

# Urban Tree Canopy Schoolyard-Watershed Report

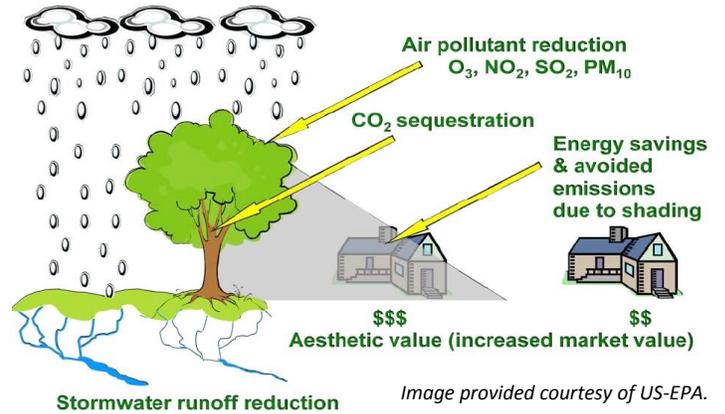
## RESA 8 Public Schools



### What is Urban Tree Canopy and why is it important?

Urban trees are the trees we live with, the trees that grace our towns, neighborhoods, parks, streets and schools. Urban Tree Canopy (UTC) is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. UTC provides many benefits to schools including reducing heating and cooling costs, improving air quality, and reducing erosion. Establishing and maintaining UTC is essential for schools seeking to employ green infrastructure to improve quality of life. This study found that landcover at RESA 8 schools, in general, resembles urban areas—significant areas dedicated to transportation (13%) and buildings (9%) with low tree cover (14%). American Forests recommends 40% UTC even in dense highly urbanized areas.

### Ecosystem services provided by urban trees



### Project Background

At the request of the WV Chesapeake Bay Tributary Team, Cacapon Institute (CI) conducted an assessment of landcover at RESA 8 public schools. The WV Trib Team is dedicated to improving water quality; landcover is a key indicator of watershed health and the likely delivery of non-point source stormwater pollution runoff. This is an introductory assessment and is not intended to be a definitive or conclusive document. It is based on color and infrared aerial imagery from 2007 and 2009. This report indicates where the building footprints are, where impervious transportation infrastructure exists, and where the grounds have forest patches and tree canopy cover. CI is committed to continued investigation of landcover and non-point source water pollution issues.

### Cacapon Institute



**From the Cacapon River to the Potomac to the Chesapeake Bay we protect rivers and watersheds using science and education.**

Founded in 1985, Cacapon Institute has grown from a local

watershed research and protection group to an organization reaching a broad audience across the Mid-Atlantic.

Our online Potomac Highlands Watershed School is used by tens of thousands of students. Our science projects include watershed research and urban tree canopy studies. As problem solvers we facilitate community and school based hands-on watershed conservation. CI is an active participant in the WV Chesapeake Bay Tributary Team and Chesapeake Bay Program.

CI is funded by federal and state grants, private foundation including The MARPAT Foundation and Evenor Armington Fund, and the generous support of our members.

### Key Terms

**UTC:** Urban Tree Canopy, in this case “urban” is a reference to the densely populated highly built-out conditions of public schools. Tree canopy is the leaves, branches, and stems of trees that cover the ground when viewed from above.

**Land Cover:** Physical feature of a landscape. This study generalizes landcover into four types: UTC, buildings, transportation related (including asphalt & concrete surfaces accessible to cars, trucks & buses); and open space (all the remaining area including lawn and sports fields).

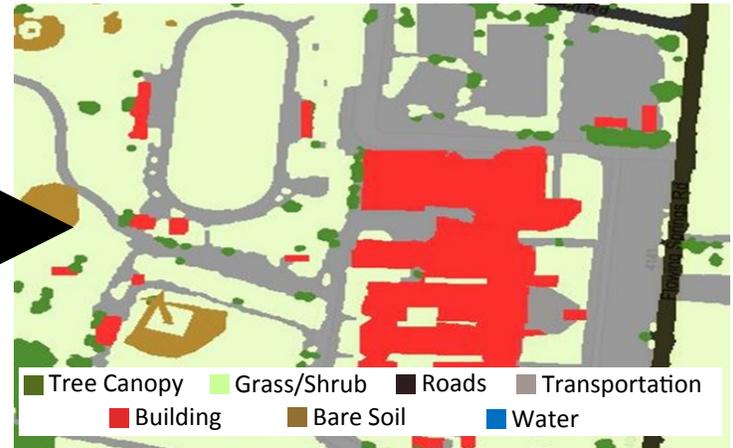
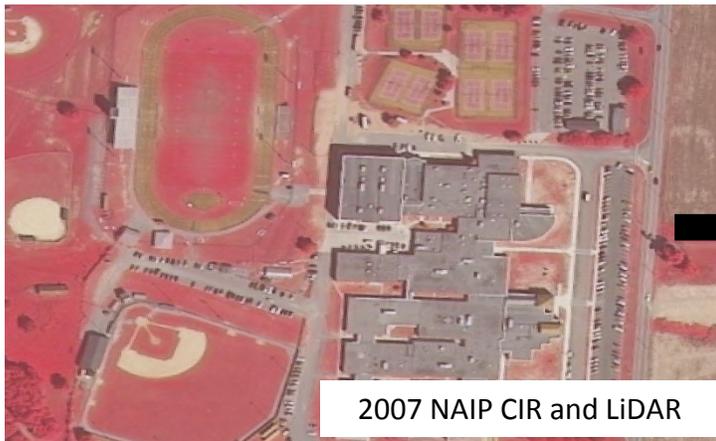
**Trib Team:** The WV Chesapeake Bay Tributary Team is a voluntary cooperative among state and non-profit agencies working to reduce current pollutant loads to the Potomac River, primarily non-point source nutrient and sediment pollution.

**RESA 8:** Regional Education Service Area Eight, the central administration office of WV Department of Education covering the eight counties of the greater Eastern Panhandle and Potomac Basin (Berkeley, Grant, Hampshire, Hardy, Jefferson, Mineral, Morgan, Pendleton)

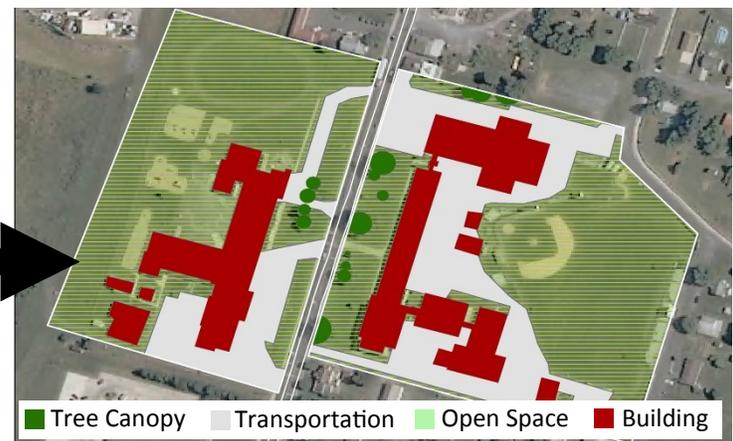
**USFS:** USDA Forest Service

# UTC Schoolyard-Watershed Report

## Methodology



**Method 1:** The USDA Forest Service’s (USFS) computer assessment protocol was commissioned by Jefferson County in 2009. It was based on 2007 National Agriculture Inventory Program (NAIP) color infrared (CIR) imagery and Light Detection and Ranging (LiDAR) object-height modeling. By combining NAIP and LiDAR the USFS assessment eliminates shrubs. The result is a UTC assessment estimated that is 97% accurate. The process is capable of detecting individual trees.



**Method 2:** Cacapon Institute conducted a human-eye assessment of schoolyard landcover for the remaining seven counties of RESA 8. It is based on 2009 NAIP imagery. CI assigned landcover classes for canopy, transportation, and buildings. The three landcover classifications, once created, were subtracted from the total area of the school grounds leaving an area of “open space” that includes sports and play areas. Open space is a landcover designation, not a land use estimate.

In both methods the property parcels were approximated based on perceived boundaries such as roads and fence lines. With the boundaries drawn and the landcover types delineated it is possible to quantify and summarize the landcover data.

## Differences in Approach

The USFS UTC was computer generated and identified seven types of landcover but CI’s human-eye interpretation identified only four. The USFS UTC information was reclassified to match the four categories of CI (open space, UTC, transportation, and buildings). The USFS UTC identities for bare soil, water and grass/shrub were reclassified as a single set in CI’s open space; the road and transportation-other were reclassified under CI’s transportation. In the combined eight county assessment, Jefferson’s totals are unique. The computer generated assessment includes sidewalks, tennis courts, and other paved areas under “transportation”. In the seven counties evaluated by CI, the tracks, tennis courts, and other impervious areas are not identified with transportation, they are included in the totals for “open space.” Therefore Jefferson’s transportation landcover is slightly higher by comparison.

# UTC Schoolyard-Watershed Report

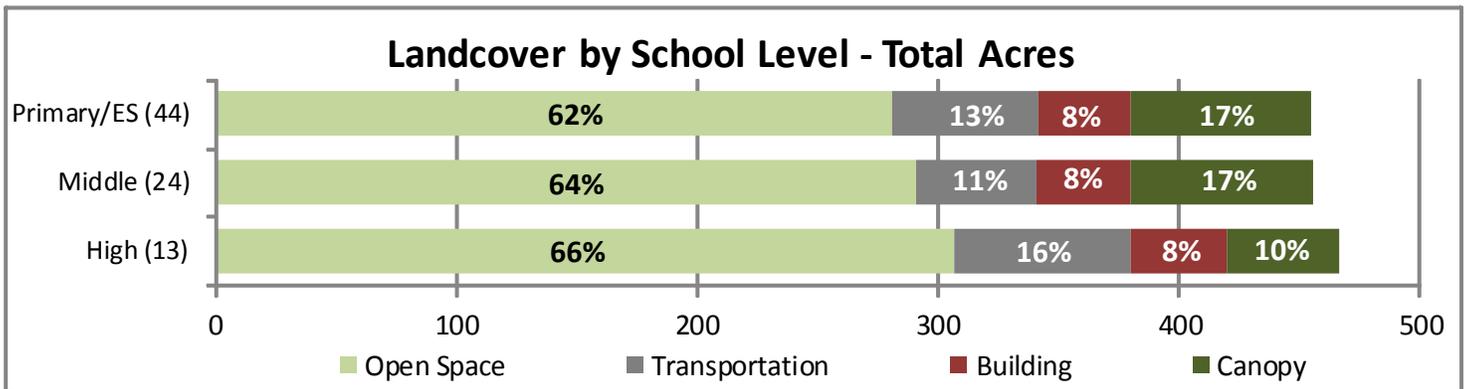
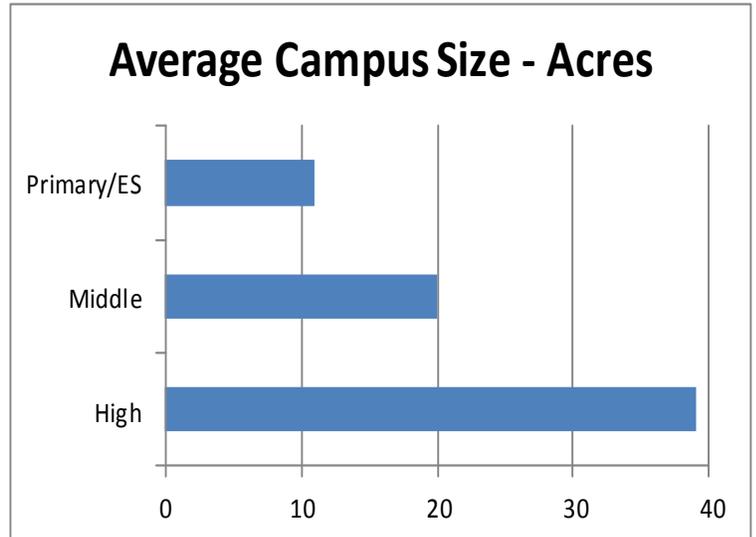
## UTC Summary

CI's investigation found there are 1,377 acres of public K-12 school grounds with:

- 877 acres open space
- 199 acres UTC
- 184 acres transportation
- 117 acres buildings

The study presented four significant findings when dividing school properties into age-grouped school levels.

1. The average campus size almost doubles at each school level so high school campuses are nearly four times the size of elementary campuses (right).
2. The total acreage by school level is similar (below). Although there are fewer high schools, they are larger in acreage, so the total acreage between school levels is comparable.
3. Elementary and middle schools, as a single combined whole, have similar landcover break downs. High schools have notably less tree canopy.
4. Middle schools have less transportation than elementary schools, but the high schools have the highest percentage of transportation.



## Additional Findings

CI staff visited some RESA 8 schools across the eight counties to assess the health and vigor of the tree population, indicators of future tree canopy cover. Where trees are healthy and well-placed they can be expected to continue to grow and provided ecological benefits. To maintain the ecological benefits over time, new trees must be grown to replace dying or unhealthy stock.

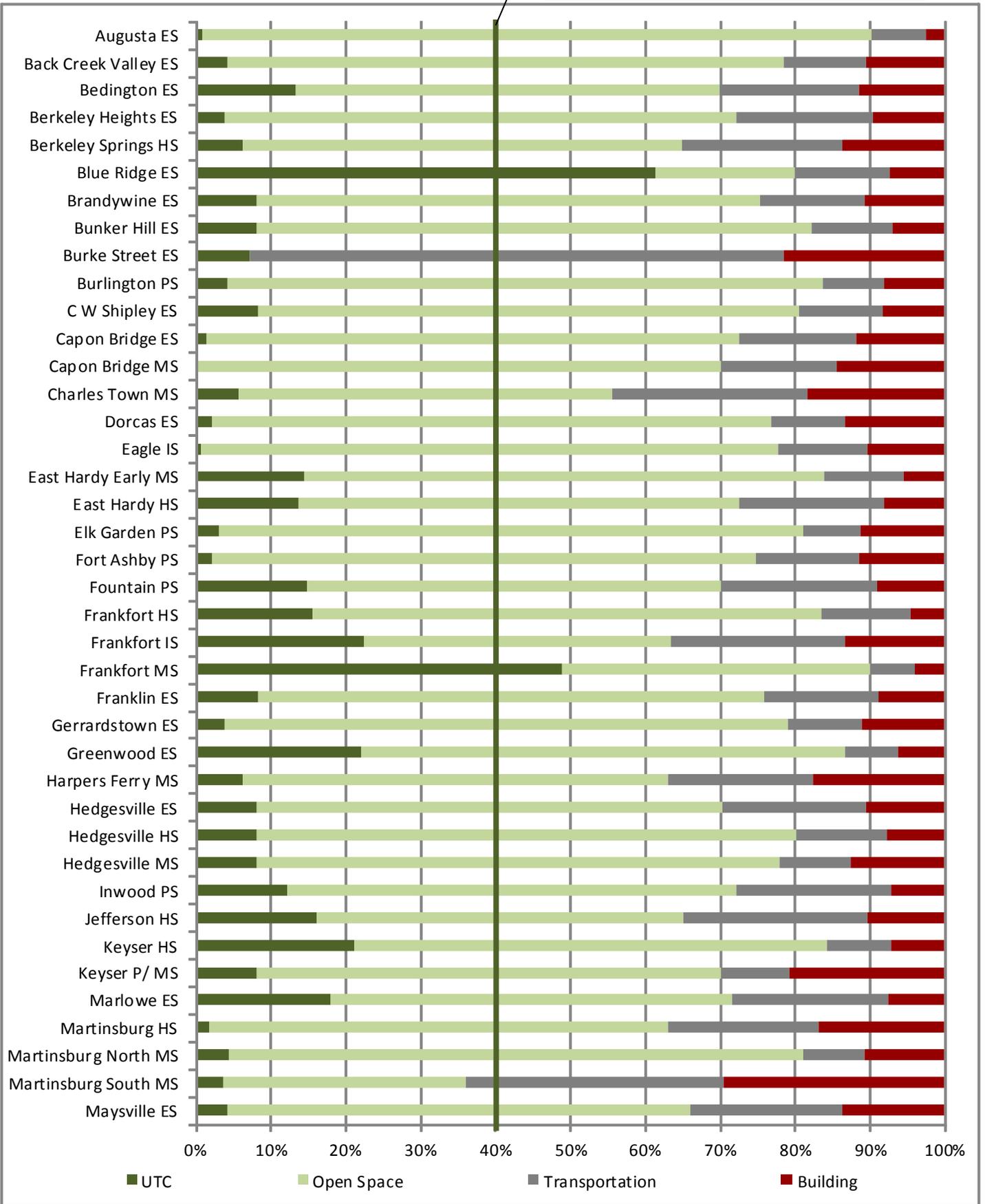
Pruning, mulching, or tree-specific landscaping care was not widely evident and utility conflicts were common. Many of the trees were found to be in a typical "industrial" condition; i.e., tree care is a secondary landscaping concern. Less benefit and higher than normal mortality can be expected under those conditions (Picture A).

On the other hand, many schools have small well maintained landscape areas. These often included flowering and shade trees (Picture B).



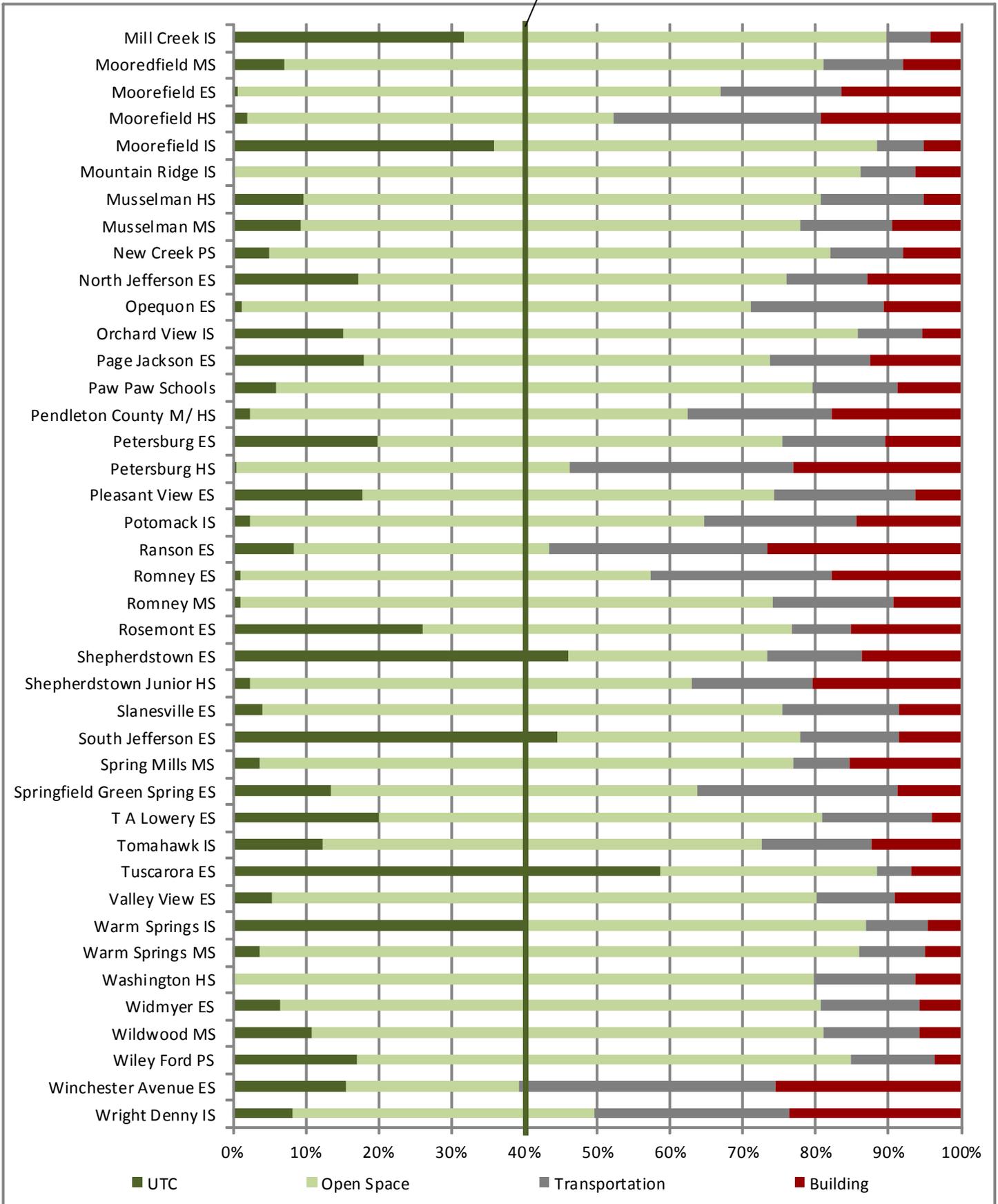
# UTC Schoolyard-Watershed Report

American Forests Recommended 40% Tree Cover



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## Tree Planting Recommendations

### Current Condition Observed

### Recommendation Example

**Provide Shade:** Even a single tree can provide significant shade for spectators or teacher chaperones. Engaging the parent community in volunteer tree planting events supports school spirit. Trees could be added to sports and play areas for shade.



**Calm Traffic:** Studies have shown that tree lined avenues and lanes tend to calm traffic. Additionally trees planted in proximity to blacktop significantly reduce ambient temperatures. Trees could be added to parking lots, medians, and along sidewalks.



**Reduce Mowing Costs:** Transferring savings from reducing mowing cost to planting and maintaining trees can provide benefits without additional cost. Schools should consider trees as a landscaping alternative, especially in places difficult to reach, with steep inclines, or wet lowlands. Trees could be added to school grounds to reduce mowing costs and difficulties.



# UTC Schoolyard-Watershed Report



## Stormwater Management Recommendations

### Current Condition Observed

### Recommendation Example

**Rooftop Runoff Reduction:** Planting trees and other native vegetation can dramatically reduce the amount of stormwater runoff pollution that sheds off of rooftops through downspouts and rain gutters. More grounds could be dedicated to gardens and trees.



**Surface Runoff Reduction:** As stormwater runs off of impervious surfaces such as parking lots, playgrounds, and sidewalks it picks up pollutants. Trees and native vegetation could be used to capture those pollutants to keep local streams healthier.



**Rain Barrels:** Using rain barrels to catch stormwater runoff pollution as it exits downspouts is a cost-effective tool for reducing soil erosion on school properties. The captured stormwater can then be used to water trees, plants, and gardens. Rain barrel activities can be integrated with class objectives in art, math (volume and conversion) or social studies (natural resource management).



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## Conclusions and Recommendations

Many of the schools surveyed across RESA 8 have significant open space that is not utilized for organized play and offers potential to increase tree canopy. Rain gardens and other stormwater management practices that incorporate tree canopy in their design can significantly reduce the amount of stormwater runoff pollution coming off of campuses. This improves local water quality in streams. Trees can shade outdoor classrooms and they can lower heating and cooling costs. Trees and gardens offer educational opportunities, especially in biology, science and art. Trees can be applied to improve defensible space. They break sight lines from outside the campus looking in and establish physical and psychological boundaries. Hands-on conservation offers project-based learning opportunities and are a proven method to engage students. Additionally, school boards, principals, and PTA's should promote student-lead real-world conservation projects to meet their goals to beautify school grounds, improve environmental sustainability, make campuses healthier and more inviting, and engage the community in volunteer efforts.

### WV Project CommuniTree

**CTree** promotes tree planting and education on public land through volunteerism in the Potomac Headwaters of West Virginia.

CTree and its partners invite organizations and agencies to apply for CTree kits to organize, coordinate, and implement urban tree plantings through a competitive grant process. Twice annually groups can apply for CTree Kits for spring and fall plantings. CTree Kits include:

- Native Trees
- Mulch
- Deer Protection



### Potomac Headwaters Leaders of Watersheds

Through **PHLOW**, CI teaches students about watersheds and the problems and causes of non-point source water pollution, especially stormwater runoff pollution. Students are then empowered to identify and address significant environmental problems on their campus and in their community. PHLOW is devoted to education programs prior to, and after, outdoor conservation and is building a future generation of watershed stewards.



## WV Chesapeake Bay Tributary Team

The WV Chesapeake Bay Tributary Team includes the WV Department of Environmental Protection, WV Department of Agriculture, WV Conservation Agency, WV Division of Forestry, Cacapon Institute, The Conservation Fund's Freshwater Institute, and WV University. This report was supported by, but does not necessarily represent the views of, the US EPA's Chesapeake Bay Program, USDA Forest Service, Potomac Watershed Partnership, and the generous support of Cacapon Institute's members.



## For More Information

For more information contact Tanner Haid, Urban Forestry Coordinator for Cacapon Institute:

**Email:** [THaid@CacaponInstitute.Org](mailto:THaid@CacaponInstitute.Org)

**Phone:** 540.335.0687

**Mail:** #10 Rock Ford Road, Great Cacapon, WV 25422