;¹⁴
- 5) Crush and run gravel will create 0.640 gallons per square foot;¹⁵
- 6) Brick, stone, or concrete pavers^{16,17} will create 0.963 gallons per square foot;¹⁸
- 7) Uncovered wooden decks with spaces greater than 0.5 inch will not produce storm water; decks of other materials and with spaces smaller than 0.5 inches will create 0.7 gallons per square foot.
- 8) water feature (like ponds) will be credited with 16.06 gallons per square foot;^{19, 20}
- 9) Earthen swales with large rocks will be credited with 2.25 gallons per cubic foot;²¹
- 10) Drywells or concrete storm water retention ponds will provide a credit of 6.42 gallons per cubic foot.²²

Subsection a7. Calculations will be done by addressing each subtotal as illustrated in the following example:

1) Single 6000 square foot lot	-2571 gal
2) 6 trees at 4 inches (x-10) + 4 trees at 6 inches (x-10)	-480 gal
3) 3 trees at 24 inches (x-20)	-1440 gal
4) 1250 sq ft building (x3.21)	4013 gal
5) 3000 sq ft stone paver parking lot (x0.963)	2889 gal
6) <u>150.1 sq ft water feature (x16.06)</u>	<u>- 2410gal</u>
Total	1 gal

Subsection a8. All ordinances and parts of ordinances in conflict with this ordinance are repealed. APPROVED this 9 day of June, 2003 by the Mayor and Council of the City of Pine Lake.

Permeable materials provide an option to reduce runoff while the inclusion of trees provides a credit.

¹¹ Trees are measured at breast height.

¹² Roofs have an impermeability factor of 1.0. and each 1 square feet of roof creates 0.5 cubic feet of water (1 square foot x 0.5/ feet per hour = 0.5 cubic foot)

¹³ Consideration to reduce this factor will be given for innovative means to create means to allow for water to percolate into the soil (as with discontinuous paving).

¹⁴ Paved surfaces have an impermeability factor of 0.9 (or 90% of that of the roof).

¹⁵ Gravel surfaces have an impermeability factor of 0.2 (or 20% of that of the roof)

¹⁶ Other materials will be assigned a value by the city or agent thereof within a range of 0.8-0.4.

¹⁷ other materials will be considered based upon there permeability, consider benefits at:http://www.lid-stormwater.net/permeable_pavers/permpavers_benefits.htm and <http://www.pavingexpert.com/permabl1.html> and <http://www.toolbase.org/tertiaryT.asp?TrackID=&CategoryID=1438&DocumentID=2160> consider alternates like: http://www.concretenetwork.com/concrete/porous_concrete_pavers/ (not considered endorsement of company by the city).

¹⁸ These materials are assigned an impermeability factor of 0.3 (30% of that of the roof).

¹⁹ These features are assigned an impermeability factor of -2.5 (a credit).

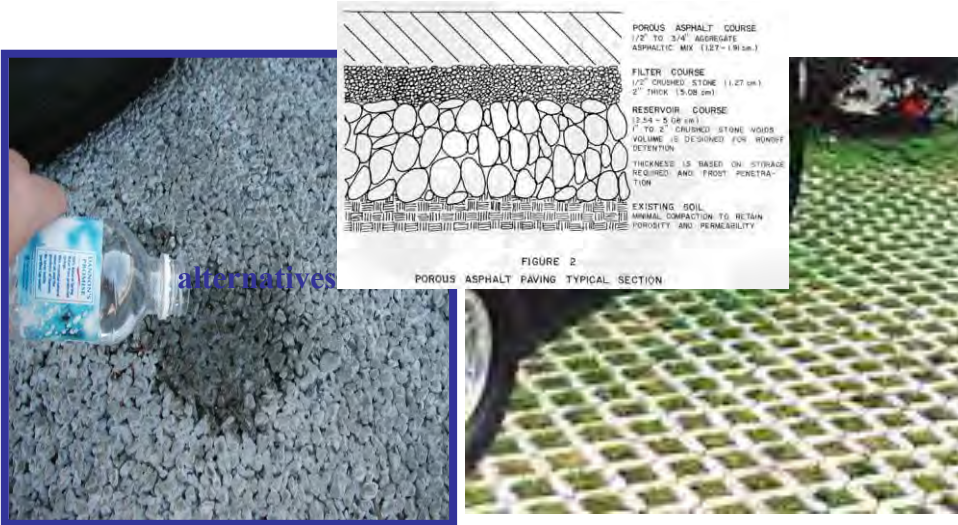
²⁰ http://www.watergarten.com/pages/build_wg.html# (for volume determination)

²¹ These features are assigned an impermeability factor of -0.7 (a credit).

²² These features are assigned an impermeability factor of -1.0 (a credit of volume equal to its holding capacity).



Examples of Permeable Materials for Paving



alternatives



Pine Lake's WaterFirst PERC Plan

P) Protection, E) Education, R) Recycling & Reclamation and C) Conservation

Examples of Natural Features for Stormwater Credits



In the spring of 2003, Pine Lake accessed various data bases from ARC, DCA and DeKalb, and, with the assistance of commercial consultants, developed a GIS database which includes the local topography and building density.

The GIS platform enabled city officials and committees to make plans on a city-wide and regional basis while being able to manage on a lot-by-lot basis. Knowing that the City is working to encourage more businesses and better management of traffic in the business district, the GIS tool enables us to optimize land reserve issues and to plan for future storm water management. These plans are being shared with the county. The City will submit the plans to ARC for an LCI grant after acceptance of the City's Comprehensive Plan. Much of the plan depends on annexing property adjacent to the City and will be elaborated in the 2005 Comprehensive Plan. The plan would be to collect the businesses' storm water and retain it with three lakes near the businesses, creating an attractive setting for people to work and shop as well as allowing for the pretreatment of water before its being discharged into the natural watershed.



Pine Lake's WaterFirst PERC Plan

P) Protection, E) Education, R) Recycling & Reclamation and C) Conservation

We are working with the county to improve storm water management, and to mitigate the effect of development upstream and non-point-source pollution entering the streamway. E-coli bacteria have consistently been measured in the lake at unhealthy levels and are thought to be from sewer leaching into the creek upstream. A pilot study in the spring of 2003, conducted by diverting the creek away from the lake, supports this theory.

The Snapfinger Creek Watershed Alliance, a citizen's group based in Pine Lake, is active in education and advocacy and is engaged in partnership with citizens, government, and businesses to improve water quality in the watershed.

Recently, the Alliance was instrumental in encouraging the DeKalb County Board of Education not to develop a drivers' education training course on land abutting the creek upstream on the outskirts of the City of Pine Lake.

The Pine Lake Environmental Access and Steward Committee teamed up with the Snapfinger Creek Watershed Alliance in May to raise enough money to pay for a comprehensive management plan for the lake, to be developed later this year, by Aquascapes Engineering, Inc, an Atlanta-based environmental consulting firm.

The city has participated in ARC and DeKalb initiatives to control storm water runoff and improve water quality.

Difficulties with the management of storm water have been exacerbated by the resurfacing of the streets without grading or resetting the curbs. This has allowed water to inappropriately enter from the streets onto some properties and rerouted the paths of some runoff away from the intended management system.

The city has contacted the county to reset those curbs where specific runoff problems have been identified. An email letter has gone out to the community recommending that residents contact the city's public works department when they identify similar problems.

3. Water Supply Planning

An important management tool that promotes orderly, methodical development and wise investments while protecting irreplaceable natural resource.

Water Distribution System

The City is served by DeKalb County water. It is our belief that the County will be able to adequately furnish sewer services for the foreseeable future. The city developed its long-term planning by reviewing its goals with the county. The long-term plan provided in the comprehensive plan reflects coordinated efforts toward the city's growth.



4. Water Supply Protection

The fundamental idea is to protect water supplies from contaminants, rather than to rely on treatment processes to remove them. Additionally, it is managing potential sources of contaminants and engaging in contingency planning by determining alternate sources of drinking water.

The city has instituted a building inspection process during major building renovations where sewers are being excavated. The city will use this opportunity to inspect the condition of the water/sewer distribution systems.

After 911, the city started an education program for prudent public practice. The mayor distributed a weekly newsletter (email and hardcopy at City Hall) which often includes public health and safety information. It includes information on how much water should be stored in case of an emergency and why²³ --including the occasional disruption of service or introduction of contaminants when the system is breached, replaced, or when a new home receives distribution.

5. Water Conservation

Conservation is a careful preservation and protection of something; *especially* : planned management of a natural resource to prevent exploitation, destruction, or neglect. It can also be defined as the efficient use of a resource.²⁴ Conservation of water offers both economic and environmental benefits.

Pine Lake's water conservation practices involve xeriscaping, city-supplied mulch, watering restrictions, and education.

Example - Water Conservation (Indoor and Outdoor Water Saver Kits)



²³ Energy, food, medical, pharmaceutical, and other supplies are addressed.

²⁴ Webster's Dictionary



Pine Lake's WaterFirst PERC Plan

P) Protection, E) Education, R) Recycling & Reclamation and C) Conservation

The city will ensure that the community is educated about the availability of these resources (recommended by the DCA) as well as xeriscaping and mulching procedures through PLEAS and the Garden Club.

A Novel Solution for Conservation (and Reclamation)

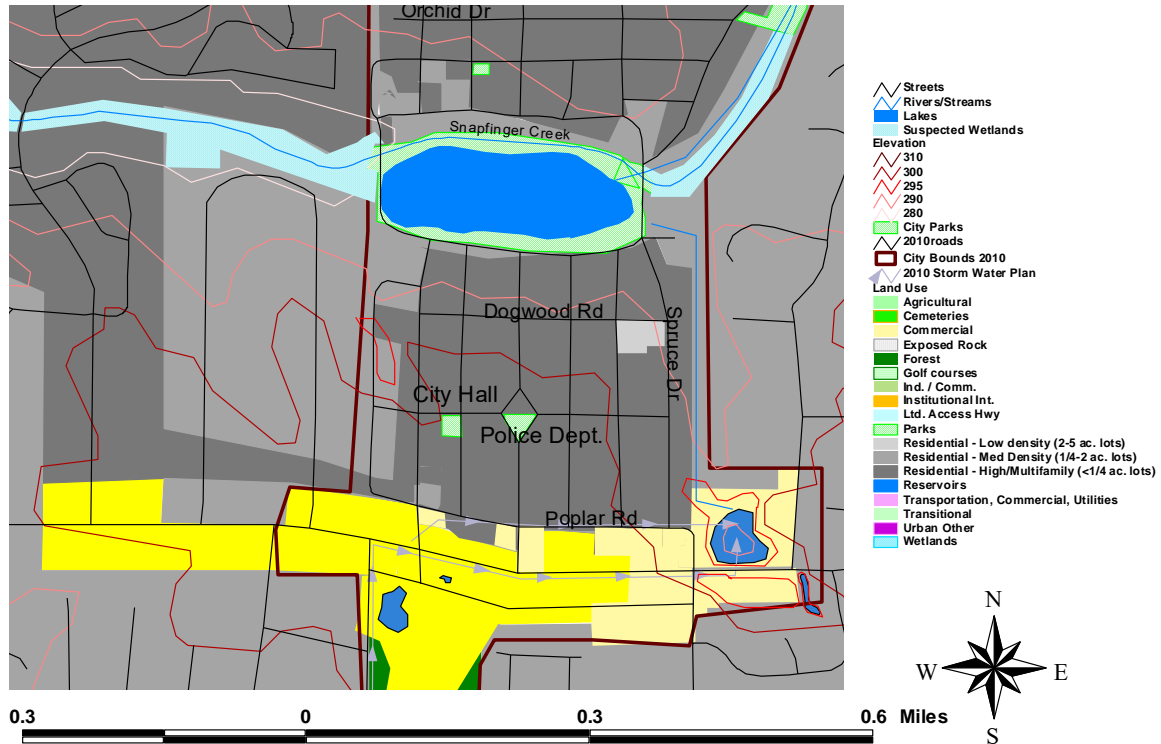
In 2002-2003, city management began developing a plan to overcome environmental challenges resulting from regional development while recharging its watershed and improving the local economy. The city received technical assistance from ACE and the Georgia EPD, in response to an LCI proposal drafted to include the development of a Stormwater Lake to resolve infrastructure, environmental, and economic issues. The plan proposes resolving the problem through these steps;

1. Construct a hard-walled retention pond (1½-2 acres) with some permeable surfaces in a topographic depression located along the business district.
2. Create a surface water drainage system along ½ -mile section of the business district to conduct water to the retention pond.
3. The retention pond will offer attractive features including an aeration and pretreatment system. The pond will allow for gravity separation of oils, water, and solids and will have a spillover that connects to an existing swale that runs north along the eastern edge of the city for approximately ½ mile.
4. The swale will be altered to allow more aeration and vegetation filtration to further clean the water. The water will be tested and if “clean” will be allowed to enter the city's namesake recreational lake.
5. The namesake lake overflows into Snapfinger Creek. Creek water quality will be monitored to determine the impact of the reclamation/pretreatment system on the watershed so that the stormwater preservation plan can be adapted elsewhere to meet ARC's regional objectives.
6. The pond will create an attractive feature around which to develop commercial businesses, park amenities and an outdoor public mall.

The figure below illustrates the overarching design plan for the stormwater infrastructure and pretreatment system.



Pine Lake's "Stormwater Lake"



The Stormwater Lake is located in the bottom right corner and Snapfinger Creek is outlined by the “projected wetlands” blue shading which extend east and west of the recreational Lake. The swale that will conduct the Stormwater lakewaters to the lake (or alternatively, Snapfinger Creek, runs parallel to the city’s eastern boundary.

6. Wastewater Master Planning

Reviewing the adequacy of existing wastewater collection, conveyance, treatment and disposal facilities and assessing potential changes for the future

Sewage System and Waste Water Treatment

The City is served by DeKalb County sewage. Few, if any homes are still on septic tank systems. Again, it is our belief that the County will be able to adequately furnish sewer services for the foreseeable future.



Pine Lake's WaterFirst PERC Plan

P) Protection, E) Education, R) Recycling & Reclamation and C) Conservation

However, the city has identified two incidents in the past year where catastrophic breaches in the sewer system have lead to (additional) contamination of Snapfinger Creek. Subsequent to the system repairs, bacteria counts continued to drop –indicating that the leaks may have been slight prior to the catastrophic ruptures. This has given impetus to investigate other minor breaches of the system along the watershed. The city has initiated a cooperative effort with DeKalb County to conduct these investigation

As a separate initiative, the city has instituted a building inspection process during major building renovations where sewers are being excavated. The city will use this opportunity to inspect the condition of the water/sewer distribution systems.

Since the city government is closest to a city-specific incident, the city's public works department has established a procedure to report complaints or odors that they detect during their daily routine. The workers themselves have identified their counterparts at the county so that the formalized process that is in place does not become stagnated due to incomplete communication. Pine Lake's public works department now recognizes a sewer breach or commingling of water streams as "higher priority" than their other daily routine. The city has adopted the GA DMA's prescribed first response system. The procedure for the public works department is:

1. Phone First (phone county and radio city authorities)
2. Inspect the safety of the site (with police if needed)
3. If safe, enter the site for gross containment
4. Cooperate with the county to achieve mutual goals of safety, containment, and minimum environmental impact.

The DMA figure below indicates one method for immediate overflow response; this follows a "phone first" response.





Pine Lake's WaterFirst PERC Plan

P) Protection, E) Education, R) Recycling & Reclamation and C) Conservation

Since the city has a system of primitive swales and canals, the surface water conduits can be quickly diverted to prevent contaminated water from entering sensitive portions of the watershed, such as the lake. After initial containment, the public works staff is trained to divert the flow of swales that lie adjacent to the sewers in order to minimize the impact on the environment.

7. Residual Biosolids Recycling

Biosolids are the nutrient rich organic materials resulting from the treatment of sewage sludge which can be safely recycled and applied as a natural soil amendment to improve and maintain productive soils.

Biosolid waste is managed by DeKalb County (as described above). However, the city has a long practiced system to compost leaves, chip wood, and recover creek dredged spoils. Land farming is conducted by several residents on a volunteer basis and the city supplies the materials to the residents upon request.

Solid Waste Management

The City contracts with BFI to collect household garbage and recyclables once each week. Senior citizens receive free service and the cost of the contract is spread equally among the other residences. The City also contracts to have co-mingled recyclables picked up. The city's Solid Waste Management Plan was approved by DCA in 1999.

The City provides pick-up of construction debris, household items, etc. and transports it to a dumpster at the City's public works station. The dumpster is emptied by a commercial contractor and the charge is passed on to the homeowner. The City also picks up yard trimmings, which are composted and exchanged for mulch at the County landfill or composted on city or residential property (at the residents' request). The garden club and PLEAS committee prescribe xeriscaping on city property. For these properties, the city deposits yard wastes for composting and amending the soil.

8. Water Reclamation and Reuse

Reclaimed water is highly treated wastewater that can be used again safely for other purposes.

Although, the city has no plan for reclamation of over-treated water, the city plans to collect, preserve, and pretreat stormwater as addressed in Section 5 - Water Conservation. The following map reveals an integration of the Stormwater Lake with the existing city's infrastructure and natural resources.



Pine Lake's WaterFirst PERC Plan

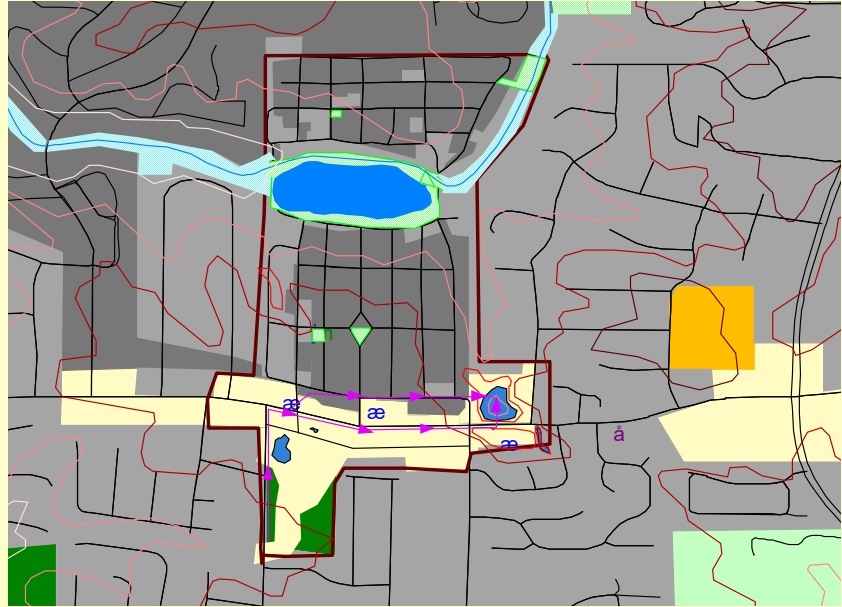
P) Protection, E) Education, R) Recycling & Reclamation and C) Conservation

Pine Lake, Year 2010



Legend

- 2010 Storm Water Plan
- Elevation
 - 310
 - 300
 - 295
 - 290
 - 280
- Rivers/Streams
- Lakes
- Suspected Wetlands
- City Parks
- 2010roads.shp
- City Bounds 2010
- Streets
- Road Characteristics
- Facilities
 - Colleges/Universities
 - Schools
 - Fire Station
 - Police Stations
 - Hospital
 - Libraries
 - Malls
 - Parkand Ride Lots
 - Government City/County Halls
 - Religious Institutions
 - Sport Area/Stadiums
- Medium Density Residential
- High Density Residential
- Business Lake
- 2000 businesses.shp
- 2003a businesses.shp
- 2010 Business
- Landuse
 - Agricultural
 - Cemeteries
 - Commercial
 - Exposed Rock
 - Forest
 - Golf courses
 - Ind. / Comm.
 - Institutional Int.
 - Lid. Access Hwy
 - Parks
 - Residential - Low density (2-5 ac. lots)
 - Residential - Med Density (1/4-2 ac. lots)
 - Residential - High/Multifamily (<1/4 ac. lots)
 - Reservoirs
 - Transportation, Commercial, Utilities
 - Transitional
 - Urban Other
 - Wetlands



0.1 0 0.1 0.2 Miles





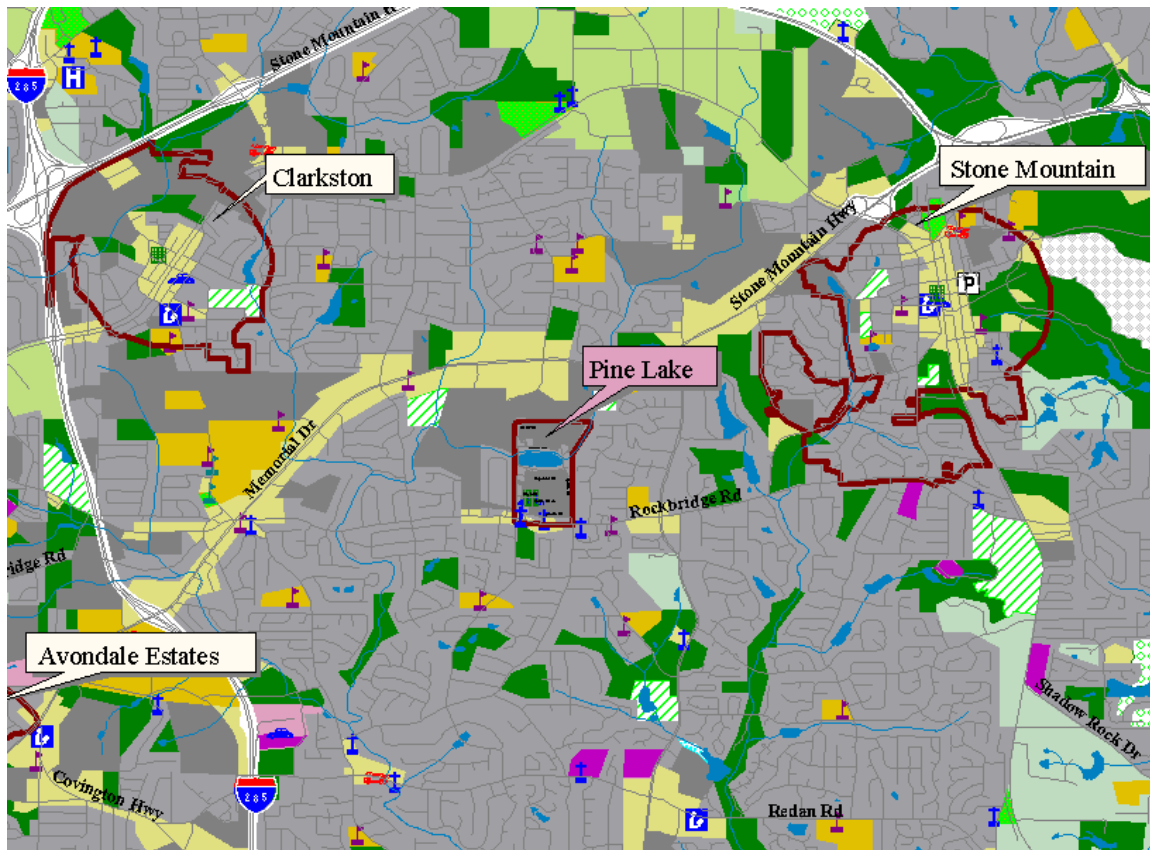
Appendix A

Additional City & Community Information

GENERAL LOCATION

The City of Pine Lake is in the heart of DeKalb County, situated between the cities of Decatur, Stone Mountain, Clarkston, and Avondale Estates. The City is approximately 12 miles east of downtown Atlanta and is 3 miles outside the I-295 Perimeter Highway (see map in section 1.5). The City is 1.1 square mile, situated around a 13-acre man-made lake and within the Snapfinger Creek Watershed. The original lake was 15 acres, reduced to 12 acres to control flooding, and has since eroded to approximately 13 acres.

Pine Lake and the Surrounding Region of Central DeKalb County





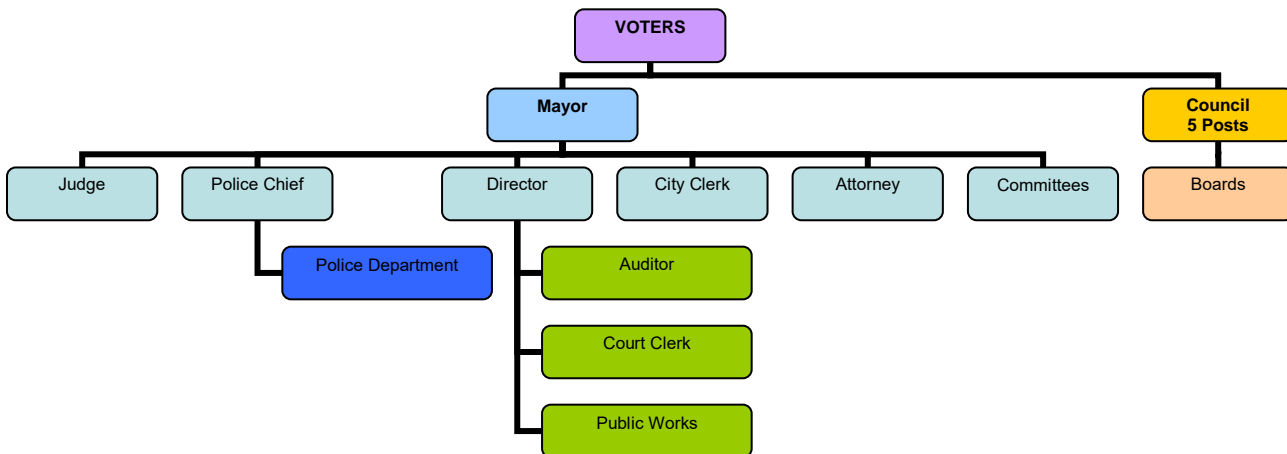
Pine Lake's WaterFirst PERC Plan

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GOVERNMENT

The charter outlines a description of a strong Mayor-City council administration, consisting of a Mayor and five at-large City Council members, Posts 1-5 (see Figure 1.3, below). The City has two senior management positions: Chief of Police and Director of Administration. The Director of Administration has a staff consisting of: City Clerk, Court Clerk, Parks & Public Works Supervisor, a Maintenance Helper, and a Beach Manager. The figure below depicts the city organization chart as amended in 2003.

Pine Lake's 2003 Organization Chart



POPULATION ELEMENT

The mayor, the Director of Administration and the CD/ARC chair have been sharing information with the ARC, DeKalb County, the Georgia Municipal Association (GMA), the Georgia Division of Community Affairs (DCA) and commercial planners and transportation engineers to assist with sustainable development plans.

We believe that, by annexing the adjacent business district and by continuing our aggressive campaign in revitalizing our business district, we will be able sustain the addition of six businesses a year. Our City has met with County officials to promote the annexation of the aging, unincorporated business district in order to produce a harmonized, coordinated, attractive, and pedestrian-friendly business district that becomes a destination rather than a “stop-off”. We believe that the currently unincorporated businesses will increase in value and volume to match that of the incorporated businesses. (Pine Lake businesses average three times higher than unincorporated businesses.) The County’s immediate loss of

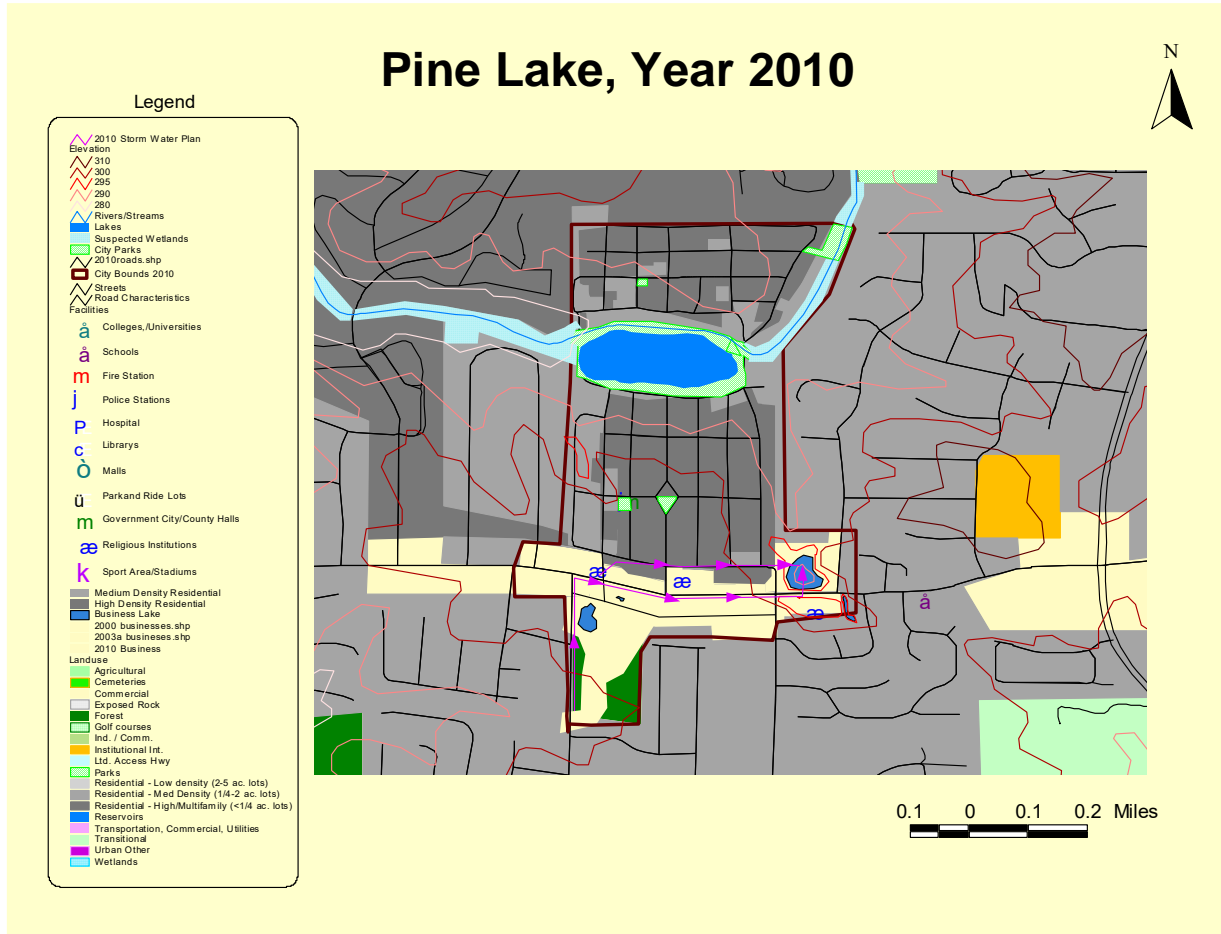


Pine Lake's WaterFirst PERC Plan

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\$12,000²⁵ in reduced property taxes will be recovered by the increase of property value within three years. Furthermore, by harmonizing the entire business district on Rockbridge Road, we can optimize the properties to allow zoning which could facilitate four times the businesses that are presently there. The figure below reveals the land use plan for the city after annexation.

Zoning of City in 2010-2023 (businesses in yellow)



By creative management of storm water, we could also offer pretreatment of surface water with an attractive water feature that will attract business and customers. The new businesses will make high-end mixed housing feasible. We project that the property value of the business district will eclipse the property values of the residences by the year 2007.

²⁵ From DeKalb County Tax Assessment of properties considered for annexation (June 2003).



Pine Lake's WaterFirst PERC Plan

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NATURAL AND HISTORICAL RESOURCES ELEMENT

Parks and Recreation

As previously mentioned, the City has the lake and surrounding park area, has purchased additional acreage contiguous to the parks, and is seeking grant funds to purchase more of the unprotected wetlands that neighbor our borders.

County, Region State level.