Surveillance Impact Report

Gunshot Detection Hardware and Services
Emergency Management

As required by San Francisco Administrative Code, Section 19B, departments must submit a Surveillance Impact Report for each surveillance technology to the Committee on Information Technology ("COIT") and the Board of Supervisors.

The Surveillance Impact Report details the benefits, costs, and potential impacts associated with the Department's use of gunshot detection hardware and services.

DESCRIPTION OF THE TECHNOLOGY

The Department's mission is the following:
The San Francisco Department of Emergency Management (DEM) leads the City in planning, preparedness, communication, response, and recovery for daily emergencies, large scale citywide events, and major disasters. DEM is the vital link in emergency communication between the public and first responders, and provides key coordination and leadership to City departments, stakeholders, residents, and visitors.

In line with its mission, the Department uses gunshot detection hardware and services to:

Gunshot detection hardware and services support the mission of our department to respond to daily emergencies by reporting potential incidents involving gunfire. Gunshot detection hardware and services notifications help make the department aware of gunfire events they would have otherwise not have known about.

The Department shall use gunshot detection hardware and services only for the following authorized purposes:

Authorized Use(s):

- Dispatch is notified of gunshots through the ShotSpotter application, and then creates a call for service for police officers to respond to the location.

Prohibited use cases include any uses not stated in the Authorized Use Case section.

Further, processing of personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, gender, gender identity, disability status, or an individual person's sex life or sexual orientation, and the processing of genetic data and/or biometric data for the purpose of uniquely identifying an individual person shall be prohibited.

Gunshot detection hardware and services technology may be deployed in the following locations, based on use case:

ShotSpotter detection sensors are installed in different coverage areas in San Francisco. Current coverage is within the areas of the following Police Districts:

- Southern Station (Company B)
- Bayview Station (Company C)
- Mission Station (Company D)
- Northern Station (Company E)
- Ingleside Station (Company H)
- Tenderloin Station (Company J)

ShotSpotter acoustic sensors are strategically placed in an array of approximately 20-25 sensors per square mile, typically on the tops of buildings or sometimes lampposts.

Technology Details

The following is a product description:

ShotSpotter uses an array of acoustic sensors that are connected wirelessly to ShotSpotter's centralized, cloud-based application to reliably detect and accurately locate gunshots using triangulation. Each acoustic sensor captures the precise time and audio associated with impulsive sounds that may represent gunfire. This data is used to locate the incident and is then filtered by sophisticated machine algorithms to classify the event as a potential gunshot. Acoustic experts, who are located and staffed in's 24×7 Incident Review Center, ensure and confirm that the events are indeed gunfire. They can append the alert with other critical intelligence such as whether a fully automatic weapon was fired or whether there are multiple shooters. This entire process takes less than 60 seconds from the time of the shooting to the digital alert popping onto a screen of a computer in the 911 Call Center or on a patrol officer's smartphone or mobile laptop.

A. How It Works

To function, ShotSpotter, Inc. is a California-based company that operates ShotSpotter Flex, a proprietary technology that uses sensors strategically placed around a geographic area to detect, locate, and analyze gunshots, and notify law enforcement. ShotSpotter is the most widely used gunshot detection technology in the United States, currently operating in nearly 100 jurisdictions across the country. ShotSpotter uses acoustic sensors that are strategically placed in an array of approximately 20 sensors per square mile. These sensors are connected wirelessly to ShotSpotter's centralized, cloud-based application to reliably detect and accurately triangulate (locate) gunshots. Each acoustic sensor captures the precise time and audio associated with impulsive sounds that may represent gunfire. This data, from multiple sensors, is used to locate the incident, which is then filtered by sophisticated machine algorithms to classify the event as a potential gunshot. Expertly trained acoustic analysts, who are located and staffed in ShotSpotter's 24x7 Incident Review Center, then further qualify those highlighted incidents. These analysts ensure and confirm that the events are in fact gunfire. In addition, the analysts can append the alert with other critical intelligence such as whether a full automatic weapon was fired and whether the shooter is on the move. There are three components to the ShotSpotter system:

1. Gunshot Location Detection (GLD) Sensors: Sensors are installed in different coverage areas in San Francisco.
2. ShotSpotter Headquarters (HQ): Sensors send acoustic information to HQ where computer-based machine-learning algorithms are used to analyze the sound. If the sound and visual audio signature match gunfire, the incident file is then passed along to the Incident Review Center (IRC). Acoustic experts at the IRC review incidents within seconds and provide additional information (e.g. number of gunshots, number of guns, types of guns). Confirmed gunshots are pushed out to Communications (DEM Dispatch) as well as to the SFPD ShotSpotter software system within seconds.
3. ShotSpotter Response Software: This software allows certain authorized personnel (SFPD) to use a desktop application that connects to the ShotSpotter system for more in-depth gunshot analysis.

All data collected or processed by Gunshot Detection Hardware and Services will be handled or stored by an outside provider or third-party vendor on an ongoing basis. Specifically, data will be handled by ShotSpotter, Inc. to ensure the Department may continue to use the technology.

IMPACT ASSESSMENT

The impact assessment addresses the conditions for surveillance technology approval, as outlined by the Standards of Approval in San Francisco Administrative Code, Section 19B:

1. The benefits of the surveillance technology outweigh the costs.
2. The Department's Policy safeguards civil liberties and civil rights.
3. The uses and deployments of the surveillance technology are not based upon discriminatory or viewpoint-based factors and do not have a disparate impact on any community or Protected Class.

The Department's use of the surveillance technology is intended to support and benefit the residents of San Francisco while minimizing and mitigating all costs and potential civil rights and liberties impacts of residents.

A. Benefits

The Department's use of gunshot detection hardware and services has the following benefits for the residents of the City and County of San Francisco:

	Benefit	Description
☐	Education	
☐	Community Development	
X	Health	Gun violence and its impacts are a Public Health concern. Preventing gun violence is an essential component to building healthy communities.
☐	Environment	
X	Criminal Justice	Gunshot detection hardware and services notifications help make the department aware of gunfire events they would have

		otherwise not have known about which is in the interest of Public Safety. In 2019, only 15% of SF gunfire incidents were called into 911.
☐	Jobs	
☐	Housing	
X	Public Safety	Gunshot detection hardware and services alerts enable a fast, precise officer response to unreported gunfire to render Medical aid to victims of a gunshot, secure critical evidence, and apprehend armed individuals which is in the interest of Criminal Justice.
☐	Other	

B. Civil Rights Impacts and Safeguards

The Department has considered the potential impacts and has identified the technical, administrative, and physical protections as mitigating measures:

The department has examined the use of gunshot detection hardware and services in the following potential categories that may impact civil liberties and civil rights. DEM's intent is to safeguard the rights of the public.

- Dignity Loss - No identifiable issues as gunshot detection hardware and services does not contain personally identifiable information.
- Discrimination - No identifiable issues as gunshot detection hardware and services does not identify an individual or reveal any of the following: racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, information concerning an individual person's sex life or sexual orientation
- Economic Loss - No identifiable issues as gunshot detection hardware and services does not contain personally identifiable information so it cannot lead to identity theft.
- Loss of Autonomy - No identifiable issues as gunshot detection hardware and services does not contain personally identifiable information that could be used or processed by others.
- Loss of Liberty - Gunshot detection hardware and services identifies the location of gunfire, if multiple shooters appear to be involved, and high capacity weapons. Responding police officers may then locate a possible gunfire suspect at the scene or nearby area, potentially leading to detention or arrest based on the responding law enforcement's policies and procedures.
- Physical Harm - No identifiable issues as gunshot detection hardware and services does not cause physical harm or death. In fact, it can help send police officers to render aid at shootings if no witnesses have called 911.
- Loss of Trust - Great care has been taken by SFPD and ShotSpotter (vendor) to ensure the public's trust in gunshot detection hardware and services. Safeguards have been built in, such as audio sensors that only trigger a human review if 3 or more sensors detect a loud, impulsive

sound. Then machine learning or a trained acoustic analyst at Shotspotter (vendor) reviews the audio and makes a determination whether there is possible gunfire. (This screens out cars backfiring, construction noise, fireworks, helicopter, etc.) Then an alert is sent to the Dispatch Center and to SFPD Officers with access to the application. The audio sensors cannot stream live audio and are mounted high above the streets. The audio snippet is restricted to only 1 second before until 1 second after the gunfire. The audio data is purged after 30 hours unless it is identified as gunfire; ShotSpotter security protocols also mitigate gunshot detection data access. ShotSpotter does not provide extended audio to the department; they will not provide this access even if requested. Additionally, ShotSpotter does not provide actual precise locations of the sensors to SFPD or the department.

ShotSpotter policy stipulates that only a limited number of authorized forensic engineers can access the storage buffer of a sensor to retrieve prior recorded data within that 30-hour window and search for other gunshot impulsive sound events. To avoid listening to recorded data on a sensor in a haphazard way, the search for a missing gunshot is first done visually through a secure interface looking for the prevalence of electrical "pulses" strong enough to be a gunshot that occurred around the time of the incident in question.

The administrative safeguards are as follows: Department General Order 6.3 states:"

- Need to Know/Right to Know: The "need to know" and the "right to know" shall exist before any database inquiry is made. If any employee suspects that any request for information from the automated systems does not fit the criteria, even if the requestor is another Department employee, they shall not release the information and shall notify supervisory personnel immediately. Members shall not release confidential from database files to authorized recipients over the telephone unless the member is certain of the identity of the authorized recipients." All gunshot detection hardware and services incidents are logged in CAD and all Operations staff are trained in gunshot detection hardware and services use. Violations of policy are handled through standard retraining and discipline procedures."

The technical safeguards are as follows: For DEM, the data can only be accessed on an application that is password protected.

The physical safeguards are as follows: Access to the building and room that has the ShotSpotter clients installed is only available through keycard access. The building also has video surveillance on the outside perimeter, along with Sheriff deputies guarding the building.

C. Fiscal Analysis of Costs and Benefits

The Department's use of gunshot detection hardware and services yields the following business and operations benefits:

Benefit	Description
Financial Savings	

X	Time Savings	The technology saves time by notifying dispatch of gunshot activations faster than processing a 911 call. This technology is much faster and more accurate with determining the location than witnesses who call 911.
	Staff Safety	
X	Data Quality	The technology improves data quality by providing a calculated location for the gunshots, how many gunshots were detected, whether there were multiple guns involved, and the possibility of a high caliber weapon. Most witnesses are unable to provide this level of detail when calling 911.
	Other	

The fiscal cost, such as initial purchase, personnel and other ongoing costs, include:

Number of FTE (new & existing)	Less than 0.3 FTE per year, comprised of all (8239-8240) Public Safety Communications Supervisors and Coordinators that view activations and (1091-1095) I.T. Operations Support Admin personnel that support trouble-shooting. DEM's role is generally limited to responding to activations and checking that the software is online.	
Classification	- *(8239-8240) Public Safety Communications Supervisors and Coordinators that view activations* - *(1091-1095) I.T. Operations Support Admin personnel*	
	Annual Cost	***One-Time Cost***
Total Salary & Fringe	*Approximately $30,000 per year in salary costs to support ShotSpotter at DEM.*	*Approximately $5,160 in salary costs to train department staff on ShotSpotter.*
Software	*DEM is not responsible for ShotSpotter costs. Please refer to the SFPD policy for ShotSpotter costs.*	*DEM is not responsible for ShotSpotter costs. Please refer to the SFPD policy for ShotSpotter costs.*

Hardware/Equipment	*DEM is not responsible for ShotSpotter costs. Please refer to the SFPD policy for ShotSpotter costs.*	*DEM is not responsible for ShotSpotter costs. Please refer to the SFPD policy for ShotSpotter costs.*
Professional Services	*DEM is not responsible for ShotSpotter costs. Please refer to the SFPD policy for ShotSpotter costs.*	*DEM is not responsible for ShotSpotter costs. Please refer to the SFPD policy for ShotSpotter costs.*
Training	*DEM is not responsible for ShotSpotter costs. Please refer to the SFPD policy for ShotSpotter costs.*	*All dispatchers are trained on how ShotSpotter works, and all supervisors are provided additional training on how to use the client to access, read, and enter incidents. Cost to train a dispatcher is approximately a $30.00 one-time cost, and approximately a $40 one-time cost to train a supervisor based on their average hourly salaries.*
Other	*DEM is not responsible for ShotSpotter costs. Please refer to the SFPD policy for ShotSpotter costs.*	*N/A*
Total Cost	***$30,000.00***	***$5,160***

The Department does not fund the use of ShotSpotter. SFPD owns the contract and pays for the service. Funding for training of DEM staff comes from the DEM budget which comes from the General Fund.

COMPARISON TO OTHER JURISDICTIONS

Gunshot detection hardware and services are currently utilized by other governmental entities for similar purposes.