HOBART AND WILLIAM SMITH

Creating a Sustainable, Walkable Community for Odell's Village and the HWS Campus

TEAM #019

Student Members

Madeleine Buck – Environmental Studies
Owen Hotaling – Environmental Studies & Physics
Erin Howe – Environmental Studies & Architectural Studies
Tarang Malhotra – Environmental Studies & Economics
Jackson Mischler – Environmental Studies & Philosophy

Faculty Supervisors

Beth Kinne - Associate Professor of Environmental Studies
Max Piersol - Assistant Professor of Architectural Studies

COLLABORATORS

Chris Button, LEED AP, HWS
Mark Costich, P.E.
Dr. Tom Drennen, HWS Economics
Jim Engle, White Oak Nursery
Adam Fahrid, Videographer, HWS
Kristy Garretson and Preston Garretson, Anchor Welding, Inc.
Mike Montalto, Costich Engineering
Jim Norwalk, Butterfly Effect Nursery
Chad Petersen, HWS Buildings and Grounds
Sophie Redmond
Dr. Shannon Straub, HWS Biology
Ian Smith, Seneca Watershed Steward

ABSTRACT

Hobart and William Smith (HWS) is a small undergraduate liberal arts institution on the shores of scenic Seneca Lake, in the Finger Lakes region of upstate New York. Project Pond Walk is a proposed system of permeable pedestrian and bike paths that follows a central drainage route on the HWS campus, linking 4 existing retention ponds and connecting the Main and Arts campuses through a recently acquired woodland, Cooper's Woods. Project Pond Walk deploys green infrastructure elements such as permeable paving solutions, bioswales, rain gardens and native plants to increase stormwater infiltration and reduce flooding. The Pond Walk also reimagines underutilized spaces along the path to add educational, social, and recreational attractions such as an expanded community garden, tree nursery and outdoor classroom. Finally, Project Pond Walk serves as a historical and cultural bridge, educating path users on the history of the land beginning with the early Native American tribes of the Seneca Nation to the current town of Geneva, and the ecological and cultural significant native plantings. Overall, Project Pond Walk significantly reduces surface runoff by increasing stormwater infiltration and retention while meeting strategic planning goals of increasing accessibility, walkability and bikeability, and improving student experience by creating a living and learning campus.

Site Selection

Seneca Lake is a Class AA water source and the destination for Hobart and William Smith's stormwater (NY DEC, 2017). The terrain on the western side of campus directs stormwater away from Seneca Lake and into the Cemetary Creek drainage route. Odells Pond, a man-made reservoir, is designed to receive and detain surface runoff and piped drainage. It is equipped with a regulated dam control release of stormwater downstream. The pond is designed to retain a base level of water, which beautifies campus and creates wildlife habitat for fish, turtles, herons, and redwing blackbirds (Hobart and William Smith, 2024). The Pond has an area of about 3.2 acres with an average depth of 2.29 feet and a total capacity of 319,207 cubic feet (Costich Engineering, 2022). The Odells Pond drainage route was initially selected because heavy rainfall events were noticeably straining the pond's current capacity, causing flooding along the sections of the drainage route (See Figure 1)

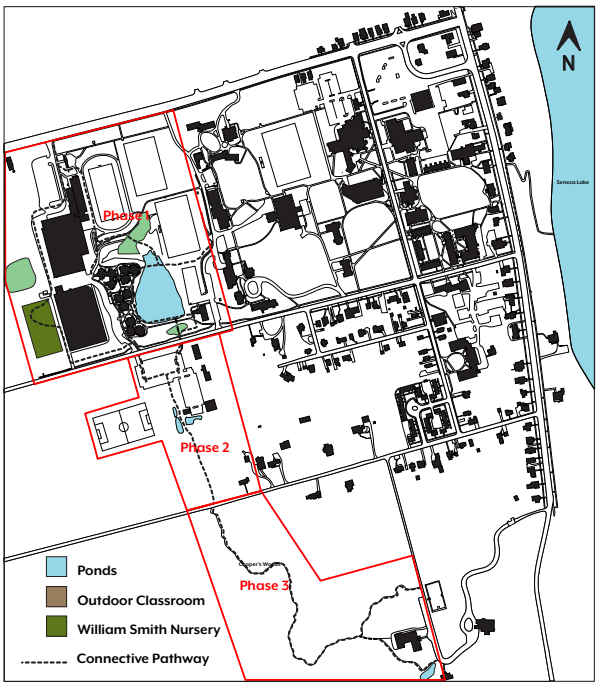

Figure 1: Project Area & Site Phasing

Project Pond Walk is divided into three phases targeting different sections of the Odell's Pond/Cemetery Creek drainage route (see figure 1). Phase 1 prioritizes immediate intervention in the campus core by revitalizing existing paths, introducing a new connective pathway, and deploying green infrastructure immediately around Odell's Pond to facilitate infiltration and retention of inflowing runoff, thereby reducing stress on the pond's capacity and minimizing localized flooding. The phase 1 site includes the residential community of Odell's Village to the pond's west, athletic facilities to the pond's north, and the historic barn to pond's east.

Phase 2 expands the connective pathway south by creating a new path along the outflow route from the Odell's Pond dam, while continuing to deploy stormwater infrastructure and creating new social and educational features. The Phase two site includes the Odell's overflow lot, the community garden, a soccer practice field, and two other stormwater retention reservoirs.

Phase 3 further extends the Pond Walk along the drainage route through Cooper's Woods, directly connecting the HWS Main Campus to the previously isolated Art's Campus and ending at a final stormwater retention reservoir called the Carriage House Pond.

Existing Conditions

Traffic Circulation: Odell's Village houses approximately 12% of the total undergraduate population, who park vehicles in both Odell's North Lot (53 spaces) and Odell's South Lot (170 spaces). The "William Smith Hill" residences to the pond's east house another XX students, who park in the Barn Lot (72 spaces). The Athletic facilities also draw significant traffic to the area. Bristol Fieldhouse houses the campus's primary gym, and teams practice and play on neighboring turf fields. There is heavy traffic during practice times, peak gym hours, and games. Many students use the pedestrian paths north of Odell's Pond or park in the Fieldhouse Parking lot (110 spaces).

Athletic team buses park in the Fieldhouse lot, Barn lot, and the Odell's South Lot.

Soil: The soil structure around Odell's Pond is characterized by approximately five to 10 inches of topsoil, one foot of silt, and 16 feet of clay (Geotechnical Consultation, Foundation Design, PC. 2022). The ground water is confined below the clay layers, about 20 feet below the surface, and disconnected from the Odells Pond. The embankments of Odells Pond are characterized by sharp unvegetated slopes, particularly notable along the dam on the south side, contributing to erosion. The USDA Web Soil Survey indicates the presence of Lyons and Cayuga Silt Loam soils bordering Odells and Fluquavents - Udifluvents complex along the Cemetery Creek Drainage in phase 2 of the Project Site (United States Department of Agriculture, 2024).

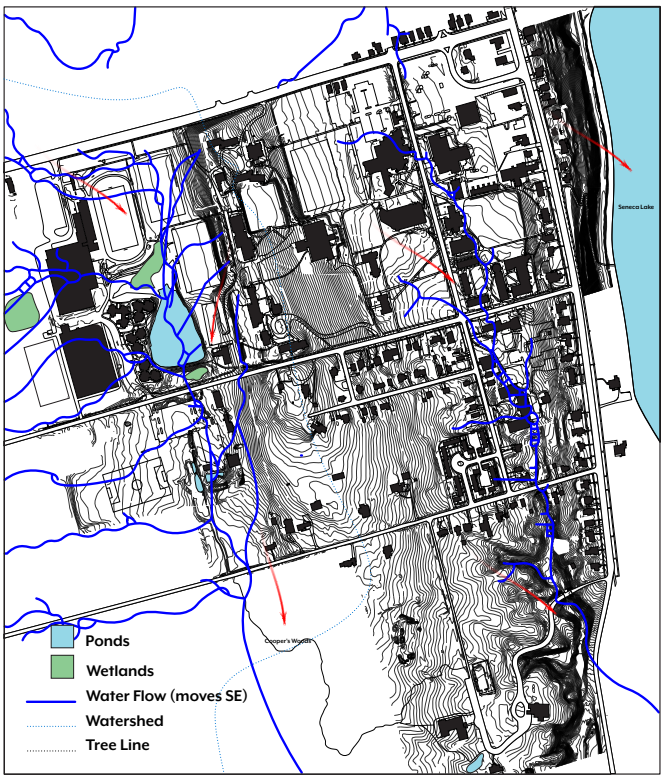

Figure 2: Hydrology, Topography & Wetlands

Hydrology: Local topography causes Odell's pond to receive significant amounts of surface runoff from the western half of the college campus as well as piped runoff from commercial areas beyond the boundaries of HWS campus. Storm grates on campus parking lots and roads pipe stormwater directly into Odell's Pond or the drainage route downstream. Private property ownership and the subterranean location of pipes complicates reworking of existing gray infrastructure. Green upstream intervention targeting runoff into campus storm grates and directly into the Pond is plausible. Parts of the project area are designated Federal wetlands (U.S. Fish and Wildlife Service, 2024).


Figure 3: Strain on Odell's Pond Capacity


Figure 4: Flooding on Odell's Village Paths


Figure 5: Flooding in Odell's North Lot

Impervious Surfaces: The project area contains approximately 637,232 sqft of impervious surfaces including 278,988 sqft of buildings, 262,221 sqft of parking space, and 96,022 sqft roads and pathways. While outside the project area, impervious surfaces from the surrounding community contribute to stormwater runoff collected by Odell's Pond. These prominently include 1,114,069 sqft of impervious surfaces from an abutting apartment complex and shopping plaza which drain via a 36" reinforced concrete pipe into the north end of Odell's Pond.

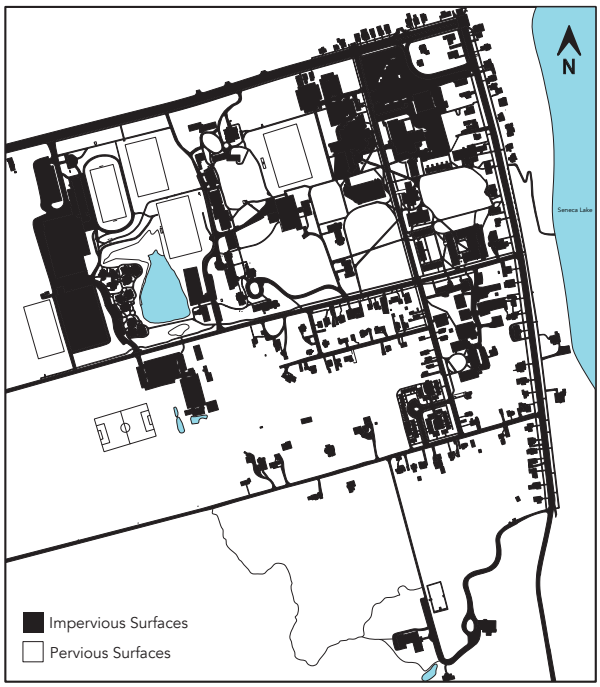

Figure 6: Impervious Surfaces

Site Challenges & Intervention Approaches

Challenge #1 Lack of Connectivity: Odell's Village is only accessible through the athletic complex to the north and the paths along Saint Clair Street to the south. McCooey field interrupts paths along the perimeter of Odell's pond and prevents complete circumnavigation, forcing students to walk nearly the entire perimeter of the pond to access Odell's Village or the other Athletic Facilities. St Clair Street also lacks crosswalks, creating dangerous situations for students and hindering pedestrian access to Odell's South Lot and the neighboring community garden. While the Arts Campus is only a short distance away from the main campus, students currently must access it via a lengthy circuitous route along several streets, most of which do not have sidewalks. This commute encourages the use of automobiles. Finally, student use of existing infrastructure is limited by the narrow width (3' wide) and frequent flooding of the paths in and around Odell's village, and lack of designated space for cyclists (See Figure 5).

Intervention #1 Increase Campus Connectivity and Promote and Green Transportation Alternatives: Project Pond Walk aims to revitalize and expand the existing network of paths in the project area to increase campus connectivity. The updated path system will improve transportation infrastructure within Odell's Village, and between Odell's Village and the Arts Campus. Bike-sharing stations will be set up at different points along the Pond Walk, providing students with access to free green transportation. The Pond Walk will follow the existing drainage route beginning at the north end of the project area in the Bristol Fieldhouse Parking Lot. It will run southward along the west side of Bristol Fieldhouse and then go east to connect to a new boardwalk over Odell's Pond. The composite wood boardwalk will reduce travel times and give people better access to the pond. Sidewalks and crosswalks added on St Clair Street will allow safer access to the community garden and the Odell's South Parking Lot. South of the community garden, Project Pond Walk will transition to an elevated path, which will run between two scenic stormwater retention ponds. The Pond Walk traversing Cooper's Woods and ending at the Art Campus Carriage House Pond will be a stone dust path. Overall, the Pond Walk will reduce travel time between Odell's Village and the Arts Campus by 50%, create a safer pedestrian-friendly route, and reduce student reliance on automobiles (See Design Board #2, Drawing xx for map of existing vs. new paths).

Challenge #2 Inadequate Storm Water Retention Capacity & Localized Flooding: Recent heavy weather events have strained the storage capacity of Odell's Pond. Figure #4 shows Odell's Pond overflowing, and Figure #5 shows water spilling onto the paths of Odell's village. When the pond's inflow pipes fall below the waterline,

water backs up through the nearby storm sewers, leading to significant flooding in Odell's North Lot, as shown in Figure #6. High rates of outflow further erode the drainage route (Foundation Design, P.C., 2022).


Figure 7: Thruflow™ Decking

Intervention #2 Green Infrastructure to Reduce Stress on Odell's Pond and Minimize Localized Flooding: Bioswales and rain gardens deployed around Odell's Pond during Phase 1 will reduce runoff to alleviate stress on the Pond's capacity and mitigate localized flooding. More bioswales will be added in Phase 2 and 3 to continue facilitating infiltration and retention while alleviating flooding along the Odell's/Cemetery Creek drainage route (see Figure 1). The field to the south of the Athletic Bubble will become a designated grow zone where native plantings will facilitate stormwater infiltration. The proposed path system will aid stormwater infiltration by utilizing porous paving materials. The path system south of the community garden in Phase 2 will use elevated ThruFlow™ decking, allowing rainwater and light to flow through the path, and minimizing any disturbance to the wetlands below (ThruFlow™, 2024).

The third phase extension through Cooper's Woods to the Arts Campus will be made with crushed stone dust to replace frequently waterlogged dirt paths, while still allowing for effective stormwater infiltration. Existing asphalt paths within Odell's Village, which are highly prone to flooding, will be resurfaced FilterPave, a recycled glass material. twice as porous as regular pervious paving solutions, thereby increasing percolation (FilterPave™, 2024). Resurfacing Odell's South, Odell's North and the Barn Parking Lots with porous asphalt will further reduce overland flows. Solar carports in Odell's South Lot and the Barn Lot will generate clean energy, support EV charging, and further manage runoff by capturing stormwater via a gutter system directed to bioswales on the perimeters of the parking lots. Overall, existing impervious surfaces will be reduced by 25.82% and stormwater runoff will be reduced by 16.39%.

Challenge #3 Underutilized Spaces and Lost Opportunities for Education, Recreation, Community-building: The proposed project area contains several large and unutilized spaces. Around the Athletic Bubble are two vacant, unused fields measuring 96,416 sqft and 35,794 sqft respectively. Another 200,769 sqft field is located behind Odell's South Lot. While this field is used by the Hobart Soccer team for practices, it is nearly three times as large as a typical soccer field, and parts of the field are soggy. The existing 1900 sqft community garden occupies only a small portion of an otherwise vacant 12,500 sqft. Finally, further downstream along cemetery creek is a 61,000 sqft field abutting Jay Street.

Intervention #3 Educational and Recreational Use of Underutilized Spaces: Careful development of spaces along the Pond Walk will provide educational, social, and recreational features. The field to the west of the Athletic Bubble will become a tree nursery to honor the legacy of William Smith's founder, and a parking lot comprised of porous pavers to offset the space dedicated to bioswales in Odell's South Lot. In Phase 2, the soccer practice

field will be sized to standard dimensions, with the surplus area designated for an orchard, expanded community garden, and outdoor classroom space — all conveniently accessible from the Pond Walk.

Educational displays along the route will educate users about the vast history of the region and the Colleges going back over 200 years. Travelers will also learn about the sustainable materials used for the path and the green infrastructure implemented.

Each pond along the path highlights aspects of the community's natural and cultural heritage. Odell's Pond showcases habitat for great blue heron, redwing blackbird, and snapping turtles, among others; The Orchard Pond, surrounded by apple and pear trees, recognizes past and current regional economies, from the sophisticated orchards of the Haudenosaunee to William Smith's nurseries to the USDA malus (apple family) collection hosted by Geneva today. Falls Pond features species of importance to the Haudenosaunee and shade-tolerant native perennials such as to Lizard's Tail (Saururus cernuus L.) and Mapleleaf Viburnum (Viburnum acerfolium). Native wetland species like Broad Leaf Cattail (Typha angustifolia) support amphibian species in the Carriage House Pond. Along parts of the Path, invasive species like Honeysuckle (Lonicera periclymenum), Buckthorn (Rhamnus cathartica L.), Multiflora Rose (Rosa multiflora), and Bradford Pear (Pyrus calleryana), and yellow flag iris (Iris pseudocorus) will be eradicated, offering opportunities to educate users on common invasive species. Carbon sequestration is increased by additional trees over the project's lifetime (See Figure 8).

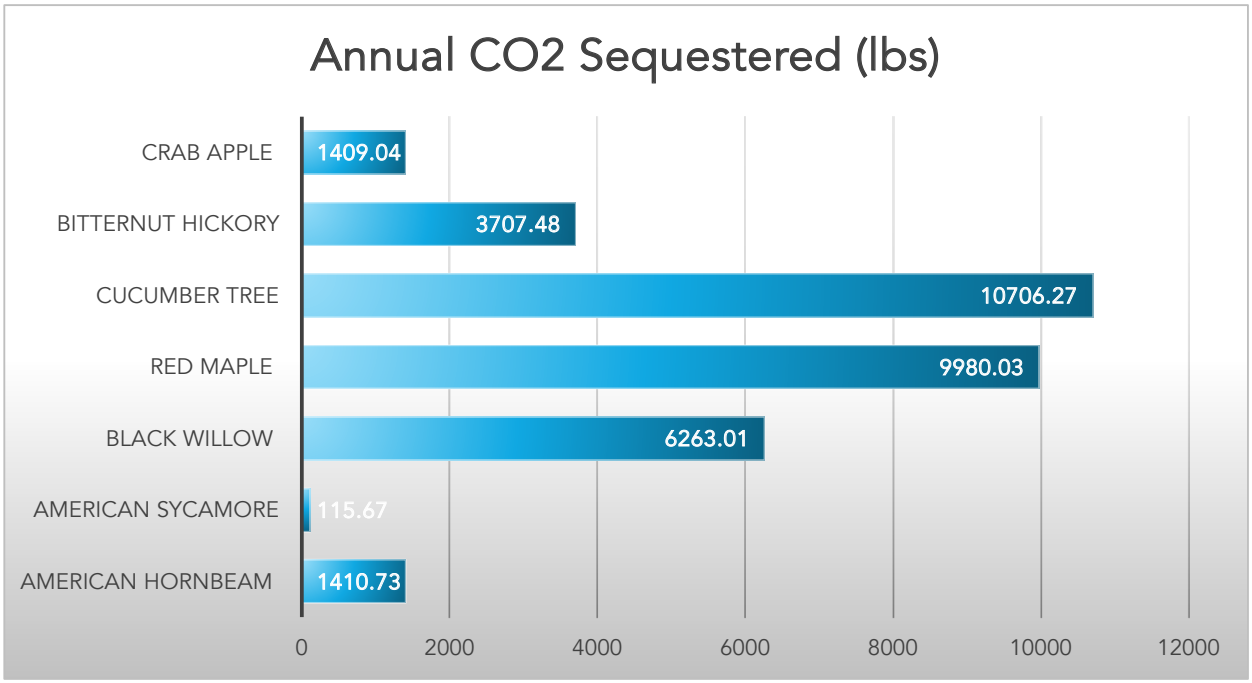

Figure 8: Estimated Carbon Sequestration From All Trees Planted (1 Year)

Continuous monitoring and assessment of the impact of green infrastructure on water levels, flooding, and changes in biodiversity will provide additional opportunities for education and fine-tuning of interventions.

Immediate 1-3 Years	• **Revitalization of existing path networks between Hamilton & St. Clair Street** • **Stabilization of Odell's Pond banks.** • **Construction of extensive bioswales and rain gardens in the Odell's Village development and the barn** • **Roll out of educational placards along existing path system** • **Removal of invasive plants** • **Expansion of community garden** • **Monitoring of GI performance**
Near-Term 3-5 Years	• **Creation of Odell's Boardwalk; educational placards** • **Expansion of path system across St Clair Street to Jay Street and through Cooper's Woods to create connectivity to the Arts Campus** • **Creation of Tree Nursery** • **Monitoring of GI performance and invasive species** • **Barn Lot Solar Car Ports**
Long-Term 5-10 Years	• **Creation of outdoor classroom, orchard and tree nursery** • **Cooper's Woods Gravel Path** • **Monitoring of GI performance and invasive species.** • **St Clair Solar Car Ports**

Figure 9: Implementation Phasing

Feasibility & Compliance

Alignment with Institutional Planning: Project Pond walk is carefully designed to align with the long-term planning objectives of the Colleges. The following list shows planning objectives from the current HWS master plan and the features of Pond Walk that further each objective (Hobart and William Smith, 2016).

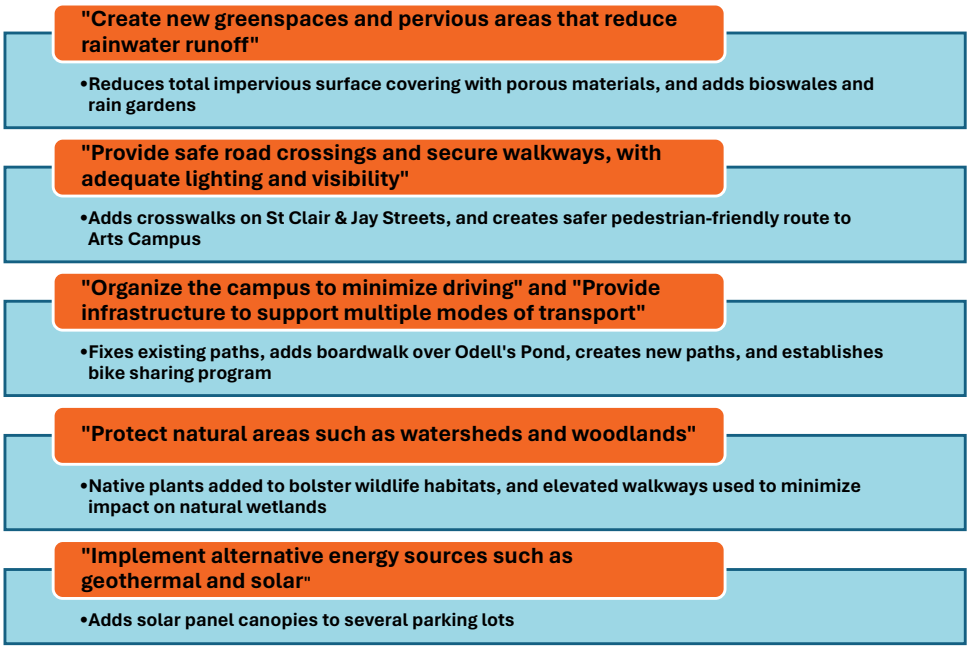

Figure 10: Allignment with HWS Master Plan

Wetland Permitting and ADA Compliance: Several portions of the project area, including the boardwalk over Odell's Pond and the Phase 2 path to Jay Street encroach on federally regulated wetlands. Development in these areas is limited to a total cumulative disturbance of less than 1/10 of an acre (4356 sqft) (U.S. Army Corp of Engineers, 2022) and will require state and federal permitting, subject to official wetland delineation. By using elevated walkways supported by 8in round pylons, the total wetland disturbance of the project can be limited to a mere 213.8 sqft. The proposed pond walk will be compliant with ADA requirements for railing height and maximum slope. Parking lots will maintain required 1 handicap parking space per 20 spaces (U.S. Department of Justice, 2024).

Continuing Maintenance

Green infrastructure requires different maintenance than grey infrastructure and lawns. Bioswales and rain gardens need to be weeded and managed, particularly in the first several years as they are getting established. Trash and other debris from runoff must be cleared annually to prevent build up from inhibiting effective infiltration and retention. Permeable pavers require vacuuming to prevent sediments from clogging the pores. The FilterPave path material used for resurfacing of existing Odell's pathways does not need to be vacuumed, but it does need to be re-coated periodically. Maintenance costs were calculated in collaboration with the facilities experts at the Colleges.

Estimated Costs

Project Pond Walk will cost an estimated $9,070,859 to install, with annual maintenance costs of about $224,143, leading to an estimated 20-year lifetime cost of $12,064,903.

Pondwalk Feature	Total Area (sq ft)	Total Capital Costs	Annual Maintenance Cost ($)	Life Cycle Cost ($)
Path Resurfacing	35772.15	$510,682.25	$25,534.11	$1,021,364.50
Parking Lot Resurfacing	164,475.12	$1,227,606.84	$61,380.34	$1,729,402.02
Bioswales	55,192.39	$993,463.02	$49,673.15	$1,986,926.04
Nursery	67,200	$16,800.00	$1,680.00	$50,400.00
Orchard	49,580	$9,916.04	$991.60	$29,748.11
Rain Gardens	1,066	$12,792.00	$799.50	$28,782.00
New Pond Walk Path	62,450.48	$952,008.75	$28,560.26	$1,523,214.00
Outdoor Classroom	1,463.00	$51,205.00	$2,560.25	$102,410.00
Solar Car Ports	36898.68	$5,296,385.00	$52,963.85	$5,592,656.20
Other	1,782.10	$13,347.50	$200.00	$68,552.50
Total	474098.006	$9,070,858.90	$224,143.07	$12,064,902.87

Figure 11: Cost Table

Potential Funding Sources

Capital Campaign: Hobart and William Smith Colleges recently launched a $400M capital campaign, $55M of which is earmarked for improvements to the student experience, namely updating spaces on campus to better fit student needs. (Hobart and William Smith Colleges, 2024). Pond Walk's improvement to campus connectivity and the creation of social, educational, and recreational spaces may make it eligible for funding from this campaign.

Individual Donors: Pond Walk may also receive partial funding from individual donors. Features like the outdoor classroom, nursery, bike-share program, and boardwalk may prove attractive to donors looking for impactful ways to improve the student expierence on campus and could bear the donor's name.

Federal & State Grants: Part of the project cost may also be offset by Federal and State grants, particularly for components that would allow us to recruit a municipal partner. For example, The New York Department of Environmental Conservation (DEC) has previously provided $350,000 to projects aimed at improving and protecting Finger Lakes watersheds (NY DEC, 2023). The New York State Environmental Facilites Corporation also has grant funding available for projects promoting green innovation and clean water (Environmental Facilities Corporation, 2024). There is precedent for state funding of green infrastructure projects; in 2016 HWS's host city of Geneva won a $10 million downtown revitalization grant, almost $3 million of which was allocated to the creation of green streets.

Student Volunteers and Service-Learning Experiences: Installation and continuing maintenance may also be offset by volunteers and opportunities for experiential education. Hobart and William Smith Colleges already host "Days of Service" twice annually where students participate in a wide variety of service activities, which could include weeding and removing debris. Instructors may also engage their classes in educational activities, such as the identification and removal of invasive species, or the planting and cultivation of certain crops in the community garden and tree nursery.

References

Ayers Saint Gross. (2016). Hobart and William Smith Colleges Campus Master Plan.

Costich Engineering. (2022). Hobart and William Smith Colleges Odell's Pond Soil Exploration Exhibit.

DeGaetano, A. (1994, January). Daily Evapotranspiration and Soil Moisture Estimates for the Northeastern United States. Retrieved from https://www.nrcc.cornell.edu/services/research/reports/RR_94-1.pdf

Earles, A., Wre, D., & Hennon, V. (2023). Xeriscape Runoff. Retrieved from https://mhfd.org/wp-content/uploads/2023/10/Memo-Xeriscape-Runoff_2023-10-19.pdf

Environmental Facilities Corporation. (2024). State Water Grants. Retrieved from: New York State Environmental Facilities Corporation: https://efc.ny.gov/wiia

FilterPave. (2024). Attractive Porous Paving for Stormwater Management. Retrieved from: https://filterpave.com/about

Foundation Design, P.C. (2022). Odell's Pond Geotechnical Consultation.

Geneva, NY Climate. (n.d.). BestPlaces. Retrieved May 25, 2024, from https://www.bestplaces.net/climate/city/ny.aspx_not_found/geneva

Lady Bird Johnson Wildflower Center - the University of Texas at Austin. Www.wildflower.org, www.wildflower.org/plants/result.php?id_plant=libe3. Accessed on

Hobart and William Smith. (2024). Sustainability Projects and Operations. Retrieved from: https://www.hws.edu/offices/sustainability/projects-operations.aspx#:~:text=Odell's%20Pond%20serves%20as%20a,multi%2Dstep%20stormwater%20management%20system.

Hobart and William Smith Colleges. (2024). Further Together the Campaign for Our Third Cen tury. Retrieved from Hobart and William Smith Colleges: https://www.hws.edu/together/default.aspx

Minnesota Pollutant Control Agency (April 2, 2024). Pollutant removal by BMPs, Retrieved from https://stormwater.pca.state.mn.us/index.php/Information_on_pollutant_removal_by_BMPs#References

MyTree. (n.d.). Mytree.itreetools.org. https://mytree.itreetools.org/#/

NY DEC. (2017). 2017 Finger Lakes Water Quality Report.

NY DEC. (2023, December 13). DEC announces $350,000 in Grants Awarded to Finger Lakes Watershed Projects. Retrieved from https://dec.ny.gov/news/press-releases/2023/12/dec-announces-350000-in-grants-awarded-to-finger-lakes-watershed-projects

North Carolina Department of Environmental Quality (2007). Stormwater BMP Manual. Retrieved from https://www.deq.nc.gov/water-quality/surface-water-protection/spu/spu-bmp-manual-documents/bmpman-ch03-swcalcs-20090616-dwq-spu/download

NOAA (n.d.). Atlas 14 Point Precipipation Frequency Estimates: NY, https://hdsc.nws.noaa.gov/pfds/pfds_map_cont.html?bkmrk=ny

Resources, U. of C., Division of Agriculture and Natural. (n.d.). Using ANSI/ASABE S623 & SLIDE to Estimate Landscape Water Requirements. Ucanr.edu. Retrieved May 25, 2024, from https://ucanr.edu/sites/UrbanHort/Water_Use_of_Turfgrass_and_Landscape_Plant_Materials/SLIDE__Simplified_Irrigation_Demand_Estimation/

ThruFlow. (2024). Our Products. Retrieved from ThruFlow: https://thruflow.com/products/

University of Kentucky Department of Horticulture. (2020). American Hornbeam. www.uky.edu/hort/American-Hornbeam.

U.S. Army Corp of Engineers. (2022, February 25). Nationwide Permit 1 - Aods to navigation. Re trieved from U.S. Army Corp of Engineers: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.swt.usace.army.mil/Portals/41/docs/missions/regulatory/2021%20NWP/NWP-01.pdf?ver=UTCndXwz620xWwvUITIz0A%3D%3D

USDA. (2024). Web Soil Survey. Retrieved from: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

USDA Natural Resource Conservation Service Plant Database, N.D. https://plants.usda.gov/home.

U.S. Department of Justice. (2024). Accessible Parking Spaces. Retrieved from: https:// www.ada.gov/topics/parking/

U.S. Fish and Wildlife Service. (2024). National Wetlands Inventory. Retrieved from: https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/

US EPA (2008). Handbook for Developing Watershed Plans Handbook for Developing Watershed Plans to Restore and Protect Our Waters. Retrieved from https://www.epa.gov/sites/default/files/2015-11/documents/2008_04_18_nps_watershed_handbook_ch08.pdf

Un, K. (2010, February 5). Fact Sheet: Permeable Paving. MAPC. https://www.mapc.org/resource-library/fact-sheet-permeable-paving/#:~:text=Runoff%20coefficients%20range%20from%200.1

Weather averages Geneva, New York. (n.d.). Retrieved May 25, 2024, from https://www.usclimatedata.com/climate/geneva/new-york/united-states/usny0548