GREEN FUND

Project Application

Green Fund Mission Statement: "The NAU Green Fund promotes student participation in and provides funding for projects that reduce NAU's negative impact on the environment and create a culture of sustainability on-campus."

REQUIREMENTS FOR FUNDING:

- The project must be implemented on the Flagstaff Mountain Campus.
- The person submitting the project must be a NAU student, faculty, or staff member.
- Projects must provide all necessary documents, letters of support, and authorizations prior to submission.
- The Green Fund distributes funding on a **reimbursement basis**. Project teams should partner with an administrative office to provide upfront funding for the project. Once the project has been successfully completed, the Green Fund will reimburse the administrative partner.
- All project applications should be submitted to greenfund@nau.edu for review.

DISCLAIMERS: All applications will go through a comprehensive vetting process, and you may be asked to provide more detailed information. **The Green Fund is not responsible for acquiring the necessary permits, permissions, or approvals for a project, although we are happy to assist with this process if needed.** Additionally, the Green Fund does not provide any ongoing maintenance costs unless otherwise specified by the committee. A sponsoring department must take responsibility for operations and management. The Green Fund Committee only meets during the academic year. All projects submitted outside of the regular academic year will be reviewed at the start of the next academic session.

REVIEW PROCESS: Upon project application submission, the Green Fund will begin to review your project within two-three weeks. At this time, the Green Fund will provide comments on the project. **This process can extend for long periods of time depending on the scope of the project**. Incomplete applications will not be reviewed until all components are submitted.

We highly recommend meeting with a Green Fund Committee member prior to submitting the application. The Green Fund Committee member will assist you with the proposal writing process, if needed.

CONTACT INFORMATION

Contact Information

Project Leader Name: Jeff Meilander

Phone: 928-202-0588

NAU Email: Jeffrey.Meilander@nau.edu

Expected Graduation Date (if applicable): N/A

Project Name:

Project Advisor Information

Project Advisor Name: Jeff Meilander

Phone: 928-202-0588

NAU Email:Jeffrey.Meilander@nau.edu

NAU Department/Unit for Funding Reimbursements: Pathogen and Microbiome Institute

PROJECT OVERVIEW

Please answer the following questions to the best of your ability, for questions that are not applicable, please list N/A.

Executive Summary

Please provide a brief overview of your proposal. Please address how this project will support the goals of the Green Fund (student involvement, creating a culture of sustainability, and lessening NAU's impact):

Summary

We propose developing an on-campus vermicomposting living lab at the Environmental Engineering Field Station on South Campus, located behind Howard's Mesa near the existing NAU food composting site. **This initiative directly supports NAU's Climate Action Plan (CAP) by advancing sustainable waste management practices that reduce campus waste and lower greenhouse gas emissions.** By incorporating worm-based composting, the system minimizes reliance on heavy equipment for turning compost, further decreasing emissions. The project also aligns with NAU's zero-waste goals and promotes closed-loop resource management.

An undergraduate compost manager (CM)—funded by the Green Fund and mentored by Dr. Jeff Meilander—will lead the development of the vermicomposting system. The CM will contribute to the system's design and operational planning, coordinate outreach and education efforts, guide future research directions, and help reduce labor and transportation costs for Campus Facilities.

The project aims to reduce campus food waste streams, increase the diversion of post-consumer food waste from dining halls, and raise awareness of sustainable waste management both on and off campus. The living lab will serve as a central outreach hub, offering hands-on workshops, educational signage, and opportunities for NAU students to create their own research projects and submit Green Fund proposals.

Beyond its role in waste reduction, the living lab will function as an interdisciplinary research and education platform, offering experiential learning opportunities to students across multiple disciplines. Potential student-led research projects include:

- Microbiology students using high-throughput sequencing to identify microbial taxa, genes, and enzymes that enhance composting efficiency
- Environmental science students assessing the environmental impacts of composting systems
- Business students developing market strategies and business models for compost-derived products
- Engineering students designing monitoring systems to automate and optimize composting operations
- Sociology students investigating public perceptions and barriers to household composting and sustainable practices

Additional students enrolled in BIO 497 and participating in the Interns 2 Scholars program—also under Dr. Meilander's mentorship—will collaborate with the CM to strengthen the program's foundation. Their work will support day-to-day operations, help expand research capacity, and lay the groundwork for future growth and funding opportunities beyond the Green Fund. The living lab will also serve as a launchpad for future student-led research initiatives.

Through these roles, students will be encouraged to pursue independent research projects via BIO 485, submit their own Green Fund proposals, and gain valuable experience in research design, project management, and grant writing—skills that prepare them for graduate education and sustainability-focused careers.

We also plan to develop community engagement opportunities, such as inviting Flagstaff-area students to participate in hands-on composting activities or hosting workshops where community members can learn about vermicomposting from NAU undergraduates. The lab will further integrate NAU's sustainability mission with Dr. Meilander's ongoing partnerships with local farms (Townsite Urban Farm, Flagstaff EcoRanch, Forestdale Farms), businesses (Restoration Soils), and government agencies (Wildcat Wastewater Treatment Facility, Grand Canyon National Park, the City of Flagstaff Sustainability Office, Coconino County Sustainable Building Program). These collaborations will provide NAU students with real-world, interdisciplinary experiences that contribute to building a circular economy through sustainable waste management.

Sustainability

This project directly supports NAU's Climate Action Plan by expanding composting efforts to include vermicomposting, thus advancing a closed-loop resource management approach to campus sustainability. Managing vermicompost requires less human intervention (saving time and money) and reliance on heavy equipment and fossil fuels.

Beyond emissions reduction, this initiative enhances soil health by producing nutrient-rich compost and worm castings that increase soil organic matter and promotes carbon sequestration when applied to NAU's landscapes. By producing high-quality compost and worm castings, we reduce reliance on energy-intensive synthetic fertilizers with high carbon footprints while also lowering NAU's landscaping costs. Additionally, the finished compost and worm castings, which generate higher revenue than traditional compost, can be sold to the community—creating sustainability benefits while generating income to support a circular economy.

Equally important, this project fosters long-term research and learning opportunities for NAU students, as outlined in the Climate Action Plan. The SNAIL and SSLUG Gardens as well as the current food composting program (initially Velo Composting), initiated by master's students in the Sustainable Communities program nearly 20 years ago, demonstrate the lasting impact of student-led sustainability initiatives. Our living lab builds on this tradition, providing a hands-on resource for students to engage in research, composting innovations, and sustainability science while contributing directly to NAU's environmental goals.

Project Components

1. Does your project require space or construction on campus? If so, where? Please review the "Space Committee Document" located on our webpage and follow the steps to begin requesting a location.

Yes. This project requires space at the Environmental Engineering Field Site, located north of Howard's Mesa. We currently have an approved and ongoing human excrement composting (HEC) project at this location. We have communicated with and been approved by Dr. Adam Bringhurst, the CECMEE Lab Manager, about incorporating the vermicomposting project onto the same site (if we are funded). In order to proceed he asked that we submit an addendum to our existing HEC project plan. An addendum has been provided at the end of this document.

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2. Have you obtained all necessary approvals for this project? The Green Fund is not responsible for acquiring the necessary permits, permissions, or approvals for a project, although we are happy to assist with this process if needed. Please attach all letters of support to this application. Letters of support should include confirmation from the sponsoring department that the sponsoring department will cover all upfront expenses and work with the Green Fund Business Manager to acquire reimbursement after project completion.

Yes. Dr. Greg Caporaso has approved the project and confirmed that the sponsoring department will cover all upfront costs. Debbie Martin, Associate Director of Finance and Business Operations Core within PMI, will coordinate with the Green Fund Business Manager for reimbursement after the project's completion. See attached LoS.

Peter Friederici has approved collaborating on this project until a student assumes the role of acting SSLUG Student Gardener. See attached LoS

We have also received approval from Jacob Vanetsky, with NAU Campus Dining to collect food waste from the dining halls. Food waste, which was originally destined for the Howard's Mesa compost site, will instead be delivered to the Environmental Engineering Field Site by Jay Grafft. Dr. Meilander will coordinate delivery times to ensure proper handling, minimize wildlife interference, and ensure that the waste is correctly deposited into the vermicomposting bins. See LoS.

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3. Does the project include any continued maintenance costs? The Green Fund does not provide any ongoing maintenance costs unless specified within the budget and approved by the committee. A sponsoring department must take responsibility for operations and management.

No. Ongoing maintenance will not be required.

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4. Will this project provide funding for student wages? Coordination of wages must be done through the sponsoring department and must be included within the project budget.

Yes. One undergraduate Compost Manager (CM) will receive a $2,500 stipend ($1,250 per semester) for approximately 4–6 hours of work per week. The CM will track hours in a shared spreadsheet, which will be reviewed regularly by Dr. Meilander. A minimum of 3 hours per week is required; however, weekly hours may vary, allowing the CM to work more hours some weeks and fewer hours in others. We are committed to accommodating students' academic schedules, including midterms, exams, and finals. If the minimum weekly hours are not consistently met, the student may be asked to complete an improvement plan.

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5. Please list all additional sources of funding you have pursued, including department, grants, ASNAU graduate, student government, etc.

The Caporaso Lab has committed discretionary funding to cover the upfront costs of this project. At this time, no additional funding sources have been pursued, however, we anticipate seeking future support through departmental resources, external grants, or student-led Green Fund proposals as the project expands.

Project Specifics

1. Is there a public outreach plan? How do you plan on communicating your project with the NAU community? Do you require assistance from the Green Fund in your outreach plan?

Yes. Upon Green Fund approval of this project, Dr. Meilander will leverage his professional networks within the Biology, Environmental Science, Education, and First Year Experience departments to promote the project and recruit an undergraduate Compost Manager (CM). He currently maintains a list of strong candidates who applied to the Interns to Scholars and CAMINOS programs but were not selected. Priority will be given to these students, particularly those who previously applied to our HEC composting project. If needed, a job posting will also be submitted through Handshake.

Once the CM is hired, Dr. Meilander and the student will coordinate a meeting with the acting SSLUG Student Gardener to collaboratively develop a comprehensive outreach plan and schedule to engage the NAU community. This plan may include educational events, workshops, social media campaigns, and signage at the composting site. Additionally, Dr. Meilander and the CM will meet with the Caporaso Lab's current Interns to Scholars (I2S) student (Olivia), BIO 497 students (Alexis, Rania, Kayla, Kaylee), and Undergraduate Research Assistant (Antonio) to create an integrated outreach strategy that not only advances the vermicomposting project but also supports the ongoing HEC project by fostering broader student involvement across campus.

We would welcome additional support from the Green Fund in developing and implementing this outreach plan, if feasible.

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2. Are you working with other groups on or off campus? If so, describe your partnership.

Yes. Dr. Meilander founded and has operated the Flagstaff EcoRanch since 2012, where he has mentored thousands of students and interns from NAU's Biology and Environmental Science departments, as well as high school classes, global volunteers, and community members. Dr. Caporaso founded and operates the Townsite Urban Farm since 2021, where he has similarly

mentored numerous community members and interns. Through these entities, we maintain strong relationships with the local grower and food systems community in Flagstaff.

In addition, Dr. Meilander's recent PhD research established partnerships with key sustainability stakeholders, including the Wildcat Wastewater Treatment Plant, the City of Flagstaff Sustainability Program, and Coconino County's Sustainable Building Program Citizen Advisory Committee.

Dr. Meilander also has deep ties to K–12 education in Flagstaff, having taught middle and high school at Northland Preparatory Academy, leading educational tours at the EcoRanch, and currently serving as the Board Vice President for Tynkertopia, a nonprofit focused on hands-on STEM education.

Project Parameters

1. What are the environmental costs and benefits associated with your project?

The environmental benefits of this project are significant and directly support NAU's sustainability goals. By diverting both pre- and post-consumer food waste from landfills, the vermicomposting system helps reduce greenhouse gas emissions—particularly methane—that would otherwise result from anaerobic decomposition. Integrating vermicomposting into NAU's existing food waste reduction strategy demonstrates the need for a multi-faceted approach to sustainability and offers an accessible model for students and community members to replicate at home. Dr. Meilander successfully managed a vermicomposting bin for three years (2007-2010) in a bedroom closet during his master's work at NAU and enjoys teaching others how to set these systems up.

Unlike traditional composting methods that rely on heavy machinery to turn piles, vermicomposting requires minimal mechanical intervention, thereby reducing fuel consumption and associated emissions. The system will produce nutrient-rich compost and worm castings, which are often significantly more valuable for soil health than conventional compost. These outputs can be used in the SSLUG garden, for campus landscaping, or shared with local partners (previously listed), advancing closed-loop resource management and regenerative agricultural practices.

Environmental costs are minimal. While the initial setup requires materials such as lumber, signage, and protective coverings, these will be durable and reused for multiple years. The project's overall ecological footprint is low, and its long-term benefits—in waste diversion, emissions reduction, and soil restoration—far outweigh the initial resource investment.

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2. Is this a one time expense or will you require future funding for your project?

This one-time expense is intended to establish the foundational infrastructure of the vermicomposting living lab and to outline a plan for its future development. Future student-led research projects may independently pursue Green Fund proposals to support continued innovation and development. As the lab evolves, we anticipate seeking additional funding—both internal and external—to expand the project's scope and support more advanced research initiatives, which will be co-designed with participating students. This current request is focused on covering the startup needs necessary to launch, manage, develop, and sustain the core operations of the program.

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3. How will you measure and monitor the impact of your project after its implementation?

We will measure and monitor the impact of the vermicomposting living lab through a combination of quantitative and qualitative methods. Students will track key metrics including the volume of food waste diverted, the quantity of compost and worm castings produced, and estimates of reductions in GHGs and labor and equipment needs compared to traditional composting practices. Students will track data on system inputs and outputs, monitor composting conditions (e.g., temperature, moisture, pH), and document improvements in efficiency and performance over time.

In addition, we will evaluate educational and outreach impacts by tracking student involvement (through course enrollment, independent research, or internships), documenting public engagement activities, and collecting feedback from workshop participants. Outcomes will be compiled into semesterly or annual reports and used to inform future improvements and funding proposals.

Deliverables:

1. Build vermicompost

Project Budget

Please include a thorough breakdown of all project costs as well as **justification for each line item**, as well as a 5% line item for contingency. Based on the parameters of the project, the committee may increase or decrease this contingency. **Make sure to include all potential taxes or costs associated with each item.**

Project Cost Breakdown and Justification

Category	Item	Quantity	Unit Cost	Total	Justification

Personnel	Dr. Meilander (1-month salary)	1	$8,920.00	$8,920.00	Covers mentorship, site supervision, construction support, student oversight, outreach, and reporting.
	Undergraduate Compost Manager (CM)	1	$2,500.00	$2,500.00	The CM will manage day-to-day operations, collect and log data, support outreach, and help coordinate student involvement.
Materials & Supplies	Lumber (2"x12"x8')	4	$29.68	$118.72	Base construction for bins; other materials sourced from scrap.
	2" Construction Screws (box)	1	$10.48	$10.48	For building and securing bin infrastructure.
	Rock Rakes	2	$14.98	$29.96	Used to mix bedding and food waste, improving aeration and worm activity.
	Subtotal (Lumber + Tools, incl. tax)	–	–	$174.10	–
	Red Wiggler Worms (5000 count)	1	$213.00	$213.00	Foundation of the vermicomposting process
	Bulk Hand Sanitizer	1	$25.00	$25.00	Hygiene for students working with food waste and composting materials.
	Additional Tools & Supplies (donated)	–	–	$0.00	Includes shovels, gloves, pH paper, computer access, hoses, power tools, and protective covers—donated by Caporaso Lab, Flagstaff EcoRanch, Townsite Urban Farm, and the existing HEC project.
Total Estimated Project Cost (Pre-Contingency)	–	–	–	**$11,832.10**	–
5% Contingency	–	–	–	**$591.61**	–
Total Requested	–	–	–	**$12,423.71**	–

from Green Fund					

Project Timeline

Please provide a timeline for the significant dates of your project. Please add all relevant information and consider any holidays/breaks and time required to obtain necessary approvals. **Please be as specific as possible.**

Timeline	
Action & Parties Involved	**Month/Year**
Hire undergraduate compost manager	End of August/Beg. Sept 2025
Build a vermicompost bin. Ongoing system and variable maintenance (recording pounds of food scraps, temps, pH, worm activity, collecting samples, etc.) will continue throughout the project. Meeting with SSLUG.	End of August/Beg. Sept 2025
Advertising and outreach across campus and through professional networks using social media platforms (LinkedIn, FB, IG, etc). Begin brainstorming educational programs and outreach events.	September 2025
Hold 2 on campus educational and outreach events at the compost site which will include student led discussions with Q&A, volunteer work, hands on activities (sampling, working in garden, turning compost, etc.)	Mid/End October 2025
Winterize worms	November 2025
Prepare for expansion and brainstorm future experiments, funding opportunities, and student led projects.	November 2025
Recruit and advertise for undergraduate research opportunities in Spring 2026 and explore student-led Green Fund proposals.	November 2025
Break (Dr. Meilander will continue to check on system through	December 2025

winter break)	
Hire/train new 497 and 485 students	December/January 2025
Develop 2 off campus educational and outreach events for K-12 classrooms and 2 on campus educational and outreach events (similar to fall 2025)	January 2026
Hold 2 educational and outreach events in K-12 classrooms	February 2026
Prepare for expansion and brainstorm future experiments, funding opportunities, and student led projects.	March 2026
Hold 2 on campus educational and outreach events at the compost site.	End March/Beg. April 2026
UGCM prepares for and presents at UGRADS	April 2026
UGCM and Dr. Meilander prepare for AY 2026-2027	April 2026
Recruit and advertise undergraduate research opportunities for AY 2026-2027	April/May 2026
Dr. Meilander maintains vermicompost system	May-August 2026

Anticipated Date of Completion	May 2026

Project Completion Checklist

Please complete all of the following items before submitting an application

- Contact Information
- Project Overview
- Project Budget
- Project Timeline
- Obtain **ALL** necessary letters of support for reimbursement, ongoing maintenance, student wages, etc. Attach the letters of support to the completed application.
- Submit the completed application to GreenFund@nau.edu

Thank you for your submission. We deeply appreciate your commitment to sustainability at NAU, and we look forward to working with you.

Supplemental Materials

Letters of Support

NAU NORTHERN ARIZONA UNIVERSITY

Sustainable Communities Program

Date: August 7, 2025
To: Green Fund Committee
From: Peter Friederici, Professor; Advisor, SSLUG Club

I am writing to express my strong support for Dr. Jeff Meilander's proposal to develop a vermicomposting living lab at the Environmental Engineering Field Site on South Campus. This project aligns closely with the mission of the SSLUG garden to promote sustainability, student engagement, and hands-on learning experiences at NAU.

The proposed living lab will not only divert food waste from landfills and reduce greenhouse gas emissions, but it will also create meaningful opportunities for collaborative workshops, community outreach, and integration with existing sustainability initiatives on campus. Through this collaboration, we will engage more students in sustainable agriculture, utilize compost and worm castings in the SSLUG garden, and support student-led research and Green Fund proposals connected to this effort.

I look forward to exploring ways for SSLUG and the vermicomposting lab to work together—engaging NAU students and the Flagstaff community through site visits, volunteer workdays, and K–12 educational activities. Together Dr. Meilander and the SSLUG garden have demonstrated commitment to student engagement, mentorship, and sustainability, and I am confident this project will have a lasting, positive impact on both NAU and the broader Flagstaff community.

Sincerely,

NAU NORTHERN ARIZONA UNIVERSITY

College of the Environment, Forestry, and Natural Sciences

Pathogen and Microbiome Institute
Northern Arizona University
7/28/25

To the Green Fund Committee,

I am writing to express my support for the proposed vermicomposting project led by Dr. Jeff Meilander. This project is a valuable extension of our ongoing compost microbiome research and will provide important educational and environmental benefits to the NAU community.

I, Dr. Greg Caporaso, confirm that the Caporaso Lab will serve as the sponsoring unit for this project and cover all upfront expenses up to $12,423.71 through local funds.

I, Deborah Martin, Associate Director of Finance and Business Operations Core within PMI, confirm that I will coordinate with the Green Fund Business Manager for reimbursement after the project's completion.

Please feel free to contact us with any questions.

Sincerely,

J Gregory Caporaso, PhD
Professor, Department of Biological Sciences
Northern Arizona University
Greg.Caporaso@nau.edu

Deborah Martin

Deborah Martin
Associate Director of Finance and Business Operations Core
Pathogen and Microbiome Institute
Northern Arizona University
Deborah.Martin@nau.edu

Northern Arizona University – Campus Dining
August 12th, 2025

To Whom It May Concern,

This letter serves as confirmation that Northern Arizona University Campus Dining supports the vermicomposting project led by Dr. Jeff Meilander. We have approved the collection and redirection of pre-consumer food waste from our dining halls to the Environmental Engineering Field Site, located north of Howard's Mesa.

Originally, this food waste was intended for the Howard's Mesa composting site; however, we are pleased to support this initiative by redirecting food waste deliveries to the vermicomposting system at the Environmental Engineering Field Site. Jay Grafft will oversee the transportation of food waste, and Dr. Meilander will coordinate delivery schedules to ensure proper handling, prevent wildlife interference, and maintain site cleanliness.

We are excited to support this innovative and sustainable project and look forward to its outcomes.

Sincerely,
Jacob Vanetsky
Sustainability Specialist
NAU Campus Dining
jacob.vanetsky@nau.edu
(928) 523-8361

Addendum to HEC Project Plan: Vermicomposting System for Food Waste Diversion and Education

Principal Investigator: Jeff Meilander
Site: Environmental Engineering Field Station

Date: 7/26/25

Purpose and Scope

This addendum proposes the installation of a small-scale vermicomposting system to operate in parallel with our approved human excrement composting (HEC) research project at the Environmental Engineering Field Station. The goal of this addition is to divert pre- and post-consumer food waste from the landfill and transform it into a high-quality compost product using *Eisenia fetida* (red wigglers). The system will also serve as a demonstration site for education and outreach in sustainable waste management.

This vermicomposting system will not introduce additional biological hazards to the site and will not involve any human excrement or contaminated materials. It is designed to be a low-risk, self-contained system that complements our ongoing compost microbiome research.

Project Objectives

- **Objective 1:** Divert food waste from campus dining facilities and evaluate vermicomposting as a low-cost, low-input waste treatment approach suitable for urban and off-grid settings.
- **Objective 2:** Support undergraduate education and student-led research on waste transformation, nutrient cycling, and circular economy systems.
- **Objective 3:** Compare composting system types (thermophilic HEC vs. mesophilic vermicomposting) as part of a living lab model for waste management education and community engagement.

System Design and Materials

The proposed vermicomposting system will include:

- 1 worm bins (~5' x 10' x 12”') constructed from new and salvaged materials.
- Food waste collected and delivered by Campus Dining.

- Shredded paper and wood chips used as bulking material and bedding.
- Worm castings harvested periodically and assessed visually and through potential future nutrient or microbial assays.

The system does **not** require any new utility hookups, plumbing, or excavation. All bins will be above-ground, fully enclosed, and wildlife-safe.

Signage may be added to identify the project as a student-run waste diversion initiative connected to the broader HEC living lab.

Operations and Oversight

- The system will be managed by undergraduate compost managers (e.g., funded interns or volunteers) under the supervision of Jeff Meilander.
- Site access and operations will follow the same safety protocols, oversight structure, and cleanup responsibilities outlined in the HEC plan.
- No vermicompost material will be mixed with human excrement compost.
- Final compost will be cured and transported to the SSLUG garden on NAU campus or local farms such as Flagstaff EcoRanch or Townsite Urban Farm for application in soil health trials and education.

Integration with Existing HEC Research

The vermicomposting system provides a non-pathogenic comparison to thermophilic composting of human excrement, allowing:

- Broader student engagement through lower safety barriers,
- A systems-level view of waste transformation approaches,
- Preliminary data collection for low-cost composting in non-sewered environments,
- An additional resource for comparing microbial succession and compost quality under mesophilic vs. thermophilic conditions in future grant proposals.

Site Use and Environmental Impact

This system:

- Will occupy a small footprint (approximately 50 sq ft) adjacent to the existing compost bins;
- Involves no new risks beyond basic manual labor;
- Will be removed and fully cleaned up upon conclusion of the project.

As noted in previous email communication, Dr. Adam Bringhurst, the CECMEE Lab Manager, has conditionally approved co-locating this system with the existing project pending this formal addendum.