


INFORMATION REPORT

TO:	Mayor and Members General Issues Committee
COMMITTEE DATE:	April 3, 2024
SUBJECT/REPORT NO:	Assessment of Environmental Impacts of Fireworks at Municipal Events (PED24051) (City Wide)
WARD(S) AFFECTED:	City Wide
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SIGNATURE:	

COUNCIL DIRECTION

General Issues Committee, at its meeting 23-031 of November 15, 2023, approved the following motion:

- a) That Tourism and Events staff study the feasibility of alternatives to fireworks for a Canada Day spectacle show that are more responsive to our climate action, biodiversity and public health priorities and report back to the General Issues Committee by Q1 2024.

INFORMATION

Historical Background

Historically, the City of Hamilton has hosted an annual Canada Day event at Bayfront Park on July 1, drawing approximately 20,000 attendees throughout the day. The event offers a variety of activities such as family-friendly entertainment, food trucks, arts and crafts, and concerts, concluding with a professional fireworks display.

The City of Hamilton declared a climate emergency on March 27, 2019. This classification and subsequent warnings issued to the public about the need to modify behaviour because of poor outdoor air quality were the direct result of the migration of wildfire smoke into the city from wildfires burning in remote locations in both Ontario and Quebec.

In the lead-up to the Canada Day 2023 celebrations, the Ministry of the Environment, Conservation and Parks classified Hamilton's air quality as 'high risk'. The hazy air quality conditions and associated public exposure warnings were still in place on June 30.

This generated inquiries from concerned community members regarding Canada Day fireworks and whether it was prudent to proceed and further exacerbate poor local air quality conditions. In response to similar concerns, other Ontario municipalities cancelled their Canada Day fireworks displays.

Environmental Impacts of Fireworks

Air Quality

- Fireworks, which contain heavy metals, chemicals, and paper, significantly contribute to air pollution. This pollution not only affects the immediate area but can also have a more widespread impact.
- The discharge of pollutants including particulate matter (i.e., PM_{2.5}, PM₁₀), sulfur dioxide, carbon dioxide and heavy metals from fireworks is a concern. These substances are known to reduce air quality and pose a risk to both human health and the natural environment.
- Post-discharge, the pollutants from fireworks can remain in the atmosphere for extended periods prolonging poor air quality.
- Fireworks displays produce fine particulate matter. These particles are linked to a range of health problems including respiratory and cardiovascular diseases. Those with pre-existing respiratory and/or cardiovascular conditions, young children and older adults are particularly sensitive to the deteriorated air quality caused by fireworks.

Noise and Light

- Firework displays can produce noise exceeding 150 decibels. Exposure to noise above 110 decibels can be detrimental to human hearing.

- The combination of loud noises and intense lights from fireworks can have adverse psychological effects. These effects are especially pronounced in individuals with mental health conditions such as post-traumatic stress disorder as well as in those with neurodivergent conditions such as autism. Military veterans and individuals from conflict zones can also find the experience distressing.
- Wildlife can be affected by the noise from fireworks. The disruption caused by these loud sounds can lead to disorientation and panic in animals, particularly nesting birds and small mammals and may result in wildlife abandoning their habitats and nests.
- Fireworks can also adversely affect domestic animals. The noise can cause significant stress and anxiety in pets.

Alternatives to Fireworks

Laser Light Shows: These shows use lasers to create colorful and dynamic visual displays in the sky. Laser light shows do not produce the air and noise pollution caused by traditional fireworks.

Drone Light Shows: Utilizing drones equipped with LED lights, drone light shows can create spectacular visual effects without the noise and air pollution caused by traditional fireworks.

Water Displays: Water-based displays, including fountains and water screens, can be used to create visually stunning shows, especially when combined with lights and music, without the air pollution caused by traditional fireworks.

Projection Mapping: This technology projects images onto buildings or other surfaces, creating intricate and impressive visual displays. When paired with music, projection mapping can offer a captivating experience without the environmental impact caused by traditional fireworks.

Glow-in-the-Dark Events: Events that use glow sticks, LED lights and other luminescent materials can be a fun alternative without the noise and air quality impacts caused by traditional fireworks.

Silent Fireworks: Some manufacturers produce silent or low-noise fireworks which are a good alternative to traditional fireworks that inflict noise-related stress on animals and humans.

Constraints and Limitations of Alternatives

Cost and Budget: Alternatives like laser and drone light shows are more expensive than traditional fireworks owing to the up-front investment in technology and the cost of professionals to operate them. A traditional 15-minute fireworks display costs \$35,000. The same budget would cover a drone show lasting roughly 9-minutes featuring 2D shapes and limited 3D shapes and limited unique formations.

Public Expectation and Reception: People can be emotionally and culturally attached to traditional fireworks. Alternatives may lessen the acceptance and success of the event.

Weather: Some alternatives, particularly drone and laser shows, can be more sensitive to weather conditions than traditional fireworks.

Safety Regulations: While alternatives such as drone shows are safer regarding fire hazards, they raise additional safety concerns and regulatory requirements such as airspace regulations and drone operation licenses.

Environmental Considerations: While alternatives proposed above are generally more environmentally friendly, they are not without impact. Laser shows require electricity and drones have a carbon footprint associated with their production, operation, and charging.

Venue Limitations: Some alternatives require specific environmental or infrastructural conditions. For instance, projection mapping requires suitable building facades and laser shows are best viewed in darker environments.

Preparation and Planning Time: High-tech shows require more time for programming and rehearsal.

Technical Expertise: Running high-tech shows like drones or laser displays requires specialized skills and knowledge. There are a limited number of providers of alternative options for high-profile events such as Canada Day.

Legal and Regulatory Compliance: Each alternative to traditional fireworks comes with its own legal and regulatory considerations.

Scalability and Visibility: Some alternatives may not be as visible or impactful in large open spaces as traditional fireworks.

Other Canadian Jurisdictions:

Niagara Falls, ON

The City of Niagara Falls is exploring drone light shows as an alternative to traditional fireworks. Recently, a test was conducted by Canadian company North Star Drones to determine if drone shows could supplement the usual fireworks. The drones, which formed various shapes in the sky, were flown about 120 meters high between Skylon Tower and Clifton Hill. The drone show was designed to be less noisy than fireworks, addressing concerns from pet owners about the stress caused to their animals by the loud noises of traditional displays.

Waterloo, ON

The City of Waterloo has used drone light shows. In response to the University of Waterloo no longer hosting its longstanding Canada Day event at Columbia Lake, Waterloo Council approved plans for a new celebration at Waterloo Park. This new event featured a drone LED light show. The decision was influenced by community feedback, where close to half of the respondents were open to a celebration without fireworks, citing concerns about pets, wildlife, and the environmental impact.

Calgary, AB

The City of Calgary considered a drone light show but decided that funding a display on the scale of their traditional fireworks display was not possible. "It was too cost-prohibitive," and they are "waiting for the industry to develop," according to the city's team lead for festival and event planning.

Path Forward

The scoring strategy for the 5-year Canada Day producer RFP will consider the following key elements:

1. **Environmental Impact**
2. **Innovation in Celebration Techniques**
3. **Public Health Impact**
4. **Wildlife Impact**
5. **Feasibility and Cost-effectiveness**
6. **Community Feedback and Acceptance**

APPENDICES AND SCHEDULES ATTACHED

N/A