STATE OF MICHIGAN
IN THE SUPREME COURT

On Appeal from the Court of Appeals
(Jansen, P.J., Gleicher, C.J., and Ronayne Krause, J.)

LONG LAKE TOWNSHIP,

Plaintiff-Appellee,

v

TODD MAXON AND HEATHER MAXON,

Defendants-Appellants.

Supreme Court Case No. 164948

Court of Appeals Case No. 349230

Grand Traverse CC No. 18-034553-CE

AMICUS CURIAE BRIEF OF PROJECT FOR PRIVACY AND SURVEILLANCE ACCOUNTABILITY, INC., IN SUPPORT OF DEFENDANTS-APPELLANTS TODD MAXON AND HEATHER MAXON

Nicholas P. Miller (P70694)
Schaerr | Jaffe LLP
1717 K St. NW
Suite 900
Tel.: (202) 599-6101
Email: nmiller@schaerr-jaffe.com

Gene Schaerr*
Schaerr | Jaffe LLP
1717 K St. NW
Suite 900
Tel.: (202) 361-1061
Email: gschaerr@schaerr-jaffe.com

Attorneys for Amicus Curiae
Project for Privacy and Surveillance
Accountability, Inc.
**Pro Hac Vice* motion forthcoming

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INTRODUCTION AND INTEREST OF *AMICUS*[1]

In response to a run-of-the-mill zoning dispute, Long Lake Township spent years surreptitiously surveilling the Maxon's property without a warrant. They used drones for this surveillance for good reason: They are hard to detect, fly low to the ground, are precisely maneuverable, and are very inexpensive, thus enabling—as this case shows—invasive surveillance over relatively frivolous issues. (And the surveillance capacity of the drone used here was mild compared to more modern drones, with thermal vision, autonomous navigation, and more.) This case, then, powerfully illustrates not only the ease with which drones enable invasive surveillance for even frivolous reasons, but also why the Fourth Amendment protects against drone surveillance without a warrant, and why such searches need to be deterred, at least in civil cases, by applying the exclusionary rule.

The application of the Fourth Amendment to drone surveillance is an issue of enormous importance to *Amicus* Project for Privacy & Surveillance Accountability (PPSA), a nonprofit, nonpartisan organization focused on protecting Fourth Amendment rights from high-tech threats to privacy. To hold that Americans have no reasonable expectation of privacy from these searches, or that the results of such searches cannot be excluded from evidence even in civil cases, would enable the creation of the kind of technological surveillance state that PPSA works to avoid.

[1] No counsel for a party authored this brief in whole or in part, and no counsel for a party and no party made a monetary contribution intended to fund the preparation or submission of this brief.

BACKGROUND

In 2008, Long Lake Township sued the Maxons, alleging the pile of old cars and other scrap material on their property "'constitute[d] an illegal salvage or junk yard' in violation of" a zoning ordinance. *Long Lake Twp. v. Maxon*, 336 Mich. App. 521, 525, (2021) (*Maxon II*). The Township settled, agreeing not to pursue its claim if the Maxons did not grow their scrap pile. *Id.* But the Township grew suspicious that the Maxons had broken the deal. So in 2010, 2016, 2017, and 2018, it took extreme measures and hired Zero Gravity Aerial, a private drone photography business, to investigate the scrap pile on the property. The Township did not obtain a warrant. *Id.* at 524-526.

Based on the photographs, the Township filed a civil action alleging a violation of the settlement agreement, the zoning law, and a nuisance law. *Id.* at 525. At their civil trial in the Circuit Court of Michigan, the Maxons moved to suppress the drone photographs, but the motion was denied. *Long Lake Tp. v. Maxon*, No. 2018034553CE, 2019 WL 12312060, at *1 (Mich.Cir.Ct. May 16, 2019) (*Maxon I*).

On appeal, the Michigan Court of Appeals held that the search violated the Fourth Amendment. *Maxon II*, 336 Mich. App. at 542. The Township petitioned for review in this Court, which remanded with orders to consider whether the exclusionary rule applies to the drone-derived evidence. *Long Lake Twp. v. Maxon*, 509 Mich. 981, 973 (2022) (*Maxon III*). The Court of Appeals held that it did not, first stating that the exclusionary rule categorically does not apply to civil zoning proceedings, then arguing that the deterrence of unlawful searches from exclusion would be outweighed by exclusion's social costs. *Long Lake Twp. v. Maxon*, No. 349230, 2022 WL 4281509, at *4-*7 (Mich. Ct. App. Sept. 15, 2022) (*Maxon IV*). The Maxons have now appealed that ruling.

ARGUMENT

As shown in Section I below, the Court of Appeals was correct in holding that the drone surveillance of the Maxon's property violated the Fourth Amendment. Section II further demonstrates that the Court of Appeals was wrong in holding that the illegally obtained evidence is not subject to the exclusionary rule, and thus could be introduced in a civil proceeding against the Maxons.

I. Under a proper Fourth Amendment analysis, Americans possess a reasonable expectation of privacy against surveillance by drone surveillance systems like Zero Gravity, and such surveillance therefore requires a warrant.

In its landmark ruling in *Carpenter v. United States,* 138 S. Ct. 2206 (2018), the Supreme Court made clear that the Fourth Amendment applies to new technologies—in that case location information derived from mobile phones—as well as technologies available during the Founding period. *Id. at 2213-14*. And the Court reiterated its prior holding that "application of the Fourth Amendment depends on whether the person invoking its protection can claim a . . . 'legitimate expectation of privacy' that has been invaded by government action." *Smith v. Maryland*, 442 U.S. 735, 740 (1979).

Here there is no question that Zero Gravity's drone surveillance invaded the Maxons' privacy, or that the use of drones for government surveillance represent a tremendous threat to every American's privacy. Even Zero Gravity's simple drones can collect more information, of a more intimate nature, than normal overflights because of their precise maneuverability, ability to fly low, and high-definition, easily maneuverable cameras.[2] But modern drones have thermal cameras and other sensors that are an extraordinary escalation of the overflights involved in cases like *California v. Ciraolo*, 476 U.S. 207, 215 and in *Florida v. Riley*, 488 U.S. 445, 449,

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[2] For example, the DJI Matrice 300, "one of the most popular commercial drone platforms," can maintain position with a near perfect precision of 10 centimeters, both horizontally and vertically, when hovering, even in windy conditions. Czyza et al., *Assessment of Accuracy in Unmanned Aerial Vehicle (UAV) Pose Estimation with the REAL-Time Kinematic (RTK) Method on the Example of DJI Matrice 300 RTK*, 23 Sensors 2092 et seq (2023). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9962678. Another DJI Drone, the Phantom, is able to provide such precision and stability that it can be used to reconstruct a landscape with accuracy "up to the cm level." Gupta & Shukla, *Application of drone for landslide mapping, dimension estimation and its 3D reconstruction*, 46 Journal of the Indian Society of Remote Sensing 903-14 (2018). Zero Gravity routinely flew its drone at "less than 400 feet," even at 1 A.M. Appellee's App. At 097T (Dennis Wiand affidavit).

(1989), which used either a simple camera or "naked eye" observation. And "sensor fusion" techniques exacerbate this by combining data from multiple sensors to extract even more information—significantly more than in *Kyllo*, 533 U.S. at 35. Zero Gravity's drone might not be able to observe more people than a traditional overflight, but modern drones have sophisticated animal herd tracking algorithms that could be applied to surveil large numbers of people.[3] Zero Gravity's drone also has greater maneuverability and precision than a normal overflight,[4] and so is more difficult to escape than normal overflight surveillance. Ane even more modern drones can facilitate almost entirely inescapable, round-the-clock surveillance through improved hardware, facial-recognition software, and drone swarming techniques.[5] *Compare United States v. Jones*, 565 U.S. 400, 430 (2012) (Alito, J., concurring) ("longer term GPS monitoring ... impinges on expectations of privacy."). Modern drones can also incorporate lightweight cell-site simulator devices that force automatic data disclosure,[6] and thus violate *Carpenter* directly. Zero Gravity's drone was also orders of magnitude cheaper than a traditional overflight,[7] encouraging widespread surveillance. And modern drones will become even cheaper and easier to use, and cheaper to outfit with advanced features as AI becomes more powerful.[8]

As shown below, under each of the factors specified in *Carpenter,* the public has a reasonable expectation they will be protected from warrantless drone surveillance, whether they are essentially just an ultra-maneuverable flying camera like Zero Gravity's drone or science-fiction-like modern machines.

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[3] *See infra* Section I.C.

[4] *See* Czyza et al., *supra* n.2.

[5] *See infra* Section I.D.

[6] *See infra* Section I.F; Mike Ball, IMSI *& Wi-Fi Catcher Surveillance Devices for Drones,* Unmanned Systems Technology (May 27, 2022) https://www.unmannedsystemstechnology.com/2022/05/imsi-wi-fi-catcher-surveillance-devices-for-drones/

[7] For example, an "affordable" police helicopter, the Bell 505, can cost close to $2 million, while a top of the line surveillance drone can be had for less than $10,000. *See infra* Section I.E.

[8] For example, one Ph.D. Student was able to avoid the cost of compiling an image set to train a drone to detect certain objects, by using AI-generated images. Daito Xing, *UAV Surveillance with Deep Learning Using Visual, Thermal and Acoustic Sensors,* New York University Ph.D. Thesis (2023). https://www.proquest.com/docview/2815083930

A. Under *Carpenter,* a proper understanding of the Fourth Amendment requires preservation of at least the degree of privacy present at the Founding Era, in light of advances in technology.

As *Carpenter* held, a proper application of the Fourth Amendment must "assure preservation of that degree of privacy against government that existed when the Fourth Amendment was adopted." *Carpenter v. United States,* 138 S. Ct. 2206, 2214 (2018). And the "application of the Fourth Amendment depends on whether the person invoking its protection can claim a . . . 'legitimate expectation of privacy' that has been invaded by government action." *Smith v. Maryland*, 442 U.S. 735, 740 (1979). Thus, to determine when a reasonable expectation of privacy exists, courts should keep "Founding-era understandings in mind when applying the Fourth Amendment to innovations in surveillance tools." *Id*

The Founders adopted the Fourth Amendment largely in response to "the reviled 'general warrants' and 'writs of assistance' of the colonial era, which allowed British officers to rummage through homes in an unrestrained search for evidence of criminal activity." *Carpenter, 1*38 S. Ct at 2213. They aimed to "secure the privacies of life against arbitrary power" and "to place obstacles in the way of a too permeating police surveillance." *Id.* At 2313.

Accordingly, when new technologies create a level of surveillance incompatible with founding era privacy and modern social life, the government must obtain a warrant to use them. For example, as the Supreme Court held in *Carpenter,* "while ordinary overflights—reminiscent of commercial overflights—do not require a warrant so long as they use visual observation or a simple camera, overflights with sense-enhancing technology, such as thermal vision, do." *Id.* at 2217; *accord Kyllo v. United States*, 533 U.S. 27, 38 (2001) (Use of thermal imaging required a warrant, and "[l]imiting the prohibition of thermal imaging to 'intimate details' would not only be wrong in principle; it would be impractical in application"); *Florida v. Riley*, 488 U.S. 445, 449, (1989) (overflight and observation by "naked eye" did not require a warrant); *California v. Ciraolo,* 476 U.S. 207, 215 (1986) (overflight using a simple 35mm camera did not require a warrant).

As the Supreme Court further held in *Carpenter*, courts evaluating an expectation of privacy against a surveillance technology should consider (1) the amount and intimacy of information collected, (2) the number of people surveilled, (3) inescapability of the surveillance, (4) whether there is automatic disclosure of information, and (5) the cost of the surveillance. *See, e.g.,* Matthew Tokson, T*he Aftermath of Carpenter: An Empirical Study of Fourth*

Amendment Law, 2018-2021, 135 Harv. L. Rev. 1790, 1800 (2022).[9]

But this cannot be applied in a mechanical way, only considering the technology actually used in each particular case. That would leave the public "at the mercy of advancing technology," *Carpenter,* 138 S. Ct. at 2213. Instead, "the rule the Court adopts 'must take account of more sophisticated systems that are already in use or in development.'" *Id.* At 2218 (quoting *Kyllo*, 533 U.S. at 36).

As shown below, under each of the *Carpenter* factors, the public has a powerful expectation of privacy vis-à-vis drone surveillance.

B. Drones can collect significantly more information, of a more intimate nature, than traditional overflights.

As to the first factor—the amount and intimacy of information collected—Zero Gravity's drone was already capable of collecting more information than a normal overflight. It had a precision camera, that was fully maneuverable, with significant zoom capabilities, and it could hover anywhere from an undetectable height to near-ground level with almost zero perturbation[10] —something neither a traditional plane nor helicopter could accomplish. Surveillance using Zero Gravity's system was and is thus comparable to a physical search.

But modern drones collect so much information, of such an intimate nature, they can be *more invasive* than traditional physical searches**.** They can see around walls, see in the dark, track people by heat signatures, and recognize and track specific people by their face.[11] They use

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[9] The *Carpenter* test synthesizes and expands on pre-existing jurisprudence from *Katz v. United States*, 389 U.S. 347 (1967) and its progeny, and adds in factors more applicable to technological surveillance. *See* Matthew Tokson, *The Emerging Principles of Fourth Amendment Privacy*, 88 Geo. Wash. L. Rev. 1, 27 (2020) (discussing "the emerging Fourth Amendment principles of intimacy, amount, and cost" in *Katz*-test cases). Some formulations of *Carpenter* enumerate the factors differently, without altering the substance. For instance, Justice Alito's dissent characterized it as a 5-factor test of "intimacy, comprehensiveness, expense, retrospectivity, and voluntariness" which collapses amount of information gathered and number of people surveilled into a single factor. *Carpenter*, 138 S. Ct. at 2234 (Alito, J., dissenting).

[10] Popular commercial drones can achieve perturbation of less than 10 centimeters even in windy conditions Czyza et al, *Assessment of Accuracy in Unmanned Aerial Vehicle (UAV) Pose Estimation with the REAL-Time Kinematic (RTK) Method on the Example of DJI Matrice 300 RT*K, 23 Sensors 2092 et seq (2023). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9962678.

[11] Yossi Hasanah Putri & Hidayat Nur Isnianto, *Implementation of PID control for DJI Telos drone-based human face tracking stabilization*, Gadja Mada University Final Project (Oct. 5., 2023) https://etd.repository.ugm.ac.id/penelitian/detail/224792

sophisticated algorithms to extract even more information from their already superhuman senses.[12] And they can cause an actual physical intrusion, by autonomously navigating around a house, without any human input—or into it.

Drone sensors, moreover, have far surpassed those at issue in the Supreme Court's traditional overflight cases. The high-definition, fully maneuverable cameras which come standard on many drones are concerning, but increasingly popular thermal cameras are even more so.[13] Thermal cameras not only allow drone operators to see in the dark, they also "highlight" people using heat signatures.[14] This enables video-game-like tracking of targets, as in the following image:[15]

[12] *See, e.g.*, Keller et al., *Real-Time 3D Reconstruction in Dynamic Scenes Using Point-Based Fusion*, Proceedings. of Joint 3DIM/3DPVT Conference (3DV) (2013); Krishnan et al., *Fusion of visible and thermal images improves automated detection and classification of animals for drone surveys,* 13 Scientific Reports 10385 (2023) https://www.nature.com/articles/s41598-023-37295-7 (Accessed Oct. 11 2023).

[13] *See* Gupta and Shukla, *supra* n.2 (discussing camera capabilities); Christian Allred, *Drone Thermal Cameras: Everything You Need to Know,* The Drone Life (July 11, 2023) https://thedronelifenj.com/drone-thermal-cameras-everything-you-need-to-know

[14] TurnCircles, *Weather Resistant Long Flight UAV/Drone with FLIR thermal camera and live video stream*. https://turncircles.com/long-flight-uav-drone-flir-thermal-camera-with-live-video-stream (accessed Oct. 12 2023).

[15] *Id.*

Modern drones, moreover, are often sold in "stereo-camera" configuration, enabling reconstruction of 3D images from two 2D cameras packaged together, and can zoom in 20X or more.[16] This goes well beyond the technology in *Kyllo*, 533 U.S. at 35, which simply used "heat radiating from the external surface of the house" to detect marijuana cultivation. *Id.* And such advanced technology can also be deployed with almost no "tech savvy": Ready-made drone packages, specifically designed for thermal surveillance flights, with the ability to create 3-dimensional maps from their footage, can be had for around $6,000.[17]

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[16] *See, e.g.*, DroneFly, *FLIR Vue TZ20 Dual Thermal Camera* https://www.dronefly.com/flir-vue-tz20-dual-thermal-camera-60hz.html (accessed Oct. 11 2023).

[17] Image and pricing from TurnCircles, Weather Resistant Long Flight UAV/Drone with FLIR thermal camera and live video stream. https://turncircles.com/long-flight-uav-drone-flir-thermal-camera-with-live-video-stream; https://turncircles.com/images/thermal_drone_aerial_view_5.webp (accessed Oct. 12 2023)

Furthermore, with modern acoustic sensors, drones could soon "see" with sound—including around walls.[18] This could enable mapping out an entire house through one open window.

Drones can also construct a detailed 3D model of whatever they surveil for later, allowing detailed exploration with a simple interface.[19] This enables days' worth of surveillance from a short flight. How? This is done through sensor fusion, which uses sophisticated statistical techniques to combine data from multiple sensors and extract significantly more detail than either sensor could provide on its own.[20]

To understand how sensor fusion works, consider the following 3D model of an office, created by fusing camera images with rangefinder data.[21] And consider that it was created more than a decade ago, in 2013:

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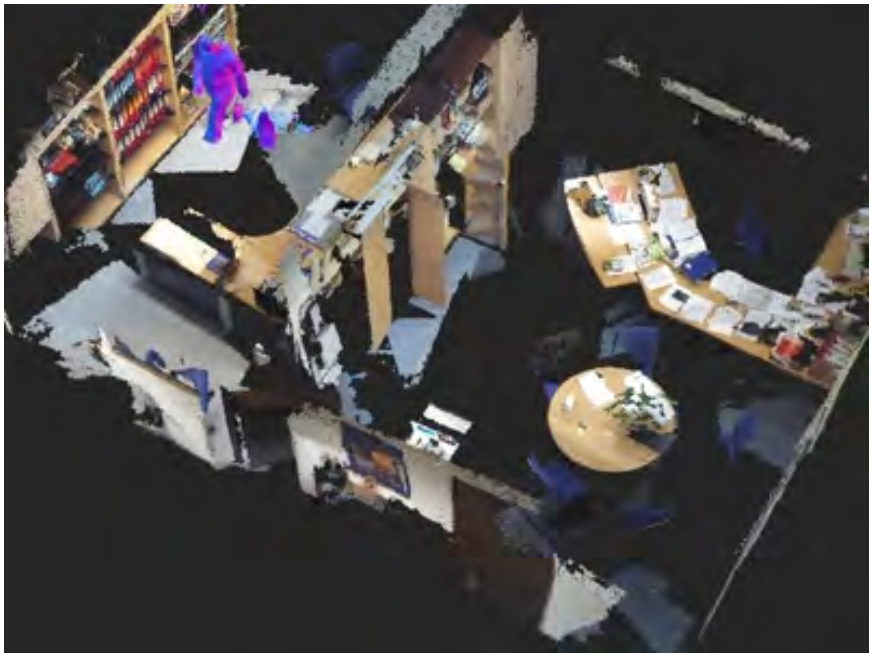
[18] Lindell, Wetzstein & Koltun, *Acoustic Non-Line-of-Sight Imaging,* Computer Vision Foundation (2019) https://openaccess.thecvf.com/content_CVPR_2019/papers/Lindell_Acoustic_Non-Line-Of-Sight_Imaging_CVPR_2019_paper.pdf

[19] Keller et al., *Real-Time 3D Reconstruction in Dynamic Scenes Using Point-Based Fusion*, Proceedings. of Joint 3DIM/3DPVT Conference (3DV) (2013);

[20] "Sensor fusion is the combining of sensory data or data derived from sensory data in order to produce enhanced data in form of an internal representation of the process environment. The achievements of sensor fusion are robustness, extended spatial and temporal coverage, increased confidence, reduced ambiguity and uncertainty, and improved resolution." Wilfried Elmenreich, *Sensor Fusion in Time-Triggered Systems*, at i, Vienna University of Technology Ph.D. Thesis (2002). https://mobile.aau.at/~welmenre/papers/elmenreich_Dissertation_sensorFusionInTimeTriggeredSystems.pdf (accessed Oct. 12 2023).

[21] Image from Keller et al., *Real-Time 3D Reconstruction in Dynamic Scenes Using Point-Based Fusion*, Proceedings. of Joint 3DIM/3DPVT Conference (3DV) (2013).



More modern algorithms enable drones to navigate new environments and construct a detailed map, showing both physical structure and heat signatures, in real-time.[22]

Other examples include fusion of a regular and a thermal camera to create crisp images that machine-learning algorithms can use to track animals,[23] and reliably predict building occupancy—an "intimate detail[] of the home" as in *Kyllo*, 533 U.S. at 30—with cheap and primitive sensors.[24]

Drones are also more invasive than a normal overflight because they can fly at low heights and navigate autonomously with extreme precision, readily converting an overflight into a traditional search.[25] They can even be programmed to autonomously navigate into buildings

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[22] Pazzi, Pertile, Chiodini, *3D Radiometric Mapping by Means of LiDAR SLAM and Thermal Camera Data Fusion*, 22 Sensors 8512 (2022) https://www.semanticscholar.org/reader/3baaaff67924028fa9ee994dab1c4de2410aedad (accessed Oct. 13 2023)

[23] Krishnan et al., *Fusion of visible and thermal images improves automated detection and classification of animals for drone surveys,* 13 Scientific Reports 10385 (2023) https://www.nature.com/articles/s41598-023-37295-7 (Accessed Oct. 11 2023).

[24] Arvidsson et al., *Sensor Fusion and Convolutional Neural Networks for Indoor Occupancy Prediction Using Multiple Low-Cost Low-Resolution Heat Sensor Data,* 21 Censors 1036 (2021) https://www.mdpi.com/1424-8220/21/4/1036 (Accessed Oct. 10 2023)

through open windows should the opportunity arise[27] and to recognize and follow specific faces.[27]

In short, under *Carpenter'* first factor, drones' enormous power as instruments of surveillance strongly suggests that Americans have a legitimate expectation of privacy vis-à-vis that technology.

C. Modern drones enable surveillance of larger numbers of people than traditional overflights.

Moving to the second *Carpenter* factor: It is unclear if Zero Gravity's drone's maneuverability would enable surveilling more people than a standard overflight. But modern specialized identification and tracking techniques are powerful enough that drones can identify individual unhealthy plants in a large farm field, using only a normal camera, or recognize specific people by their face from prior pictures and follow them.[28] These are useful for disaster relief and agriculture.[29] But it is obvious that they could readily applied to mass surveillance as well, and readily combined with algorithms to surveil in a fuel-efficient, stealthy manner.[30]

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[25] Jin et al., *An Improved Probabilistic Roadmap Planning Method for Safe Indoor Flights of Unmanned Aerial Vehicles,* 7 Drones 92 (2023) https://www.mdpi.com/2504-446X/7/2/92 (Accessed Oct. 10 2023).

[27] Pritzl, Stepan, & Saska, *Autonomous Flying into Buildings in a Firefighting Scenario,* IEEE International Conference on Robotics and Automation (2021). https://ieeexplore.ieee.org/abstract/document/9560789 (Accessed Oct. 10 2023).

[27] Yossi Hasanah Putri & Hidayat Nur Isnianto, *Implementation of PID control for DJI Telos drone-based human face tracking stabilization*, Gadja Mada University Final Project (Oct. 5., 2023) https://etd.repository.ugm.ac.id/penelitian/detail/224792

[28] Yamati et al., *Automatic scoring of Rhizoctonia crown and root rot affected sugar beet fields from orthorectified UAV images using Machine Learning*. Plant Disease (Sept. 27 2023); Putri & Insianto, *supra* note 13.

[29] See, e.g., Wan et al., *An Accurate UAV 3-D Path Planning Method for Disaster Emergency Response Based on an Improved Multiobjective Swarm Intelligence Algorithm*, 53 IEEE Transactions on Cybernetics 2658-2671 (2022) https://ieeexplore.ieee.org/abstract/document/9780258; Krishnan et al., *supra* note 23; Abraham et al, *Swarm Robotics in Disaster Management*, International Conference on Innovative Sustainable Computational Technologies (2019) https://ieeexplore.ieee.org/abstract/document/9008139

[30] Zhang et al., *A Multi-Strategy Improved Differential Evolution algorithm for UAV 3D trajectory planning in complex mountainous environments*, 125 Engineering Applications of Artificial Intelligence 106672 (2023) https://www.sciencedirect.com/science/article/abs/pii/S0952197623008564;R**o**berge, Tarbouchi

Under the second *Carpenter* factor, this too strongly indicates that Americans have a legitimate expectation of privacy as against drone technology.

D. Drones can be made inescapable through persistent surveillance techniques.

The third *Carpenter* factor points in the same direction. Like workers at a 24-hour factory, drones can work in shifts. Swarming algorithms allow drones to communicate and have some takeoff and others land to enable persistent overflights despite fuel or battery limitations.[31] They are increasingly silent and long-lasting[32] as well. Thus, they are more difficult to escape than all but the most intense persistent overflight programs, which are at least limited by availability of pilots. *Leaders of a Beautiful Struggle v. Baltimore Police Dep't*, 2 F.4th 330, 334 (4th Cir. 2021) (en banc) (city-wide aerial surveillance program was approximately 40 hours a week).

For all those reasons, drones easily satisfy *Carpenter*'s "inescapability" factor, which also points to a legitimate expectation of privacy vis-à-vis drone surveillance.

E. Drones are orders of magnitude less costly than traditional overflights.

The same is true for the fourth *Carpenter* factor: Drones enable pervasive surveillance, and more frequent surveillance in general, because they are orders of magnitude cheaper than traditional overflights. For less than $10,000,[33] police can obtain a specialized drone with superhuman sensory abilities, and better maneuverability than a multi-million-dollar helicopter or plane.[34] A single drone operator is also far less expensive to train than a pilot and multiple

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& Labonte, *Fast Genetic Algorithm Path Planner for Fixed-Wing Military UAV Using GPU*, 54 IEEE Transactions on Aerospace and Electronic Systems 2105-117 (2018), https://ieeexplore.ieee.org/abstract/document/8294239.

[31] Bandarupalli et al., *Persistent Airborne Surveillance using Semi-Autonomous Drone swarms* , Proceedings of the 7th Workshop on Micro Aerial Vehicle Networks, Systems, and Applications (2021) https://dl.acm.org/doi/abs/10.1145/3469259.3470487; Alexander Williams & Oleg Yakimenko, *Persistent mobile aerial surveillance platform using intelligent battery health management and drone swapping*, 4th International Conference on Control, Automation, and Robotics (2018) https://ieeexplore.ieee.org/abstract/document/8384677.

[32] Townsend et al., *A comprehensive review of energy sources for unmanned aerial Vehicles, their shartfalls and opportunities for improvements*, https://www.cell.com/heliyon/pdf/S2405-8440(20)32128-9.pdf.

[33] *See, e.g.* TurnCircles, *Weather Resistant Long Flight UAV/Drone with FLIR thermal camera and live video stream.*https://turncircles.com/long-flight-uav-drone-flir-thermal-camera-with-live-video-stream; DroneFly, *FLIR Vue TZ20 Dual Thermal Camera* https://www.dronefly.com/flir-vue-tz20-dual-thermal-camera-60hz.html (accessed Oct. 11 2023)

crew members. Furthermore, AI will not only increase drone autonomy, but make it cheaper to implement; for instance, drones can now be trained to detect specific objects using mostly AI-generated images.[35]

Given the low cost of drones and associated drone technology, the fourth *Carpenter* factor likewise points to an expectation of privacy.

F. The automatic disclosure problem of *Carpenter* is worse with drones than with phone location data.

So too the fifth *Carpenter* factor. In *Carpenter,* the government had to at least obtain a subpoena to obtain cell phone location data, 138 S. Ct. at 2221. But now, any municipality can have a ready-made flying *Carpenter* violation shipped straight to its office. Specialized companies make lightweight "stingray"-type devices, designed for drone use. These devices mimic cell towers and trick phones into connecting to them and handing over data—often far more effectively than in *Carpenter*.[36]

For example, the "Revector Detector," was praised by an industry magazine because it "establishes a new mobile phone cell site, encouraging all GSM, UTMS and LTE devices in the area to connect." And, after "a target device is connected, the Revector Detector provides a range of capabilities, including: Forcing 4G devices down to 2G/3G[;] GPS location extraction[;] Target battery draining[;] Selective jamming (Denial of Service)[; and] SMS sending to target."[37] Thus, drones present an even greater risk of automatic disclosure—the fifth *Carpenter* factor – than the technology at issue in that case.

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[34] For example, the Bell 505, billed as "low cost of acquisition" helicopter, costs nearly $2 million. Bell Flight, *Bell 505 - Public Safety Helicopter*, https://www.bellflight.com/products/bell 505/public-safety; Bayley Bischof, *Breaking down the costs of the Nebraska State Patrol's new helicopter*, 1011 Now News (Nov 21. 2022) https://www.1011now.com/2022/11/21/breaking-down costs-nebraska-state-patrols-new-helicopter-aviation-division/.

[35] Daito Xing, *UAV Surveillance with Deep Learning Using Visual, Thermal and Acoustic Sensors,* New York University Ph.D. Thesis (2023). https://www.proquest.com/docview/2815083930

[36] Mike Ball, IMSI *& Wi-Fi Catcher Surveillance Devices for Drones,* Unmanned Systems Technology (May 27, 2022) (noting the ability to do more than capture location data) https://www.unmannedsystemstechnology.com/2022/05/imsi-wi-fi-catcher-surveillance-devices-for-drones/

[37] *Id.*

In summary, all give *Carpenter* factors point strongly toward a reasonable expectation that Americans will *not* be subject to surveillance by drones, absent a warrant issued pursuant to usual Fourth Amendment standards and processes. Drone technology is simply too powerful to permit any other result.

II. The Exclusionary Rule properly applies in civil proceedings involving drone surveillance because the deterrence benefit to privacy far outweighs any societal cost of exclusion.

While the Court of Appeals correctly recognized that defendants had violated the Fourth Amendment in using drone surveillance without a warrant, the court erred in ruling that this illegally obtained evidence could nevertheless be admitted against the Maxons in their civil case. If the Fourth Amendment is to have any real meaning in this context, evidence obtained by illegal drone surveillance must be subject to exclusion.

As the Court is well aware, the long-established Exclusionary Rule protects Fourth Amendment rights by allowing suppression of illegally seized evidence when the privacy benefits of suppression outweigh the societal costs of suppression. It applies to civil proceedings whenever this balancing test is satisfied. Cases that appear to state otherwise are dealing with secondary proceedings—where the evidence was originally seized for use in a criminal proceeding, then introduced in a later civil proceeding—which is not the case here. And, especially in this civil setting, the Exclusionary Rule applies because the privacy benefits of suppression easily outweigh any associated social costs.

A. The Exclusionary Rule rests on a balancing test that places a premium on the likelihood of deterring future illegal searches.

The Exclusionary Rule is a judicially crafted remedy that gives teeth to the Fourth Amendment by excluding illegally obtained evidence when the privacy value of enforcing Constitutional rights outweighs social harm from excluding the evidence. When applying the exclusionary rule, the "Supreme Court has required that the deterrence effect must be balanced against the 'substantial cost on the societal interest in law enforcement by its proscription of what concededly is relevant evidence.'" *Wolf*, 13 F.3d at 193 (quoting *United States v. Janis*, 428 U.S. 433, 448–49 (1976). The deterrence effect must include both the likelihood of deterring future violations, *id.*, and the magnitude of the harm done to a reasonable expectation of privacy. *United States v. Leon*, 468 U.S. 897, 908 (1984) (exclusionary rule should not apply where officers' "transgressions have been minor").

The exclusionary rule is likely to deter illegal conduct if applied to evidence in the seizing official's "zone of interest." *Wolf*, 13 F.3d at 193. Courts have considered two alternative tests to determine zone of interest, by the Second Circuit and the Sixth Circuit. The Sixth Circuit test considers (1) the nature of the proceeding, (2) whether the material was seized by the same sovereign that is using it as evidence, (3) whether the search and the proceeding at issue were initiated by the same agency; (4) "whether there is statutory regime in which both agencies share resources, particularly resources derived from one of the proceedings" and (5) the degree of "relationship between the law enforcement responsibilities and expertise of the seizing officials and the type of proceeding at which the seized material is being offered." *Kivela v. Dep't of Treasury*, 449 Mich. 220, 228–29 (1995) (summarizing test from *Wolf*, 13 F.3d 189 before applying as alternative basis for holding). The Second Circuit test applies essentially the same factors. *Tirado v. Comm'r*, 689 F.2d 307, 311-15 (2d Cir. 1982) (considering whether the proceeding is "different from . . . the proceeding for which the search was conducted," the "relationship between the search and the secondary proceeding," whether "the secondary proceeding were initiated by the same agency," the "relationship between the law enforcement responsibilities and expertise of the seizing officials and the type of proceeding at which the seized material is being offered," and degree of cooperation between agencies, but rejecting the sovereignty prong).

As shown below, proper application of either balancing test requires exclusion of the drone surveillance evidence at issue here.

B. The Exclusionary Rule applies to civil proceedings, at least when they are not secondary to a criminal proceeding.

Preliminarily, both tests considered in *Kivela* apply to civil proceedings. *Tirado* explicitly stated it was "unsound to reject the exclusionary rule in all civil proceedings." 689 F.2d 313. And this was not confined to forfeiture or other quasi-criminal proceedings, but expressly included "civil antitrust" and "FTC proceeding[s.]" *Id.* at 311. And *Tirado* was the "primary case on which the majority relie[d]" in *Kivela*. 449 Mich. at 242, (Cavanagh, J., dissenting). Similarly, *Wolf* explicitly allowed for civil application of the exclusionary rule, but found the deterrence value was generally low when applied to evidence seized by law enforcement officers. 13 F.3d at 194.

So what are we to make of the line in *Kivela* that "federal circuits in *Tirado* and *Wolf* have rejected the application of the exclusionary rule in civil tax proceedings?" 449 Mich. at 230. *Kivela* and these cases were addressing "secondary proceedings," where the evidence was seized for a criminal investigation and the motion to exclude was in a civil proceeding. *Id.* at 238. In contrast, the exclusionary rule clearly applies when the evidence was originally seized for use in the civil proceeding at issue. *Tirado*, 689 F.3d at 311 ("courts routinely prohibit governmental authorities from using illegally seized evidence in the proceedings *for which the search was conducted*, . . . in [a] variety of civil proceedings") (emphasis added).

Similarly, *Wolf*'s test only makes sense if the rule can apply in civil proceedings. The first factor, the nature of the proceeding, is about the relation of the proceeding to the official's enforcement duties, because that is most likely to cause deterrence. A police officer is most likely to be deterred from illegally capturing evidence if it is excluded from criminal proceedings, or even quasi-criminal proceedings, but not secondary civil proceedings. *Id.* at 194 (citing *One 1958 Plymouth Sedan v. Pennsylvania*, 380 U.S. 693 (1965)). But the opposite is true for searches by civil enforcement officers: "Where evidence is obtained in an allegedly illegal search in furtherance of a [civil] investigation, it is generally unlikely that application of the exclusionary rule to bar the evidence in a secondary [criminal] proceeding will deter future Fourth Amendment violations." And just as "[t]he primary interest of law enforcement agents is . . .deterrence of future criminals through the imposition of criminal sanctions[,]" *Wolf*, 13 F.3d at 194, the primary interest of civil enforcement agencies is deterrence of future civil violations through imposition of civil sanctions.

But the Court of Appeal's majority opinion fails to consider either *Tirado* or *Wolf,* and does not mention the difference between a secondary proceeding and the proceeding for which the evidence was seized. Thus, it misinterprets *Kivela*.

C. The extraordinary threat to privacy posed by drone surveillance, weighed against the minor harm of the Maxons' zoning violation, justifies applying the Exclusionary Rule in this non-secondary civil proceeding.

Because the search at issue here violated a significant privacy right and exclusion creates a high likelihood of deterrence, and the Maxons' zoning violation does not pose a significant threat to the public, the Exclusionary Rule should apply to the drone photographs here.

First, the magnitude of the violation is high, because of the significant privacy interest against drone surveillance, as explained earlier, and because this was a flagrant and willful violation.

Second, the evidence is within the Township's "zone of interest" based on the *Wolf* test, as all five factors predict deterrence.

The first factor, the nature of the proceeding, is about the relation of the proceeding to the official's type of enforcement duties, because that is most likely to cause deterrence. A police officer is most likely to be deterred from illegally capturing evidence if it is excluded from criminal proceedings, or even quasi-criminal proceedings, but not civil proceedings. *Wolf,* 13 F.3d at 194 (citing *One 1958 Plymouth Sedan v. Pennsylvania*, 380 U.S. 693 (1965)). Here, in contrast, the Township's zoning enforcement is most likely to be deterred from illegally obtaining evidence by excluding it from the civil proceedings they specifically obtained it for.

Addressing the other factors, the material was seized by the same sovereign that is using it as evidence (the Township), the search and the proceeding were initiated by the same agency (the Township), there is something more than a "statutory regime in which both agencies share resources, particularly resources derived from one of the proceedings," because the Township caused the searches and initiated the proceedings, and the degree of "relationship between the [civil] enforcement responsibilities and expertise of the seizing officials and the type of proceeding at which the seized material is being offered" is high—the Township has significant expertise in investigating zoning violations. And under the *Tirada* test, deterrence is likely because these are "the proceedings for which the search was conducted," 689 F.3d at 311.

The argument that this will have little deterrence value because a "private party" performed the search, and not the Township, is unsound. *Maxon IV*, 2022 WL 4281509, at *6. Applying the exclusionary rule would deter officials from *hiring* outside operators to conduct searches for them. And that is at least as important as deterring public officials from doing illegal searches themselves.

Finally, the cost to society of excluding the evidence is low. Unlike in a criminal proceeding, double jeopardy does not apply here, so the Township is free to gather new evidence to use in enforcement. And there is no evidence that the scrap pile is analogous to a "leaking hazardous waste dump" demanding immediate removal for reasons of health or safety. *Maxon IV,* 2022 WL 4281509, at *4.

CONCLUSION

Off-the-shelf drone technology has surpassed every form of technological surveillance held to be a search by the Supreme Court, custom-made algorithms push the envelope even further, and AI will accelerate this dramatically. Citizens clearly have a reasonable expectation of privacy against drone surveillance. And this threat to privacy is so severe that the benefits of deterring civil enforcement entities, like the Township, from using warrantless drone surveillance outweigh any public harm from the Maxons maintaining a scrapyard. The case should be remanded for a new trial in which the photographs are suppressed.

Respectfully Submitted,

/s/ Nicholas P. Miller (P70694)
Schaerr | Jaffe LLP
1717 K St. NW
Suite 900
Tel.: (202) 599-6101
Email: nmiller@schaerr-jaffe.com

Gene Schaerr*
Schaerr | Jaffe LLP
1717 K St. NW
Suite 900
Tel.: (202) 361-1061
Email: gschaerr@schaerr-jaffe.com

Attorneys for Amicus Curiae
Project for Privacy and Surveillance Accountability, Inc.
**Pro hac vice* motion forthcoming

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