

MARCH 2025



Spray Drone Proposal

Implementing Drone Spraying for Asset
Management Purposes

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Overview of Technology

At the forefront of modern cleaning solutions, spray drone technology is transforming the way we approach building and infrastructure maintenance. With advancements in drone capabilities—such as longer flight times, larger tank capacities, and the flexibility of tethered and non-tethered systems—these drones are rapidly becoming the preferred tool for our building washing operators.

The versatility of using either tethered or non-tethered drones allows for operations to be tailored to specific job requirements.



TETHERED DRONES

Tethered drones, with their continuous water and chemical supply, are especially well-suited for cleaning building facades with precision and efficiency. For these operations we use the industry leading equipment manufactured by Lucid, a renowned robotics company based in the United States. Their innovative design and cutting-edge technology have set the standard for excellence in this field.



NON - TETHERED DRONES

Non-tethered drones are the ideal solution for roof cleaning, delivering unmatched maneuverability and the freedom to access hard-to-reach areas without the limitations of a tether. Leading the way in this category are the DJI Agras T50 and the XAG P100 Pro, both equipped with impressive tank capacities sitting at 50 litres, making them powerhouses for large-scale cleaning operations.

Legislation & Qualifications

To legally operate spray drones for the purpose of washing buildings and infrastructure in New Zealand the company along with the drone pilot(s) must hold the appropriate training and certifications requirements.

The company engaging in spray operations must hold an Unmanned Aircraft Operator Certificate. To obtain this the company must write what's known as an 'Exposition'. This is an extensive suite of manuals outlying procedures, drone maintenance protocols, hazard and risk registers as well as training and certification requirements.

The exposition is then submitted to CAA (who govern all drone operations) to be reviewed and subsequently approved.

We've partnered with New Zealand's leading drone training and consultancy business; [DroneMate](#) which has developed a pathway to train, certify, and implement successful spray drone programs across both the Asset Management and Agricultural sectors.

It was the first to implement the pathway of 'Aerial Asset Operations' awarded to pilots who go through an intensive training program. This rating is in place for training and certifying pilots to operate with the sole purpose of applying product to buildings and structures using a tethered or non-tethered drone platform.

Common products such as "Wet and Forget" or "30 Seconds" or similar are considered to be a domestic pesticide and therefore defined as agrichemicals by both the EPA and CAA. Holding a current Aerial Asset Operations rating allows us to apply these products using a spray drone.

TRAINING & CERTIFICATION PATHWAY



Develop Company Exposition



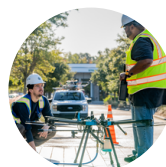
Prime Person Interview with CAA



Part 102 Pilot Certification



Pilot Chemical Rating Course



Drone Type Rating



Operational Competency Assessment



Aerial Asset Operations Rating Certificate Issue



Methodology

Spraying buildings & infrastructure with drones.

1

Survey Drone and Data Processing Carried Out

A smaller survey drone flies over the intended spray area and gathers data which is then processed into a 3D digital twin.

2

Automated Spray Plans Built Using 3D Data

Our drone pilot uses the 3D point cloud to program a safe and effective flight route, drawing around obstacles and on-site hazards.

3

Job Safety Assessment And Associated Documentation Completed

CAA approved Part 102 procedures are in place and utilized to minimise risk levels across the operation.

4

Equipment Set Up & Pre-Flight Checks

The pilot, in conjunction with their ground crew and observers, initiate equipment set up, conduct a site briefing, work through pre-flight checklists and cordon off safety buffers.

5

Mission Executed and Reconciled

The non-tethered spray drone will initiate it's automated spray missions to clean the roofs. The tethered drone will be flown manually to wash the facades and windows.

One of the most significant advantages of spray drones is their remarkable speed in completing tasks. By eliminating the need for cumbersome setups such as scaffolding, cherry pickers, or ladders, spray drones can substantially reduce the time required for cleaning buildings and infrastructure.

As a result, large-scale projects that previously took days or even weeks can now be finished in a fraction of the time, minimizing disruption and enabling clients to resume normal operations more swiftly.

Effective pre-planning is crucial for spray drone operations. Considering an availability of an average total of 120 acceptable flying days per year due to weather conditions, we plan for multi-day operational windows and collaborate closely with you to execute the work as soon as conditions allow.

Methodology

Continued...



Pictured: Point cloud generated from survey drone used as base map for spray route planning.

CHEMICAL & HOT WASH SOLUTIONS

For single-story buildings, the facades can often be sprayed efficiently by on-ground crews, while the roof is handled by the spray drone for thorough coverage. However, for structures over two stories, the spray drone becomes essential, ensuring safe and effective cleaning of both facades and roofs without the need for scaffolding or elevated work platforms.

During a standard spraying operation, the process begins with cleaning the roofs. This approach ensures that any runoff or residual spray from the roof is effectively washed away during the subsequent cleaning of the facades. Once the roof is complete, the facades are saturated with cleaning solutions, allowing the chemical to penetrate and work overnight. The next day, the tethered drone focuses specifically on the windows, meticulously washing away any dried chemical spots to ensure a spotless, professional finish.

It is essential to note that spray drones are not intended for restorative building cleaning but are instead used for regular maintenance to preserve a building's condition. With significantly reduced onsite times—measured in days rather than weeks or months—this approach makes regular maintenance highly efficient and cost-effective.

If a building is in poor condition, a more manual and labor-intensive cleaning process will be required initially to restore it to a satisfactory "on-condition" state. Once this baseline is achieved, spray drones can take over, ensuring the building remains well-maintained with regular, efficient cleaning operations.



Alternatively, we can use hot deionized water for cleaning, which eliminates the need for chemical solutions. This method is particularly effective for environmentally sensitive areas or locations where chemical runoff is a concern. Hot deionized water works by breaking down dirt, grime, and organic matter at a molecular level. The heat helps to dissolve stubborn contaminants, while the deionization process removes minerals and impurities from the water, preventing streaking or spotting on surfaces.

The hot deionized water is delivered through high-precision nozzles on the spray drone, ensuring even coverage and maximum cleaning efficiency. This approach is especially beneficial for glass surfaces, as it leaves a pristine finish without requiring additional rinsing. Additionally, the absence of chemicals means there is no risk of residue buildup, making it an excellent choice for buildings with delicate materials or areas with strict environmental regulations.

Both cleaning methods—chemical-assisted spraying and hot deionized water—offer unique advantages, allowing property managers to choose the best solution based on their building's specific needs. With spray drone technology, routine maintenance is not only faster and safer but also adaptable to different cleaning requirements, ensuring buildings remain in top condition year-round.



An aerial view of a drone with a white tank and blue nozzles spraying a blue liquid onto a grey corrugated metal roof. The drone is positioned over a residential area with green trees and a blue ocean in the background.

Name:	Roof Spraying and Façade Cleaning Operation	Flight Area	Authority Library	NOTAMS
UID:	3657-20241118-023356-73783			
Objective:	To conduct a spray operation.			
Objective Description:	To spray all the rooves and facade inside the target area of the School.			
Crew Notes:	Ground crew to have PPE and handheld radios.			
	Cordon off access to the west of site.			
	All pedestrians clear as school holidays - observers to remain vigilant.			
Date/Time:	18/11/2024 18:31 NZDT			
Time of Day:	DAY			
Visual Line of Sight:	VLOS			
Estimated Duration:	1h 0m 0s			
Operation Type:	Commercial			
Mission Type:	Standard			
Remote Pilot In Command:	Jonathan Lopardo # -			
Additional Crew:				
RPA:	AT Agras T40 (2) Serviceable			
Equipment:				
Location:	Roof Spraying and Façade Cleaning Operation			
Planned Max Height:	400 ft (AGL)			
Emergency Contacts:				

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Resources Required



The success of spray drone operations relies on a coordinated team of professionals and robust equipment. Highly trained pilots are at the heart of the process. For tethered drones, pilots focus on intricate facade cleaning, utilising a continuous water supply to ensure smooth operations and precise cleaning. Pilots undertaking roof cleaning utilize their expertise to program and manoeuvre un-tethered drones effectively in environments that demand thorough pre-built automated spray missions.

Supporting the pilots is a ground crew responsible for managing critical equipment like pumps, tether systems, and generators. Their role ensures the operation runs seamlessly, maintaining uninterrupted water flow and power supply. Observers are equally essential, monitoring safety zones and managing traffic in busy or public areas. This ensures the public and the team are kept safe while operations proceed without disruption.

The equipment itself plays a vital role in enabling these advanced cleaning techniques. High-capacity pumps and reliable generators are used to deliver consistent power and water supply, allowing for efficient cleaning regardless of the scale of the project. The tether system for facade work is meticulously managed to prevent tangles or accidental disconnections, while non-tethered setups are optimized for maximum range and flexibility.

Together, this combination of skilled personnel and cutting-edge technology ensures spray drone operations are not only efficient but also safe and adaptable to various challenges. Every detail, from preflight checks to post-operation inspections, is managed with precision, guaranteeing a professional and reliable service.

