# NEON ASSIGNABLE ASSET REQUEST SUBMISSION AND EVALUATION PROCESS: A USER'S GUIDE

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The National Ecological Observatory Network (NEON) is a major facility fully funded by the National Science Foundation and operated by Battelle.

# 1 DESCRIPTION

The National Ecological Observatory Network (NEON) program is designed to provide specific infrastructure assets (referred to as assignable assets, AAs) to non-NEON scientists for PI-driven research and environmental studies. NEON assignable assets and their availability are summarized in Table 1; with more detailed information in Appendices A-D.

The co-location at NEON sites of measurements of many key drivers of environmental change, complemented by the extensive sampling of aquatic and terrestrial organisms, is a critical feature of the NEON design. This makes it attractive for researchers to conduct their own research at NEON terrestrial and aquatic sites by making use of NEON's on-site sensor and biological sampling infrastructures (SI and OSI). In addition, NEON's Airborne Observation Platform (AOP) and Mobile Deployment Platform (MDP) are unique assets that can be employed in various studies in the vicinity of or remote from existing NEON sites.

**Table 1 Summary of NEON assignable assets and their availability**

| Assignable Asset | Description |
|---|---|
| Sensor Infrastructure (SI) | Includes several distinct physical instrument systems or arrays for collecting environmental data from automated sensor suites (Appendix A) |
| Mobile Deployment Platform (MDP) | Mobile sensor arrays that can be set up quickly to collect meteorological, soil and surface water data for short- to medium-term monitoring projects. The MDP is a self-contained suite of sensors, power systems and data logging capabilities for capturing atmospheric, soil, and surface water measurements. Central to the concept of the MDP is the ability for rapid deployment to capture stochastic ecological events (e.g. fires, flood events, pest outbreaks) across the landscape. (Appendix B) |
| Observational Sampling Infrastructure (OSI) | Researchers may request access to:<br>• Sampling locations at NEON Sites<br>• Field technician support for PI-led projects at NEON sites<br>• Biological samples from NEON sites before they are archived in the NEON Biorepository (Appendix C) |
| Airborne Observation Platform (AOP) | An array of instruments installed into a light aircraft to collect remote sensing data. Requests include those to fly non-NEON sites or to fly NEON sites at times of year when NEON does not collect AOP data. AOP instruments include a high-fidelity hyperspectral imaging spectrometer, discrete and waveform LiDAR, and a high-resolution digital camera. (Appendix D) |

Scientist and educators interested in requesting AAs are required to follow a formal application process; and all requests undergo a feasibility evaluation by NEON staff. Battelle expects to receive a wide range of requests for use of one or more of NEON's AAs, ranging from the simple to the highly complex.

Regardless of their complexity, all requests undergo a feasibility evaluation by appropriate Battelle staff. All costs associated with the use of these assignable assets will be borne by the requestor or the requestor's sponsor.

## 1.1 Purpose

The purpose of this document is to describe the overall process for managing requests to use NEON assignable assets (AAs). This process is intended to be transparent and fair and to involve clearly defined criteria for evaluating and approving requests. NEON aims to (i) meet the scientific needs of the investigator while ensuring the scientific integrity of the observatory; (ii) address all operational planning and safety needs; and (iii) ensure that all risks and liabilities are identified and mitigated.

## 1.2 Scope and Limitations

This plan identifies guiding principles, generalized workflow, evaluation schedules and processes, roles and responsibilities, and related considerations that guide the evaluation and fulfillment of requests and that are generally applicable across all four asset types – AOP, MDP, SI and OSI. Asset-specific details and information requirements are provided in the Appendices (A-D).

Battelle does not own the properties on which NEON sampling, measurement, and other activities occur. As such, Battelle cannot grant permits that a PI might need in order to access a NEON site. Rather, the PI is required to obtain necessary access and collection permits, and to be fully aware of site- specific safety, liability, and use issues. Battelle will provide contact information for the landowner or manager to the extent that we are permitted to do so – note that some sites are not open to public or researcher access (see individual field site pages for the specifics for each site).

## 1.3 Guiding Principles

The NEON AA program is managed in accordance with the following guiding principles:

1. Close collaboration between the PI and Battelle is a key to success.
2. AA activities do not degrade the scientific capability or programmatic functions of NEON.
3. AAs represent a means for effective interaction and engagement with the research community; as such Battelle is receptive and responsive to investigator requests.
4. The NEON AA program requires full cost recovery, i.e., cost neutral.
5. The NEON program staff and all of Battelle are committed to minimizing liabilities associated with AAs; e.g., only observatory personnel are permitted on towers.

6. Data handling and distribution resulting from assignable asset deployments proceeds in accordance with the NEON Data Policy (Box 1).
7. When there are conflicting AA requests or an over-subscribed asset, the priority for assignment is as follows:
   a. NSF-Biological Science Directorate sponsored research,
   b. Other NSF sponsored research, or
   c. Other, non-NSF funding sources.
8. The feasibility evaluation of a request and approval process is largely internal to Battelle; subject to periodic review by NSF. The scientific merit review is to be done by the sponsoring agency, e.g., NSF.

**Box 1. NEON Data Policy (Assignable Assets)**

Investigators utilizing NEON assignable assets are encouraged to make their research data freely and openly available as soon as possible and requires data sets so collected to be registered with the NEON data archive.

Data access may be restricted for a period not exceeding two years from the end-of-use date for data collected by investigators using NEON assignable assets. At the end of the restricted access period, all data will be freely and openly available. The restricted period may be extended under exceptional circumstances, but only by agreement between the Principal Investigator and the NEON Program Manager.

Data that has already become public cannot be made proprietary under any circumstances. Data which has been published in whole or part becomes publicly available at the time of publication.

# 2 REQUEST SUBMISSION, FEASIBILITY EVALUATION AND INTEGRATION

All requests, from whatever source, are made via a formal application to Battelle, describing in detail the proposed use of the assignable asset. Application materials and instructions are located on the Use NEON Infrastructure web page. Questions and queries may be e-mailed to AssignableAssetRequests@battelleecology.org.

The steps involved in the request submission and evaluation process, as well as post-award integration and operation, are described below. The workflow is illustrated in Figures 1-2. Investigators are encouraged to submit requests well in advance of agency proposal deadlines and to contact Battelle prior to an actual request submission to help ensure a timely and smooth evaluation process.

## Step 1 Investigator Submits Initial Request

The submission process is initiated by the investigator via a formal application to Battelle describing the purpose of the proposed use along with key technical and logistical details. Requests should be submitted as a WORD or PDF document limited to no more than 15 pages of text exclusive of figures and graphics. Detailed technical specifications and other supporting material may be submitted as attachments. Links to web-based material are also acceptable.

Upon receipt, a NEON Request Analyst reviews the application for completeness. If the application is found to provide sufficient technical and logistical details, it is passed on to the appropriate AA evaluation team. If the application is found to be incomplete, it is returned to the investigator with a request for additional information.

Requests can be submitted at any time. Investigators are encouraged to submit requests well in advance of agency proposal deadlines, allowing at least 4 weeks for NEON to review your request and provide a cost estimate.

## Step 2 Battelle Conducts Initial Feasibility Evaluation

All AA requests will be evaluated by Battelle to determine likely technical and logistical feasibility based on information provided by the investigator along with any supplemental information requested by the Battelle evaluation team. Scientific feasibility may also be evaluated as a basis for recommending assignment priorities when assets are oversubscribed. These criteria are defined as follows:

- ***Technical Feasibility:*** Can the proposed asset assignment be accomplished within the current technical and design constraints of the observatory subsystems; and without interfering with or otherwise negatively impacting other instrumental and observational data collection activities of the observatory?
- ***Logistical Feasibility:*** Can the desired asset be made available, operated and adequately maintained within the time frame of the proposed effort?
- ***Scientific Feasibility*** **(different from scientific merit review):** Are the science questions and hypotheses consistent with the observatory mission to enable understanding and forecasting of the impacts of climate change, land use change and invasive species on continental-scale ecology?

Battelle will execute this evaluation based solely on the information provided by the Principal Investigator (PI). Hence, the more detailed information about the proposed asset use that the PI can submit with their request to Battelle, the more robust the feasibility evaluation. The PI will need to provide sufficient information to allow Battelle to determine whether the proposed deployment or activity will interfere with NEON data collection and data integrity, or other research projects.

If a request fails this initial evaluation for any reason, Battelle personnel may suggest and/or consider investigator proposed modifications to the request such that all or some significant portion of the originally intended scientific objectives can be achieved. Battelle will be as flexible as practicable to support investigator-led assignable asset applications.

## Step 3 Battelle Estimates Costs and Resource Requirements

Subsequent to or in parallel with a successful feasibility evaluation, Battelle will determine costs and resource requirements that will need to be reimbursed by the PI and/or the PI's sponsor. Battelle is required to recover all costs incurred by the NEON AA program for investigator-driven research and environmental studies. (See section **5 Cost Recovery** below.)

## Step 4 Battelle Reports Results of Feasibility Evaluation

Battelle notifies the PI regarding the outcome of the feasibility evaluation and, if deemed feasible, estimated costs to be recovered by Battelle. For requests deemed feasible:

- requiring funding, go to Step 5.
- with funding already in place, go to Step 6.

## Step 5 Proposal Submission and Agency Review

The sponsoring agency, not Battelle, will perform any required scientific merit review. It is the PIs responsibility to have all the sponsor-required documentation as part of their proposal. Battelle will provide PI with material documenting results of the feasibility evaluation and cost estimates, and can provide additional information as requested – e.g., letters of support. Note also that NEON is an NSF asset; as such, any given AA request may be subject to NSF review and concurrence.

*Step 5a: PI Submits Proposal to Funding Agency.* Submission of a research proposal to NSF or other funding agency including details about the proposed asset use is the responsibility of the requesting PI.

*Step 5b: Funding Agency Conducts Scientific Merit Review.* A scientific merit review is conducted by the agency sponsoring the proposed research or environmental study.

*Step 5c: Funding Agency Notifies PI.* Sponsoring agency notifies PI of award; PI in turn notifies Battelle so that Battelle can schedule and integrate the awarded AA in a timely fashion.

**Figure 1 Illustration of NEON's assignable asset request and evaluation process (Steps 1-6)**

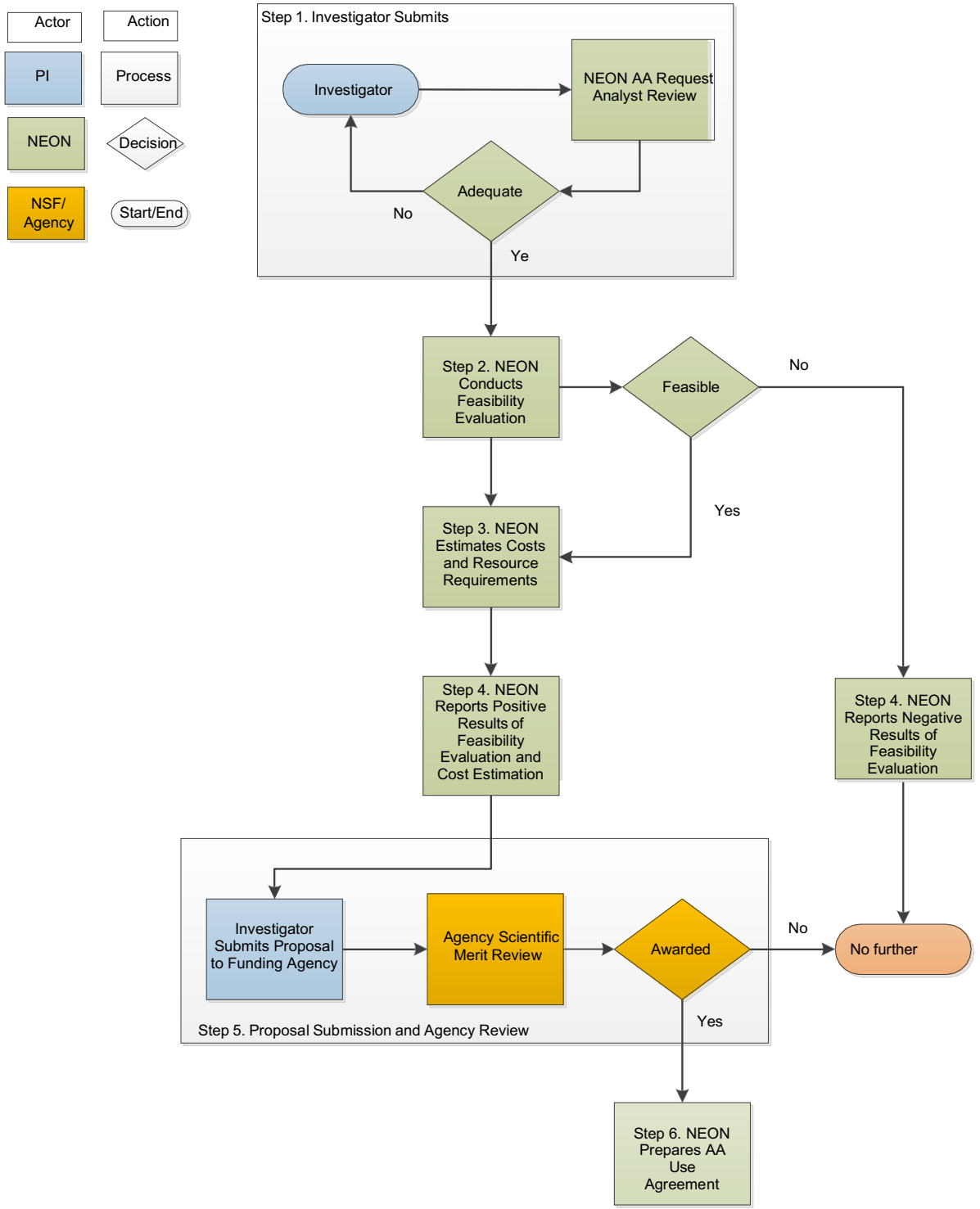
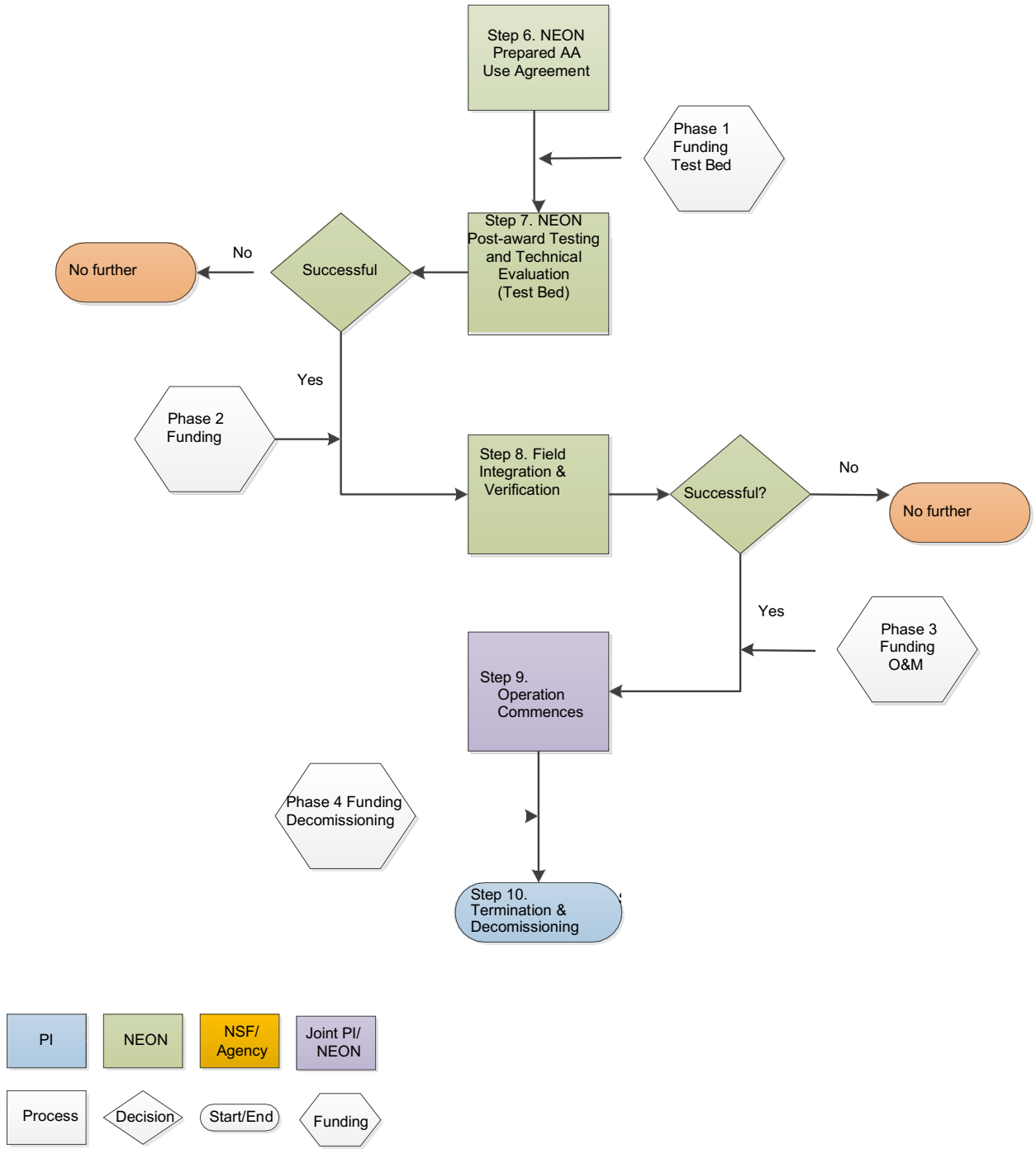


**Figure 2 Illustration of NEON's assignable asset request and evaluation process (Steps 6-10)**



## Step 6 Battelle Prepares Assignable Asset Use Agreement

Battelle and the PI agree to terms and conditions for the use, operation and maintenance of the assigned asset. This includes standard terms and conditions applicable to each asset as well as any request-specific requirements mutually agreed upon.

Once the agreement is formally accepted, agreed upon funds are made available to Battelle by the PI's institution or sponsoring agency via direct transfer or via an invoicing agreement. This may occur in four phases to cover the costs to Battelle of Steps 7-10 as follows:

- Phase 1 Funding: Step 7. NEON Post-Award Testing and Technical Evaluation (Test Bed)
- Phase 2 Funding: Step 8. Field Integration and Verification
- Phase 3 Funding: Step 9. Operations and Maintenance
- Phase 4 Funding: Step 10. Project Termination and Decommissioning

## Step 7 NEON Post-Award Test-bedding, Technical Evaluation and Design

This step occurs post-award to confirm feasibility of the proposed AA use, and to carry out any further testing and technical evaluation or design work that may be needed prior to operation. The PI is responsible for delivering final proposed protocols, procedures, sensors and instruments, designs and other materials required to complete this critical pre-operation step.

- For asset use not involving additional sensors or instruments, this may simply entail confirmation that conditions surrounding the proposed use have not changed and that it can still be accommodated as planned or with only minor modifications.
- When the addition and integration of new sensors is required, physical testing of power requirements and potential for interference with NEON sensors and instruments may be necessary.
- Modifications to the instrumental or observational design may be considered at this time – e.g., due to unforeseen technical or logistical challenges.

## Step 8 Field Integration and Verification

For other than AOP requests, Battelle works with the PI to deploy, test and verify that asset performs as expected – instrument assemblies, MDP site deployments, OSI sampling locations and design. Design and deployment modifications may be considered at this time with appropriate cost changes agreed upon by Battelle and the PI.

## Step 9 Operation and Maintenance Commences

Operation, maintenance and data collection commence on the agreed upon timeline. If any problems occur during operations, the PI can notify Battelle so that timely repairs or adjustments can be made as appropriate and at cost to the PI.

### Step 10 Project Termination and Decommissioning

Upon termination of the project, the PI will implement an agreed upon plan for decommissioning of the site. This may include actions to restore the site to its pre-project conditions.

# 3 TIME LINES FOR THE REQUEST SUBMISSION AND FEASIBILITY EVALUATION PROCESS

Battelle's target is to complete Steps 1-4 (Initial Submission through Reporting of Results) within 4-5 weeks of receiving a fully complete request package. Longer timelines may occur due to the nature and complexity of the request, number of requests received, and other unforeseen circumstances.

Proposal Submission and Review (Step 5) is outside of Battelle's control and dependent upon the funding agency scientific merit review process and timelines. The time to complete NEON's Post-Award Testing and Technical Evaluation (Step 7) and Field Integration and Verification (Step 8) depends upon a variety of factors including the asset in question and the nature, scope and complexity of the request.

- Simply confirming conditions in existence at the time of the Feasibility Evaluation (Step 2) can normally be completed within one to two weeks – i.e., when sensor integration is not part of the package.
- For situations that require test-bedding of sensors or instrument assemblies, two or more weeks may be required.
- In all cases, Battelle staff will work closely with the investigator to complete this processes as quickly as possible.

**Table 3 Summary of request submission and evaluation process**

| Step | Description | Control | Direct Cost? | Target Timeline* |
|---|---|---|---|---|
| 1 | Investigator Submits Initial Request | Internal | No | 1 week |
| 2 | Battelle Conducts Initial Feasibility Evaluation | Internal | No | 1-2 weeks |
| 3 | Battelle Estimates Costs and Resource Requirements | Internal | No | 1 week |
| 4 | Battelle Reports Results of Feasibility Evaluation | Internal | No | 1 week |
| 5 | Proposal Submission and Agency Review and Notification | External | No | Agency dependent |
| 6 | Battelle Prepares Assignable Asset Use Agreement | Internal | Yes | 1 week |
| 7 | NEON Post Award Testing and Technical Evaluation | Internal | Yes | 1-4 weeks |
| 8 | Field Integration and Verification | Both | Yes | 1-2 weeks |
| 9 | Operation & Maintenance | Both | Yes | Mutually agreed timeline |
| 10 | Project Termination & Decommissioning | Both | Yes | Mutually agreed timeline |

* Actual turnaround time may vary depending upon the nature, number and complexity of requests received

For Target of Opportunity requests that are time sensitive, all steps in the process will be expedited to the extent possible with a target turnaround time of no more than 4 weeks for the entire process.

# 4 COST RECOVERY

All costs associated with the NEON AA program are to be fully recovered by Battelle. This includes, but is not limited to:

- Test, calibrate, install, integrate, operate, maintain and remove sensors, instrument assemblies and other material and infrastructure
- Indirect costs associated with development and management of contracts or agreements
- Planning, coordinating, and executing AOP flight operations
- Delivery and set up of an MDP unit
- Troubleshooting AA integration and operations
- Processing and delivering AOP and MDP data; and related support to the extent that it can be forecasted
- Provision of supplies and materials required
- Labor required to assist with provision of biological samples, and coordinating field activities

Note that Battelle will not provide post-award in-kind support. Moreover, the PI is responsible for acquiring sensors or instrumentation sampling equipment. Battelle encourages PIs to engage early to optimize operational costs and effort, and may request the PI coordinate with the NEON Project to provide SOPs and training materials.

- ***Steps 1-6:*** The initial feasibility evaluation, cost estimation, results documentation, and agreement preparation by Battelle are not a direct cost to the PI.
- ***Steps 7-10:*** The investigator is responsible for providing funds to Battelle for the Testing and Technical Evaluation and Integration and Verification including any subsequent design work or modifications required. Battelle also recovers all costs associated with operation and maintenance activities and decommissioning.

# 5 SUMMARY OF ROLES AND RESPONSIBILITIES

## 5.1 Principal Investigator Responsibilities

PI responsibilities include, but are not necessarily limited to:

- Providing all information needed in sufficient time for Battelle to complete the feasibility evaluation
- Submitting funding proposals to appropriate agencies or organizations
- Planning for, and obtain funds to support, the use of NEON's AAs
- Delivering sensors or instruments for testing and technical evaluation and participating in these evaluations as needed
- Obtaining all required site permits, state collection permits, and/or IACUC approval for handling and care of vertebrate animals
- Obtaining utility power, communications and other service contracts that may be required
- Obtaining any permits necessary to conduct flight operations other than FAA approvals
- Storing and processing data obtained from NEON SI or OSI; at this time, Battelle is unable to deliver or process these data via the NEON cyber-infrastructure
- Abiding by NEON Data Policy (Box 1), which requires making data obtained via NEON AA's publicly available after a 24 month proprietary period

## 5.2 Battelle Responsibilities

Battelle responsibilities include, but are not necessarily limited to:

- Completing feasibility evaluations in a timely manner
- Providing the PI with cost estimates and resource requirements

- Providing the PI with letters of support to confirm feasibility evaluations
- Completing post-award testing and technical evaluations in a timely manner
- Providing power when and where necessary
- Installing, maintaining and recovering sensors/instrumentation from NEON infrastructure
- Coordinating with air service provider to obtain FAA approvals for AOP flights
- Processing, storing and delivering AOP and MDP data as needed; Battelle reserves the right to make data derived from any AA activity publicly available after the 24 month proprietary period of data use by the PI (unless otherwise negotiated).
- Incorporating AOP assignments into annual flight plans – scheduling aircraft and Battelle flight operations crews. Typically, this includes getting a payload installation FAA approved through Twin Otter and obtaining a letter of no-objection from the FAA for conducting laser operations.

# 6 ACRONYMS

| ACRONYM | DEFINITION |
|---|---|
| AA | Assignable Asset |
| AOP | Airborne Observation Platform |
| CI | Cyberinfrastructure |
| FAA | Federal Aviation Administration |
| FOPS | Field Operations |
| IACUC | Institutional Animal Use and Care Committee |
| MDP | Mobile Deployment Platform |
| NEON | National Ecological Observatory Network |
| NSF | National Science Foundation |
| OSI | Observational Sampling Infrastructure |
| PI | Principal Investigator |
| SI | Sensor Infrastructure |
| SOP | Standard Operating Procedure |
| TOO | Target of Opportunity |

## APPENDIX A: ASSIGNABLE ASSET GUIDELINES FOR SENSOR INFRASTRUCTURE (SI)

At each of NEON's core and relocatable field sites, there are several physical instrument systems or arrays for collecting environmental data from automated sensors including:

- an instrument tower for meteorological and eddy flux measurements;
- an array of soil instruments near the tower;
- sensors placed along a stream or river or on a buoy in a lake and in the adjacent riparian areas;
- and a small hut used primarily for housing instruments and equipment associated with processing sensor data and communicating it to NEON Headquarters.

Requests from the research or education community to install additional sensors or instruments on any of these systems or structures will be considered. However, only sensors and instrumentation (SI) that represent a mature approach (broadly accepted by stakeholder communities) and that are fully operational will be considered. Battelle will not consider experimental or beta-test version of sensors or instrumentation.

**Feasibility Evaluation:** The feasibility evaluation for an SI request is based on information provided by the PI as specified in Table 4 below. The time required to complete the feasibility evaluation depends on the type of sensor, complexity of the sensor system and whether the data acquisition and transport will be done by Battelle; TOO requests will be expedited.

### Assumptions

1. PI provides a 'bench-ready' design
2. There is no post-processing of 'raw' collected data by NEON Cyberinfrastructure (CI)
3. PI will receive the data as per the 'Integration Design'
4. If any problems occur with the operations of an SI, the PI can notify FOPS and repairs can be made in an ecologically relevant and timely manner
5. Battelle does not provide any specialized calibration
6. Battelle will not provide any formal System Engineering or requirements capture for SI AA
7. No additional permitting, civil construction, or major alternations to the NEON infrastructure is required for the SI AA
8. The PI is responsible for obtaining all site permits that may be required

**Deployment, Operation and Maintenance:** Battelle staff will deploy, operate, maintain and remove the SI. Concerns about safety, liability, and maintaining the integrity of exiting NEON project instrumentation require that only Battelle employees perform these activities.

**Data Handling:** Data acquisition, storage, and transport from the field to the PI may be part of the SI AA request; with details to be negotiated during the feasibility evaluation. Data delivery by Battelle to the PI can be handled via a self-contained data acquisition system or IP addressed instrumentation.

Presently, NEON is unable to ingest SI AA data via NEON's data acquisition system or to further process these data into data products or perform other analyses.

**Decommissioning:** All decommissioning will be carried out by Battelle personnel.

**Table 4** Criteria and information required to conduct feasibility evaluation of SI requests*

| Criteria | Information Required |
|---|---|
| **Description of the proposed additions** | What is the research question and why does it require the use of NEON infrastructure? Describe the instrument and measurement technology to be deployed and the phenomenon to be measured. |
| **Proposed Number and location** | How many units will be deployed per site and at what locations? Where exactly on the NEON tower or other infrastructure does the assembly need to be located (e.g., tower heights, soil depths, etc.) What are the dimensions of the required space? |
| **Duration of the Project** | How long will the research project last? How many separate instrument deployments are being requested and when during the life of the project? What is the proposed duration (weeks, months) for each instrument deployment? |
| **Data Management** | How will the data be collected and stored? How and when will data be made publicly available? (Note: Requesters are required to abide by the NEON Data Policy. |
| **Power Requirements** | What is the power load for the entire assembly (sensor, communication, auxiliary equipment, etc.)? |
| **Mechanical Interface** | NEON sensors are mounted with specific mounting hardware. Can this instrument be mounted accordingly? If not, how will it be mounted, i.e. in such a way as to avoid interference of any kind with NEON instrumentation? |
| **Data Acquisition Interface** | How does the instrument output data and what is the data format? How is the instrument configured? Does the instrument require any command and control, heating, regular calibration, etc.? Does the instrument require an active means to communicate with it, and if so, how? |
| **Electronic Interference** | Has this sensor been tested for radio frequency (RF) emissions? If so, what are they? Is this sensor affected by other RF emissions, and if so, how? (Note: New instruments will have to be tested, at the requestors cost, in the NEON engineering test bed to guarantee performance when installed in the field.) |
| **Training Plan** | Battelle staff will be responsible for installing and maintaining the instruments. Describe your plan for training Battelle staff for instrument installation, maintenance, and calibration during the period that the instrument is deployed. |
| **Field Calibration** | If regular field calibration of a gas, isotope, or other analyzer is required, what standards must be used? If they are different from standards used by NEON, where will they be stored and how will they be made available? How will the veracity of the standards be assured? |
| **Maintenance Plan** | What type and frequency of maintenance will be required? What consumable materials are required and what are their costs? What is your plan for responding to instrument failure, i.e. a spare and replacement strategy? |
| **Decommissioning Plan** | Most instrument deployments will be for a specified period of time, depending on the research goal and the funding. Describe your plan for decommissioning the instrument, in coordination with Battelle staff and the site host? |

**The term 'instrument' applies to all types of sensors or instruments (e.g., data acquisition devices) that are required for the SI Assignable Asset.*

## APPENDIX B: ASSIGNABLE ASSET GUIDELINES FOR MOBILE DEPLOYMENT PLATFORM (MDP)

The MDP is designed to increase NEON's capacity to capture the spatial and/or temporal variation in ecological drivers and responses not captured by the other NEON subsystems. This increases the ability to detect and forecast ecological trends and to observe stochastic events that cannot be captured using NEON's fixed sampling resources. Five MDPs will be available upon request for up to 1 year per deployment.

The MDP may have a variety of applications such as ground-truthing remote sensing systems, training, education and outreach, and data collection in areas in which a permanent NEON presence is not feasible. Multiple MDPs may be deployed in a coordinated array to measure larger-scale regional processes and trends, assess land-use or environmental gradients, and monitor spatial and temporal dynamics.

**Feasibility Evaluation:** The feasibility evaluation for an MDP request is based on information provided by the PI as specified in Table 5 below. It is important to provide sufficient information to permit a determination as to whether the proposed deployment would interfere with any other research project, instrumentation, data collection, and data quality that is at the site. The time required to conduct a feasibility review for Standard Requests depends on the type of field deployment, and whether the data acquisition and transport will be done by Battelle; TOO requests will be expedited.

### Assumptions

1. PI provides a "site-ready" design
2. PI will receive the data as per the Integration Design
3. If any problems occur with the operations of an MDP, the PI can notify Battelle and repairs can be made in an ecologically relevant and timely manner
4. Battelle does not provide calibration beyond that typical for NEON instruments
5. Battelle will not provide any formal System Engineering or requirements capture
6. No additional permitting, civil construction, or major alternations to the NEON infrastructure is required for the MDP AA
7. The PI is responsible for obtaining all site permits, or utility power and/or communications service or service contracts that may be required

**Deployment:** Battelle is solely responsible for deploying the MDP. Battelle Engineering will have refurbished and prepared the MDP prior to deployment – i.e., re-calibration or repair of sensors and infrastructure. This may include transportation from the field site back to NEON HQ, or in some instances, directly to the next deployment. Concerns about safety, liability, and maintaining the integrity of MDP instrumentation require formal agreement between Battelle and the PI as to operational roles and responsibilities prior to deployment.

**Operation and Maintenance:** After delivering the MDP to a research site, setting it up, and training the researchers on how to operate it, the operation will be left to the researchers. Battelle staff will not be present during the deployment, except as needed to resolve technical issues and to remove the unit from the site.

**Data Handling:** Data acquisition, storage, and transport from the field to the PI may be part of the MDP AA proposal, with details to be negotiated during the feasibility evaluation. NEON will process MDP data into standard data products. Presently, further data product development or analysis is not possible.

**Decommissioning:** Battelle is responsible for decommissioning field-deployed MDPs at the end of their funding tenure. This includes dismantling and transporting the MDP from the field site. The PI is responsible for any site clean-up or restoration required, and the termination of any service contracts (power and communications), and any other host-required activities.

**Table 5** Criteria and information required to conduct feasibility evaluation of MDP requests

| Criteria | Information Required |
|---|---|
| **Description of the proposed use of the MDP** | Describe the research question or activity and why does it require the use of one or more MDP? |
| **Use of the MDP at a NEON site** | If an MDP will be deployed at a NEON site, where in relation to NEON infrastructure will the proposed use of the MDP occur? Has permission been sought from the land owner/manager to work and deploy an MDP at the site? |
| **Use of the MDP at a non- NEON site** | What organization owns or manages any non-NEON site at which the MDP will be deployed? Has permission been sought or granted to work and deploy an MDP at the site? Are any special permits required to work or deploy an MDP at the site, and have these been sought or granted? Are there any access or safety issues that could be encountered in deploying an MDP? |
| **Duration of the research project and each MDP deployment** | How long will the research project last and how many separate (in time, e.g., once a year for 3 years) MDP deployments are being requested and when during the life of the project? How long (weeks, months) will each proposed deployment of an MDP last? |
| **Use of non-NEON instruments or other equipment** | Addition of sensors, instruments or other equipment to an MDP is not possible at this time. This capability may be available in the future. |
| **Data management** | How and when will data be made publicly available? Requesters are required to abide by the NEON Data Policy |
| **Presence and training of research personnel** | Will research personnel be present whenever an MDP is deployed at a site? Describe your plans for training research personnel to ensure that they understand any guidelines and restrictions pertaining to the use of the MDP and, if at a NEON site, conducting the research near NEON infrastructure. |
| **Decommissioning/clean-up/restoration** | Describe your plan for decommissioning the research sites, including removing all markers, equipment, etc., and to the extent possible, restoring research sites to their original state? |

## APPENDIX C: ASSIGNABLE ASSET GUIDELINES FOR OBSERVATIONAL SAMPLING INFRASTRUCTURE (OSI)

Researchers may request access to NEON sampling locations, field technician support for PI-led projects at NEON sites, or biological samples from NEON sites before they are archived in the NEON Biorepository. At the present time, Battelle is unable to allow destructive sampling, manipulative experiments or other disturbances, such as placement of infrastructure, within NEON sampling plots.

Nondestructive sampling may be permitted if it can be shown that it does not negatively impact the integrity of NEON observations.

Only requests for access to specific NEON sampling locations and samples will be considered under the assignable asset program. Requests to conduct research in areas not within or immediately adjacent to NEON sampling locations will follow the Research Coordination Guidelines (PDF or visit Use NEON Infrastructure for Research webpage) .

These guidelines do not apply to requests for samples that have been archived. Archived samples will be stored as museum specimens. All of these specimens, with the exception of the NEON Soil Archive, will be stored at facilities external to NEON. Soil samples will be archived at NEON headquarters. The policy for requesting loans and use of these specimens/samples will be in accordance with policies of the hosting facility/museum.

**Feasibility Evaluation:** The feasibility evaluation for an OSI request is based on information provided by the PI as specified in Table 6 below. It is important to provide assurances that the proposed deployment would not interfere with any other research project, instrumentation, data collection, and data quality that is at the site. The time required to conduct a feasibility review for standard requests depends on the scope and complexity of the proposed field research activity, and whether the data acquisition and transport will be done by Battelle; TOO requests will be expedited.

### Assumptions

1. PI provides a “field-ready” sampling design
2. PI provides necessary training and funding for any anticipated use of NEON Field Ecologists to directly assist in field data collection efforts unless part of an existing NEON workflow, and except to coordinate sampling locations
3. PI will obtain data as per the Field Integration Design
4. If any problems occur with the sampling, the PI can notify NEON and adjustment can be made in an ecologically relevant and timely manner
5. Battelle does not provide any sampling equipment
6. Battelle will not provide any formal System Engineering or requirements capture for OSI AA
7. No additional permitting, civil construction, or major alternations to the NEON infrastructure is required
8. The PI is responsible for obtaining all site permits that may be required.

**Deployment, Operation, Maintenance and Decommissioning:** The PI is solely responsible for (1) deployment, operation, maintenance, removal, and decommissioning of any instruments, equipment or other sampling infrastructure; (2) data handling; and (3) any site restoration or cleanup required.

Battelle staff can and will assist in coordinating sampling times and locations and related activities so as to avoid impacts on NEON data and data collection activities. The PI is also responsible for coordination with the site host as regards access to the site, avoiding interference with other research activities, and any site-specific restoration/clean-up measures required.

**Table 6** Criteria and information required to conduct feasibility evaluation of OSI requests

| Criteria | Information Required |
|---|---|
| **Description of The Proposed Research Activity** | What is the research question or activity and why does it require access to NEON's observational sampling infrastructure? What data or samples will be collected and by what methods? |
| **Proposed Quantity and Location** | Describe which and how many specific plots or other locations will be utilized? |
| **Duration of Research Project** | How long will the research activity continue – provide start and end dates? Will the nature of the activity (e.g. location, types of data collected, etc.) change in any way over the course of the research? If so, please describe. |
| **Sampling Requirements** | If samples are to be collected, what are the proposed size and number of samples? What is the proposed size of the sampling plots or other areas within which the research activity and data collection will occur? How many replicates or research plots are proposed? |
| **Field Samples of Plant or Animal Material** | What specific samples collected by NEON are being requested? How will the samples be used, e.g., measurements taken, subsamples collected? What is the plan to submit specimen vouchers or any derived materials (e.g., DNA extracts) to a museum or long-term archive facility? |
| **Frequency of Visits by Research Personnel and/or NEON Field Technicians** | When during the year would the research activity occur? When during the day would activity occur? How frequently would research personnel/NEON Field technicians visit each location, i.e., number of times per day, per week, per month? Will visits be at regular and pre-planned intervals or will they be irregular or unpredictable? |
| **Number of Research Personnel** | How many individuals would normally visit at any one time? How many different individuals are likely to visit during a season or year? |
| **Research Equipment** | To establish research plots or other units, will there be need to install long-term infrastructure (including plot markers)? If so, please describe (including number, size, and material). |
| **Data Management** | How and when will metadata and any data derived from samples and specimens collected be made publicly available? Requesters are required to abide by the NEON Data Policy. |
| **Training of Research Personnel** | Describe your plans for training research personnel to ensure that they operate in a safe and environmentally compliant manner, and that they understand any guidelines and restrictions pertaining to conducting the research involving infrastructure? |

| | |
|---|---|
| **Decommissioning/Clean-Up/Restoration** | Describe your plan for decommissioning the research sites, including removing all markers, equipment, etc., and to the extent possible, restoring research sites to their original state? |

## APPENDIX D: ASSIGNABLE ASSET GUIDELINES FOR AIRBORNE OBSERVATION PLATFORM (AOP)

NEON will support PI-requested deployments of any of three AOP's when they are not needed to support regular NEON flight operations. AOP instrumentation on each includes a high-fidelity visible-to-shortwave infrared imaging spectrometer, a waveform LiDAR and a high-resolution digital camera.

The AOP assignable asset may be deployed in coordination with routine AOP payloads dedicated to coverage of NEON sites. Linking the AOP assignable asset to the routine AOP payloads may fill gaps in spatial coverage and enable greater understanding of the scale of variation in ecological processes and trends along regional or continental gradients. Additional uses envisioned include scaling other non- NEON in situ sampling to satellite observations, training, education and outreach, and data collection in areas in which a permanent NEON presence is not feasible.

**Feasibility Evaluation:** The feasibility evaluation for an AOP request is based on information provided by the PI as specified in Table 7 below. It is important to provide sufficient information to permit a determination as to whether the proposed deployment would interfere with any other research project, instrumentation, data collection, and data quality that is at the site. The time required to conduct a feasibility review for Standard Requests depends on the type of field deployment, and whether the data acquisition and transport will be done by Battelle; Target of Opportunity requests will be expedited.

### Assumptions

1. PI provides a 'flight-ready' data collection design, with sufficient detail to enable a feasibility evaluation.
2. PI will receive the data as per the AOP user agreement.
3. NEON will not provide any specialized calibration (standard instrument calibration included).
4. NEON will not provide any specialized data products outside of the NEON data product catalog unless additional funding is provided for their development.
5. No formal system engineering or requirements generation will be provided beyond that already generated and available; though additional assistance can be provided on a cost-reimbursement basis.
6. The PI is responsible for obtaining all site permits for any coincident fieldwork associated with the AOP AA airborne surveys.
7. NEON AOP will ensure any new hardware added to the payload meets aviation safety standards.

**Deployment and Operation:** Battelle is solely responsible for deploying the AOP. Concerns about safety, liability, and maintaining the integrity of AOP instrumentation require formal agreement between Battelle and the PI as to operational roles and responsibilities prior to deployment.

**Data Handling:** Data acquisition, storage and delivery to the PI will be accomplished by Battelle staff. NEON will process AOP data into Level 1 data products; higher-level data products can be produced at an additional cost to the PI.

**Table 7** Criteria and information required to conduct feasibility evaluation of AOP requests

| Criteria | Information Required |
|---|---|
| **Description of the proposed use of the AOP** | Describe the research question or activity and why it requires the use of the AOP? What remote sensing data products are being requested– hyperspectral, discrete lidar, waveform lidar, high-resolution photography? |
| **Proposed location** | What geographic area or landscape ecological features does the PI wish to acquire, including NEON domains/sites as appropriate? (Please provide KML or shapefile polygon(s), or describe requirements in detail). Does the proposed flight box cover any portion of a National Park or U.S. Forest Service wilderness area, or other area characterized by a controlled or restricted airspace? |
| **Use of the AOP assignable asset at a NEON site** | If an AOP assignable asset will be deployed over a NEON site (e.g., during winter) in conjunction with PI field-based data collection, has permission been sought from the land owner/manager to work at the site? |
| **Use of the AOP assignable asset at a non-NEON site** | What organization owns or manages the non-NEON site at which the AOP assignable asset will be deployed? Has permission been sought or granted to work and deploy an AOP over the site? Are any special authorizations required to work or deploy an AOP over the site, and have these been sought or granted? Are there any known safety issues that could be encountered in deploying an AOP assignable asset? |
| **Timing of the research project and AOP deployment(s)** | What time of year is proposed for the survey (e.g., during peak greenness or during leaf-off)? What is the approximate maximum deployment time available for the mission, including cloud/weather contingency days? How much flexibility is there in the PI schedule to accommodate other NEON AOP flight commitments (i.e., is the proposed PI flight activity strictly linked to other external activities or ecological phenomena)? |
| **Use of non-NEON instruments or other equipment** | Addition of sensors, instruments or other equipment to an AOP is not possible at this time. This capability may be available in the future. |
| **Data Management** | How and when will metadata and any data derived from samples and specimens collected be made publicly available? Requesters are required to abide by the NEON Data Policy. |
| **Presence and training of research personnel** | Will research personnel be present on the site whenever an AOP is deployed at a site? Describe your plans for training research personnel to ensure that they understand any guidelines and restrictions pertaining to research conducted at the site and, if applicable, near NEON infrastructure. |