



## DOE - Princeton Plasma Physics Laboratory

### FY 2008 Beneficial Landscape Plan

April 1, 2008

Prepared by:

\_\_\_\_\_  
Keith Rule  
Project Engineer, Environmental

\_\_\_\_\_  
Date

Reviewed by:

\_\_\_\_\_  
Virginia Finley  
Head, Environmental Compliance

\_\_\_\_\_  
Date

Approved by:

\_\_\_\_\_  
Robert S. Sheneman  
Head  
Materiel & Environmental Services Division

\_\_\_\_\_  
Date

Approved by:

\_\_\_\_\_  
Shawn Connolly  
Head  
Maintenance and Operations Division

\_\_\_\_\_  
Date

Princeton Plasma Physics Laboratory  
James Forrestal Campus  
P. O. Box 451  
Princeton, New Jersey 08543

Under US DOE Contract No.DE-AC02-76CH03073

## **Table of Contents**

- I. Environmental Setting**
- II. Proposed Landscaping Projects**
- III. Accomplishments in 2007**
- IV. Environmental Review Committee (ERC) Landscaping Subcommittee**

**PPPL's Beneficial Landscaping Plan's goal is the improvement of our site's environment through better management practices. By reducing the amounts of pesticides and fertilizers, thus improving stormwater quality, by reducing the need for mowing, thus lowering air emissions, fuel use, and time/money, and by planting native vegetation, thus avoiding high maintenance or introduced species, and reducing the quantity of stormwater runoff, will serve to enhance the overall quality of PPPL's facility.**

## **I. Environmental Setting**

The Princeton Plasma Physics Laboratory (PPPL) site is in the center of a highly urbanized region of the Northeast region. Set back from US Highway Route 1 North, the laboratory is located on the James Forrestal Campus (JFC) and is surrounded by mixed oak forest. PPPL is a compactly developed site that is bordered by forests and wetlands and, therefore, has limited opportunities for large beneficial landscaping projects. Where possible and within budget constraints, PPPL has implemented beneficial landscaping practices. Future construction, demolition and maintenance projects will incorporate beneficial landscaping as appropriate.

As can be seen from the aerial photograph below, undisturbed areas surrounding the site include upland forest, wetlands, open grassy areas, cultivated fields, and a minor stream (Bee Brook), which flows along its eastern boundary. These areas are designated as open space in the JFC Site Development Plan. The aerial photo shows the general layout of the facilities at the C- and D-sites of Forrestal Campus as viewed from the north; former TFTR and NSTX Test Cells are located at D-site (on the left side of photo).



All of PPPL's storm water runoff flows to Bee Brook, a tributary of Devils Brook and the Millstone River, directly *via* a detention basin or to a swale on the west side of the site that empties to wetlands south of the site.

PPPL's Stormwater Management Plan allows for a maximum impervious coverage of 60 % of the developable land, which excludes wetlands – 18 acres of the 88.5 acres. Approximately 45 % of the site's total area is covered by impervious surfaces - buildings, roadways and parking lots, and storage trailers.

Also, the 500-year flood plain elevation (85 ft above mean sea level) delineates the storm protection corridor, which is vital to the flood and water quality control program for PPPL as well as the Princeton Forrestal Center site. This "corridor" is preserved and is protected from development by Princeton Forrestal Center in the Site Development Plan.

The topography of the site is relatively flat and open with elevations ranging from 110 feet in the northwestern corner to 80 feet above mean sea level along the southern boundary. The low-lying topography of the Millstone River drainage reflects the glacial origins of the surface soils; sandy loams with varying percents of clay predominate.

Two soil series are recognized for the immediate environs of the site. Each reflects differences in drainage and subsurface water tables. Along the low-lying banks of stream tributaries, Bee Brook, the soils are classified Nixon-Nixon Variant and Fallsington Variant Association and Urban Land.

This series is characterized by nearly level to gently sloping upland soils, deep, moderate to well drained, with a loamy subsoil and substratum. The yellowish-white sands contain patches of mottled coloring caused by prolonged wetness. On a regional scale, the water table fluctuates between 1.5 and 2.5 feet below the surface in wet periods and drops below 5 feet during drier months.

In the slightly higher elevations (above 70 feet), the sandy loams are better drained and belong to the Sassafras series. The extensive farmlands and nurseries in the area indicate this soil provides a good environment for agricultural purposes, both today and in the past.

An upland forest type with dominant Oak forest characterizes vegetation of the site. Associated with the various oaks are Red Maple, Hickories, Sweetgums, Beech, Scarlet Oak, and Ash. Red, White, and Black Oaks are isolated in the lower poorly drained areas. Along the damp borders of Bee Brook, a bank of Sweetgum, Hickory, Beech, and Red Maple define the watercourse. The under-story of the wooded areas is partially open with isolated patches of shrubs, vines, and saplings occurring mostly in the uplands area. The poorly drained areas have a low ground cover of ferns, grasses, and leaf litter.

The forest throughout most of the site has been removed either for farmland during the last century or recently for the construction of new facilities. Grass has replaced much of the open areas.

## II. Proposed Landscaping Projects

The Environmental Review Committee – Landscaping Subcommittee met to discuss ideas for future beneficial landscaping projects, in particular linking them with restoration and/or renovation or new construction projects. As maintenance and project funding is available, beneficial landscaping (low maintenance plantings, native and drought-resistant vegetation, and habitat enhancements) will be incorporated into future projects.

The following areas were identified as potential opportunities: Importance should be placed on areas where soil is still exposed and/or potential for erosion exists.

### 1. Swale maintenance More progress in FY07.

- Remove vegetation along south bank and trim trees.
- Placed rip-rap stone at exit of pipe into swale
- Reduced mowing to 2 times per year



**Swale 2006**

### 2. Maintenance needed in 2008 on North, South and Basin Swales

- Place 2" shoulder stone along road.
- Place seed matting and seed, along selected embankments.
- Plant native plantings on selected embankments.
- Cleaning of west swale



**Swale 2007**



### 3. Gravel and soil restoration along C-site roadways.

- Place 2" shoulder stone along road.
- Place topsoil and seed.
- Place 3/4" gravel in selected areas.



#### 4. Landscape the perimeter of this parking lot.

- Add soil and gravel to elevate portions and provide base drainage
- Design varied growth to include drought resistant flowers, herb type plants, and wildflowers.
- Add proper soil and mulch to provide filtration, drainage and proper soil moisture.



**Engineered Landscaping D-site Parking Lot**

#### 5. Gravel and soil restoration along D-site roadways.

- Place 2" shoulder stone along road??
- Place topsoil and seed.





**6. West Entrance– improved plantings and other landscaping elements to reduce amount of grass and improve drainage.**

- Consider drainage piping
- Create shrub beds
- Install solar powered light



**7. Eliminate mowing on parking islands.**

- Remove grass and poor soil/gravel.
- Plant low ground shrubs - Weberie
- Mulch areas.



**8. Increase beds around trees.**

- Use Roundup to kill grass
- Remove grass with air spade
- Add mulch to drip line

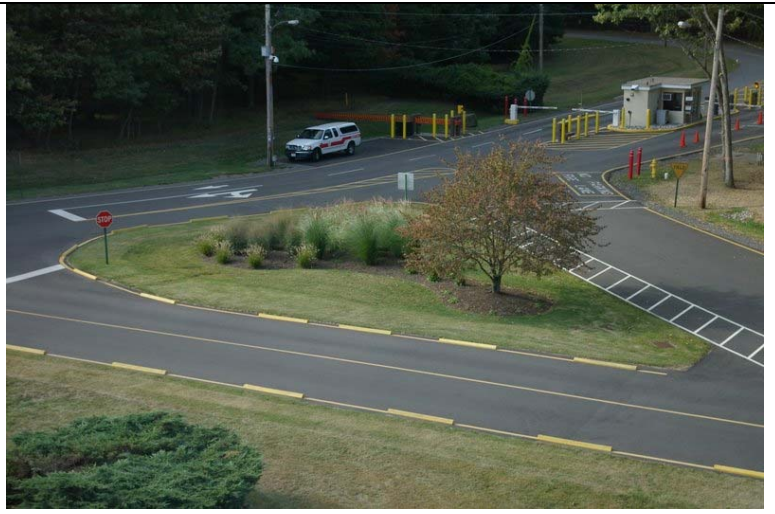




Section III: Accomplishments in FY 2007



**Lab Entrance 2006**



**Lab Entrance Summer 2007**



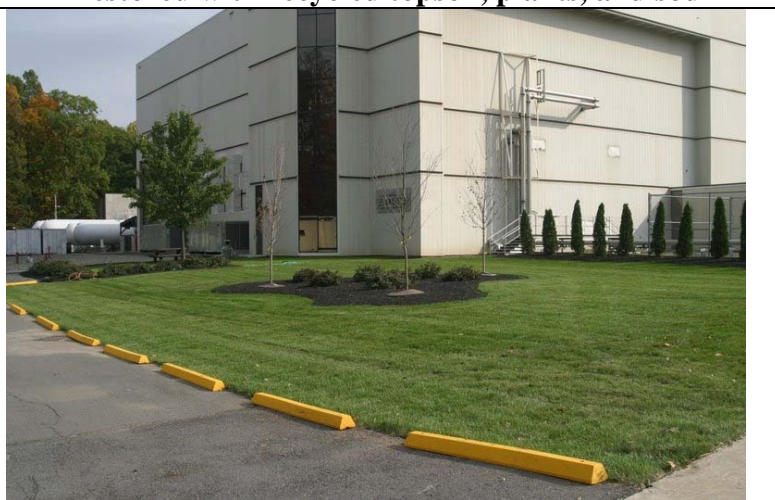
**D-site Blocks, Dumpsters, HP trailer**



**Restored with recycled topsoil, plants, and sod**



**Blocks removed and reused**



**Planting completed in September 2007**





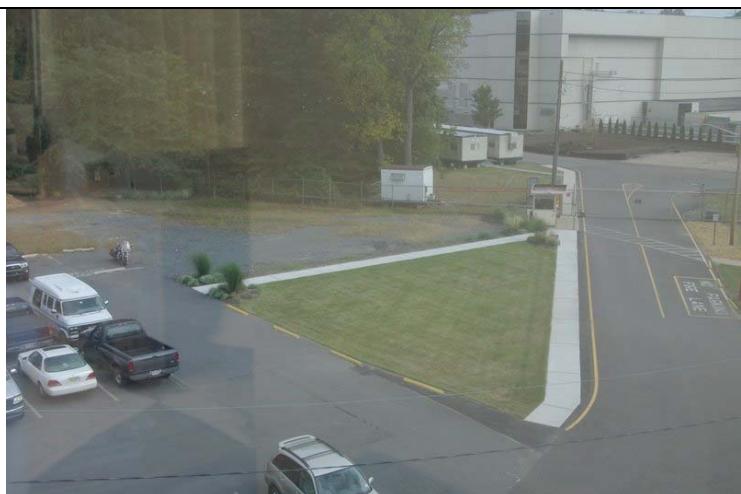
**Library courtyard 2006**



**Mulch beds around trees, more plantings**



**Gravel area at entrance to D-site**



**New sidewalks, grass, and gardens**



**55 Colorado Blue Spruce Trees were planted at PPPL in 2007**

The following is a list of sustainable landscaping practices supplied by Morrison Landscape & Design at the NJ Waste Wise meeting of 5/22/05:

1. To reduce the amount of lawn area, plant a field type of grasses, which can withstand a major cutting once or twice a year. After the grass is established, mow turf 10 feet from the roadway edge and 5 feet from the walkway edge. [Normal turf grasses should only be cut 1/3 of the height; cutting more than 1/3 will stress the turf grass and lead to failure of the lawn.]
2. **Before** planting or adding any fertilizer, test the soil pH.
3. Plant the right plant in the right place! Dogwoods & rhododendron like shade; they are “under story” plants. Planting them in the sun will destroy them.
4. Consider the mature height of the plants when the planting location is near a building.
5. Plants native to the area will grow the best at your location; do NOT import plants from other parts of the country or state.
6. If the soil has a great deal of clay, do NOT use dolomite lime. It will make the ground very hard. Use calcium-based lime in clay type of soil.
7. The best place for putting down mulch is under the drip lines of trees. Grass has a difficult time growing there, and shade plants will NOT get the proper amount of rain water. Also, any plant or grasses will compete with the tree roots.
8. Plants in this area of central NJ should be deer **resistant**; no plant is deer **proof**! The best website for this is the Rutgers University; Rutgers Cooperative Research & Extension websites (see IV. References and V. Attachment).

### III. References

<http://www.rcrc.rutgers.edu/deerresistance/>

the main webpage for gardens is:

<http://www.rcrc.rutgers.edu/garden/>

and the home page for the Rutgers Cooperative Research & Extension is:

<http://www.rcrc.rutgers.edu>

### IV. Environmental Review Committee (ERC) – Landscaping Subcommittee

Virginia Finley

Margaret King

Tom McGeachen

Rob Sheneman

Tim Stevenson

Keith Rule

Bill Gervasi

John Bennevich – Photographer of photos seen in Sections II-III of this Plan