

## STATEMENT OF WORK

### Investigation of Alternative Plants as a Replacement of Current Airfield Vegetation Regimes (Phase One)

#### A. BACKGROUND:

The purpose of this project is to identify an improved vegetation management regime for the southeast region airfields. Bird strikes to aircraft on Department of Defense (DoD) airfields continue to be a major concern in terms of both cost of damage to aircraft and loss of life. Through early 2022, Navy data shows 6,871 bird/animal strikes with an associated cost of over 364 million dollars. As long as airfields are maintained as vegetated spaces that provide habitat for a variety of other species (e.g. small mammals, insects), birds will be attracted to these areas. There is no proven way to prevent all bird activity in and around airfields. Consequently, mission impacts from bird strike are a daily occurrence and are ongoing. While all types of birds pose some level of Bird/Animal Aircraft Strike Hazard (BASH) risk, data indicates that the greatest hazard is from large and medium-bodied species. Therefore, many BASH managers consider small bodied, non-flocking species as the accepted risk and preferred bird species in the airfield environment. Since some level of bird activity is unavoidable, how to manage vegetation habitats to dissuade use by large and medium-bodied species is the primary goal of the installation BASH Program.

Vegetation management on airfields is a critical component of manipulating habitat, and therefore, a tool to reduce the presence of high-risk BASH species. The current paradigm for vegetation management on military and civil airfields is to maintain grass-like vegetation in areas around the runway and the taxiways. This vegetation typically begins as monotypic turf-type grass plantings that deteriorates over time to a mixture of grasses and other herbaceous vegetation. Typically, this vegetation is maintained by mowing to a height of between 7-14 inches.

The current vegetation management regime has created several unintended challenges for managing BASH risk including:

- 1) The mix of grasses and herbaceous cover produces food that is consumed by a variety of invertebrates, small mammals, and birds. Many of the birds that are attracted to these food items (seeds, fruits, and invertebrates) include BASH hazardous species such as pigeons, doves, starlings, egrets, larks, and others.
- 2) Food availability supports populations of small mammals, reptiles, amphibians, and invertebrates that are prey for additional BASH hazardous species like raptors, falcons, kites, and other species.
- 3) Frequent mowing to maintain grass height results in injures and mortality of wildlife that are accidentally struck by the mower blades. The injured and dead wildlife are another attractant to other BASH hazardous species including vultures, caracaras and others.

- 4) Lastly, airfield mowing has a high annual cost and is a source of greenhouse gas emissions. This negatively affects US Navy and DoD budgets and greenhouse gas reduction targets, respectively.

This project is an investigation into potential alternative airfield plantings that break from the paradigm of planting grasses. As described above, these grasses become infested with other herbaceous plants that either directly or indirectly attract BASH hazardous species. Additionally, these grass-like vegetated airfields have a high cost to maintain. This project will identify candidate plant species that meet criteria as an elimination-process to develop the initial test group that meet the acceptance criteria. This initial group will then be tested in a controlled environment looking at additional criteria. These criteria will be designed to find a plant that could replace grasses and increase flight safety and decrease maintenance costs. If successful plant candidates are identified, then outdoor test locations will be identified for additional field trials. If one or more plant species are identified from this testing, then future funds will be requested for a full airfield planting implementation.

#### **B. OBJECTIVES:**

The Cooperator will be responsible for providing technical and scientific research assistance to identify vegetation cover that can be used in airfields that is not attractive to birds and other wildlife as outlined in Phase One below.

This will be achieved using a phased approach as described below. Note that the current project will include Phases One, Phase Two and Three are for future funding, if required and are included here for context and should not be included in current proposal. The broader objectives of this initiative include the following three phases:

#### **Phase One Project: Controlled Testing (Current Scope of Work)**

- 1) Identify plant candidates that meet certain testing criteria.
- 2) Establish test plots in a controlled environment such as a greenhouse.
- 3) Eliminate plants that fail to meet the testing criteria.

#### **Phase Two Project: Field Testing (Unfunded: Potential Future Modification to Scope of Work or New Award)**

- 1) Establish outdoor test locations for plants that met testing criteria in the controlled environment.
- 2) Monitor and test the outdoor testing locations for a specified period.
- 3) Select a plant or plants that are successful in the outdoor test locations.
- 4) Develop report and presentations.

#### **Phase Three Project: Implementation Phase (Unfunded: Potential Future Modification to Scope of Work or New Award)**

- 1) Identify a location in which to remove current vegetation and plant the new alternative airfield plant.
- 2) Monitor in a live situation on an active airfield.

- 3) Plant alternative airfield plant in all Region SE locations replacing the current vegetation.

**This scope of work only includes the effort and costs involved to complete Phase One.** Phase Two and Three are for future funding, if required and are included here for context and should not be included in current proposal.

### **C. SERVICES REQUESTED:**

#### **TASK 1 – IDENTIFY ALTERNATIVE PLANT CANDIDATES:**

The Cooperator will conduct a search using a trait-based selection process of plant databases to identify plants that meet the criteria outlined below for initial controlled testing. There are two criteria levels, Primary and Secondary. To be included in Task 2, a plant must meet all the Primary Criteria. Plants can be included that do not meet the Secondary Criteria. The Cooperator in coordination with the Government Representative will narrow selection to no more than ten plant species.

The project will focus on plants that would be successful in United States Department of Agriculture (USDA) Plant Hardiness Zones 8 and 9 in Navy Southeast Region especially focusing on Florida, Mississippi, Alabama, Georgia, Louisiana, and South Carolina. The USDA defines the average annual extreme minimum temperatures for Zone 8 as 10 °F (-12.2 °C) to 20 °F (-6.7 °C) and Zone 9 as 20 °F (-6.7 °C) to 30 °F (-1.1 °C).

#### **Primary Criteria**

- 1) Will grow and thrive in USDA Plant Hardiness Zones 8 and 9.
- 2) Will not exceed 24 inches at maximum height to meet airfield emergency access requirements.
- 3) Will achieve full cover (>85% aerial cover) and will crowd out most other vegetation.
- 4) Will not produce vegetation, fruit, or seeds that are considered a wildlife food attractant.
- 5) Is perennial, will maintain vegetative coverage year-round, and will not go into winter dormancy unless dormancy maintains vegetative coverage.
- 6) Spreads by vegetative means or asexually only.
- 7) Will survive (will not cause mortality) at temperatures that reach a low of 10°F to avoid complete failure of airfield vegetation.
- 8) Requires little or no maintenance after established. No mowing, watering or herbicide application to maintain coverage.

#### **Secondary Criteria**

- 1) Will not exceed 14-inches in height.
- 2) Does not have flowers that attract large numbers of insects.
- 3) Is a native species.
- 4) Is a greater carbon sink than grass.
- 5) Absorbs more heat than grasses.
- 6) Does not shed large portions of vegetation producing Foreign Object Debris (FOD).

## **TASK 2 – ESTABLISH AND TEST GREENHOUSE PLOTS:**

The Cooperator will develop a Work Plan to test the Primary and Secondary criteria for Navy review and approval. The Work Plan will outline the methods and metrics that will be used to test the Primary and Secondary criteria for plants grown in a controlled location such as a greenhouse or growth chamber. Temperature, humidity, light, and moisture will be controlled to best approximate USDA Plant Hardiness Zones 8 and 9. The Cooperator will monitor the plants for one year in accordance with the Work Plan to provide information on the following:

- 1) Growth form, method of spread, and height at maturity.
- 2) Percent of coverage during all 4 seasons under simulated climate conditions.
- 3) General health throughout growth year, looking at ability of plant once established to survive long-term with little or no maintenance
- 4) Rate and amount (%) of aerial cover.
- 5) Collect seeds, foliage, and fruits (if applicable) and assess whether they are a wildlife attractant for small mammals and birds.
  - a. Will captive small mammals such a mice, rats, and/or voles feed on fruits and seeds preferring over other available food?
  - b. Will captive seed eating birds such Rock Pigeons (*Columba livia*) and/or House Sparrow (*Passer domesticus*) and/or Java Sparrows (*Lonchura oryzivora*) or similar feed on fruits and seeds preferring over other available food?
  - c. Will foliage be browsed by White-tailed Deer (*Odocoileus virginianus*)
- 6) Longevity of the plant and its ability to regenerate replacement plants past one life cycle. Will the plant need to be replaced after a X-number of years?
- 7) Cold tolerance of plant

Analyze monitoring and testing data to determine if any plant species that met the Primary Criteria. Narrow the selection down to the best candidates using Secondary Criteria if necessary. Select no more than **four species** for field-testing in Phase Two.

## **TASK 3 – FINAL REPORT AND MEETINGS:**

A Draft and Final Report shall be generated that provides details on results of all work, including implementation of the study design, results, discussion, and recommendations. A cost of implementation at a selected airfield will be included. The Draft Report will be sent to the Project Manager for review. Once edits and comments are received on the Draft Report from The Project Manager, the Cooperator will incorporate as needed and deliver a Final Report to the Project Manager within 90 days of receiving the draft comments.

## **MEETINGS:**

The Cooperator shall attend (in person or virtually) a kick-off meeting to be held at Cooperator within two (2) weeks following project award. The intent of the meeting will be to verify the schedule and introduce key personnel. The Cooperator shall also participate in conference calls, up to one-hour call a month for the length of the period of

performance. The intent of these calls will be to define and clarify the specific requirements associated with this project. The Cooperator shall prepare meeting minutes for all meetings, including conference calls. The Cooperator shall submit written meeting minutes, via email, to all meeting participants within seven (7) days of the meeting.

#### **D. DELIVERABLES:**

*Monthly Reports.* The Cooperator shall prepare and submit (via email) monthly progress reports to both the NAVFAC BASH/NR PM. Monthly progress reports shall address: (1) tasks completed during the reporting period, (2) any problems encountered during the reporting period, and (3) tasks to be completed in the next reporting period. In addition, the monthly progress report shall include the percentage of work completed to date, contract number, report date and period, project name, and client name.

*Safety Plan.* The Cooperator shall develop a Safety Plan to identify potential hazards associated with the scope of work and define safe work practices to eliminate or control exposure to those hazards. The Safety Plan will identify the appropriate lines of authority and site-specific responsibilities. It must include a list of emergency contacts and must outline procedures to obtain medical help and to make required notifications. If herbicides are proposed for use on Navy property, the Cooperator must obtain Navy approval prior to use. Herbicide applicators must be licensed and must follow all label instructions and safety data sheet information.

*Work Plan.* The Cooperator shall develop a Work Plan to test the Primary and Secondary criteria. The Work Plan will outline the experimental design, methods and metrics that will be used to test the Primary and Secondary criteria for plants grown in a controlled location such as a greenhouse or growth chamber. Temperature, humidity, light, and moisture will be controlled to best approximate USDA Plant Hardiness Zones 8 and 9. The Work Plan will also include a brief summary of the literature search that led to the selection of test species. Pursuant to Navy approval, the Work Plan will provide the basis of operations for the one-year testing required in Task 2.

*Draft Report.* The Cooperator shall prepare and submit one (1) electronic Draft Report (via email in PDF and WORD) to NAVFAC BASH/NR PM once Task2 is completed. This report should contain typical report sections to include execute introduction, methodologies, results, discussion, and recommendations. The draft should contain preliminary results from Task 1 and 2. The NAVFAC BASH/NR PM shall provide (if there are any) the Cooperator their respective comments, suggestions, or edits within thirty (30) days from the date of submittal of the Draft Report. The Cooperator shall incorporate all comments, suggestions, or edits provided (if there are any) by NAVFAC BASH/NR PM into the Final Report unless NAVFAC BASH/NR PM is consulted and approves of non-incorporation of comment, suggestion, or edit.

*Final Report.* One (1) electronic copy (via email in PDF and WORD) of the Final Report shall be concurrently submitted to NAVFAC BASH/NR PM within ninety (60) days upon receipt of comments from NAVFAC BASH/NR PM on the Draft Report. An

electronic copy of the Final Report (text, tables, figures, and color photos) shall be submitted in Microsoft Word and PDF. All electronic source files for tables and figures shall be labeled and submitted electronically.

*Literature.* The Cooperator may prepare literature publications in cooperation and partnership of the NAVFAC BASH/NR PM. This partnership will include review and edits of the publication and final okay for submittal. This publication shall follow scientific literature standards.

All documents, maps, and illustrations must be of high quality and easily reproducible on standard or color copiers. Pages intentionally left blank shall be labeled as such.

All deliverable documents and maps, charts, etc. will also be delivered in electronic format, PDF, Microsoft Office Word and in jpeg formats. Files must be delivered in electronic formats that can be altered or updated by the Government.

All databases containing raw data and all associated electronic data summary and analytical files shall be formatted in Excel, Word, or any compatible Microsoft database software and submitted to the NAVFAC BASH/NR PM electronically. Microsoft ACCESS files shall include all queries, reports, tables etc. All geospatial data developed as a part of this project shall be compatible with the Regional NAVFAC geodatabase, specifically the datum, coordinate system and projection, and adhere to the Navy's current version of the approved GIS Data Model.

#### **E. ROLE OF GOVERNMENT PERSONNEL (Government)**

1. Substantial Government involvement in all tasks is expected. Government personnel will
  - a) assist in determining study design including quantitative / qualitative methods to be used to test Primary and Secondary Criteria and assist in the study processes at the greenhouses;
  - b) visit greenhouse facilities to observe and assist in plant care and data collection;
  - c) give substantive input on final plant selection to be included in Phase One;
  - d) coordinate preliminary results of Phase One with other Navy stakeholders and make final decisions on which plants can be considered for future phases; and,
  - e) provide substantive input on deliverables to ensure they are sufficient to support future work in other phases.
2. The Government will participate in the planning and implementation of each task described in the scope of work and will prioritize tasks based on mission requirements.
3. The Government will furnish materials including electronic copies of technical reports and other documents that provide information about Navy airfields in the southeast US, as requested by the Cooperator.
4. The Government will coordinate access to any Navy base with an airfield as necessary for the purposes of this project. Base access for Phase One is not anticipated.

**F. ROLE OF THE COOPERATOR**

1. To furnish all materials, equipment, supplies, labor and services necessary to conduct the aforementioned technical assistance and tasks.
2. To equip their personnel with gear necessary to complete the tasks including, but not limited to, digital camera, sampling equipment, personal computers with necessary software / internet access, scientific literature databases and inter-library loans, and personal protective equipment.
3. To comply with all Occupational Safety and Health Administration (OSHA) requirements. To conduct all activities safely in accordance with the approved safety plan. The Cooperator is liable for the safety of its personnel and representatives conducting work under this agreement.

**G. COORDINATION:**

The Cooperator shall coordinate directly with the NAVFAC BASH/NR PM on this project for all technical issues and direction. The Cooperator shall assign a project manager for this project, and shall advise the NAVFAC BASH/NR PM if a change of project manager is necessary during the execution of this contract.

**H. PERIOD OF PERFORMANCE:**

The period of performance is 16 months after award. Award is anticipated for the summer of 2024, therefore, period of performance is anticipated to be 31 April 2026.

**I. Points of Contact**

**Principle Investigators:**

**NAVFAC Contracting Officer Representative/Project Manager**

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