

| Tree Pla | | | | |
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| Air Quality | | | | |
| Technical Issue | General Tree Characteristics | Species | Placement | Time Frame |
| Maximize CO2 Reduction | Maximize us of woody plants, especially trees, since they store more CO2 than herbaceous plants and grass. | | Provide as much pervious surface as possible (including use of porous concrete near trees) so that trees grow vigorously and store more CO2. | Larger, slow growing trees will sequester more CO2, however in the short run, choosing a fast growing tree will cause more overall CO2 to be sequestered |
| | Select species that are adapted to local climate, soils, and other growing conditions. Adapted plants should thrive in the long run and will avoid CO2 emissions stemming from high maintenance needs | | Group species with similar landscape maintenance requirements together and consider how irrigation, pruning, fertilization, weed pest, and disease control can be done most efficiently. | |
| Capture particulate matter | Mature, mixed woodland - will capture airborne particles at approximately 3x the rate of grassland | | Trees on the edge of woodland are more effective at capturing airborne particles than the trees in the center of the wood because they have larger leaf areas and are exposed to the wind | |
| Energy | | | | |
| Technical Issue | General Tree Characteristics | Species | Placement | Time Frame |
| Trees and air conditioning | Shade Trees: Mature trees produce 3 to 8 times more energy savings than small trees due to the greater effects on wind, building shade, and cooling by transpiration. | | For individual buildings, strategically placed trees increase energy efficiency. Solar angles are important when the summer sun is low in the east and west for several hours a day. Tree shade to protect east and especially west help keep buildings cool. | |
| | Large-leafed deciduous trees and some large evergreens provide excellent shade | | Shade trees should be planted mainly to the south and west side of a building. (Master Garden, 2003). | |

Integrated Urban Environmental Improvement and Tree Planting Guidelines-Draft

| -Tree Planting Guidelines | | | | | | |
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| Maintenance Guidelines | Growth Rates | Water Use | Quantities | Notes | Sources | Local Organizations & Stakeholders |
| Increase tree-stocking levels where feasible, and immediately replace dead trees to compensate for CO2 lost through tree and stump removal | | | | Fast growing trees will sequester more CO2 initially than slow-growing species, but may not live as long, (consider long-term benefits) | Alpharetta Tree Cover / Storm Water Study Urban & Community Forestry Grant # 97-23 http://www.gfc.state.ga.us/Services/UCF/FinancialAssistanceProgram/A_Compilation_of_Urban_Tree_Studies.pdf | |
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| Trees and heating | Trees as Windbreaks: Fast-growing, dense conifer species with stiff branches that will mature at a height about 1 1/2 times the height of the house. The species should retain branches low to the ground at maturity. Evergreens/Coniferous trees | Good choice for windbreaks: Poplar, Cedar, White Spruce, Colorado Blue Spruce Norway Spruce | Average annual net energy benefits for residential trees were found to be greatest for a tree located west of a building due to the negative effects on heating costs associated with winter shade were minimized. A yard tree located south of a building produced the least net energy benefit. Trees located on the east provided intermediate benefits. A small deciduous tree (i.e. crabapple) placed on opposite south-facing walls was found to increase heating costs more than the benefits of shading and climate benefits reduced cooling/heating costs. (McPherson, Mountain Prairie guide) | |
| | | | *Windbreaks should be placed at right angles to the prevailing winter wind on the north and west sides of the building. The windbreak should be longer than the area to be protected. Wind reduction downwind occurs for a distance up to 30 times the height of a windbreak; the amount of reduction will vary depending on the density of the trees. Therefore, a building will receive the most protection from a 20-ft high planting within 400 ft. from the windward side. Place south side windbreaks farther away to prevent shading (Master Garden, 2003) | |
| | | | Spacing: Dependent on the species used, however pine and spruce should be placed about 6 ft. apart and should be staggered, not aligned. With dense trees such as these, two rows are sufficient (Master Garden, 2003) | |
| Trees and the Urban Heat Island Effect | | | Parking Lots | |
| | | | | Trees and Stormwater F |
| Technical Issue | General Tree Characteristics | Species | Placement | Time Frame |
| Stormwater runoff reduction through tree planting | Architectural features that maximize interception, such as large leaf surface area and rough surfaces that store water. | Poplars, Willows in-leaf | Infrastructure Issues: Keep Trees at least 30 ft. (10m) away from street intersections to ensure visibility. Avoid planting shallow rooting species near sidewalks, curbs and paving. Tree roots can heave pavement if planted too close to sidewalks and patios. Avoid planting within 3 ft (1m) of pavement, and note that trunk flare at the base of large trees can displace soil and paving for a considerable distance. | When evaluating the stormwater benefits provided by trees, it is apparent that young trees provide very few significant benefits during the first 15 years of establishment. While other environmental benefits may accrue from young trees, stormwater benefits are only derived from crown size and density. Taking species characteristics into account, most species do not begin to provide stormwater benefits until 15 years after establishment. |

*Note: in drought periods, planting smaller trees, (2 in or less caliper for deciduous and 6 ft. or less height for evergreens) reduces the investment and risk, and the tree can become more established, requiring less water.

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| | | | | | Master Garden. (2003). Conserve Energy with Landscaping. Accessed via: http://www.mastergardenproducts.com/sustainablelandscape/conserveenergy.htm | |
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Runoff Reduction - Planting Guidelines

| Maintenance Guidelines | Growth Rates | Water Use | Quantities | Notes | Sources | Local Organizations & Stakeholders |
|------------------------|------------------------------|--|---------------------------------|--|---|---|
| | Rapid Growth rates are ideal | Low water use species and natives that once established require little supplemental irrigation | Thick density of trees required | Conifers intercept more rainfall than similar sized deciduous trees. | McPherson, 2003, Northern Mountain Prairie Community Tree Guide | Water- Sewer - Gas - Telecommunication - Powerlines, Streetlights-Traffic Signs |