

Buildings and Grounds Committee

ECO-VILLAGE FEASIBILITY STUDY



Gooch Drive

Sadler Center

Student Health Center

14 16

12 10 8 6 4 2

N



Gooch Drive

Student Health Center

Sadler Center

Solar Plaza
Rain Garden

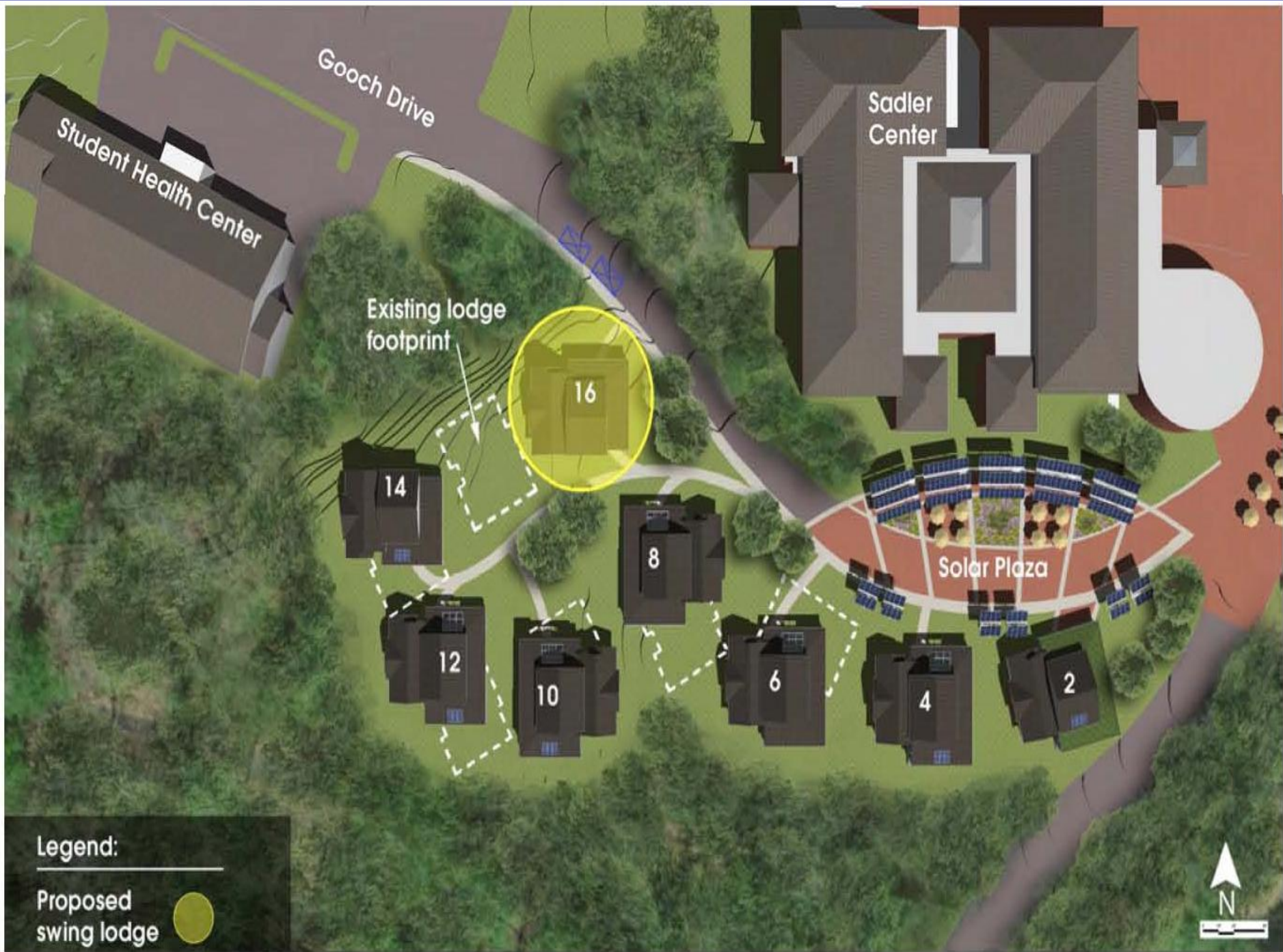
Legend:

Rain Garden

Flowering Trees

Canopy Trees









College of William & Mary Eco-Village Feasibility Study & Site Plan Design Matrix

(Final Revisions made 08.18.11)

	All (Lodge 4 -baseline)	Lodge Option 1 (Lodges 10,12,14)	Lodge Option 2 (Lodges 6,8,16)	Specialty Features
Site/Landscaping	<ul style="list-style-type: none"> · Permeable pavement as part of total site stormwater strategy · Native and drought-tolerant landscaping · Simple herb garden · Pollinator garden (native species only) · Fruiting shrubs (possibly also persimmons and pawpaws) · Bird attracting features (feeders/baths/houses) owner furnished · Bat boxes (high in trees) owner furnished · Outdoor patio · Lockups for bikes 			<ul style="list-style-type: none"> · Daily Grind – green roof with irrigation (soaker hoses and moisture sensors) on lower slopes of roof · Daily Grind-solar hot water on portions of the roof that are not green roof
Water Use and Conservation	<ul style="list-style-type: none"> · Low-flow showerheads (1.5 gpm) · Low-flow bathroom faucets (0.5 gpm) · Traditional kitchen faucets (2-2.5 gpm) · Lodge 4 only to have both rain barrel and root zone irrigation w/ moisture sensor and submetered irrigation water · Whole house water meter reports to dashboard 	<ul style="list-style-type: none"> · Dual-flush toilets (1.1/1.6 gpf) <i>(note, include dual flush in lodge 4, too)</i> · Rain barrel—include gutters. 	<ul style="list-style-type: none"> · Low-flush (1.28gpf) toilets · Root zone irrigation with moisture sensor (note: submeter irrigation water) 	<ul style="list-style-type: none"> · Pick one lodge to include graywater system (flush with handwash water) · Research “Living Machine” to determine if it makes sense to include in one lodge

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Energy Efficiency	<ul style="list-style-type: none"> · PassivHaus design · Super-insulated envelope · Open up southern exposures · Highly efficient two-stage ground source heat pump · Energy efficient windows & doors · Energy recovery ventilators (ERVs) · Energy Star appliances · Ceiling fans · Programmable thermostats · Extensive daylighting · Innovative lighting (skylights, SolaTubes, fiber optic) · Daylighting controls (to darken skylights) · CFL for lodge lighting · Heavy window shades for daylight control · Smart meters; compatible with smart grid technology · Submeter HVAC, site lighting, interior lighting, plug loads; provide portable meters for students to study outlet-by-outlet consumption · Recycled content insulation, to the extent applicable 	<ul style="list-style-type: none"> · DHW: Solar hot water with de-super heater and electric resistance auxiliary heat · No window indicator · Daylight sensors/dimming 	<ul style="list-style-type: none"> · DHW: Water to water heat pump (no solar hot water) · Window indicator tied to HVAC · Occupancy sensors 	

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	All (Lodge 4 -baseline)	Lodge Option 1 (Lodges 10,12,14)	Lodge Option 2 (Lodges 6,8,16)	Specialty Features
Material Usage/Recycling	<ul style="list-style-type: none"> · Bamboo floors/reclaimed wood floors (note: hard floors preferable to carpet) · Recycled/reused furniture—owner furnished · Recycle construction waste · Composting barrels · Recycled content drywall · EnergyStar appliances · Reused/salvaged building materials · Bird-friendly glass 			
Indoor Air Quality	<ul style="list-style-type: none"> · Zero VOC paint · No carpet · Walk-off mats at entrances 			
Education	<ul style="list-style-type: none"> · Educational signage · House-wide dashboard · Energy end-use monitoring (see submetering above) 			



LEED 2009 for New Construction and Major Renovations

Project Checklist

2011.11.11

18	7	1	Sustainable Sites	Possible Points: 26
Y	?	N		
Y			Prereq 1 Construction Activity Pollution Prevention	
	1		Credit 1 Site Selection	1
5			Credit 2 Development Density and Community Connectivity	5
	1		Credit 3 Brownfield Redevelopment	1
6			Credit 4.1 Alternative Transportation—Public Transportation Access	6
1			Credit 4.2 Alternative Transportation—Bicycle Storage and Changing Rooms	1
3			Credit 4.3 Alternative Transportation—Low-Emitting and Fuel-Efficient Vehicles	3
2			Credit 4.4 Alternative Transportation—Parking Capacity	2
	1		Credit 5.1 Site Development—Protect or Restore Habitat	1
	1		Credit 5.2 Site Development—Maximize Open Space	1
	1		Credit 6.1 Stormwater Design—Quantity Control	1
	1		Credit 6.2 Stormwater Design—Quality Control	1
	1		Credit 7.1 Heat Island Effect—Non-roof	1
		1	Credit 7.2 Heat Island Effect—Roof	1
1			Credit 8 Light Pollution Reduction	1

64			Water Efficiency		Possible Points: 10	
Y			Prereq 1	Water Use Reduction—20% Reduction		
4			Credit 1	Water Efficient Landscaping		2 to 4
	2		Credit 2	Innovative Wastewater Technologies		2
2	2		Credit 3	Water Use Reduction		2 to 4

22	4	9	Energy and Atmosphere	Possible Points: 35
Y				
Y			Prereq 1 Fundamental Commissioning of Building Energy Systems	
Y			Prereq 2 Minimum Energy Performance	
Y			Prereq 3 Fundamental Refrigerant Management	
12	2	5	Credit 1 Optimize Energy Performance	1 to 19
3	2	2	Credit 2 On-Site Renewable Energy	1 to 7
2			Credit 3 Enhanced Commissioning	2
2			Credit 4 Enhanced Refrigerant Management	2
3			Credit 5 Measurement and Verification	3
		2	Credit 6 Green Power	2

5	3	6	Materials and Resources	Possible Points: 14
Y				
			Prereq 1 Storage and Collection of Recyclables	
		3	Credit 1.1 Building Reuse—Maintain Existing Walls, Floors, and Roof	1 to 3
		1	Credit 1.2 Building Reuse—Maintain 50% of Interior Non-Structural Elements	1
2			Credit 2 Construction Waste Management	1 to 2
		2	Credit 3 Materials Reuse	1 to 2

Materials and Resources, Continued				
Y	?	N		
1	1		Credit 4	Recycled Content
1	1		Credit 5	Regional Materials
	1		Credit 6	Rapidly Renewable Materials
1			Credit 7	Certified Wood

15	Indoor Environmental Quality	Possible Points: 15	
Y	Prereq 1	Minimum Indoor Air Quality Performance	
Y	Prereq 2	Environmental Tobacco Smoke (ETS) Control	
1	Credit 1	Outdoor Air Delivery Monitoring	1
1	Credit 2	Increased Ventilation	1
1	Credit 3.1	Construction IAQ Management Plan—During Construction	1
1	Credit 3.2	Construction IAQ Management Plan—Before Occupancy	1
1	Credit 4.1	Low-Emitting Materials—Adhesives and Sealants	1
1	Credit 4.2	Low-Emitting Materials—Paints and Coatings	1
1	Credit 4.3	Low-Emitting Materials—Flooring Systems	1
1	Credit 4.4	Low-Emitting Materials—Composite Wood and Agrifiber Products	1
1	Credit 5	Indoor Chemical and Pollutant Source Control	1
1	Credit 6.1	Controllability of Systems—Lighting	1
1	Credit 6.2	Controllability of Systems—Thermal Comfort	1
1	Credit 7.1	Thermal Comfort—Design	1
1	Credit 7.2	Thermal Comfort—Verification	1
1	Credit 8.1	Daylight and Views—Daylight	1
1	Credit 8.2	Daylight and Views—Views	1

1		5		Innovation and Design Process		Possible Points: 6	
		1		Credit 1.1	Innovation in Design: Specific Title		1
		1		Credit 1.2	Innovation in Design: Specific Title		1
		1		Credit 1.3	Innovation in Design: Specific Title		1
		1		Credit 1.4	Innovation in Design: Specific Title		1
		1		Credit 1.5	Innovation in Design: Specific Title		1
1				Credit 2	LEED Accredited Professional		1

4		Regional Priority Credits		Possible Points: 4	
1		Credit 1.1	Regional Priority: Specific Credit		1
1		Credit 1.2	Regional Priority: Specific Credit		1
1		Credit 1.3	Regional Priority: Specific Credit		1
1		Credit 1.4	Regional Priority: Specific Credit		1

71	23	16	Total	Possible Points: 110
				Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110



The College of William and Mary
Eco Village Concept Cost Study



New Construction of Lodge(s)
Construction Summary

10/5/2011

Donley LLC

1	Solar Park and Solar Panel array(s) (Based upon 183 panels)	\$	1,355,700
	<i>Lodges w/o site work (see below for overall site package)</i>		
2	Lodge #4 (Base Package)	\$	507,300
3	Lodges #10, 12 & 14 (Option #1 including hot water solar)	\$	1,374,700
4	Lodges # 6,8 & 16 (Option # 2 w/o hot water solar)	\$	1,352,600
5	Daily Grind (Shell only w/ green roof , geothermal & solar hot water)	\$	473,100
6	Overall Project Site Work (incl walks and landscaping)	\$	598,600
7	CONCEPT TOTAL COSTS	\$	5,662,000

EcoVillage Research & Teaching User Group

- Sarah Stafford; Economics & Public Policy
- Dennis Taylor; VIMS, ENSP, COS
- Lynda Butler; Law, COS
- Michael Luchs; Business
- Rex Holmlin; Business, Facilities Management
- Sharon Zuber; English
- Cheryl Dickter; Psychology
- Brent Kaup; Sociology
- Sarah Hanke; COS
- Kelly Joyce; Sociology, Arts & Sciences
- Scott Gibson; Business
- Randy Chambers; Biology, ENSP, COS
- Annie Davis; Development
- Dylan Reilly '12; Geology
- Corbett Drummey '12; Marketing
- Zander Pellegrino '15; Biology
- Gabbie Names '12; Biology & COS
- Will Douthitt '12; East Asian Studies & ENSP
- Katie Snyder '13; Business & ENSP

User Group Areas of Interest

- Resource Use/Ecosystem Impacts/Habitat Management/Overall Project Performance
- Human Use and Behavior
- Cost, Cost Sustainability, Feasibility and Policy Issues Related to Sustainable Living
- Documentation and Communication of the EcoVillage Project
- Community Outreach and Engagement

Sample Projects

- Demolition and construction analysis
 - Physical impacts on the site and cost analysis for recycling materials and habitat restoration.
 - Impacts/costs of renovation vs. new construction.
 - Comparison of sustainability gains in new vs. renovated construction.
- Analysis of resident behavior
 - Analysis of information and training on behavior.
 - Analysis of different feedback mechanisms on resource use and systems interaction.
- Documentation of “life in the lodges”
 - Oral histories from past residents of the Lodges.
 - Blogs and documentaries from students living in the EcoVillage.

Sample Projects (Continued)

- Projects with a resource use/ecosystem focus
 - Studies of solar panels and siting variables that impact cost effectiveness and performance.
 - Analysis of green roof performance and long-term viability.
 - Studies of landscape management, restoration and native plant re-vegetation, habitat integrity.
 - Stormwater analysis of the site before, during and after construction.
- Engaging the community
 - Sustainable building exposition for local residents.
 - Provision of green building and sustainable living information via videos and other materials on our website and through the EcoVillage Kiosks.
 - Field trips and project engagement at the EcoVillage that tie in with K-12 science SOLs.

Important EcoVillage Features

- Renovated lodge to compare to new construction
- Carbon dioxide monitor and weather station
- Individual water and electricity meters for key spaces (bedrooms, common rooms, bathrooms, kitchens)
- Water collection and reuse systems (rain barrels, cistern, gray-water use in toilets)
- Multiple green roofs
- Wiring to support cameras in common areas