Permaculture Design Evaluation for the Office of Environmental Sustainability Property

By Jess Sullivan

Climate:

The OES building's surrounding macroclimate poses a number of significant design challenges, primarily stemming from the volatile weather (Donegan 2016) expected in New Hampshire's mountainous north country. The USDA zones this locale at around 5a hardiness (U.S. Department of Agriculture, 2012), as outlined in their Plant Hardiness Zone Map, or PHZM (U.S. Department of Agriculture, 2017). Frequent precipitation events- more than a third of the year can expect some form of precipitation- with around 6 feet of snow annually- and intense seasonality (e.g. sun angle, temperature extremes, wind and frost events, etc) define clear, restrictive constraints around botanical construction (bestplaces.net 2020). The growing season without frost may be estimated at a maximum of 120 days (May 23 - Sep 20) (plantmaps.com 2020). The significance of this approximation may be completely diminished when coupled with the spontaneity of local weather events along with additional microclimatic attributes of the OES site.

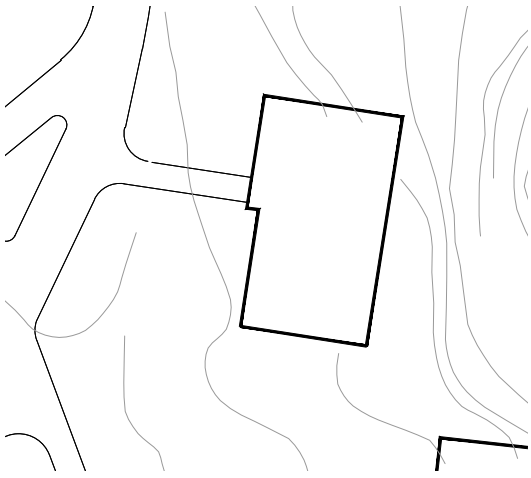
These features include the institutionalized nature of campus maintenance, with a long history of municipal activity and anthropogenic change. Additionally, the site is subject to truncated sun hours, due to a thick, wooded grove over the eastern face and the shade cast by Hyde Hall on the west.

Soils:

The soils of the OES site have long been and will continue to be subject to harsh, abrading material from the adjacent roads, walkways, and additional high-impact activities consequential to a busy campus (Gould 2013). The western face may be exposed to additional grounds keeping materials such as nitrogen and fixatives (Landschoot 2016). While this plot objectively offers very little soil value, the cause of these suboptimal conditions- a busy, outdoor-focused community of students and faculty- will undoubtedly play a similarly pivotal role in increasing the future worth of this soil and plot.

Land forms:

While the building itself occupies a corner section of the flat campus green, the wooded area off on the eastern face is notable for a variety of reasons. In addition to peaking around ~40 feet above the west-facing campus walkway, the terrain is distinctly rocky, revealing a granite form unfavorable for architectural development. Effectively offering an island of maturing, secondary succession in an otherwise heavily modified suburban property, a distinct and long-term “edge effect” has developed, illustrated by the many edge-dwelling flora and bird species.



Vegetation and wildlife:

In addition to the existing segments of perennial horticulture surrounding the OES building, the primary focal point is the wooded area adjacent to the east. This small area exhibits common features of secondary succession in the northeast, including a variety of mature conifers (primarily Hemlock and White Pine) and large Oak trees (White and Red). While the space far too small to deviate from permeating edge effects, small mammals, migrant bird species, and the local gamut of woodpeckers clearly maximize the potential of this grove. Destructive species involved in accelerating succession and landscape adaptation (Walsh et al 2019) have been observed around the OES site in the last year, including Yellow-bellied Sapsucker and Downy, Hairy, Red-bellied, Pileated woodpeckers. Small mammals including Chipmunks, Grey and Red squirrels have frequently been observed exploiting the grove for shelter and acorn food supply.

Access and circulation:

The location of the OES building is both high traffic and high value; it is situated in the center of the University campus near parking, dorms, numerous services and the beautiful Langdon Woods trails. The building itself features a neat accessibility entrance, increasing the value further still. With these premium attributes in mind, one must wonder why so little has become of the former BFA Studio.

Jess Sullivan
OES Permaculture Design Evaluation

Buildings and Infrastructure:

As part of the Universities municipal infrastructure, the OES building has abundant access to consumables and resources such as electricity, potable water, plumbing, internet, etc. However, with this boon of civil assets comes the jurisdiction of the providers- the numerous branches of University governance. These separate, organized bodies working to maintain the resources they command are of course celebrated facets of a campus community. Conversely, the hidden cost of our excellent resource availability is the complexity and bureaucracy it has added to municipal projects.

Water:

Due to the flat, compressed nature of the OES plot, drainage is poor. The building itself has been subject to water damage, and the green on which it stands regularly becomes oversaturated during precipitation events. The eastern face is directly in the lee of runoff from the adjacent, elevated wooded area. These drainage characteristics not only pose an ongoing logistical threat to OES plot design but the municipal resources of the University.

Aesthetics and sense of place:

Perhaps stifled in part with historical changes in ownership and the numerous bureaucratic hurdles required to initiate major change, the OES building and plot is under-used and poorly developed.

A&A Summary, Goals Articulation:

The OES plot offers numerous opportunities to increase its valuation. Strong foundational aspects include:

- Central campus location: Proximal not only to essentially all campus resources (such as dormitories, classrooms, dining services and the HUB), the OES plot is subject to a high volume of foot traffic.
- Convenient layout: In addition to the existing handicap accessibility features, the road, parking, and highly walkable location offer tremendous value; many of these features are inherent to the OES plot's locale and cannot easily be replicated elsewhere.

Nearly all current OES plot detractors may be remedied with the very actions advocated by the Office of Environmental Sustainability itself. The most immediate of these ailments include:

- Volatile soil and water layout: The large, flat campus green has poor drainage characteristics and is devoid of major root systems or variegated flora. This largely homogenous environment- coupled with the high traffic road and walkway forming the plot's boundaries- makes this area highly susceptible to climactic events.
- Uninspiring aesthetics and usage: As stated previously, the OES building and plot is under-used and poorly developed.

Discussion:

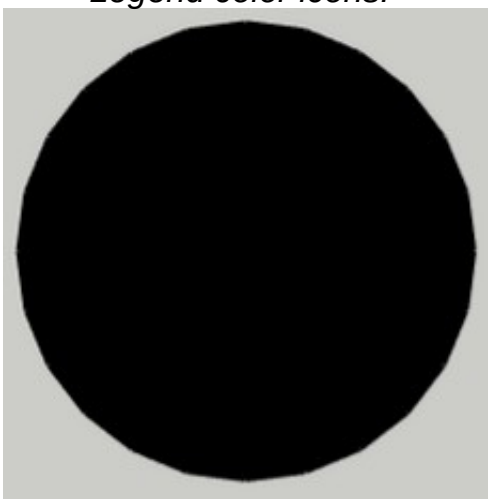
From my perspective, the OES plot is poised to become a multidisciplinary lab environment to develop and execute sustainability research and educational programming. While many Plymouth State students and professors are actively involved in this and similar fields, there is limited on-campus access to experimental land.

To maximize usage of the soil and land surrounding the current building, spatial resources will be divided into the following three categories:

- **Allotable space for research & education**
- **Functional & rehabilitation measures**
- **Long-term aesthetics & multifunctional use**

Functional & rehabilitation measures:

Legend color icons:

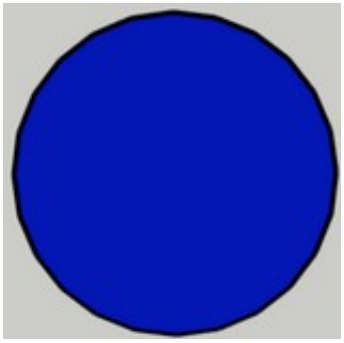


Fraxinus nigra (Black Ash):

- To increase soil resilience against seasonal weather events; root systems do well in bog-like / damp environments
- redistribute moisture to both canopy and deep soil levels
- Provide high canopy gleaners foraging opportunities (such as Blackburnian, Cape May warblers)
    - Increases potential for greater biocomplexity
    - Expands opportunities for trophic delineation

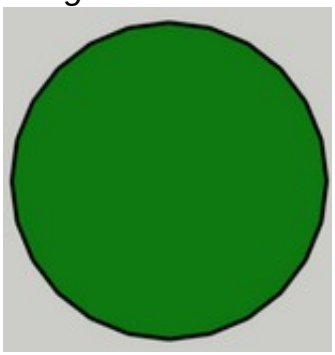
Ilex verticillata (Winterberry) & Blueberry shrubs:

- To provide a robust barrier from road and foot traffic
- Winterberry is a common northeast Holly species- the red berries are prized cold weather forage for wintering birds
    - Both male and female feature very strong stems and an upper soil root system



Long-term aesthetics & multifunctional use:

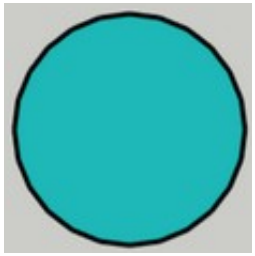
Legend color icons:



Viburnum species (such as Viburnum dentatum & Viburnum trilobum):

- To provide a dense, insect friendly barrier for the surface of the soil
- Attractive to many pollinators!

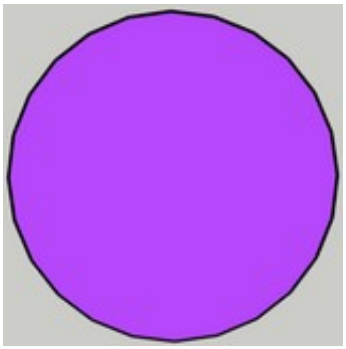
Buddleja sensu lato / Butterfly bush:



- To attract pollinators, insects, etc
- Very attractive perennial shrub in all sorts of colors
- Low maintenance, resilient to harsh winters (most variants regrow from root system)

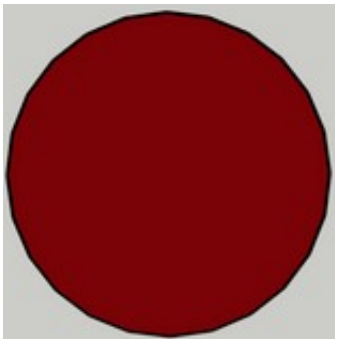
Rubus & Ribes & Fragaria & Vaccinium:

- Rubus- raspberries / Blackberries / etc
- Ribes- currants / Gooseberries / etc
- Fragaria × ananassa- Strawberries
- Vaccinium- Blueberries



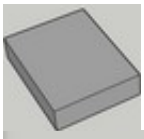
  - To line foot traffic routes with nostalgically New England snacks
  - Spiky shrubs with tasty fruits

Apple trees:

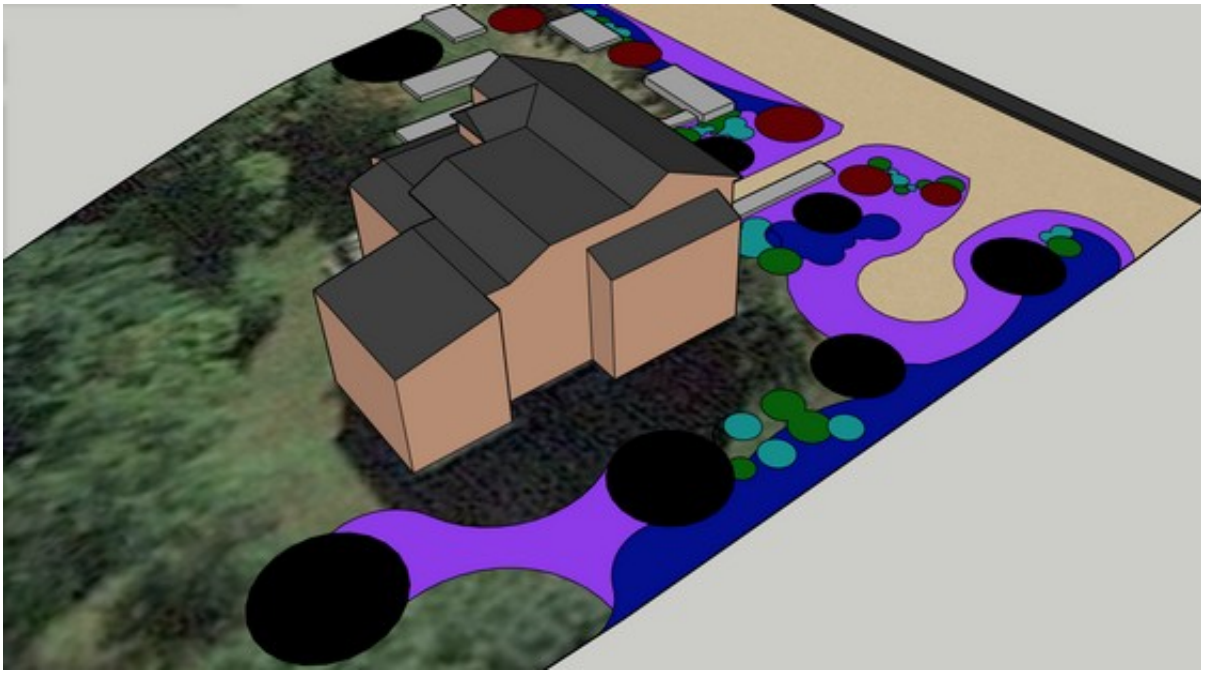


- To provide additional nostalgically New England snacks for pedestrians
- Both frugivorous and insectivorous bird species respond well to apples
- Fallen fruits of great value for insects, and subsequently those who eat insects

Layout Examples:



- *Research / educational allotments are denoted with raised grey beds*
- *Raised beds are aligned with East – West sun travel to maximize sun hours*



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