



SUBJECT: RPF 35-20 Gypsy Moth Budget Request

TO: Environment, Infrastructure & Community Services Cttee.

FROM: Roads, Parks and Forestry Department

Report Number: RPF-35-20

Wards Affected: Ward 1, Ward 3 and Ward 6

File Numbers: 820-03

Date to Committee: November 9, 2020

Date to Council: November 23, 2020

Recommendation:

Approve the aerial application of Foray 48B with active ingredient *Bacillus thuringiensis* 'Kurstaki' ("Btk") to 108 hectares of City and Conservation Halton land as detailed in roads, parks and forestry department report RPF-28-20 at a cost of \$140,150 funded from the Tax Rate Stabilization Reserve Fund; and

Approve the single source procurement for the aerial application of the biological pesticide *Bacillus thuringiensis* 'Kurstaki' ("Btk") to Zimmer Air Services Ltd, based on the technical nature of the work and specialized equipment required.

PURPOSE:

The purpose of this report is to provide an update to Council as to the status of the current Gypsy Moth infestation across the City. In addition, this report will provide recommendations for control of the pest based on an Integrated Pest Management Approach and provide detail to some of the operational challenges related to the application of Foray 48B with active ingredient *Bacillus thuringiensis* 'Kurstaki' ("Btk") over urban areas.

Vision to Focus Alignment:

- Support sustainable infrastructure and a resilient environment
 - Building more citizen engagement, community health and culture
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Background and Discussion:

Gypsy Moth (*Lymantria dispar dispar*) is a non-native invasive species that was introduced to North America around 1869. Gypsy moth was first discovered in Ontario on Wolfe Island around 1969. Since that time, Gypsy moth has continued to have a cyclical impact with high populations occurring approximately every 10 years. It is a tree defoliator; most damaging in its larval (caterpillar) stage. A full-grown caterpillar can ingest up to 1 m² of foliage per day and in one season, a Gypsy moth infestation can defoliate a mature oak tree.

In 2008, the City of Burlington implemented an aerial spray program to treat five parks and one golf course for Gypsy Moth. In the six Burlington blocks, a total of 89.4 ha were treated with two applications of Foray 48B with an active ingredient: *Bacillus thuringiensis* var. *kurstaki* (Btk). At that time Zimmer Air Services was hired to conduct the aerial application of Btk. Follow up analysis indicated that the program was effective at achieving program goals.

City staff have been monitoring the cyclical increase in Gypsy Moth populations annually since 2017. In 2018, in addition to an egg mass survey program, staff engaged a contractor to ground spray significant trees at Mountainside Park with moderate success.

In January of 2019, Forestry staff completed egg mass surveys in various pre-determined locations throughout the City. During that time, approximately 121 hectares were identified as exceeding an action threshold of 2,500 egg masses per hectare. In May and June of that year, these areas were treated with two applications of Foray 48B with active ingredient: *Bacillus thuringiensis* var. *kurstaki* (Btk). Zimmer Air Services was again hired to conduct the aerial application of Btk.

Plans to spray for the 2020 season were curtailed due to the COVID-19 pandemic. At the time of report preparation and budget request, the Emergency Order from the Province in place omitted pesticide application as an essential service. Through consultation with senior leadership, it was decided that the aerial program would not proceed in 2020.

Integrated Pest Management Approach

Using an integrated pest management approach (IPM), staff have focused on monitoring pest populations over time and determining whether populations are growing or declining and whether they are moving from one location to another. Further, action thresholds are established which identify the number of pests before requiring some mitigating action, or control. In the case of Gypsy moth, the action threshold is identified as 2,500 egg masses per hectare. When Gypsy moth populations reach or exceed this point, it is anticipated that notable defoliation will occur, which results in increased stress to trees. When cycles of defoliation occur several years in a row, nutrient stores are depleted to dangerous levels and trees will start to decline, and in some cases die.

Pesticide Use - Btk

The purpose of an integrated pest management program is to implement a control to reduce pest populations to a tolerable level if an action threshold has been exceeded, rather than eradicating them altogether. For Gypsy Moth, the most economical way to control expansive populations of Gypsy Moth is via aerial application of *Bacillus thuringiensis* 'Kurstaki' (Btk).

Btk is a bacterium that is found naturally in the soil. Btk is applied to the leaves of trees while caterpillars are in the early instar (immature) stage of development. Once ingested, the bacteria disrupt the digestive system of the caterpillars within 24-48 hours, leading to mortality shortly thereafter. In order to be effective, Btk relies on an alkaline gut environment. As a result, Btk does not impact birds, bees, people, or pets.

Btk has low residual qualities in the natural environment, persisting for a short period of time of 1 to 4 days after application, as sunlight and fungi deteriorate it, and rain washes it away. Due to the narrow window of application due to insect development stages, coupled with low-residual qualities of the product, Btk has very low impacts to other non-target species of butterflies and moths.

Strategy/process

The City's consultant has determined approximately 100 hectares of public land exceeding an action threshold of 2,500 egg masses per hectare. Forestry staff recommend the aerial application of Foray 48B to 105 hectares of public land for the control of the pest as the most cost-effective option.

LaSalle park demonstrates some numbers slightly below this action threshold, though it has been included for consideration due to the high value of the park, and existing forest pathogens (*Armillaria spp.*) that are already stressing the ecological health of the park. By targeting LaSalle, it is the goal of forestry to mitigate impact to residential ravines in the North Shore Boulevard area, and to maintain the quality of canopy and biodiversity currently present at the park.

It should be noted that at the time of report creation, consultation with Halton Region Conservation Authority (HRCA) is ongoing with respect to ‘piggybacking’ on the City’s aerial spray program. There is some interest in including additional areas owned by the HRCA within the Kilbride area, which cost would be borne solely by the HRCA. There would be no additional financial impact to the City.

Table 1 below, identifies the treatment locations in relation to ward and size of area that are proposed to be treated:

Table 1: Recommended Treatment Areas

Proposed Treatment Block	Approximate Egg Masses per Hectare	Defoliation Forecast	Area (hectares)	Affected Wards
Zimmerman Park	24, 325	Severe	6	6
City View Park	18, 214	Severe	33	1
Kerncliff Park	4, 441	Severe	33	1
LaSalle Park	2,149	Moderate	13	1
Kilbride	13, 666	Severe	4	3
HRCA Contributions (Pending)			16	3
Total Area:			105	1, 3, 6

Timing of the aerial application of Btk is based on the emergence of the Gypsy moth larvae, which is typically the last week of May to the first week of June. Pest emergence coupled with the weather dictate the exact date of application.

In order to proceed with a program of this magnitude, additional provincial and federal legislative requirements have to be met through the Ministry of Environment, Conservation and Parks for alternate notification of pesticide use, and Transport Canada for Authorization for low lying helicopters, detailed below. These applications require additional time for review and approval of a minimum of one month.

Alternate Notification of Pesticide Use

In accordance with the Ontario Pesticide Act, Ontario Regulation 63/09, a licensed exterminator is required to post signage that details the nature of the work being performed on a site. Given the large-scale nature of the application, there is a mechanism within the Act, whereby an applicant can perform an alternate notification of pesticide use. This was implemented during the 2019 spray program through a

comprehensive communications strategy which included: newspaper advertisements; letter drops to approximately 7,000 residents; website updates; and social media status updates. This application is subject to approval through the Ministry of Environment, Conservation, & Parks. There is an approximate cost increase of 10% of the total project value.

Federal Aviation Regulations

Transport Canada Aviation Regulations require a twin-engine helicopter be used for the low-altitude flight work needed to spray pesticide over urban/suburban areas. In addition to the unique qualifications required for the operation of the low-flying twin engine helicopter, there is complexity to the aerial application. Canadian Aviation Regulations requires the air operator to submit an application for Aerial Work with a detailed work plan. This application must be submitted to Transport Canada officials at least 21 days prior to initiating the operation. Upon approval, the air operator is granted Ministerial Authorization through a Special Flight Operations Certificate for Aerial Work. The pesticide must be applied between mid-May to early-June. This specialty in terms of equipment and expertise limits the applicators that are able to complete this work. Zimmer Air Services is the only known vendor that has the required skills and equipment to carry out this work in compliance with Transport Canada Aviation Regulations.

Additional Operational Considerations

The coordination of work on the ground will require additional staff from within the Roads, Parks, and Forestry department as rolling road closures are required for compliance with Transport Canada approvals. In 2019, approximately 20 staff with vehicles performed this work on 2 separate days. As this work is performed outside of regular shifts with very specific timing due to pesticide effectiveness, standby pay and overtime rates are incurred. These additional operational considerations will increase the project cost by approximately 10 percent.

In addition, a consultant is required to evaluate pest emergence rates and daily weather forecasts to determine the optimum timing for the application of the pesticide (2 different spray events). Recommendation and insight from service providers is taken into serious consideration based on their extensive experience with the pesticide and operation at hand. In addition, the consultant also performs specialized spray analysis and efficacy studies to ensure the correct amount of pesticide was applied and conducts canopy analysis within the spray sites to determine post-spray pest populations. In 2019, the City hired a consultant to do this work for a value of approximately \$25,000.00

Determining Application Date:

The final date selection for spraying requires significant analysis of both larval development of the insect and the stage of leaf growth of the trees. This will be completed through the City's consultant as detailed above. Typically work of this nature is completed over two (2) spray events, within the last week of May to the first week of June.

Options Considered

Gypsy Moth control on Private Land

The aerial application of Foray 48B on privately owned trees was considered by staff. In some cases, predominantly in rural environments, this approach is appropriate given the vicinity of adjacent woodlands that would otherwise harbor gypsy moth populations if left untreated. This is the case in Kilbride, where the City is actively engaged in discussions with Halton Region Conservation Authority with the possibility of spraying additional HRCA lands at their cost. There would be no additional costs incurred by the City.

In urban and semi-urban areas, it is less cost effective to apply the same control method given the amount of hard surface present and lack of foliage generally. To that end, it is not recommended by staff to proceed with an aerial application on private lands within urban and semi-urban areas.

Do Nothing Approach

Monitoring data indicates that the population has grown since 2019, by comparing new and old egg masses, as well as relative egg mass size. Since no controls were applied in the 2020 season, population size did increase (as did the amount of defoliation).

Gypsy moth populations are known to be cyclical, reaching a peak infestation of approximately every 10 years. As a result, it is estimated that the City is in year 4-5 of the cycle (nearing, or at peak infestation), suggesting that the population is in a growth phase. Without implementing a control program, it is anticipated that the insect population will continue to grow, trees will undergo a subsequent season of defoliation and there is a higher likelihood to partial or whole tree mortality.

Financial Matters:

The total cost of the spray program is estimated at approximately \$140,150. Refer to Table 2 – Gypsy Moth Financial Summary below:

Description	Option 1 with Conservation Halton Lands	Option 2 Without Conservation Halton Lands
Gypsy Moth Aerial Spray (\$1,000/ha)	\$105,000	\$89,000
Post Spray Efficacy Study (lump sum)	\$25,000	\$25,000
Operational Costs (10% of project value)	\$10,500	\$8,900
Communications (~5% of project value)	\$5,000	\$4,500
Subtotal:	\$145,500	\$127,400
Contingency (~10%)	\$14,500	\$12,750
Subtotal:	\$160,000	\$140,150
Conservation Halton Recovery	\$24,380	N/A
Total	\$135,620	\$140,150

Total Financial Impact

Total Project costs are estimated at \$140,150. The program will take place between late May and early June. The program will be completed by the end of June.

Source of Funding

This program will be funded through the tax rate stabilization and reserve fund.

Other Resource Impacts

Estimated staffing and equipment costs have been identified in the table above.

Climate Implications

Trees provide one of the most cost-effective measure of carbon sequestration, in addition to providing a host of other ecological benefits associated with climate change. It is recommended that action be taken to control pest populations that are known tree defoliators, with the potential to cause long-term impacts to the urban forest via partial or whole tree mortality if left unmanaged.

Engagement Matters:

In an effort to manage Gypsy moth and to maximize the valuable impact of this program on the areas of the Niagara Escarpment within municipal borders, Forestry staff has been collaborating with the City of Hamilton, Hamilton Conservation Authority, Royal Botanical Gardens, Conservation Halton, and the Cootes to Escarpment Ecopark System. This collaboration is a demonstration to other municipalities at Burlington's commitment to maintaining its urban canopy and demonstrates to residents the commitment to the Vision to Focus goals of sustainable infrastructure and resilient environment.

Conclusion:

The adoption of the proposed plan to control Gypsy Moth populations in accordance with IPM principles, will help to alleviate some significant stresses on urban trees which are already subjected to very harsh growing conditions. By implementing a program of this scale, it is expected there will be less decline and tree mortality from this damaging forest defoliator.

Respectfully submitted,



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Appendices:

A. Sprayblock Maps Package

Notifications:

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Report Approval:

All reports are reviewed and/or approved by Department Director, the Chief Financial Officer and the Executive Director of Legal Services & Corporation Counsel.