

Date: November 4, 2021	Originator's files:
To: Chair and Members of Budget Committee	
From: Jodi Robillos, Acting Commissioner of Community Services	Meeting date: November 22, 2021

Subject

**Lymantria dispar dispar (LDD) Integrated Pest Management Program for 2022
Sole Source Contract Award to Zimmer Air Services Inc. for Aerial Spraying Services
Sole Source Contract Award to Lallemand Inc./BioForest for Aerial Spraying Advisory**

Recommendation

1. That the Corporate Report entitled "Lymantria dispar dispar (LDD) Integrated Pest Management Program for 2022" dated November 4 2021, from the Acting Commissioner of Community Services be approved.
2. That a gross budget of \$3M be included in the 2022 capital program for Forestry to conduct an Integrated Pest Management program for LDD including an aerial spray.
3. That the Purchasing Agent be authorized to execute a contract, in a form satisfactory to Legal Service, with Zimmer Air on a sole source basis in the estimated amount of up to \$3M to carry out the 2022 aerial spray program.
4. That the Purchasing Agent be authorized to execute a contract, in a form satisfactory to Legal Service, with Lallemand Inc./BioForest on a sole source basis in the estimated amount of \$25,000 to inform and advise on the 2022 aerial spray program.
5. That all necessary bylaws be enacted.

Executive Summary

- On June 16 2021, a motion was brought forward to Council by Councillor Ras asking for the City of Mississauga to commit to budgeting and planning for an aerial spray of *Bacillus thuringiensis* (Btk) for LDD affected areas in 2022.

- LDD is a non-native pest that has been present in Mississauga for more than 30 years; in 2006/2007 and 2018 the City conducted aerial sprays in targeted areas to mitigate population growth in City trees and included private property. In 2006/2007 property owners were invoiced for the services whereas in 2018, funds were provided through the city's Reserve for General Contingency.
- The City's 2018 aerial spray program of *Bacillus thuringiensis* (Btk), combined with other management practices suppressed the LDD population in sprayed areas for approximately 2 years after the spray; since then populations in these and other areas in the city have been on the rise.
- The population of LDD in the most severely impacted areas would best be treated by aerial spray in the spring of 2022 (during the month of May, depending on weather conditions).
- Recommended LDD integrated management program for 2022 includes Btk aerial spray in targeted areas; Btk is a safe product from a public health and environment perspective, governed by Health Canada's Pest Management Regulatory Agency (PMRA), and the same product used for the City's 2006/2007 and 2018 aerial spray programs.
- The proposed 2022 LDD IPM will require \$3 million in gross funding. Funds are requested in the 2022 capital plan pending council approval.
- Similar to the 2006/2007 and 2018 aerial spray programs, the proposed area for aerial spray in 2022 includes both public and private land. Mississauga is one of a handful of municipalities that includes sprays within residential areas into its programming.
- 45% of the potential aerial spray zone is estimated to be owned or managed by the city of Mississauga, and approximately 55% of the projected spray area is privately owned. There are considerable efficiencies to having the City coordinate an aerial spray on both public and private properties rather than each property owner contracting services to treat their own private trees. Treatment of private properties also allows the city to reduce pressure on adjacent city property from LDD populations that are harboured on private property.
- Zimmer Air Services Inc. is recommended for contract award as it has the specialized equipment, experience and successfully carried out the City's 2006/2007 and 2018 aerial spray. They also regularly undertake aerial sprays for other municipalities including the City of Toronto (2017, 2019), Oakville (2021) and Burlington (2021).
- Forestry is working with other municipalities considering a 2022 spray program with this vendor to provide the most cost effective program.
- Lallemand Inc. /BioForest is recommended for contract award as it is a specialised provider of advisory services regarding LDD and aerial sprays. This company's experience completing these types of data gathering, analysis, projections and operational guidance both on the City's previous LDD aerial spray programs, as well as on similar programs elsewhere in the province, corners a very specific market of urban forest pest management. This company has a familiarity with the City's working processes, reviews and requirements of municipalities and advised on the previous aerial spray in 2018.

- LDD is well established in Mississauga and eradication is not possible. Through a variety of Integrated Pest Management (IPM) measures, including an aerial spray, the City aims to reduce impacts on tree health from LDD in a given year, until such a time as natural pathogens cause a population level collapse.
- Generally, in natural conditions, LDD populations are known to fluctuate over time, with long periods of low population levels climbing rapidly to outbreak conditions, and then collapsing to pre-outbreak levels. This outbreak cycle is thought to occur over 7 – 10 year periods, with outbreaks lasting between 2 and 4 years. Through our annual monitoring, the City has identified that this pattern is not always consistent throughout the city. Most susceptible areas in the city seem to consistently maintain some low level presence of LDD year over year, while localized pockets may experience rapid increases. To address this, Forestry is looking to incorporate smaller annual aerial sprays where necessary to provide the most effective treatment to reduce populations locally before they reach outbreak levels.

Background

LDD Provincial Trends

The province of Ontario is in the midst of the largest LDD outbreak recorded in Ontario. Defoliation caused by LDD increased from 47,203 ha in 2019 to 586,385 ha in 2020, to 1,800,000 ha in 2021 with both light and moderate to severe defoliation mapped during aerial surveys (Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, 2021, Forest Health Conditions in Ontario 2020; and Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry, 2021, *Lymantria dispar dispar* (LDD) moth, <https://www.ontario.ca/page/lymantria-dispar-dispar-ldd-moth>). A map of the affected areas across southern Ontario is found in Appendix 1.

Mississauga is contained within the Aurora District, and although detailed defoliation mapping for urbanized areas of the district like Mississauga are not undertaken by the provincial government, data from the more rural portions of the district indicate the area of moderate to severe LDD defoliation increased from 1,949 ha in 2019 to 15,613 ha in 2020 to 97,164 ha in 2021.

City of Mississauga LDD Integrated Pest Management Program

The city has been proactively managing LDD since the early 2000s. Since LDD is well established in Mississauga and southern Ontario, the goal of the City's Integrated Pest Management (IPM) program is to reduce the LDD population and control it to levels where the pest will not significantly affect the urban forest canopy, rather than to eradicate it. The City's IPM program includes several aspects described below.

The requirements for these measures are analyzed annually, and a selection of the IPM measures are implemented as needed.

- Egg mass surveys during fall and winter months to help estimate population levels in the following year.
- Scraping egg masses off infected trees and killing the eggs.
- Wrapping burlap around trees to capture caterpillars.
- Hanging traps in trees to monitor LDD moths in new areas.
- Tree injections of TreeAzin® in individual trees.
- Ground sprays of Btk for individual trees.
- Aerial sprays of Btk.

The City has conducted aerial spray programs in 2006, 2007 and 2018 to mitigate LDD population (the 2018 spray was also conducted to control Fall cankerworm) and since then have continued to monitor and manage pests for City owned trees. The most recent aerial spray in 2018 resulted in lower manageable populations in the years immediately following the spray; however, monitoring results as well as staff and resident observations confirm that populations have increased in select areas across the city.

Lymantria dispar dispar (LDD)

LDD is an invasive defoliator of all types of trees; having been found on approximately 500 different tree species in forests, urban trees, ornamental species and even orchard settings. They mostly prefer hardwoods and several factors affect how a tree responds to defoliation such as the amount of leaves removed, weather, number of years impacted and timing within the season. Most healthy trees can withstand two to three years of defoliation but many repeat years of heavy defoliation can start to have negative impacts on the overall health of the tree.

Effects of Weather on LDD population

Weather conditions can favour either low- or high-density populations. Extreme weather conditions characterized by prolonged periods of cold temperatures (colder than -32°C) can kill unprotected LDD eggs, which can help to keep populations low or decrease high density populations. In contrast, warm, dry conditions tend to accompany increases in LDD populations. Heavy rainfall during the egg hatch time may result in drowning of larvae; rainy weather during the first instar phase of the caterpillar can delay migration and cause larvae to congregate on the underside of leaves. These conditions can also increase the duration of this instar.

Natural Controls for LDD

Low density populations are normally kept in check by natural enemies such as predators and parasites. Predators that feed on LDD larvae include about 40 species of birds such as vireos, chickadees, tanagers, orioles, robins, blue jays, grackles, starlings, blackbirds, and cuckoos, other insects, and small mammals such as skunks, white-footed mice, squirrels, and raccoons. Insect parasitoids kill LDD by laying their eggs in LDD eggs, larvae, and pupae.

At the start of an LDD outbreak, natural enemies have little effect on the LDD population. Populations increase when suitable conditions exist such as favourable weather and abundant foliage. Population decreases tend to happen in cooler, wetter conditions that favour pathogens

(described below). No single natural enemy or combination of natural control agents can completely eliminate a LDD population. Natural control agents can keep LDD populations low, however, at times when outbreak conditions occur the natural enemies are not able to control the growing LDD populations.

Natural pathogens that effect LDD

LDD is susceptible to a variety of naturally occurring infectious diseases that are caused by bacteria, fungi, and the nucleopolyhedrosis virus (NPV). Entomophaga maimaiga and NPV, the most significant natural enemies of LDD, are capable of killing large numbers of LDD larvae and represent the largest and most important factors in high density LDD population crashes.

E. maimaiga is a fungus that is specific to LDD and is prevalent throughout low-to-high density LDD populations. Although it is not completely clear how E. maimaiga first became established in North America, it was first recovered from North American LDD in the northeastern United States in 1989. It was recovered from LDD in southern Ontario in 1990. A late larva killed by E. maimaiga hangs vertically with its head pointed downward and its body tight to the trunk of the tree. An early larva killed by E. maimaiga generally remains on the foliage.

NPV was inadvertently introduced to North America with the LDD or its parasites. Like E. maimaiga, NPV is specific to LDD. NPV is often referred to as "wilt" due to the soft, limp appearance of the diseased larvae. A larva killed by NPV hangs on the tree in the shape of an inverted "V". NPV is specific to LDD and, in North America, is usually the main factor in the collapse of a LDD population. Although the mechanism is not completely understood, NPV contamination in the environment seems to be the main cause of infection.

Transmission can occur when egg masses are laid on surfaces contaminated with NPV as the virus can survive in soil, litter and bark for over a year. The larvae that emerge from these egg masses are at a high risk of infection. Once infected, the larvae die at a rate of about 90% and the resulting cadavers rupture releasing viral particles onto nearby foliage. Healthy larvae can then consume the viral particles released from the cadavers and become infected. Female LDD who survive NPV infection experience a reduction in fecundity and are able to transmit the NPV to its offspring.

Fall Cankerworm

Fall cankerworms are a native insect found throughout the majority of Canada. Similar to LDD, Fall cankerworms also undergo natural population cycles with population increases every 10 to 15 years that last for two to seven years, although usually no more than four. They feed on tree leaves from May through mid-June and then go underground to re-emerge in the late fall as moths.

In 2017, the Fall cankerworm population in the city of Mississauga rose drastically. As a result the city initiated a combined aerial spray for both Fall cankerworm and LDD in 2018. Since then there has been a marked decrease in the Fall Cankerworm population; no positive reports have

been received this year. The 2018 aerial spray seems to have coincided with the end of the Fall Cankerworm outbreak and an associated population collapse.

Present Status

2021 LDD Egg Mass Surveys in Mississauga

Based on the high population levels experienced in 2021, the City anticipated the need for population monitoring data to be produced as early as possible in preparation for an aerial spray in 2022, and as such moved up the timeframe of the egg mass surveys. This monitoring is typically conducted in the Fall, once leaves have dropped from the trees making the identification of LDD egg masses easier.

In September 2021, the City engaged Lallemand Inc. /BioForest as consultants to help further evaluate the levels of LDD in the City. Monitoring locations were selected based on staff monitoring and public reporting, including the following:

- Defoliation monitoring surveys undertaken by city staff in June/July 2021;
- Areas historically known to have high LDD populations;
- Observations reported through the city's Public Reporting Form, and
- An examination of all Service Requests received from the public related to LDD.

A standardized protocol is employed whereby a trained observer examines the trunk of certain host trees within the survey area and records the size, number and condition (new vs. old) of LDD egg masses. From this, the population of LDD in survey areas is determined and the associated level of predicted defoliation for 2022 is derived.

A selection of 50 parks and 75 1km x 1km street tree grids were surveyed in 2021; this represents an increase of 51% and 39% in the number of parks and grids surveyed from 2020 respectively.

LDD Egg Mass Survey Results

The egg mass monitoring results indicated below are based on a review of the data provided by the consultant Lallemand Inc./BioForest. From these data, predictions of the future 2022 population and defoliation potential were developed.

Risks to tree health are related to the potential for defoliation. This is monitored through several factors: a count of the number of egg masses in a park or area and an analysis of egg mass sizes, with higher numbers of large egg masses indicating the most potential to support a higher LDD population and therefore defoliation.

Park Trees

The city surveyed 50 parks for LDD; the results are summarized in Table 1 below. 32 parks (64%) were determined to have high populations of LDD leading to a severe defoliation

potential. An additional 7 parks contained localized areas of severe defoliation potential, and 2 additional parks contained areas of heavy defoliation potential for 2022 that were also in areas with severe defoliation potential the previous year. Most of the egg masses encountered in the parks surveys were new (69.6%) with an average size of 25.7mm (large). This indicates a large and healthy LDD population.

Table 1: Defoliation potential in City Parks

Defoliation Potential	Number of Parks	% of Parks
SEVERE	32	64%
HEAVY	1	2%
MODERATE	10	20%
LIGHT	5	10%
NIL	2	4%

Street Trees

A total of 75 1km x 1km grid square areas were surveyed this year in response to the widespread observation of LDD in the spring/summer of 2021. The results are summarized in the Table 2 below. 15 of the 75 grids (20%) were identified as having potential for severe defoliation. An additional 10 grid squares contained localized areas of severe defoliation potential, and 3 additional grids contained areas with heavy defoliation potential which had a severe defoliation potential in 2021. 71.3% of the egg masses encountered on the street tree surveys were large egg masses, with an average size of 29.7mm. This indicates a large and healthy LDD population.

Table 2: Defoliation potential in City Parks

Defoliation Potential	Number of Grids	% of Grids
SEVERE	15	20%
HEAVY	14	18.7%
MODERATE	11	14.7%
LIGHT	26	34.7%
NIL	9	12%

Summary of Results:

- These results demonstrate that certain areas of Mississauga continue to be in the midst of an LDD outbreak which started in 2017.
- The locations of parks and street tree grids where LDD is predicated to be the most severe are represented by the hashed area in map in Appendix 2, and are further described in Table 3 below. These areas are primarily associated with:
 - Parks containing woodlands along the Credit River
 - Parks containing woodlands in northwest and central Mississauga
 - Residential areas in southern Mississauga where there is high tree canopy and many of the favoured host species such as Oak.

- Population crashes have been observed in the east end of Mississauga, in Wards 3 and 1 and certain parks including Sugar Maple Woods (which was treated in 2021 and 2020).

Table 3: Summary of Most Severely Impacted Neighbourhoods and Parks Predicted for 2022 by Ward.

Ward	Aerial Spray in Parks	Aerial Spray in Residential Areas	Most severely Impacted Neighbourhoods	Most Severely Impacted Parks
1	Yes	Yes	Mineola	Mary Fix Park
2	Yes	Yes	Clarkson-Lorne Park	Benares Museum Whiteoaks Park Birchwood Park Jack Darling Park Meadowwood Park
3	Yes	Yes	Rathwood-Applewood	Applewood Hills Park Wood Creek Park Garnetwood Park Jaycee Park
4	No	No	N/A	N/A
5	Yes	No	N/A	Staghorn Woods Britannia Woods Paul Coffey Park
6	Yes	Yes	Erindale East Credit	Erindale Park Riverwood Park Deer Run Park Carolyn Creek Streetsville Cemetery
7	Yes	Yes	Erindale Cooksville	Huron Park Dr. Martin L. Dobkin Community Park Stillmeadow Park Carriage Way Park
8	Yes	Yes	Sheridan Erin Mills	South Common Sawmill Valley Trail Arbour Green Woodland Chase Trail Richard F.C. Mortensen Erindale Cosmopolitan Cemetery
9	Yes	No	N/A	Eden Woods Windrush Woods Quineppinon Meadows Community Park

Ward	Aerial Spray in Parks	Aerial Spray in Residential Areas	Most severely Impacted Neighbourhoods	Most Severely Impacted Parks
10	Yes	No	N/A	Sparling Woods Marco Muzzo Sr. Memorial Park
11	Yes	No	N/A	Meadowvale Conservation area Silver Fox Forest Credit Meadows P-388/Fletcher's Flats Hyde's Mill Hollow Pinecliffe park Erin Woods

Comments

Communication Strategy to Date

The Forestry section has conducted ongoing awareness and community outreach/education regarding LDD. Communications with residents continues to be a priority.

Efforts have focused on educating the public regarding impacts of these pests, prevention and mitigation options for private property as well as actions being taken for City property. Additionally, the City created an online public reporting tool and map allowing residents to submit their observations of LDD to help improve our awareness of local neighbourhood conditions and which will help in forecasting of the 2022 LDD population. Similarly, the City created a new interactive treatment map where residents were able to quickly and easily pinpoint the location of any trees being treated in the 2021 treatment program.

Typically, annual communication includes resident brochures mailed to affected neighbourhoods, Councillor Newsletters, responding to resident inquiries, updates to the Forestry web page and posts to social media channels. For an aerial spray program, the scope of the communications will need to be increased to ensure all residents in the affected area are informed.

Communication Next Steps

Once the course of action and impacted aerial spray targeted areas are confirmed for 2022, Forestry and Communications will work together to complete the key messages and communication plan. Staff will engage and inform residents about the City's approach to manage LDD populations throughout the year; including targeted communications before, during and after any potential aerial sprays. Approval of funding to conduct a 2022 aerial spray program and include private property in the severely impacted areas will trigger targeted communication with residents.

Other Municipalities and Conservation Authorities

The City's Forestry Section is working with neighbouring Municipalities and Conservation Authorities in Peel and the Greater Golden Horseshoe (GGH) area who have also experienced similarly high levels of pest infestations this past year. These partners are working together to share information and also collaborate on potential management programs, including aerial spray for 2022.

A listing of neighbouring municipalities and conservation authority partners is included in Appendix 3. This list describes whether aerial spraying is a component of their LDD programs and indicates that Mississauga is one of a handful of municipalities that includes aerial spraying within residential areas into its programming.

To date we are not aware of any municipal partners who have confirmed an aerial spray will be undertaken in 2022, although several are exploring the possibility and are awaiting further monitoring work and/or council direction.

Aerial Spray Efficacy

Aerial Spraying for LDD does not eliminate the population over the landscape in the long term, but aims to reduce defoliation experienced in targeted areas to reduce impacts on tree health and vigour while maintaining aesthetics during the current year. Aerial sprays are used as a mechanism to provide annual control until such a time as the natural controls for LDD (the fungus (*Entomophaga maimaiga*) and virus (nucleopolyhedrosis or NPV) contribute to a larger, population level collapse.

LDD Cycle

In natural forested areas the LDD population is known to be cyclical with outbreaks occurring every 7 – 10 years and lasting between 2 and 4 years.

As this species is well established in Mississauga, even after a population collapse there is still a low-level residual LDD population scattered across the city.

In urban areas like Mississauga, where populations of LDD are often isolated from one another, our monitoring shows that although the overall cyclical trend is still observed, the LDD population in some pockets of the city may be out of step with each other. This leads to localized hot spots or population collapses that may not be consistent across the city.

To address this, Forestry is looking to incorporate smaller annual aerial sprays where necessary to provide the most effective treatment to reduce populations locally before they reach outbreak levels.

Btk and Human/Environmental Health Safety

The compound used in an aerial spray program is called *Bacillus thuringiensis* subspecies *kurstaki*, commonly referred to as Btk. It is a rod-shaped bacterium that occurs naturally in soils worldwide and is cultured specifically for pesticide use.

Health Canada's Pest Management Regulatory Agency (PMRA) is responsible for ensuring human health and environmental safety of all pest control products prior to their approval for use in Canada. Manufactures of products must provide the agency with a full analysis of the products formulation, as well as extensive health and environmental data so that the agency can do an extensive risk assessment on the product. Only products that are reviewed and found to be effective and safe for use with little to no risk to human health and the environment are then registered for use.

Environmental and health monitoring is done by the federal government scientists after spray programs to evaluate any possible effects on humans or the environment. Even after many years of widespread use of Btk in forestry, agriculture and urban settings, no public health problems have been identified or any significant environmental concerns arose. In fact, strains have been used by both organic and non-organic farmers through the world in many countries. Btk is one of the few pesticides acceptable to organic growers, as it is a naturally occurring biological organism, rather than a synthetic chemical. The product does not survive in warm blooded organisms or in residues on food passed through the digestive system without any effect.

According to Health Canada, Btk is only toxic in the caterpillar stage of the LDD life cycle. When Btk is ingested by the caterpillars, their alkaline gut pH triggers the bacteria to release an endotoxin that is lethal to the insect. The caterpillar must ingest Btk for it to be effective. However, because aerial sprays of Btk are non-selective they can impact non-target caterpillars, which are an important source of food for many birds and other wildlife.

One example is the Mottled Duskywing (*Erynnis martialis*), a medium-sized butterfly that is listed as Endangered under the Ontario Endangered Species Act (ESA). Since the recovery of this species threatened by aerial sprays for LDD, permitting is required under the ESA and may not be attainable. The city of Mississauga will continue to work with Ministry of Environment, Conservation and Parks staff as well as local Conservation Authorities to identify any potential conflicts where species at risk such as the Mottled Duskywing may be present prior to selecting areas for aerial application of Btk.

Btk does not affect adult moths and butterflies (Lepidopterans), including the Monarch Butterfly, which are not in the caterpillar stage at this time that Btk is applied for LDD.

Btk does not affect other insects, fish, birds or mammals. There is also no impact on animals or pets if they are exposed to or ingest Btk.

Proposed 2022 IPM:**Aerial Spray Treatment**

An aerial spray in 2022 is recommended for:

1. Areas proposed to be severely defoliated by LDD in 2022 and,
2. Areas proposed to be heavily defoliated by LDD in 2022 and severely defoliated in 2021.

These areas are shown in Appendix 2 and cover approximately 3322 hectares (8209 acres) of the city. This area represents a generalized boundary determined through the egg mass monitoring. The proposed spray area will be refined based on additional analysis work over the winter to determine a final spray boundary. Generally speaking, the areas identified in Appendix 2 overestimate the actual area proposed for spray given that: some areas are comprised of hard surfaces such as parking lots, or other land uses that are incompatible for a spray (e.g. Sports fields, non-treed areas etc.). Based on an analysis of previous aerial sprays, anywhere between 20% – 35% of the area may not require spraying reducing the actual spray area to between 2160ha - 2658ha (5337 acres – 6568 acres).

The estimated cost for contracting aerial spraying services for 2658 ha (6568 acres) is approximately \$2,658,000. In addition to the spray costs, there are additional related which support the aerial spray including public notices, security and safety, traffic control and road closures, etc.

The proposed aerial spray in 2022 includes both public and private lands similar to the successful spray programs run in 2006/2007 and 2018. 55% of the potential spray area is estimated to be private property (see table 4 below). The estimated cost of spraying private properties is approximately \$1,461,900. Within this area there are approximately 12,500 residential properties and business.

Table 4: 2022 Proposed Aerial Spray Area Ownership

Category	Hectares of Land (acres of land)	Break Down	Approximate Cost
Privately Owned Lands	1461.9 ha (3612.4 ac)	55%	\$ 1,461,900
Publically Owned Lands	1196.1 ha (2955.6 ac)	45%	\$ 1,196,100
Total	2658h ha (6568 ac)	100%	\$2,658,000

Ground Based Treatments

Where an aerial spray application is not advantageous, ground based treatments including tree injections and ground sprays of Btk may be recommended to control localized LDD infestations. For example, the treatment of selected high-value specimen trees outside of the aerial spray area that have a severe potential for defoliation. Where it has been determined that ground based treatments are an effective method of treatment, funding will be used to support this. City Forestry will continue to survey areas throughout the winter to identify opportunities for ground based treatment, where appropriate.

Supporting Additional IPM on Private Property

The IPM program will include a considerable public awareness and education component in 2022. To augment and support residents in the control of LDD on private property, the city will source and provide a limited amount of IPM materials for the public in each affected ward. Typically these materials are in short supply at the time when they are most needed; the city will endeavour to procure materials such as burlap, tree bands and pheromone monitoring traps as early as possible to have them available for the public.

Summary

The \$3 million dollar budget includes all costs that may be incurred as part of the program including aerial spraying, consulting, road and highway closures costs, policing, communications, signage, post spray monitoring, additional ground spray treatments and other equipment and supplies related to LDD IPM such items as tree bands, burlap, egg mass scraping supplies and pheromone monitoring traps.

In early 2022 a Report will be brought forward which will include confirmed aerial spray boundaries, specific routes and final costing.

Future Direction for IPM Program

The city has identified in its capital planning \$600,000 every other year for enhanced treatment of LDD. This will allow for greater flexibility in the City's response to LDD by allowing for smaller-scale aerial spray applications to localized hot spots that may pop up from time to time.

Strategic Plan

The Green Pillar for Change within the Strategic Plan identifies the need to conserve, enhance and connect natural environments in the City of Mississauga.

Financial Impact

The proposed 2022 LDD IPM will require \$3 million in gross funding. Funds are requested in the 2022 capital plan pending council approval.

The City is working with surrounding Peel and GGH municipalities who also encountered a high LDD population in 2021 as well. We will continue to work with these municipalities to identify opportunities for joint programming to identify any cost savings. Currently, some surrounding Municipalities have indicated strong interest in an aerial spray program but none have yet been confirmed through their Council.

Conclusion

Based on egg mass monitoring data, the 2021 LDD population is strong and projected to cause significant defoliation in specific areas of Mississauga in 2022. The integrated pest management program for 2022 recommends an aerial spray component in targeted areas with the most severe projections of defoliation combined with other IPM management techniques in areas where an aerial spray is not appropriate and/or in areas of lower defoliation predictions.

The use of Btk in an aerial spray is safe from a human and environmental perspective as governed by PMRA. To ensure the protection of city owned trees as well as privately owned trees comprising the city's urban forest, a 2022 aerial spray program is recommended.

\$3.0 million in gross funding to cover communication, security, permits, and contractor costs is required to proceed with detailed project planning, communication plan and procurement. A sole source contract award to Zimmer Air Services Inc. for a 2022 spray program is recommended so staff can proceed with detailed plans and continue to work with GGH municipalities and conservation authority partners on a collaborative program to ensure the most cost effective approach. To date we are not aware of any municipal partners who have confirmed an aerial spray will be undertaken in 2022, although several are exploring the possibility and are awaiting further monitoring work and/or council direction.

A sole source contract award to Lallemand Inc. /BioForest for the provision of aerial spray advisory services is also recommended so that staff can ensure that the aerial spray is timed and implemented according to the best scientific methods, and assessed for effectiveness.

The plan is in place to carry out an Integrated Pest Management program for LDD in 2022 which includes an aerial spray component. There is however a limited window of opportunity to engage with the necessary service providers to ensure their capacity to deliver on the recommended programming for the City of Mississauga. Once direction is received on this report, staff will ensure that the necessary procurements are in place to achieve the program objectives.

In early 2022 a Report will be brought forward which will include confirmed aerial spray boundaries, specific routes and final costing.

Attachments

- Appendix 1: 2021 Areas of LDD Defoliation in Ontario
- Appendix 2: 2022 Proposed Severe Defoliation Boundary
- Appendix 3: Municipal and Conservation Authority Aerial Spray Programs
- Appendix 4: Statement of Work (SOW) for LDD Aerial Spray
- Appendix 5: Statement of Work (SOW) for LDD Aerial Spray Advisory Services



Jodi Robillos, Acting Commissioner of Community Services

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