U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

# CERTIFICATE OF WAIVER

ISSUED TO

**GreenSight Agronomics Responsible Person: Robert Knochenhauer**
**Waiver Number: 107W-2017-03655B**

ADDRESS

**12 Channel Street, Suite 605**
**Boston, MA 02210**

This certificate is issued for the operations specifically described hereinafter. No person shall conduct any operation pursuant to the authority of this certificate except in accordance with the standard, special, and common provisions contained in this certificate, and such other requirements of the Federal Aviation Regulations not specifically waived by this certificate.

OPERATIONS AUTHORIZED

sUAS operations beyond the visual line of sight by the remote pilot in command (PIC), who is the manipulator of the small unmanned aircraft, in lieu of visual line of sight (VLOS).

LIST OF WAIVED REGULATIONS BY SECTION AND TITLE

**14 CFR § 107.31 Visual line of sight aircraft operations**

## STANDARD PROVISIONS

1. A copy of the operating documents made for this certificate shall be attached to and become a part thereof.
2. This certificate shall be presented for inspection upon the request of any authorized representative of the Administrator of the Federal Aviation Administration, or of any State or municipal official charged with the duty of enforcing local laws or regulations.
3. The holder of this certificate shall be responsible for the strict observance of the terms and provisions contained herein.
4. This certificate is nontransferable.

NOTE—This certificate constitutes a waiver of those Federal rules or regulations specifically referred to above. It does not constitute a waiver of any State law or local ordinance.

## SPECIAL PROVISIONS

Special Provisions Nos. 1 to 29, inclusive, are set forth on the attached pages.

This Certificate of Waiver is effective from May 16, 2018 to January 31, 2022 and is subject to cancellation at any time upon notice by the Administrator or an authorized representative.

**BY DIRECTION OF THE ADMINISTRATOR**
JOSEPH V FAGAN JR
Digitally signed by JOSEPH V FAGAN JR
Date: 2018.05.17 07:14:05 -04'00'
**General Aviation and Commercial Division, AFS-800**

**SPECIAL PROVISIONS ISSUED TO**
**GreenSight Agronomics**

**General.**

This Certificate of Waiver is an amendment which supersedes and replaces Waiver 107W-2017-03655A issued to GreenSight Agronomics for operations under 14 CFR 107.31. Waiver 107W-2017-03655A is no longer valid.

The FAA's Flight Standards Service has reviewed your application and supporting documents to ensure compliance with the requirements of 14 CFR § 107.200. The Administrator finds that the proposed small Unmanned Aircraft System (sUAS) operation can be conducted safely under the provisions of this Certificate of Waiver (Waiver) as listed below because you have established adequate mitigations for risks involved with operating the sUAS in the manner you described. Adherence to the provisions of this Waiver establishes a level of safety that ensures safe operations within the national airspace system.

This Waiver may be canceled at any time by the Administrator, the person authorized to grant the Waiver, or the representative designated to monitor a specific operation. As a general rule, this Waiver may be canceled when it is no longer required, there is an abuse of its provisions, or when unforeseen safety factors develop. Failure to comply with any provision listed below is a violation of the terms of this Waiver and may serve as justification for cancellation.

**List of Regulations Waived by Section and Title.** The following regulations are waived:

> **14 CFR § 107.31,** Visual line of sight aircraft operation, is waived to the extent necessary to allow the remote pilot in command (PIC) to operate a small unmanned aircraft (sUA) without the ability to see the sUA throughout the entire flight. In lieu of the ability to see the sUA throughout the entire flight, another remote pilot who holds a valid remote pilot certificate under part 107 must act as a Visual Observer (VO)[1] and exercise the ability to see the sUA throughout the entire flight on behalf of the remote PIC who is directly responsible for operation of the sUAS in accordance with § 107.19.

**Common Provisions**. The Responsible Person is directly responsible for safety of operations conducted under this Waiver and will ensure all persons who fulfill duties in accordance with this Waiver comply with all provisions of this Waiver. Such persons include, but are not limited to, the remote PIC, any other remote pilot fulfilling the duties of this Waiver, person who is manipulating the controls, and VO.

1. The Responsible Person listed on the Waiver is responsible for the safe conduct of the operations. Prior to conducting operations that are the subject of this Waiver, the Responsible Person:

a) Must ensure the remote PIC and VO are informed of the terms and provisions of this Waiver and the strict observance of the terms and provisions herein,
b) Must ensure the remote PIC and VO are informed and familiar with part 107 regulations not waived, and
c) The Responsible Person must keep a log of the communications to establish compliance with subparagraphs (a) and (b) of this paragraph. This log must be presented for inspection upon request by the Administrator or an authorized representative.

[1] A visual observer is a person who is designated by the remote pilot in command to assist the remote pilot in command and the person manipulating the flight controls of the small UAS to see and avoid other air traffic or objects aloft or on the ground.

2. This Waiver must not be combined with any other waiver(s), authorizations(s), or exemption(s) without specific authorization;
3. Operations under this Waiver may only be conducted in Class G airspace unless a separate airspace Certificate of Waiver or Authorization specifically stating operations may be conducted in controlled airspace is received from the FAA, in accordance with § 107.41;
4. The FAA has the authority to cancel or delay any or all flight operations in order to maintain safety or to ensure compliance with the terms of this Waiver;
5. The Responsible Person listed on this Waiver must maintain a current list of sUA by registration number(s) used in the Responsible Person's operations. This list must be presented for inspection upon request by the Administrator or an authorized representative;
6. The Responsible Person listed on this Waiver must maintain a current list of pilots by name and remote pilot certificate number used in the Responsible Person's operations. This list must be presented for inspection upon request by the Administrator or an authorized representative;
7. A copy of this Waiver must be available during the sUAS operations that are the subject of this Waiver;
8. The Responsible Person must ensure a remote PIC who holds a valid remote pilot certificate under part 107, is designated at all times during any operation that will occur in accordance with this Waiver. See § 107.19 for a description of the responsibilities and duties of the remote PIC. The Responsible Person must have a procedure for positive, unequivocal designation of the person who is acting as the remote PIC. This procedure must include a three-step positive transfer of controls. Upon such transfer, the responsibilities and duties of the remote PIC under § 107.19 will transfer, accordingly.

**§ 107.31 Visual Line of Sight Operations Special Provisions.** The remote PIC may conduct sUAS operations without the ability to see the unmanned aircraft throughout the entire flight, provided:

9. At all times, at least one person who holds a remote certificate under part 107, must maintain VLOS of sUA in order to (1) know the sUA's location, (2) determine the sUA's attitude, altitude, and direction of flight, (3) observe the airspace for other air traffic or hazards, and (4) determine that the sUA does not endanger the life or property of another. The remote pilot who is responsible for maintaining VLOS of the aircraft involved in the operations must maintain effective communication with the remote PIC who is manipulating the flight controls of the sUAS and coordinate with the remote PIC to avoid all potential collision hazards and maintain awareness of the position of the sUA throughout the entire operation;
10. All persons participating in the sUAS operations conducted under this waiver must be physically located within the United States;
11. All persons who participate at any time under this waiver as a remote PIC during sUAS operations subject to this Waiver must, upon request, make available to the Administrator their remote pilot certificate issued under part 107;

12. Prior to operations conducted under this Waiver, the Responsible Person must develop, and the Responsible Person must ensure, the operations manual is made available to the Administrator upon request. As described in the waiver application, the Responsible Person must ensure all operations conducted under this Waiver follow the procedures outlined in the operations manual. If a discrepancy exists between the provisions in this Waiver and the procedures outlined in the operations manual, the provisions of this Waiver take precedence and must be followed;

13. The Responsible Person may update or revise the operations manual. If the Responsible Person determines that any update or revision would affect the ability to comply with any provision of this Waiver or the basis for which the FAA granted this Waiver, then the Responsible Person must apply for an amendment to this Waiver;

14. The operations manual developed by the Responsible Person must contain at least the following items:

    a. Operator name, address, and telephone number,
    b. Method of distribution and revision,
    c. Certificate of Waiver. The operations manual must include a copy of the current Waiver(s),
    d. Aircraft description and limitations list by aircraft type and model,
    e. Method to ensure safety of non-participating persons and aircraft,
    f. Safety briefing,
    g. Method of communications,
    h. Normal operating procedures,
    i. Abnormal operating procedures,
    j. Emergency procedures,
    k. Crew Resource Management,
    l. Risk management, and
    m. Accident Notification. The operations manual must contain procedures for notification and reporting of accidents in accordance with this Waiver;

15. The Responsible Person must ensure that a copy of the current operations manual, including a copy of this Waiver, is available to all remote PICs involved with the operation during sUAS operations that are the subject of this Waiver;

16. Prior to operations under this Waiver, all persons who will act as remote PIC, participate in the operation as a remote pilot certificated in accordance with part 107, subpart C, or act as a VO in furtherance of the operation must participate in a safety briefing that addresses at minimum, the following items:

    a. Designated positions and responsibilities/Crew Resource Management,
    b. Flight operating area,
    c. Designated launch and recovery area,
    d. Verification of geo-fence boundaries,
    e. Normal procedures,
    f. Abnormal procedures, and
    g. Emergency procedures;

17. The Responsible Person listed on this Waiver must ensure each remote PIC is trained in a manner consistent with how the sUAS will be operated under this Waiver. All training and demonstration for any remote PIC and VO must be documented and made available upon request by the Administrator or an authorized representative. Training operations may only be conducted under the standard requirements of part 107 (without waiver). The training must include:

    a. sUA limitations,
    b. sUA programming,
    c. sUA operational procedures,
    d. Abnormal and contingency procedures,
    e. Evasive and emergency procedures,
    f. Crew Resource Management,
    g. sUA flight training, and
    h. A demonstration of sUA ground and flight skills;

18. All sUA operations conducted in accordance with this Waiver must comply with the manufacturer User Manual, including recommendations and limitations;

19. Prior to conducting operations under this Waiver, the remote PIC must establish, and during operations conducted under the terms and conditions of this Waiver, the remote PIC must maintain continuous full-duplex hands-free audio communications with the on-site part 107 certificated airman who is acting as VO. The full-duplex audio communications must occur over an independent transmission and reception system, and not be dependent on the ground station method of data transmission and reception;

20. Communication between the remote PIC and remote pilot acting as VO must allow for the remote PIC to maneuver the sUA with sufficient time to fulfill the existing requirements of part 107 that the FAA does not waive, which include:

    a. Giving way to all other aircraft,
    b. Reacting to any unforeseen operational or mechanical failure without creating a hazard to other people, other aircraft, or property in the event of a loss of control of the sUA for any reason, and
    c. Maneuvering the sUA whenever necessary to maintain compliance with this Waiver as well as the limitations and requirements codified in part 107;

21. Prior to operations subject to this Waiver, the command and control links must be tested and verified to function as described in the waiver application;

22. The remote PIC and the on-site part 107 certificated airman who is acting as VO must have access to a real-time display of sUA altitude, sUA position, and sUA direction of flight information. This information must be available at all times to the remote PIC and remote pilot who is acting as the VO;

23. The sUA ground station displays must audibly and visually alert all remote pilots involved in the operation of any degradation in sUA that may affect compliance with any requirement of this Waiver or with any provision of part 107;

24. The sUA must have pre-programmed and available contingency and emergency profiles to avoid overflight of persons or overflight of non-participants;

25. The Responsible Person must maintain each sUAS and its components in accordance with manufacturer's instructions and recommendations. A log of all maintenance performed must be kept for each sUAS operated under this waiver, and available to the remote PIC to review prior to conducting operations that are the subject of this waiver. Each sUAS maintenance log must be presented for inspection upon request from the Administrator or an authorized representative;

26. Any sUAS that has undergone maintenance must undergo a functional test flight prior to conducting operations under this Waiver. A log entry must be made for each functional test flight. The log entry must contain at minimum the:

    a. Calendar date,
    b. sUAS registration number,
    c. Remote PIC who performed the functional test flight,
    d. Duration of the flight, and
    e. the result of the functional flight test;

27. Operations conducted subject to this waiver must cease immediately if, at any time:

    a. Safety of human beings or property on the ground or in the air is in jeopardy;
    b. There is a failure to comply with the provisions of this Waiver;
    c. Full-duplex communications cannot be maintained;
    d. There is a loss of sUA command and control link;
    e. There is a failure of sUA offsite ground control station communication link;
    f. A non-participating vehicle, aircraft, or person enters the operating area;
    g. There is a loss of sUA GPS signal; or
    h. There is degraded sUA GPS location information;

28. Flight operations recordkeeping requirements. Records shall be retained for a period of 90 days after the expiration date of the Waiver. The Responsible Person shall keep at its principal business office or at other places approved by the Administrator, and provide the Administrator on a monthly basis by email to 9-AFS-820-Part107Reports@faa.gov, the following:

    a. For each sUA flight conducted under the terms of this waiver:
        i. Registration number of the sUA,
        ii. Make and model of the sUA,
        iii. Name and certificate number of the remote PIC,
        iv. Name and certificate number of the onsite part 107 certificated airman (VO),
        v. Location of the remote PIC during the sUA flight,
        vi. Location of the sUA, and
        vii. Duration of the sUA operation;

    b. sUA equipment malfunctions. sUA equipment malfunctions include, but are not limited to, the following:
        i. Onboard flight control system,
        ii. Any portion of the navigation system to include GPS functionality,
        iii. Power plant malfunction or failure,
        iv. Battery malfunction or failure,
        v. Electrical power system malfunction or Control station malfunction or failure;

29. sUAS operations subject to this Waiver must occur at the following location as described in the waiver application:

    a) Outlaw Golf Course, 40890 N Cave Creek Road, Scottsdale, AZ 85262.

    b) Meadow Club Golf Course, 1001 Bolinas Road, Fairfax, CA 94930

    c) Lake of the Isles Golf Course, 1 Clubhouse Drive, North Stonington, CT 06359

    d) Fall River Country Club, 4232 N. Main St. Fall River, MA 02720

    e) Somerset Hills Country Club, 180 Mine Mt. Road, Bernardsville, NJ 07924

    f) National Golf Links of America, 149 Sebonac Inlet Rd, Southhampton, NY 11968